Wastewater System Facility Plan

Technical Draft

City of Troy

December 2023

519 S Main St
Troy, ID 83871

Mountain WATERWORKS
A Part of Merrick & Company

1410 N Hilton Street
Boise, ID 83706 • (208) 373-0502

Brad Little, Governor
Jess Byrne, Director

December 27, 2023

By email: dhowecityoftroy@gmail.com

Dale Howe
519 S. Main Street
Troy, Idaho, 83871

Subject: Technical Draft Approval – City of Troy Wastewater System Facility Plan; DEQ Grant # WWG-392-2018-2

Dear Dale Howe:

The Idaho Department of Environmental Quality (DEQ) received a technical draft facility plan entitled *City of Troy Wastewater System Facility Plan (Technical Draft)* submitted to DEQ on December 27, 2023. The Technical Draft was sealed and signed by Stuart Robb Hurley, PE on December 27, 2023. The planning effort is being partially funded by DEQ planning grant #WWG-392-2018-2. DEQ has reviewed the Technical Draft for general conformance with DEQ Rules[1] and determined it is approved.

Prior to completion and submission of the final facility plan, the state environmental review process (SERP) and public involvement must be completed. Detailed information regarding these processes can be found within DEQ Grant and Loan Customer Handbook located at www.deq.idaho.gov/SRF. The process is generally summarized by the following steps:

A. You must schedule an environmental scoping meeting with DEQ for the purpose of obtaining an environmental determination for the project. Please contact LaDonn Kaylor at (208) 373-0556 or ladonn.kaylor@deq.idaho.gov to initiate this process.
B. You must conduct a minimum 14 day public comment period regarding the Technical Draft and at least one (1) public meeting during the comment period. The purpose of the comment period and meeting is for the public to review and comment on the recommended alternatives presented in the Technical Draft. Please note that public comment period is subject to limited English proficiency (LEP) population guidelines.

Once above items have been completed, you will need to submit the final facility plan to DEQ for review and approval. The final facility plans shall include the SERP determination, address the results from the comment period, and present the formally selected alternative.

[1] IDAPA 58.01.16 - Wastewater Rules, IDAPA 58.01.22 – Rules for Administration of Planning Grants for Drinking Water and Wastewater Facilities

If you have any questions or comments, please contact me at (208) 373-0331 or David.Weeks@deq.idaho.gov.

Regards,

David Weeks, EIT

Water Quality Engineer

EDMS 2023AGD8642

ec: Stuart Hurley, PE, Mountain Waterworks, Merrick and Company (stuart.hurley@merrick.com)
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WASTEWATER SYSTEM FACILITY PLAN

Technical Draft

December 2023

Principal Engineer

Engineer of Record

Prepared on Behalf of
City of Troy
519 S Main St
Troy, ID 83871

Prepared by
Mountain Waterworks, Inc.
A Part of Merrick & Company
504 Main St, STE 310
Lewiston, ID 83501

Acronyms & Abbreviations

AC	asbestos cement
ACS	American Community Survey
BNR	Biological Nutrient Removed
BOD5	biochemical oxygen demand
C	Celsius
CCTV	closed circuit television
CDBG	Community Development Block Grant
City	City of Troy, Idaho
DI	ductile iron
DIN	dissolved inorganic nitrogen
DMR	discharge monitoring report
ECHO	Enforcement and Compliance History Online
EPA	Environmental Protection Agency
EU	equivalent user
FEMA	Federal Emergency Management Agency
FIRM	flood insurance rate map
FY24	fiscal year 2024
GIS	geographic information system
gpcd	gallons per capita per day
gpd	gallons per day
HDPE	high-density polyethylene
hp	horsepower
HRT	hydraulic retention time
HUD	Housing and Urban Development

IDEQ	Idaho Department of Environmental Quality
IDM	inch-diameter mile
IDOC	Idaho Department of Commerce
IPDES	Idaho Pollutant Discharge Elimination System
I/I	inflow and infiltration
IPaC	Information for Planning and Conservation
IUP	Intended Use Plan
L	liter
LIF	Leading Idaho Funds
LMI	low to moderate income
LOI	Letter of Interest
mg	milligram
MG	million gallon
MHI	medium household income
MLSS	mixed liquor suspended solids
NFIP	National Flood Insurance Program
NH3	ammonia
O&M	operation and maintenance
OP	orthophosphate
PF	principal forgiveness
PLC	programmable logic controller
PVC	polyvinyl chloride
SHPO	State Historic Preservation Office
SRF	State Revolving Fund
TIN	total inorganic nitrogen

TKN	total kjeldahl nitrogen
TMDL	Total Maximum Daily Load
TN	total nitrogen
TP	total phosphorus
TSS	total suspended solids
US	United States
USACE	United States Army Corps of Engineers
USDA-RD	United States Department of Agriculture-Rural Development
USFWS	United States Fish and Wildlife Service
WEP	Water and Environmental Program
WFLBC	West Fork Little Bear Creek
WRRF	Water Resource Recovery Facility
WWFP	Wastewater Facility Plan

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Section 1 INTRODUCTION

The City of Troy, Idaho (City) owns and operates a municipal wastewater collection and treatment system to serve residents within City limits. The collection system consists of a mixture of concrete, asbestos cement (AC), ductile iron (DI), and polyvinyl chloride (PVC) pipe, and conveys raw wastewater by gravity from the community to the Water Resource Recovery Facility (WRRF). The WRRF is a hybrid lightly aerated quasi-lagoon facility equipped with secondary clarification and the capability to recycle or waste settled sludge from the treatment process. Disinfection is provided using sodium hypochlorite and a serpentine chlorine contact basin followed by dechlorination using calcium thiosulfate prior to surface water discharge to Little Bear Creek.

The WRRF currently operates under an Idaho Pollutant Discharge Elimination System (IPDES) permit (No. ID0023604) that was issued on July 1, 2022, and expires on July 31, 2027. A wastewater facility plan was prepared and technically approved for public comment by the Idaho Department of Environmental Quality (IDEQ) in 2019 (see **Appendix A**). When the 2019 wastewater facility plan was completed, the date for issuing a new IPDES permit was not established, and there was significant uncertainty on the potential stringency of future effluent limitations. Therefore, the planning effort was halted. Now that the IPDES permit is available, this 2023 facility plan document will replace the 2019 facility plan to include the updated permit requirements and associated near and long-term improvement alternatives necessary for the community.

1.1 Purpose

This Facility Plan has been developed as a 20-year planning document to:

- Provide documentation and analysis of existing wastewater collection and treatment infrastructure;
- Evaluate the condition and performance of existing facilities and identify deficiencies;
- Evaluate current and projected wastewater flows and nutrient loads related to community population growth;
- Analyze existing discharge permit limits and provide estimates of future permit limits;
- Develop alternatives to improve the condition and performance of existing collection and treatment infrastructure to meet current and anticipated future state and federal regulations;
- Identify logical options for the City to pursue in response to IPDES permit limitation uncertainty, and,
- Provide recommended improvement alternatives, estimated project costs, options for project funding, and estimated impact on customer sewer rates.

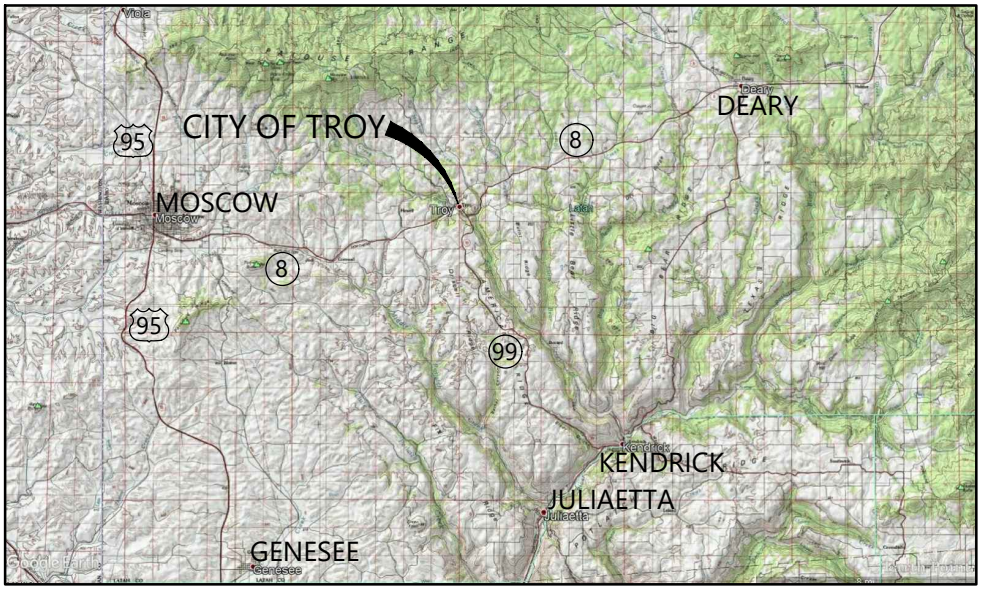
It is anticipated an IDEQ review and approval will be required for:

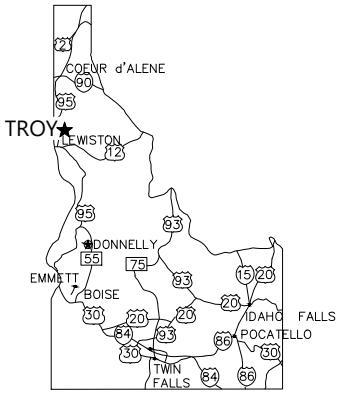
- 2023 Wastewater Facility Plan (this document)
- 2023 Wastewater Facility Plan Environmental Information Document (EID)

Future IDEQ deliverables for City selected improvements will include a preliminary engineering report(s), design drawings, and specifications.

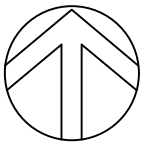
1.2 Location

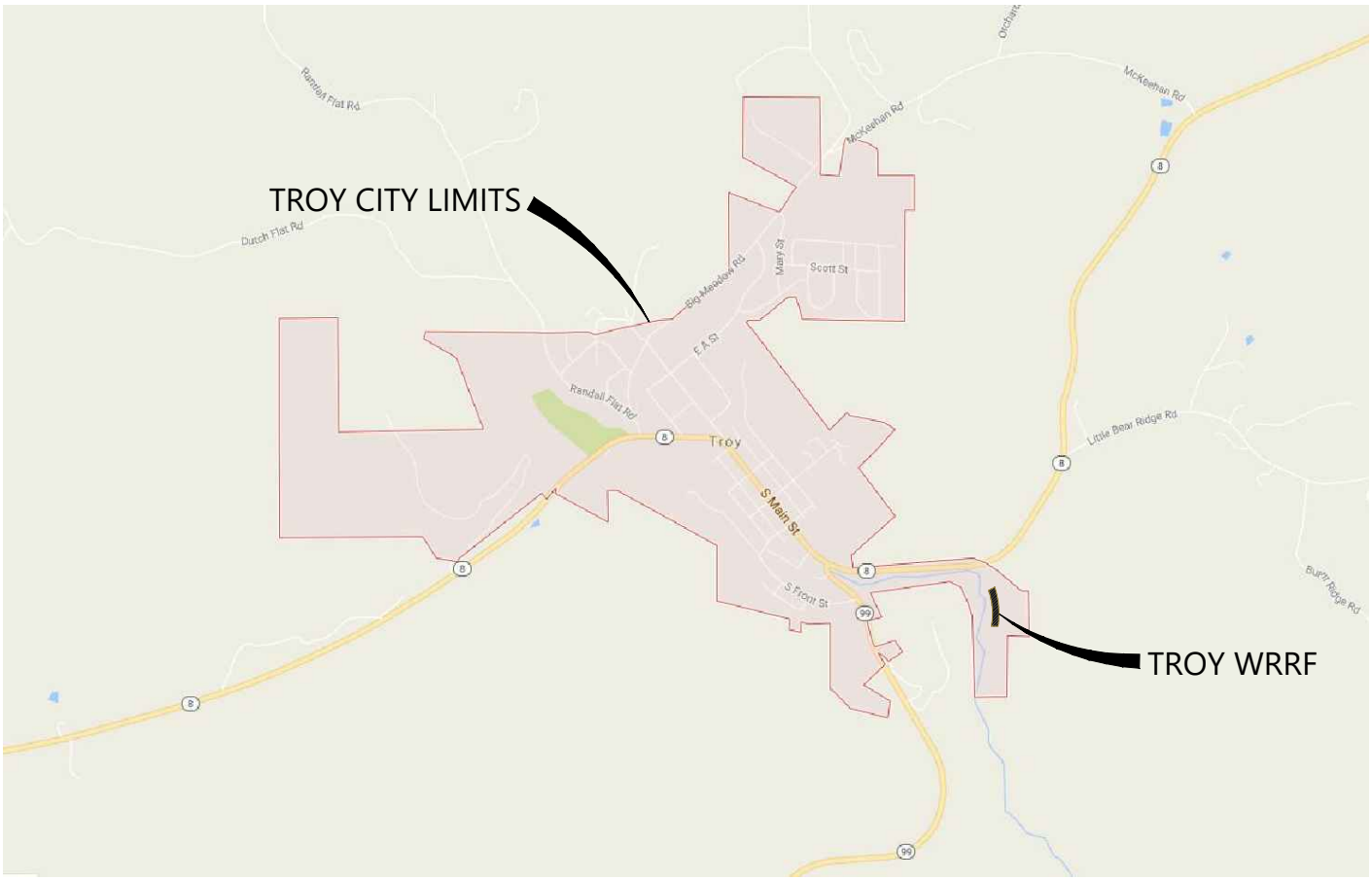
Troy is located in Latah County, Idaho, at the intersection of State Highways 8 and 99 (**Figure 1-1**). The nearest communities are Moscow located 10 miles west, Deary located 11 miles east, and Kendrick located 10 miles south. Troy is in the northwest portions of Sections 6 and 7, Township 39N, Range 3W, and Section 12, Township 19N, Range 4W, on the Boise Meridian.





LOCATION MAP





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CITY OF TROY	PROJECT NO.: 170.0020.01
VICINITY MAP	SHEET NO. FIGURE 1-1

Section 2 EXISTING CONDITIONS

2.1 Planning Area and Land Use

The wastewater collection and treatment systems are located within City limits and all City residents and businesses are required to connect to the collection system. The municipal boundary defines both the customer service and planning area, as shown in **Figure 1-1.** Land use in the planning area consists primarily of low-density residential and light commercial development, parks, and open space. Industrial development is limited to a small sawmill on the eastern side of the City.

2.2 Sewer Use Ordinances and User Rates

The City of Troy has adopted sewer use and user charge ordinances (**Appendix B**) which set fees for sanitary sewer connection and service. City code (Section 7-6-6) indicates user rates are set based on an evaluation of equivalent users (EUs), with one EU being equal to the sewage flow generated by a typical single-family residence. All residential customers and businesses, except the school district, are billed a flat rate of $61.00 per month. The school district is billed a flat rate of $1,224.58. per month (approximately 27 EUs).

A list of businesses billed at the flat rate includes the following:

BD's Troy Tavern	Strom Electric	Razors Edge
The Devil's Toboggan	Troy Market	Umpqua Bank
The Dog House	Idaho Cedar Sales	The Filling Station
Troy Motors	The Sunset Mart	Michaels Enterprises Inc.
Alley Cuts	Troy Clinic	

Under the current billing structure, the wastewater system has 385 flat rate connections in addition to the school district, for a total of 386 connections or approximately 413 EUs.

2.3 Operating Budget

The City's operating budget is typically net positive, as shown in **Table 2-1.** It should be noted that, unlike most similarly-sized Idaho municipalities, Troy is collecting enough revenue to offset asset depreciation costs. These funds are then earmarked for replacement or upgrades of wastewater system infrastructure. The City's primary source of revenue is from sewer service fees. The City had been making annual payments of $17,510 to pay off a sewer bond until 2017 when the bond was paid in full. At the end of the 2021 fiscal year, the City's Wastewater Fund had a net positive position of $1,283,810 (total assets – total liabilities). Of that amount, $24,992 was in unrestricted assets (primarily cash), with an additional $779,482 in cash restricted for wastewater system improvements.

Table 2-1: City of Troy Wastewater Fund Financial Summary

Wastewater Fund	2019	2020	2021
Operating Revenues			
Charges for Services	$ 221,744	$ 241,636	$ 260,563
Total Operating Revenues	**$ 221,744**	**$ 241,636**	**$ 260,563**
Operating Expenses			
Treatment	$ 15,470	$ 19,971	$ 16,574
Salaries, Benefits, Taxes	$ 100,298	$ 112,756	$ 120,311
General and Administrative	$ 41,389	$ 31,236	$ 41,779
Collections System	$ 14,678	$ 19,285	$ 4,142
Pension Plan Expense	$ 6,103	$ 6,825	$ (12,488)
Total Operating Expenses	**$ 177,938**	**$ 190,073**	**$ 170,318**
Operating Income (Loss)	**$ 43,806**	**$ 51,563**	**$ 90,245**
Non-Operating Revenues (Expenses)			
Interest Earned	$ 6,126	$ 6,621	$ 1,534
Interest Expense	$ -	$ -	$ -
Transfer (to)/from Other Funds	$ 17,199	$ -	$ -
Depreciation	$ (64,920)	$ (62,512)	$ (57,965)
Total Non-Operating Revenues (Expenses)	**$ (41,595)**	**$ (55,891)**	**$ (56,431)**
Net Gain (Loss)	**$ 2,211**	**$ (4,328)**	**$ 33,814**

Note:
1. Based on fiscal audits by Anderson Brother's CPA's, P.A. and Presnell Gage, PLLC

2.4 Wastewater Influent Flow

The City's wastewater system primarily serves single family residential, commercial, and light industrial customers, with the largest individual sewer users being the Troy Elementary School and Troy Junior/Senior High School. For this type of service area, all wastewater is expected to be typical low to medium strength municipal wastewater. The system is not known to treat any high-strength wastewater from industrial activities or septage haulers.

2.4.1 Wastewater Flow Measurement

Influent flow measurement is not available. Wastewater effluent flow is measured at the outlet of the chlorine contact basin using a Plasti-fab 1-foot H-flume and an ISCO 4230 bubbler flow meter/data recorder installed as part of the treatment plant upgrade in 1991. The WRRF does not have influent flow measurement equipment or instrumentation. Wastewater effluent flow data dating to May 2013 was obtained from the Environmental Protection Agency's (EPA) Enforcement and Compliance History Online (ECHO) discharge monitoring report (DMR) database and reviewed to develop estimates of current wastewater flows and to identify trends over time. Average flow and maximum daily flow data between May 2013 and May 2019 are presented in **Figure 2-1**.

Prior to mid-2014 there was noticeable month to month variability in both average and maximum flows, and there was typically a large difference between average and maximum flows. After mid-2014 variability in both average and maximum flows decreased and there was little difference between average and maximum monthly flows. The sudden change in the nature of the data indicates the flow measurement instrumentation was likely reading incorrectly, potentially due to malfunctioning or uncalibrated equipment. On average, flow measurements for the post-August 2014 data are about half those of the pre-August 2014 data.

During a February 2018 site visit by Mountain Waterworks, it was observed the ISCO 4230 controller was set to calculate flow using a V-notch weir equation instead of an H-flume equation. Changing the flow meter settings to calculate flow using the H-flume equation caused the measured flow value to double, which is reflected by the higher values for February and March 2018 in **Figure 2-1.** The monthly average measurements for these months are likely closer to the actual values.

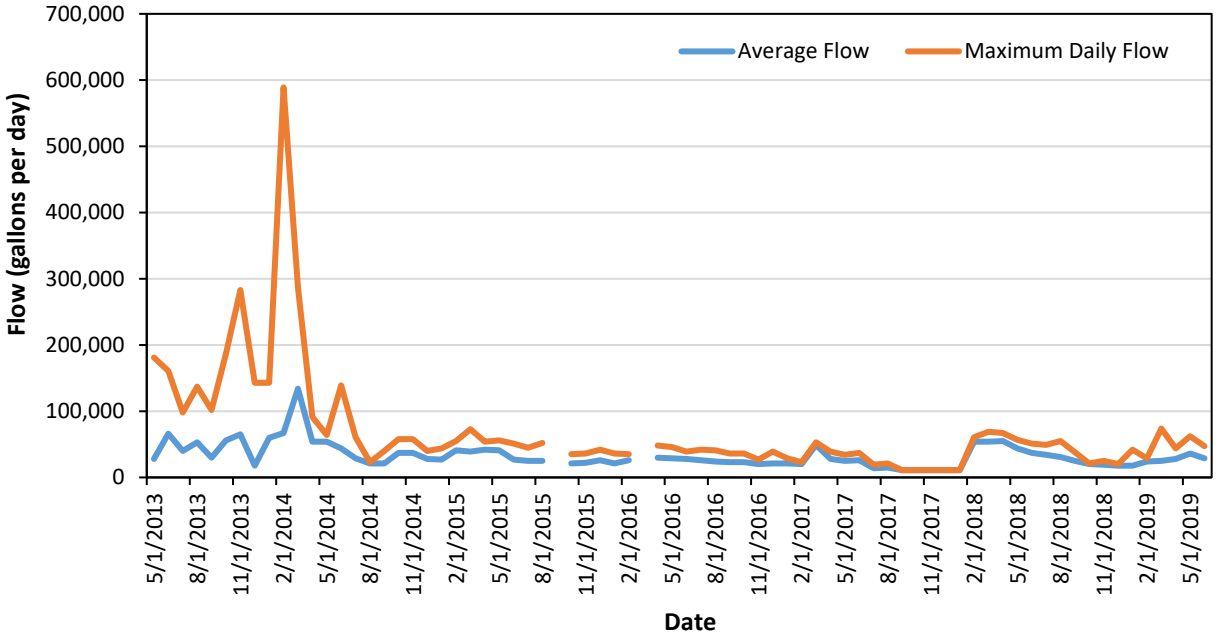

Figure 2-1: 2013 - 2019 Wastewater Flow

Given the error observed in flow meter settings, it seems apparent the last six years of ECHO flow data, at a minimum, are not likely representative of the actual influent flows and it is necessary to utilize other methods to estimate current wastewater flows to develop flow and loading design values. The following sources and references were used in developing flow estimates:

- 2003 Troy Wastewater Facility Plan
- May 2013 – July 2014 ECHO flow data
- 2017 Troy Water System Facility Plan
- Metcalf and Eddy, Wastewater Engineering: Treatment and reuse. Fifth ed.

The City currently serves six fewer connections than it did in 2000 (386 vs. 392) and there have not been extensive repairs to the collection system to reduce infiltration and inflow since the last facility plan was completed (2003). Consequently, flow data from the 2003 Facility Plan should be reasonably representative of current flows. In addition, the 2013 – 2014 ECHO data was compared to 2003 Wastewater Facility Plan data to determine if the recent data was similar and possibly reliable. Flow data from the 2003 Facility Plan and the 2013 – 2014 ECHO data are shown in **Figure 2-2.** Average daily wastewater flows during the 2013 – 2014 period appear to be about 20,000 to 50,000 gpd lower than those reported in the 2003 Facility Plan. Although there appears to be somewhat of a correlation between the sets of data, there is no consistent differential value upon which to have confidence.

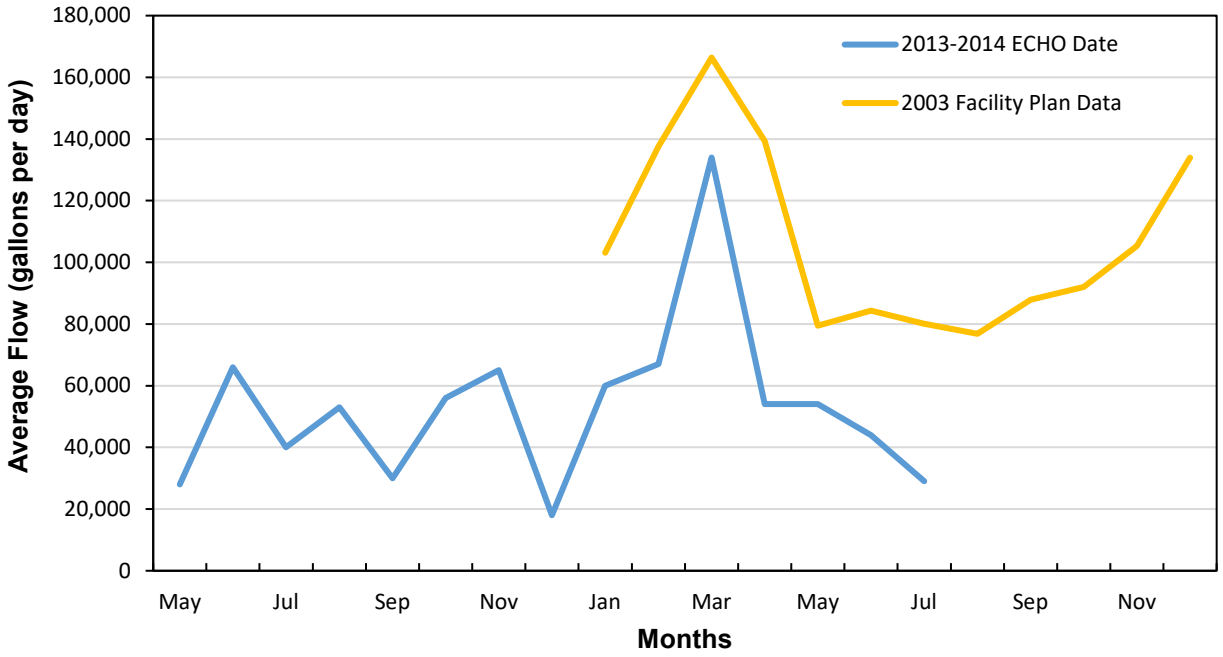

Figure 2-2: 2003 Facility Plan Flow Data Compared to 2013 - 2014 ECHO Flow Data

In general, average summer wastewater flows should be approximately equal to average non-irrigation season potable water demand because most of the water produced during these months is discharged to the wastewater system. Water demand data from the 2017 Troy Water Facility Plan was compared to the summer 2013 – 2014 ECHO data to determine if the ECHO data is more representative of current conditions.

The 2017 Water Facility Plan reported non-irrigation average daily water production to be approximately 60,000 – 70,000 gpd. Review of **Figure 2-2** indicates most values in the ECHO data are significantly less than non-irrigation season potable water production. Although it is possible that flows at the WRRF could be less than the amount of potable water delivered to the community, it is unusual.

The 2023 population of Troy is reported to be approximately 914 persons. Literature reports that individual contributions to a sanitary sewer system can range from 60 to 85 gallons per capita per day (gpcd), suggesting Troy's influent flow at the WRRF is 54,000 to 76,500 gallons. Therefore, 2003 Facility Plan data shown in **Figure 2-2** provides the most likely representation of current wastewater flows, matches generally acceptable residential flow data, and will be used in this Facility Plan.

2.4.2 Current Wastewater Flow Estimates

Given the above evaluative comparisons, it was decided that the 2001 flow data used to develop the 2003 Facility Plan will be used for the design flows and pollutant loads in this Facility Plan. This approach is reasonable given the lack of major development or wastewater infrastructure modifications since the 2003 Facility Plan was completed, the similarity between 2001 dry season flow data and current dry season flow estimates based on the 2017 Water Facility Plan, and the similar number of connections. Estimated current wastewater influent flows based on the 2003 Facility Plan data are summarized in **Table 2-2**.

Table 2-2: Current Wastewater Flow Estimates[1]

Parameter	Value, gpd	Value, gpm	Value, gpcd
Dry Season Flow (June-July-August)	80,440	56	89
Wet Season (March - April)	152,867	106	170
Average Day[2]	106,587	74	118
Max Month Average Day (March)	166,400	116	185
Max Day	219,000	152	243
Peak Hour[3]	426,346	296	474

Notes:

1. *Based on a population of 914.*
2. *Average is based on data from 2001 and May 2002. Flow data from May 2001 was not available.*
3. *Estimate based on peaking factor of 4 (PHD to ADD) per recommendations included in the 2004 Recommended Standards for Wastewater Facilities (10 State Standards).*

2.4.3 Inflow and Infiltration (I/I)

Inflow and infiltration (I/I) refers to the unwanted entry of surface water and groundwater into the wastewater collection system. Inflow is commonly caused by:

- Interconnections between storm sewers and the wastewater collection system
- Runoff entry through leaking manhole covers or cleanouts
- Discharging residential sump pumps into the collection system through cleanouts or drain connections

Infiltration is caused by groundwater leaking into the collection system through damaged manholes, pipes, and pipe joints. It may be associated with:

- Tree roots that have grown through joints in sewer pipes
- Improper pipe or manhole installation such as rolled gaskets or failure to seal manhole sections
- Corrosion damage caused by hydrogen sulfide formation in pipelines with low flow or flat slopes
- Age-related infrastructure degradation

In a system with an I/I problem, wastewater flow rates substantially increase during the wet season when the groundwater level is high and peak after periods of heavy rain or rapid snowmelt. Even a small collection system can have dozens of potential points of entry for I/I, making it difficult to locate and quantify where and how much I/I is entering the system.

Inflow and infiltration are undesirable because they dilute the wastewater strength and reduce the wastewater temperature, making it difficult to treat to the level required by the City's IPDES permit. During periods of high I/I, hydraulic retention time (HRT) in the treatment process is reduced and the facility is at greater risk of permit violations for biochemical oxygen demand (BOD_5) reduction, suspended solids reduction, nutrient reduction, and adequate disinfection.

Excessive I/I is commonly quantified using the following guidelines:

- **Per capita flow-based:** IDEQ defines systems with wastewater flows in excess of 120 gpcd as having excessive I/I.
- **The inch-diameter mile (IDM) method (*1*):** This method is based on the length and diameter of collection system piping. Wastewater flows greater than 1,500 gallons per day (gpd) per IDM are considered excessive.

Historically, the Troy WRRF has experienced a significant contribution to influent flows from I/I. A detailed I/I study was included in the 2003 Facility Plan, which recommended replacement of aging collection system piping to correct the problem based on flow monitoring studies and closed-circuit television (CCTV) surveys. The presence of I/I is reflected in the values for the IDM and population based I/I quantification approaches provided in **Table 2-3**; wet season flows exceed allowable amounts under both quantification methods.

Table 2-3: Infiltration/Inflow Quantification

Parameter	Wastewater Flow[1] (gpd/IDM)	Wastewater Flow[2] (gpcd, Table 2-2)
IDEQ Maximum Allowable Amount	**1,500**	**120**
Dry Season Flow (June-July-August)	1,566	89
Wet Season (March - April)	2,977	169
Annual Average Day	2,076	118
Max Month Average Day (March)	3,241	184
Max Day	4,265	242

Notes:

1. *IDM calculations are based on 51 inch-diameter miles of collection system pipe.*
2. *Calculations assume a population of 914 people based on US Census data.*

During 2017, City operations staff and Mountain Waterworks surveyed and evaluated all manholes in the collection system, which revealed a substantial number in poor condition and likely contributing to I/I. Although the City has replaced about 2,450 feet of collection system piping since the 2003 Facility Plan was developed, it is likely the I/I problem is only marginally improved since that analysis was completed. However, given the low reliability of the last several years of influent flow data, at least one year of accurate data will be necessary to determine the actual amount of I/I currently entering the collection system.

2.5 Wastewater Characteristics

The majority of City wastewater is generated by residential users. The system also serves a few non-residential facilities including restaurants, local retail and office, schools, and a small sawmill; there are no known dischargers of high-strength industrial wastewater to the collection system. There are also no known septage haulers dumping into the WRRF.

As summarized in **Table 2-4**, domestic wastewater typically contains 190 – 350 mg/L BOD_5 and 210 – 400 mg/L total suspended solids (TSS) (*2*). Influent wastewater strength data reported in the 2003 Facility Plan indicated Troy wastewater is in line with average values. However, more recent DMR data submitted under the City's IPDES permit (**Figure 2-3** and **Figure 2-4**) suggests the influent wastewater strength is now substantially stronger than typical domestic wastewater (**Table 2-4**), and is more in line with a high-strength industrial or commercial wastewater.

Table 2-4: Summary of Influent Characteristics of Domestic Wastewater

Influent Parameter	Concentration, mg/L				
	Average	Low Strength	High Strength	ECHO Facility Data 2014-2019[1]	2003 Facility Plan Data
BOD_5	190	110	350	766[1]	187 (0.24 lb/cap-d)
TSS	210	120	400	2,676[1]	184 (0.23 lb/cap-d)

Note:

1. Average concentration based on reported DMR data.

As no large new industrial or commercial facilities have been constructed in Troy since the last Facility Plan was completed, the most likely explanation for the anomalously high influent strength is that collected samples do not accurately represent influent characteristics. Based on conversations with City staff, it is possible solids may be settling out and accumulating upstream of the comminutor at the inlet to the treatment basins. If these solids are being disturbed and captured during influent sample collection, the results could be erroneous. Potentially compounding inflated concentrations associated with the sampling location is the nature of required sampling – that is, three discrete samples collected over an 8-hour period and only one sample required per month. The small sample size associated with such limited sampling and testing is likely unreliable for predictions.

Given the uncertainty of the wastewater data, projections in this Wastewater Facility Plan (WWFP) rely on typical per capita values for residential/municipal raw wastewater: 0.17-0.22 lb BOD_5/capita-d and 0.20-0.25 lb TSS/capita-d, as recommended in 10-States Standards. Influent total kjeldahl nitrogen (TKN) and total phosphorus (TP) were estimated similarly. As shown in **Table 2-4**, the 2003 WWFP data well aligns with 10-States Standards guidance.

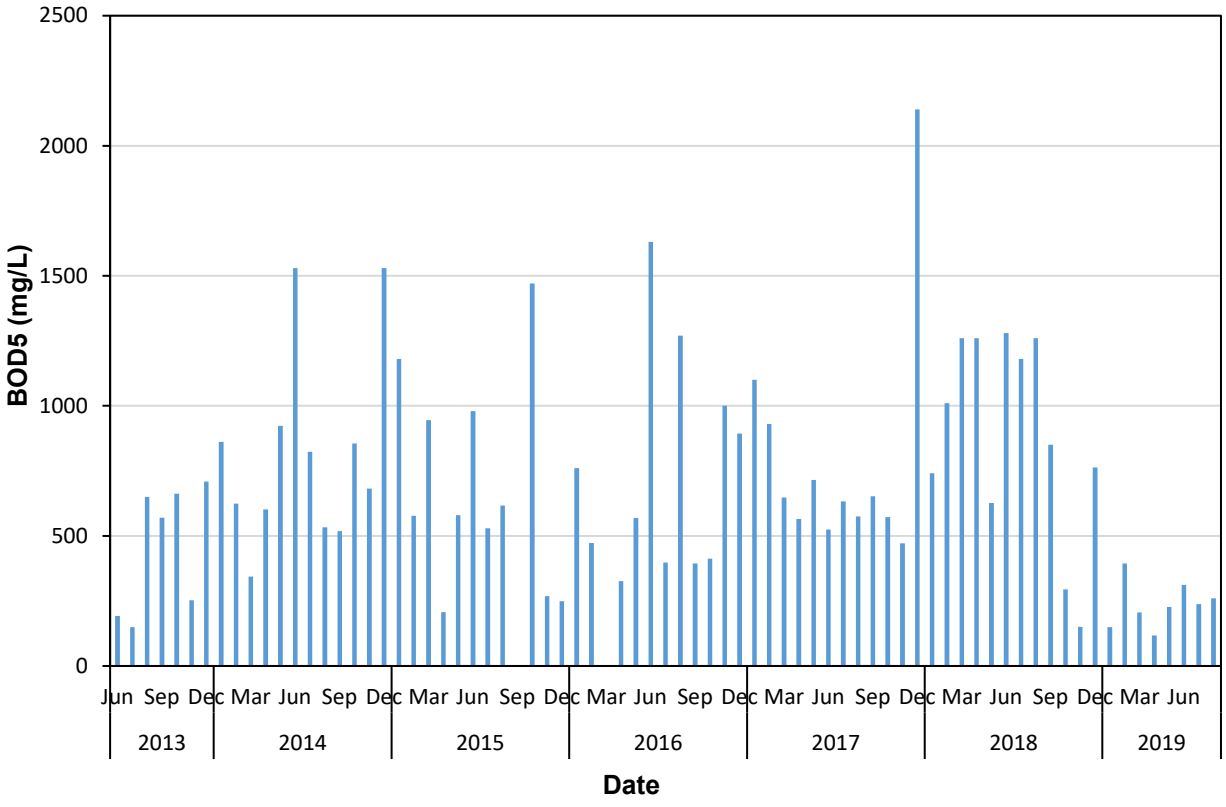

Figure 2-3: 2013 – 2019 DMR Influent BOD_5 Data

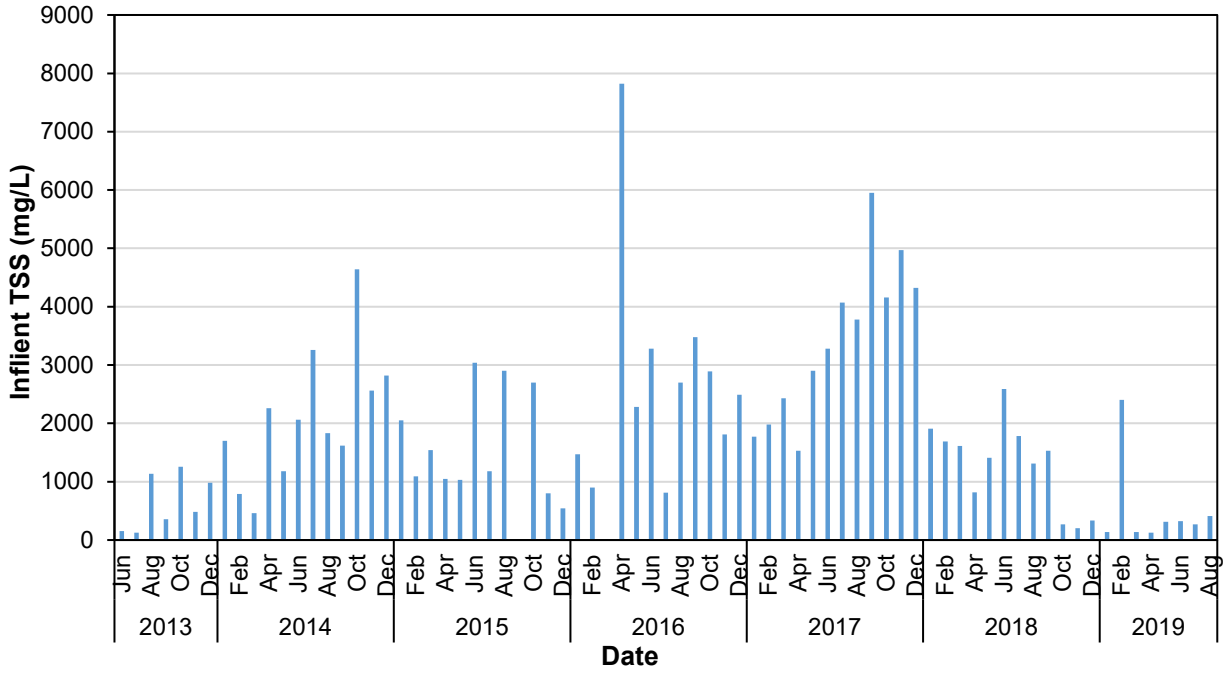

Figure 2-4: 2013 – 2019 DMR Influent TSS Data

2.6 Wastewater Collection and Treatment Process Overview

2.6.1 Collection and Treatment System Classification

The WRRF is currently classified as a Class 1 Treatment System by IDEQ and the collection system is classified as a Class 1 Collection System. The responsible charge operator is Dale Howe, who is certified as a Class 1 wastewater treatment operator (License No. WWT1-25102). TJ (Timothy) Yockey (License No. WWC1-25101) is the backup operator for the City.

2.6.2 Wastewater Collection System

The original collection system was installed in 1935 to convey City wastewater to a community septic tank. Various expansions and upgrades to the collection system have increased the length to approximately 34,150 feet of pipe ranging from 4-inch to 14-inch diameter**. Figure 2-5** presents the existing collection system pipe size and **Figure 2-6** shows the existing collection system pipe type. Newer portions of the system are constructed of PVC pipe, while older segments consist of concrete and AC pipe. DI pipe makes up some of the lower reaches of the system and is installed beneath the old railroad right-of-way. Pipe lengths, diameters, and materials are summarized in **Table 2-5.** The City owns a Hydro Jet Cleaner and CCTV push camera but does not have a routine flushing or jetting program in place.

Table 2-5: Summary of Pipes in Collection System

Pipe Diameter (inches)	Pipe Length (feet)
14	306
12	2,080
10	2,749
8	24,586
6	2,507
4	667
Unknown	1,258
Pipe Material Type	**Pipe Length (feet)**
Concrete	14,999
Polyvinyl Chloride (PVC)	15,139
Asbestos Concrete (AC)	1,753
Ductile Iron (DI)	1,813
Unknown	449
Total Length of Collection System:	**34,153 ft**

Overall elevation change across the collection system is approximately 1,000 feet. There are no lift stations, as all wastewater is conveyed by gravity flow. Wastewater generally flows southeast towards the intersection of State Highway 8 and 99 and then under the railroad right-of-way to the WRRF.

NORTH

0 400 800 1200

SCALE: 1" = 800'

LEGEND:

TROY CITY BOUNDARY

SEWER LINE:

UNKNOWN

4"

6"

8"

10"

12"

14"

STATE HWY 8 - TO MOSCOW

HWY 8

WRRF

STATE HWY 99

PROJECT	170.0020.01
DATE	9/18/2019
FIGURE NO.	FIGURE 2-5

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WASTEWATER FACILITY PLAN

TROY, IDAHO

EXISTING COLLECTION SYSTEM PIPE SIZE

Path: Q:\Water\Projects\S-Z\Troy_1701\CADD\0020_Study and Report\CSD\1700020 X Collection Sys Pipe Sz_Fig 2-5.dwg File Name: 1700020 X Collection Sys Pipe Sz_Fig 2-6.dwg Plot Date: 12/14/2023 1:00 PM ken.kreg

NORTH

0 400 800 1200

SCALE: 1" = 800'

LEGEND:

TROY CITY BOUNDARY

SEWER LINE:

UNKNOWN

ASBESTOS CEMENT

CONCRETE

DUCTILE IRON

PVC

STATE HWY 8 - TO MOSCOW

HWY 8

WRRF

STATE HWY 99

PROJECT	170.0020.01
DATE	9/18/2019
FIGURE NO.	2-6

Mountain WATERWORKS

ENGINEERING AND ENVIRONMENTAL SOLUTIONS

504 Main Street, Suite 310
Lewiston, ID 83501
(208) 780-3990

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WASTEWATER FACILITY PLAN

TROY, IDAHO

SEWER LINE MATERIAL - COLLECTION SYSTEM

Mountain Waterworks and the Idaho Rural Water Association conducted a collection system manhole survey and condition assessment during September – October 2017 and developed a set of geographic information system (GIS) maps. These maps have a consistent naming convention for the manholes and pipes. Only 133 manholes were found, although it is believed there are at least 151 manholes in the system based on the sewer map developed in 2001. It is likely the manholes that could not be located have been paved over during road maintenance activities. Common defects noted during the manhole survey were root intrusion, debris, leaks, and rotted steps. Additionally, two sewer pipes with unknown origins lead into manholes 21E and 21C.The complete list of identified manholes and corresponding survey notes developed during the condition assessment is provided in **Appendix C.** The GIS mapping is contained in **Appendix D**.

2.6.3 Wastewater Treatment System

2.6.3.1 Process Overview

The original community septic tank installed in 1935 was replaced by an 80,000 gpd capacity mechanical activated sludge Smith & Loveless Oxigest Package Plant in 1966. The Oxigest plant was replaced by the current hybrid quasi-lagoon treatment facility in 1991. **Appendix E** contains the original construction plans for the current facility.

The treatment system utilizes three partially aerated lagoons followed by sedimentation and chlorine disinfection, as shown in **Figure 2-7.** Pretreatment is provided using a comminutor; the facility does not have screening or primary treatment facilities. Disinfection is provided using 12.5% sodium hypochlorite solution and a serpentine chlorine contact basin. The disinfected effluent is dechlorinated using calcium thiosulfate prior to discharge. A submersible pump station containing two submersible pumps is used to return mixed liquor from the sedimentation basin to the head of the plant. The pumps also have the capability to remove some solids from the treatment process; however, this process is not routinely employed. Solids typically settle out in all three of the lagoon cells and must be periodically removed to restore treatment capacity. A solids removal and land application project was completed in 2020 that saw removal and subsurface injection on farm ground of 155 dry tons of solids removed from lagoon Cells 1 and 2. **Photos 2-1** and **2-2** show Cell 1 solids content before and after the project, respectively.

NORTH

0 20 40 60

SCALE: 1" = 40'

Path: B:\Projects\S-Z\Troy, 1700020_Study and Report\CSD\1700020 ETF_Fig 2-8.dwg File Name: 1700020 ETF_Fig 2-8.dwg Plot Date: 10/8/2019 11:41 AM SBennett

PROJECT	170.0020.01
DATE	9/18/2019
FIGURE NO.	2-7

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WASTEWATER FACILITY PLAN

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EXISTING TREATMENT FACILITY

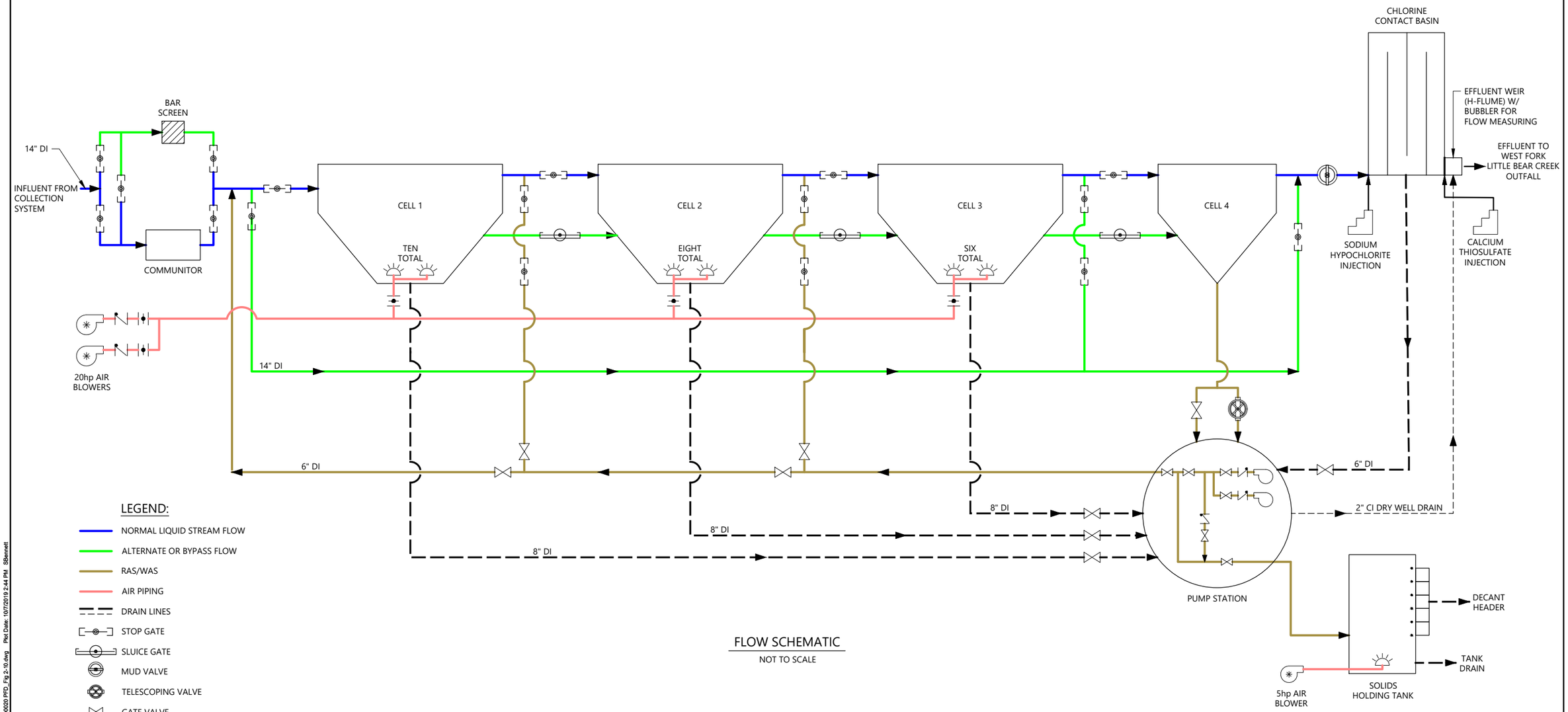
Photo 2-1: Cell 1 Prior to Solids Removal

Photo 2-2: Cell 1 After Solids Removal

The only automated process monitoring equipment in place at the WRRF is the effluent flow meter. All other process monitoring (pH, temp, TSS, BOD_5, etc.) is conducted using handheld probes or by manually collected grab samples for contract laboratory analysis.

Despite being constructed of concrete and having a cell identified as a "Clarifier," this facility is not an activated sludge type of treatment plant, but essentially an aerated lagoon treatment facility. None of the cells are completely mixed and lack of mixing energy in subsequent cells means solids settle before reaching the "Clarifier". Therefore, only mixed liquor that has not settled out in any of the three lagoon-type cells is returned to the front of the plant.

Process modifications since initial facility construction have been the addition of a waste solids holding tank in 2001 and chemical feed equipment for dechlorination in 2005. The City does not use the solids holding tank**. Figure 2-8** shows the process flow diagram for the existing facility. Detailed descriptions of each portion of the treatment process are provided in the following sections.



LEGEND:

- NORMAL LIQUID STREAM FLOW
- ALTERNATE OR BYPASS FLOW
- RAS/WAS
- AIR PIPING
- DRAIN LINES
- STOP GATE
- SLUICE GATE
- MUD VALVE
- TELESCOPING VALVE
- GATE VALVE
- CHECK VALVE
- FLOW DIRECTION
- AIR BLOWER
- AIR DIFFUSER
- BUTTERFLY VALVE
- METERING PUMP
- PUMP

FLOW SCHEMATIC

NOT TO SCALE

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PROJECT	170.0020.01
DATE	9/18/2019
FIGURE NO.	2-8

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WASTEWATER FACILITY PLAN
TROY, IDAHO

PROCESS FLOW DIAGRAM

2.6.3.2 Influent Sampling and Pretreatment

The City has recently acquired an ISCO/Teledyne refrigerated autosampler (model 5800) as part of the University of Idaho's ongoing wastewater coronavirus surveillance project. While the autosampler is currently dedicated to the University's project, the autosampler can be integrated into future project upgrades completed by the City. Influent flow monitoring is not available.

The pretreatment system consists of dual concrete channels containing stop gates that direct flow through either a comminutor or a manually cleaned coarse bar rack. Flow normally passes through the comminutor while the bar rack provides redundancy and bypassing capabilities. The comminutor is controlled by a DWS Model PC 202 motor controller. Upon detecting a jam in the comminutor, the controller will reverse the grinder's direction up to three times in attempt to dislodge the obstruction. If the obstruction is dislodged during any of the reversal cycles, the comminutor will resume normal operation. If the jam condition exists after three reversal cycles, the controller will activate an alarm, shut off the unit, and allow flow to be redirected through the bar screen. After pretreatment, flow is directed to Cell 1 during normal operation or bypassed into any other cell via a 14" DI pipe if required.

The comminutor reduces the size of unwanted plastics, rags, and other trash contained in the raw wastewater, lessening the likelihood it will clog or block downstream pumps, pipes, or other equipment. Plastics and trash tend to catch in the sedimentation basin overflow weir, foul the chlorine contact basin, and settle out in the solids in the lagoon cells. The presence of the trash increases cleaning and equipment maintenance requirements and contaminates the solids, which can limit disposal options. Landowners or compost facility operators will typically not accept unscreened solids contaminated with plastics and trash.

Photo 2-3: Pretreatment with Electric Comminutor and Manual Bar Rack

2.6.3.3 Cells 1, 2, and 3

Secondary biological treatment of wastewater is achieved in the first three cells, which are aerated lagoons. Each aerated lagoon cell has a trapezoidal cross section with a 30-foot bottom width, 60-foot top width, and depth of up to 13 feet. The first two cells are each 150 feet long while the third cell is 120 feet long. All three cells have ability to:

- Receive flow directly from pretreatment.
- Bypass any of the following cells in the system.
- Receive return activated flow from the sedimentation basin pump station.
- Move water from the top (via stop gate) or bottom (via sluice gate) to the next cell.
- Drain to the pump station wet well. Suspended solids can be returned to any cell from the pump station.

Each cell is separated by a V-notch weir and is partially aerated using static tube coarse bubble aerators that provide partial mixing. The number of aerators per cell is greater at the head of the plant (Cell 1) and decreases over the length of the facility. The cells do not have a scum removal system and in the summer, duck weed accumulates in the third treatment cell and sedimentation basin. Mixing energy is insufficient to prevent solids accumulation in each of the cells. Characteristics of each lagoon cell are summarized in **Table 2-6**.

Table 2-6: Lagoon Characteristics

Cell Number	Capacity, gpd	Length, ft	No. Aerators, each
1	500,000	150	10
2	500,000	150	8
3	400,000	120	6

On September 26, 2016, Mountain Waterworks documented solids build up in the cells and the measurements are included in **Appendix F**. In general, the cells had a large accumulation of solids that impaired treatment, first by reducing HRT, a prime component of treatment in lagoon systems; and second by feeding organic loading (BOD_5) back into the process during warmer periods of the year. Based upon results from the 2016 evaluation, it is estimated there were roughly 180 dry tons of sludge in the lagoons. The 2020 solids removal project removed approximately 155 dry tons of solids from Cells 1 and 2.

2.6.3.4 Aeration System

All aerators are 12-inch diameter, 4-foot-tall static tube aerators manufactured by Semblex. Each aerator is reported to supply up to 1.5 lbs of oxygen per hour at an air flow rate of 20 SCFM, or 1.2 lbs of oxygen per hour at 15 SCFM under testing conditions, as well as provide up to 400 gallons per minute (gpm) of pumping (mixing). Flow to individual aerators is controlled using ball valves located on the drop pipes from the main air supply header. Aerators at the head of plant reportedly clog intermittently due to accumulation of heavy plastics, solids, and trash. To unclog the aerators, the control valves are briefly closed and then opened to provide a surge of air to dislodge the unwanted debris.

Two rotary positive displacement Sutorbilt California Legend Series Model 6M blowers (**Photo 2-4**) supply air to the aerators. The blowers and rotors were rebuilt in 2017. Each blower is reported to deliver 430 SCFM at 6 psig at 1525 RPM, or 250 SCFM at 1020 RPM. Each blower is paired with a Marathon Electric 20 H.P., two-speed, TEFC, 1800/1200 RPM, 3-phase, 60 Hz, 230-volt motor through a V-belt drive system.

During normal operation, only one blower operates at time and a 24-hour timer alternates the active blower to equalize runtime between the two units. A temperature switch is provided to shut down a blower if its temperature exceeds 250ºF.

Photo 2-4: Aeration System Blowers

2.6.3.5 Cell 4

Cell 4, which was intended to be a sedimentation cell following the aerated lagoons, is a 30-foot square, 50,000-gallon concrete structure with a 9-foot-deep hopper bottom (side slopes of 1:1.44 V:H) that is 13 feet deep overall. Wastewater can enter the lower portion of Cell 4 through a 12-inch diameter DI pipe from the bottom of Cell 3 or an overflow weir from the surface of Cell 1, 2 or 3. The design intent is for the normal flow path to be through the lower pipe connection of Cell 3, but the WRRF had been operated for an extended period using the overflow weir from Cell 3. This flow configuration, since corrected, lead to a number of operational problems associated with decreased effluent quality and Permit violations:

- Algae and duckweed are present near the water surface in Cell 3 and Cell 4 where sunlight is sufficient to facilitate plant growth (**Photo 2-5**). Withdrawing effluent via the overflow weir from Cell 3 transfers algae and duckweed into Cell 4, where it accumulates on the surface. This condition could be mitigated by using the lower inlet pipe. The presence of algae and duckweed in the Cell 4 effluent causes higher TSS, increases chlorine demand, and increases the potential for *E. coli* exceedances.
- Most flow into Cell 4 short-circuits (i.e., takes the path of least resistance) across the surface directly to the outlet weir. The results of this short-circuiting are listed below.
    - Reduced detention time and poor solids removal rates.
    - Transfer of suspended solids to the chlorine contact basin.
    - Higher, more variable chlorine demand.
    - Reduced disinfection contact time due to solids accumulation in the chlorine contact basin. The current operator routine is to drain and clean Cell 4, wet well, and chlorine contact basin approximately every two months in the summer to remove trash and algae buildup.
    - Reduced disinfectant effectiveness and greater risk of *E. coli* exceedances.
    - Increased sodium hypochlorite and calcium thiosulfate usage.
    - Increased maintenance requirements associated with removing settled solids from the chlorine contact basin.

Photo 2-5: Cell 4 During Summer

2.6.3.6 Return Flow Pump Station

The return flow pump station consists of a 6-foot diameter concrete wet well containing two 4-inch discharge ABS model AF 40-4EX, 5-hp submersible pumps. Pump cycling is controlled by level float switches that start the lead pump at a 5-foot liquid level and the lag pump at a 7-foot liquid level, with a high-level alarm set at 10 feet. The pumps alternate in operation.

The wet well is connected to the Cell 4 sump by an 8-inch diameter pipe that allows mixed liquor suspended solids (MLSS) and any settled solids to be withdrawn from Cell 4 and pumped back to Cell 1 (or Cell 2 or 3) or removed from the system and put into the solids holding tank. The wet well also contains drain connections from each cell and the chlorine contact basin that allow wastewater to be transferred from one location to another. Pump discharge piping extends through the wet well to an adjacent dry pit valve vault that contains the control valves used to direct flow. Flow into the wet well from Cell 4 is controlled by a telescoping valve. The seals on this valve currently leak and the valve should be rebuilt or replaced.

2.6.3.7 Chlorine Contact Basin - Disinfection

The chlorine contact basin is a 30-foot-long, 12-foot-wide, and 7-foot-deep rectangular, concrete structure with a 16,000-gallon volume. The basin is partitioned into a 2.5-foot-wide serpentine channel by three intermediate baffles. **Table 2-7** presents the total and effective contact time for various WRRF flows. The effective contact time of 27 minutes under peak hour conditions is adequate for permit compliance as long as the upstream treatment process is performing properly. High TSS in the clarifier effluent, excessive ammonia and/or nitrite, and settled solids in the chlorine contact basin exert additional chlorine demand that can make it difficult to maintain an effective chlorine dose.

Table 2-7: Disinfection Contact Time at Various Flow Rates

Parameter	Flow, gpd	Total Time, min	Effective time[1], min
Dry Season (June-July-August)	80,440	286	143
Wet Season (March-April)	152,867	150	75
Average Day	106,587	216	108
Max Month Average Day (March)	166,400	138	69
Max Day	219,000	105	52
Peak Hour	426,346	54	27

Note:

1. Disinfection baffling factor of 0.5

Disinfection is provided using 12.5% liquid sodium hypochlorite solution. Chemical injection is flow paced to target an operator-selected total chlorine residual based on flow as measured by the effluent flow meter.

2.6.3.8 Solids Handling and Disposal

Waste solids produced by the treatment process may be removed using a vacuum truck or dredge after isolating and draining each cell. The submersible pump station can be used to remove solids from the treatment process that have not settled out in the treatment cells but do settle out in Cell 4. The pump station can also be used to withdraw limited sludge from the bottom of any of the treatment cells, however, due to the size of the Cells only sludge deposited within the direct vicinity of the suction pipe can be removed from Cells 1-3.

Solids removed using the solids pump station can be discharged to the welded steel holding tank. The tank is approximately 20 feet tall, 9 feet in diameter, and provides 9,500 gallons of storage. It is equipped with a 5 horsepower (hp) positive displacement blower that supplies air to two diffusers located 6 inches from the bottom to aerate and mix the solids and prevent septic conditions from developing. The tank has decanting ports along one side that allow solids to settle and thicken while supernatant is discharged through a temporary connection to the solids pump station.

The solids storage system was installed in 2001 to provide additional flexibility in gathering, thickening, and wasting solids from the treatment process. However, the tank coatings have not been maintained and the tank is in poor condition; the shell has extensive corrosion damage (**Photo 2-6**). The tank is not used due to the lack of a headworks and raw influent screening to remove trash and plastics that plug the discharge port. Based on interviews with operations staff, the tank has only been used once since it was installed.

Based on estimates of average wastewater flows, loads, and effluent suspended solids concentrations, it is projected sludge will accumulate at a rate of about 6 – 8 inches per year and removal will be required approximately every 5 years. The actual time interval will vary depending on volatile solids destruction rates, settled solids concentration, influent loading, process performance, and construction of process upgrades such as influent screening.

2.6.3.9 Effluent Outfall

Flow is measured at the outlet of the chlorine contact basin using a 1" H-flume and a Badger ultrasonic transducer. The Badger controller provides limited datalogging capability including maximum, minimum, and average daily flowrates. The City has experienced difficulty keeping the unit set to accurately measure flows. Treated effluent exits the facility through a 14-in DI pipe and is discharged to West Fork Little Bear Creek.

Photo 2-6: Aerated Sludge Holding Tank

2.6.4 Effluent Limits, Monitoring, and Reporting

The City of Troy is currently operating under IPDES Permit No. ID0023604, which became effective on August 1, 2022, and will expire on July 31, 2027. A copy of the permit is provided in **Appendix G**, and effluent limits and monitoring requirements are summarized in **Table 2-8** and **Table 2-9**; the latter table summarizes interim limits for ammonia-nitrogen. Importantly, the City has until 2031 to achieve compliance with strict effluent ammonia-nitrogen limits. **Table 2-10** summarizes additional non-numeric effluent monitoring requirements.

Additional important IPDES permit-required effluent characteristics include:

- A pH range between 6.5 - 9.0 standard units with monitoring once per week.
- There shall be no discharge of floating solids, visible foam in other than trace amounts, or oily wastes that produce a sheen on the surface of the receiving water.
- 85% removal requirements for BOD_5 and TSS: For each month, the monthly average effluent concentration shall not exceed 15% of the monthly average influent concentration.

Table 2-8 Current IPDES Conditions for Troy, ID

Effluent Limitations and Monitoring Requirements							
Parameter	**Effluent Limitations**				**Monitoring Requirements**		
	Average Monthly Limit	**Average Weekly Limit**	**Maximum Daily Limit**	**Instantaneous Maximum Limit**	**Sample Location**	**Sample Frequency**	**Sample Type**
Flow, mgd	-	-	-	-	Effluent	5/week	measured
Biochemical Oxygen Demand (BOD_5)	30 mg/L	45 mg/L	-	-	Influent and Effluent	1/month	8-hour composite
	48 lbs/day	71 lbs/day	-	-			
Total Suspended Solids (TSS)	30 mg/L	45 mg/L	-	-	Influent and Effluent	1/month	8-hour composite
	48 lbs/day	71 lbs/day	-	-			
E. coli Bacteria[1,2]	126/100 mL	-	-	406/100 mL	Effluent	5/month	Grab
Enterococcus[1,2]	35/100 mL	-	-	130/100 mL			
Total Chlorine Residual[2,3,4]	0.01 mg/L	-	0.03 mg/L	-	Effluent	1/week	Grab
	0.02 lbs/day	-	0.04 lbs/day				
Temperature[5], ºC	-	-	-	-	Effluent	1/month	grab
Total Ammonia as N, mg/L	2.2	-	7.4	-	Effluent	1/month	8-hour composite
Total Ammonia as N, lb/d	3.5	-	11.7	-	Effluent	Calculation	

Notes:

1. *The Geometric mean of monthly counts must be based on a minimum of five samples collected 3-11 days apart over a calendar month.*
2. *Reporting is required within 24 hours of a maximum daily limit or instantaneous maximum limit violation.*
3. *The average monthly and maximum daily concentration limits for chlorine are not quantifiable using EPA approved test methods. The permittee will be in compliance with the effluent limits for chlorine provided the average monthly and maximum daily total chlorine residual levels are at or below the compliance evaluation level of 0.05 mg/L, with a loading at or below 0.08 lbs/day.*
4. *Chlorine effluent limits shall become effective May 1, 2007, in accordance with the conditions of the Compliance Schedule.*
5. *Monitoring shall be conducted once per month starting in January 2006 and lasting for one year.*

Table 2-9 Interim IPDES Conditions for Troy, ID

Parameter	Interim Limit Period	Units	Effluent Limits		Monitoring Req'ts		Reporting Period
			Monthly Maximum	Daily Average	Sample Type	Sample Frequency	
Ammonia	Aug. 1, 2022 – Sept. 30, 2031	mg/L	20.75	28.0	8-hr Composite	1/wk	Monthly
		lb/d	32.9	44.4	Calculation		

Table 2-10 Additional IPDES Effluent Monitoring Requirements for Troy, ID

Parameter	Monitoring Period	Units	Monthly Average	Instantaneous Maximum	Daily Maximum	Sample Freq.	Sample Type
Flow	01/01-12/31	Mgd	Report	--	Report	Continuous	Recording
Nitrate + Nitrite		mg/L		--	Report	1/wk	8-hr composite
Temp.		ºC		Report	--	Continuous	Recording
Dissolved Oxygen		mg/L		--	Report	1/wk	Grab

In addition to monitoring the WRRF effluent, the IPDES Permit requires surface water monitoring of the West Fork Little Bear Creek both upstream and downstream of the effluent outfall; monitoring was to start November 1, 2022, with streamflow monitoring to start August 1, 2023. Collection of surface water grab samples for temperature, pH, and ammonia concentration was required once quarterly for four years starting October 2004 with results reported to IDEQ and EPA.

Table 2-11 Additional IPDES Effluent Monitoring Requirements for Troy, ID

Parameter	Monitoring Period	Units	Instantaneous		Daily Max	Sample Freq.	Sample Type
			Minimum	Maximum			
Above Outfall							
Flow	01/01-12/31	cfs	Report	Report	--	1/month	Measured
Ammonia		mg/L	--	--	Report	1/month	Grab
Nitrate+Nitrite		mg/L	--	--	Report	1/month	Grab
pH		SU	Report	Report	--	1/month	Grab
Temp		ºC	--	Report	--	Continuous	Recorded
Dissolved Oxygen		mg/L	Report	--	--	1/month	Grab
Below Outfall							
Temp	01/01-12/31	ºC	--	Report	--	Continuous	Recorded
Dissolved Oxygen		mg/L	Report	--	--	1/month	Grab

2.6.5 Little Bear Creek Water Quality Standards

Treated effluent is discharged from the WRRF to the West Fork Little Bear Creek. IDEQ Water Quality Standards (IDAPA 58.01.02) section 120.08 does not classify the West Fork Little Bear Creek as having beneficial or other designated uses. The West Fork Little Bear Creek flows into the Little Bear Creek, which has designated uses of cold-water communities, salmonid spawning, and secondary contact recreation. Eventually, the water enters the Potlatch River, with the same aquatic life designations, in addition to primary contact recreation and domestic water supply. The following standards apply to each type of designated use:

- **Cold Water Communities:** Water quality appropriate for the protection and maintenance of a viable aquatic life community for cold water species.
    - **pH:** between 6.5 and 9.0
    - **DO:** exceeds 6.0 mg/L
    - **Temperature:** 22ºC or less daily maximum; 19ºC or less daily average
    - **Turbidity:** shall not exceed background by more than 50 NTU for more than 10 consecutive days
    - Ammonia: not to exceed calculated concentration based upon pH and temperature
- **Salmonid Spawning:** Waters which provide or could provide a habitat for active self-propagating populations of salmonid fishes.
    - **pH:** between 6.5 and 9.5
    - **Dissolved Oxygen:**
        - **Water column:** Dissolved oxygen (DO) exceeds 6.0 mg/L or 90% saturation, whichever is greater
        - **Intergravel:** one day minimum exceeds 5.0 mg/L and exceeds 6.0 mg/L for seven-day average
    - **Temperature:** ºC or less for daily average; 9ºC or less for daily average, extra criteria for Bull Trout
- **Secondary Contact Recreation:** Water quality appropriate for recreational uses on or about the water and which are not included in the primary contact category. These activities may include fishing, boating, wading, infrequent swimming, and other activities where ingestion of raw water is not likely to occur.
    - **Bacteria:** less than 126 E. coli/100 ml average with 576 E. coli/100 ml maximum
- **Primary Contact Recreation:** Water quality appropriate for prolonged and intimate contact by humans or for recreational activities when the ingestion of small quantities of water is likely to occur. Such activities include, but are not restricted to, those used for swimming, water skiing, or skin diving.
    - **Bacteria:** less than 126 E. coli/100ml average with 406 E. coli/100 ml maximum
- **Domestic Water Supply:** Water quality appropriate for drinking water supplies.

The Water Quality Standards state that “In all cases, existing beneficial uses of the waters of the state will be protected.” (IDAPA 58.01.02.050.02.b). Details on the water quality criteria to protect

the uses listed above can be found in the Water Quality Standards sections 250.02, 251.01, 252.01, and 253.01-.02. Wildlife habitat and aesthetics will also be considered.

2.6.6 Historical Plant Performance

From 2008 – 2012, the City exceeded IPDES permit limits on multiple occasions, primarily with respect to total residual chlorine and *E. coli*. In March of 2013, the EPA notified the City of its intentions to bring enforcement action against the City and in March 2014 issued a Final Order with a Total Compliance Action Cost of $22,522. In April 2014 the case was settled, and the City and EPA agreed to a total penalty of $14,500. The facility has not violated total residual chlorine limits since the installation of the chemical dechlorination system, and the effluent pH is reported to be within the required range.

2.6.6.1 BOD_5 and TSS

A summary of the effluent data taken from discharge monitoring reports (DMRs) from October 2014 through July 2019 is summarized in **Table 2-12**, and effluent BOD_5 and TSS concentrations from January 2014 – July 2019 are plotted in **Figure 2-9** and **Figure 2-10**.

Table 2-12: Summary of Effluent Water Quality October 2014 – July 2019

Parameter		Units	Concentration			
			Average	Maximum	Minimum	Standard Deviation
Flow		MGD	0.04	0.07	0.01	0.01
pH	Inst. Max.	s.u.	8.01	8.8	7.1	0.42
	Inst. Min.	s.u.	7.63	8.6	6.9	0.45
BOD_5		mg/L	15.0	79.8	1.8	16
Total Suspended Solids (TSS)		mg/L	20.7	202	4.94	8
E. coli		#/100 mL	211	1600	0.02	20
Total Residual Chlorine		mg/L	< 0.1	0.1	<0.1	<0.1

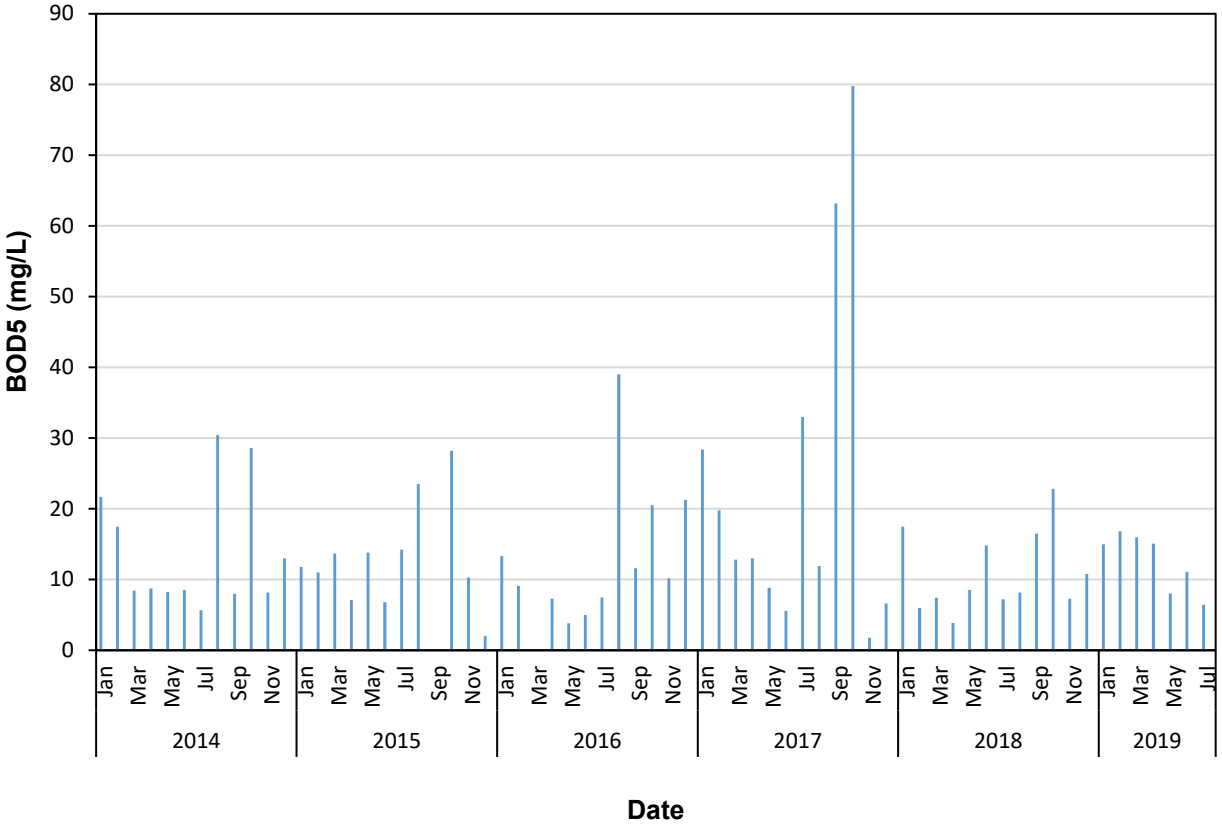

Figure 2-9: Effluent BOD_5

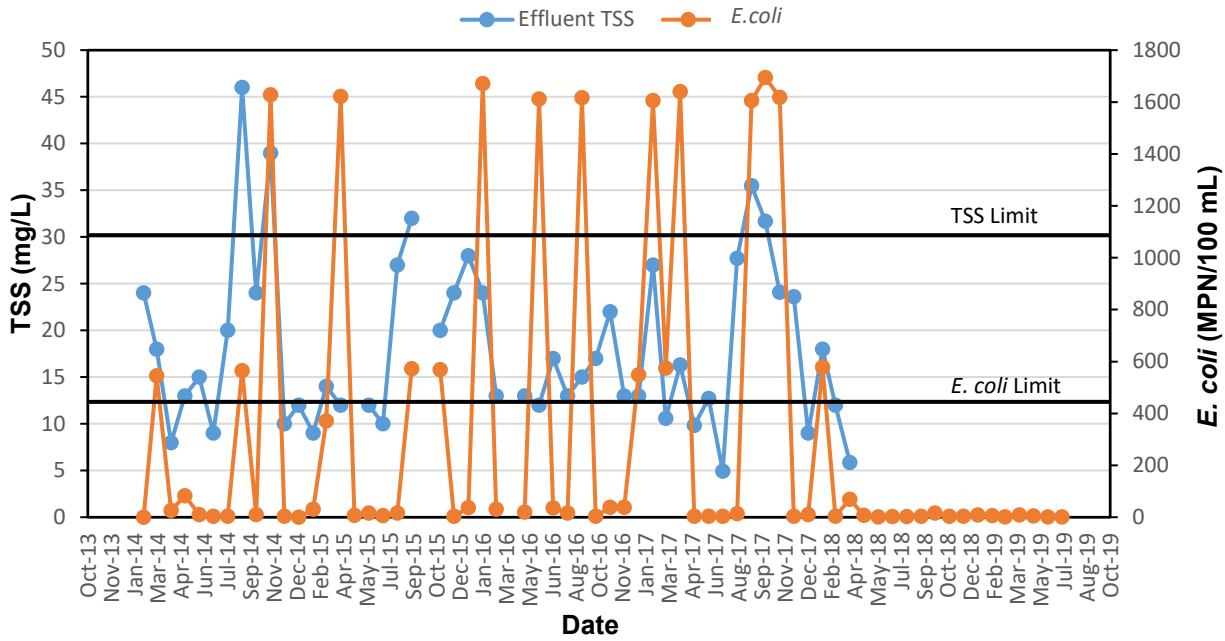

Figure 2-10: Effluent TSS and *E. coli* Levels

The WRRF generally complies with the 30 mg/L permit limits for TSS and BOD_5 during the colder months of the year, but can exceed permit limits for these constituents during the summer months (**Figure 2-10** and **Photo 2-7**). These exceedances are partially due to the use of the overflow weir to transfer flow between Cell 3 and Cell 4, which results in poor solids removal and high TSS in the clarifier effluent. Higher concentrations are also due to feedback of organic loading from the accumulated solids in the cells and from excess HRT that provides ideal conditions for algae growth. As shown in **Photo 2-7**, the liquid at the clarifier surface typically contains a high concentration of suspended solids, algae, and duckweed. Although some of this material will be retained by the effluent underflow baffle at the outlet weir, much of it is transferred into the chlorine contact basin (**Photo 2-8**).

2.6.6.2 Disinfection

High effluent TSS often correlates with permit exceedances for *E. coli*, as shown in **Figure 2-10.** This is due to the additional chlorine demand imposed by excessive TSS in the settling basin effluent as well as solids accumulation in the chlorine contact basin, which exerts chlorine demand and leaves less chlorine available to destroy pathogens. These periods typically occur in summer to late fall when algae growth is at its highest. *E. coli* exceedances that occur when TSS is lower are usually during the spring months and are likely caused by high influent flow rates associated with I/I. High flow decreases the contact time available for chlorine to inactivate pathogens in the contact basin. Finally, effluent nitrite concentrations have been found to cause disinfection issues in recent years. One part nitrite-nitrogen consumes five parts chlorine. Controlling and managing this issue is very difficult, as the City has limited capability to control nitrification and nitrite production.

Photo 2-7: Cell 4 in Summer

Photo 2-8: Chlorine Contact Basin

2.6.7 Process Analysis of Existing Treatment System

The existing WRRF has been constructed as a modified aerated lagoon type system. These systems are somewhat similar to an extended aeration activated sludge system, except recirculation of settled solids from a secondary clarifier is eliminated and the associated mixed liquor suspended solids is much lower. These extended aeration systems usually incorporate mechanical aeration to provide both oxygen for biological processes (BOD_5 reduction) and for mixing to keep the biological solids in suspension. The existing aeration system provides sufficient oxygen for treatment but does not provide adequate energy for complete mix in any of the cells. Therefore, the existing system is not an activated sludge system.

To better understand the treatment potential of the City's WRRF it is helpful to compare the system to an aerated lagoon system complete mix without recycle, a partial mix aerated lagoon system, and an extended aeration activated sludge system incorporating clarification and recycle. **Table 2-13** presents common elements for the different treatment systems compared to the City's existing WRRF.

Table 2-13: Treatment System Comparison

Parameter	Extended Aeration	Aerated Lagoons Complete Mix	Aerated Lagoons Partial Mix	Existing WRRF
Hydraulic Retention Time	15-30 hrs.	24 hr. per Cell (4 days total)	3-5 days per cell (12-20 days total)	9-17 days
Solids Retention Time	10-30 days	Years	Years	Years
Volumetric Loading, lb. BOD_5/100ft^3 day	5-15			2
Recycle Q_R/Q[4]	0.5-1.5	NA	NA	0
Aeration mixing energy[5] air, CFM/MG	1340-2680	1340-2680	NA	180
MLSS, mg/l	1500-5000	150-500	NA	180
Clarifier Loading Overflow[6], gal/ft^2. Day	600-800		NA	108-214
Clarifier Solids Loading, lb./ft^2 . day	120-400	NA	NA	500
Oxygen Level for BOD_5 $lb0_2$/lb. BOD_5 removed	1.5	1.6	1.6	1.6
Mixing Energy for Aeration Basin hp	130 hp/1[m] gallons	30 h/1[m]gallons [2]	5	NA
Depth, ft	8-15	8-16	8-15	10

Notes:

1. *Based on influent flow rate of 0.085 mgd- 0.16mgd.*
2. *Suggested to taper down to 5 hp/1MG after first cell.*
3. *Based on 140 lb/day BOD_5.*
4. *Currently not used but could vary 0.5 to 1.5.*
5. *With 1-20hp blowers operating and all aerators in operation.*
6. *No solids removal mechanism exists.*

Despite the fact the cells are constructed of reinforced concrete and Cell 4 is identified on the original construction plans as a clarifier, the existing treatment system matches more closely to typical parameters associated with a partial mix aerated lagoon system. Typical partial mix aerated lagoon systems are capable of producing average BOD_5 and TSS effluent less than 80 mg/L, although these results can be heavily influenced by the presence of algae in the effluent.

Given the above analyses, the existing WRRF was analyzed as a partial mix aerated-lagoons in series model following first order reaction kinetics assuming sufficient available oxygen to meet BOD_5 demand. The results of this analysis are summarized in **Table 2-14** and indicate that the existing WRRF is capable of meeting the current permit for BOD_5 and TSS.

Table 2-14: Predicted Effluent Quality

Flow, mgd	Organic Loading lb/day	Predicted Effluent Quality, $CBOD_5$ mg/L [1,2,3]	
		Summer	Winter
0.085	140	23	49
0.166	175[4]	29	62

Notes:

1. Temperature 4^0C winter 20^0C summer
2. 20^0C Reaction rate 0.25 day^{-1} Cell 1, 0.15 remaining cells
3. No winter nitrification
4. 25^0C Peaking factor. Metcalf and Eddie

During warming weather conditions in late summer, the facility can, and does, nitrify. However, nitrification is unstable, rapidly appearing and disappearing from the process. Therefore, the existing WRRF cannot nitrify on a reliable basis.

2.6.8 Summary of Existing Deficiencies

The following deficiencies were identified during Mountain Waterworks' analysis of the wastewater system.

2.6.8.1 Wastewater Collection System:

Inflow and Infiltration (I/I): Although accurate influent wastewater flow data is not available for the past several years, DMR data from 2013 and 2014 (**Table 2-14**) shows substantial peaks in maximum monthly flow that indicates excessive I/I in the sanitary sewer collection system. The 2003 Facility Plan concluded that large volumes of I/I were entering the collection system in areas containing older concrete pipe and recommended replacement of these segments in priority areas throughout the system. As no major collection system replacement projects were completed since the last facility plan was developed, there is no reason to believe I/I has decreased. In fact, I/I has likely worsened since completion of the 2003 Facility Plan, as the collection system has continued to age.

The pattern of late winter and early spring exceedances of the Permit *E. coli* limit are likely associated with high I/I due to spring snowmelt and elevated groundwater levels. High wastewater flows reduce treatment and disinfection effectiveness and make it difficult to maintain the free chlorine residual necessary to meet the *E. coli* limit.

Aging Infrastructure: The City's collection system contains about 15,000 feet of concrete pipe and an additional 1,750 feet of AC pipe that was installed prior to the widespread adoption of PVC sewer pipe in the 1970's. The useful life of concrete pipe (both conventional and AC) is about 50 years, so pipe in these segments of the collection system is approaching or past the end of its useful life. Breaks and leaks that result in increased I/I will become more common the longer this pipe is left in service.

The manhole condition assessment identified a number of manholes that are leaking, damaged by corrosion, or do not meet current construction standards, all of which contribute to I/I. Damaged components, such as corroded steps, make maintenance access more difficult and dangerous.

2.6.8.2 Wastewater Treatment System:

Headworks: The existing headworks consists of a comminutor that cuts trash and rags into smaller pieces intended to reduce downstream maintenance and clogging issues. However, the comminutor does not remove trash from the influent, and a portion of the material eventually makes its way to the clarifier cell and chlorine contact basin where it must be manually removed by operations staff to prevent it from being discharged from the plant. This trash also contaminates the sludge produced by the treatment process, and landowners will generally not accept biosolids containing plastics and other non-biodegradable material for land application on agricultural fields. Unless the sludge is sent to a landfill, trash must be removed by screening when it is removed from the cells, raising disposal costs.

No influent flow monitoring is available.

Sedimentation: Cell 4 is intended to be a sedimentation basin and remove suspended solids from the process effluent; however, Cell 4 lacks an influent baffling structure or stilling well to dissipate flow energy, reduce short-circuiting, and promote solids settling. If not removed in Cell 4, suspended solids will settle out in the chlorine contact basin and interfere with disinfection.

Cell 4 also lacks a mechanical solids removal mechanism typical of standard clarifiers. Rather, the setup is that Cell 4 is intended to work in conjunction with the pump station to return a portion of the solids to one of the previous cells. Little mixing energy exists in Cells 2 and 3 effluent; therefore, only a small portion of MLSS is all that could be returned to the head of the plant. Returning active biomass to Cell 1 will help treatment.

Disinfection: Multiple exceedances of the permitted *E. coli* limit over the last several years have led to EPA enforcement action against the City. These exceedances are rooted in several contributing factors including:

- **High I/I.** High flows reduce chlorine contact time and transfer suspended solids algae from the treatment process to the effluent, resulting in elevated chlorine demand.
- **Unstable Nitrification**: Nitrite production through unstable nitrification, or lack of complete nitrification converting ammonia to nitrate, creates excessive chlorine demand.

- **TSS entering the chlorine contact basin:** Cell 4 does not effectively remove suspended solids from the effluent prior to disinfection. The contact basin, which provides a quiescent flow environment, is effectively functioning as a settling basin. Suspended solids in the contact basin increase chlorine demand and make *E. coli* violations more likely. The accumulated solids must be frequently removed by operations staff and recycled back to the main treatment process, needlessly increasing operational time and effort.

Sludge/Biosolids Management: Solids must be periodically removed from a wastewater treatment facility to maintain operational functionality and discharge permit compliance and prevent nuisance conditions from developing. As noted previously, sludge was removed from Cells 1 and 2 in 2020 and will be monitored and removed in the future as needed.

The existing sludge holding tank is in poor condition with extensive corrosion damage, and according to operations staff, has been minimally used since it was first installed. The tank provides little operational benefit over alternative sludge management methods such as dewatering bags or removal using a vac truck or dredge.

Chemical Storage Building: Sodium hypochlorite, calcium thiosulfate (used for dechlorination), chemical metering pumps, lab equipment, and flow meter instrumentation are currently stored in a small structure constructed for use with the original gas chlorination system and a shed added later by City staff. The building lacks a working floor drain, pump shelving, proper separation of sodium hypochlorite and calcium thiosulfate, and spill containment. Chlorine solution should not be stored in the same room as calcium thiosulfate, as chlorine vapor will react with and neutralize the calcium thiosulfate.

Instrumentation and Monitoring: There is marginal effluent flow data for several years, making it difficult to identify problems or deficiencies in treatment performance and the condition of the collection system. Regular calibration checks of the WRRF flow meter will avoid this type of problem in the future. In addition, there is no influent flow monitoring.

Submersible Pump Station: The submersible pump station structure appears to be in fair shape. The telescoping valve leaks despite several repair attempts. Operations reports that they do use the pump station to return MLSS to the front of the WRRF. The pumps cycle normally.

Treatment Plant: The plant itself is generally in good condition, with the exception of a leaking telescoping valve in the sludge pump station. However, the existing process is not capable of meeting the ammonia limits by year 2031 contained in the current IPDES permit, nor potential total nitrogen, temperature, or phosphorus limits that could be included under a future permit.

Section 3 FUTURE CONDITIONS

New treatment facilities, as well as additions or modifications to existing facilities, cannot be designed without estimates of expected flows and loads. Many factors go into such estimates, including historical trends, future population projections, changes in land use, and the success of efforts to reduce I/I into the collection system.

3.1 Planning Period

The normal planning horizon for new or modified wastewater treatment facilities is 20 years placing the end of the planning period for this Facility Plan at 2043.

3.2 Land Use

Most commercial facilities are located in the center of the community along Highway 8. Troy schools are located at the north edge of the city limits and the WRRF is located at the far southeast edge of the City. The area outside Troy City limits is a mixture of forested and agricultural land. Some capital improvements will be likely be made to the WRRF within the existing site, not impacting future land use. Any improvements involving land application of the treated effluent will occur outside the City limits and will be agricultural in nature. It would not change the land use from agriculture but would change it from dry land farming to sprinkler irrigation farming. Collection system improvements will be made within existing easements and rights-of-way. The community reports that no known large industrial facilities are currently being planned. If large industrial sewer users move into the City, the need for additional pretreatment requirements and corresponding treatment plant improvements must be considered. Changes in the sewer rate structure would also be necessary.

Currently there are no new major residential or commercial developments that are beyond the conceptual stage. One developer has produced a conceptual design for a mixed-use development that would be annexed into the City and connected to City utilities (**Appendix H**), but as of this writing (October 2023) the project has not moved beyond the concept stage. Prior to approving an addition to the City, the impact of additional wastewater flow and pollutant loads to the collection system and the WRRF will need to be evaluated.

3.3 Economic Activities

The economy in Troy relies heavily on agriculture, forestry, and the service sector. The City also serves as a bedroom community for commuters employed in the Moscow-Pullman and Lewiston-Clarkston areas. Local employers include the school system, a farm chemical company, an internet flower company, commercial, service and manufacturing businesses, and a cedar fence post mill. Future economic activities are expected to be based around existing industries.

3.4 Population Projections

The City has experienced modest population growth since 1990, with an average annual growth rate of approximately 1% (**Table 3-1**). No major industrial or commercial growth is anticipated during the 20-year planning period and population is projected to continue to increase by approximately 1% per year.

Table 3-1: City of Troy Historical Census Population Data and Projected Growth

Population Data		
Year	**Population**	**% Change Per Year**
1900	283	-
1910	543	9.19
1920	591	0.88
1930	619	0.47
1940	580	-0.63
1950	531	-0.84
1960	555	0.45
1970	541	-0.25
1980	820	5.16
1990	699	-1.48
2000	798	1.42
2010	862	0.80
2020	868	0.07
Projected		
Year	**Population**	**% Change Per Year**
2023	914	1
2033	988	
2043	1091	

Although major industrial or commercial expansion is not anticipated during the planning period, it makes sense to plan for some modest residential growth. Therefore, an average of four residential wastewater service connections (1 percent annual population growth) are estimated to be added to the collection system each year, growing from the current 385 active connections to a projected 470 active connections by 2043. Projected population growth is shown in **Figure 3-1**.

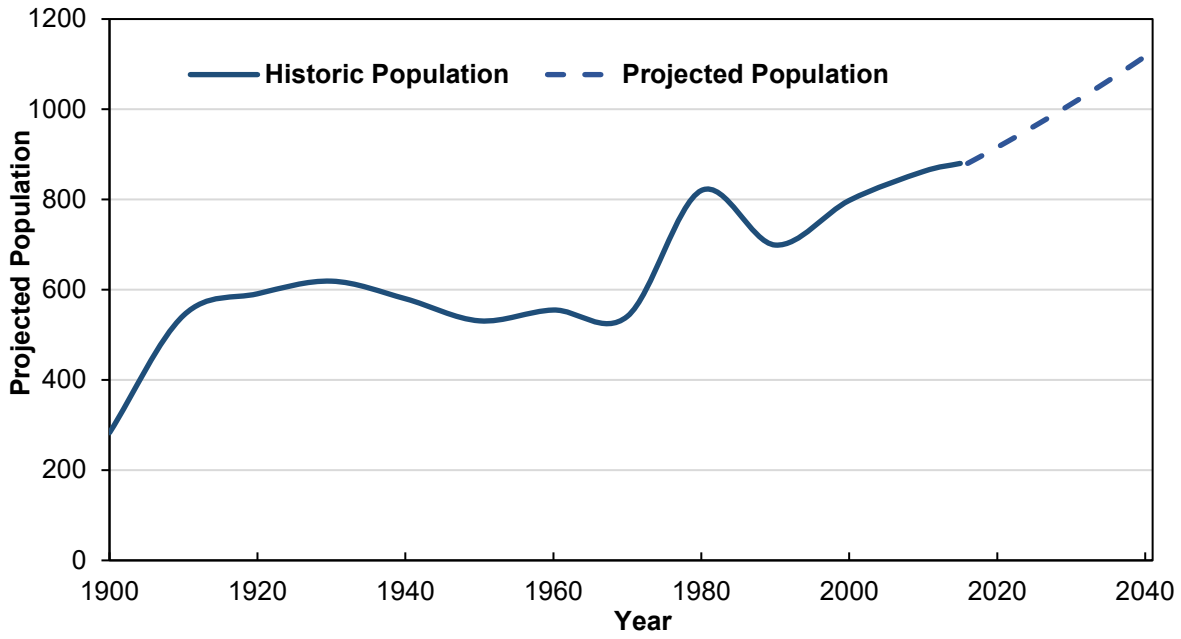

Figure 3-1: Population Growth Projections

3.5 Wastewater Flow and Load Projections

The one percent increase in population growth rate estimated above can be used to calculate projected 20-year design flows and pollutant loads. Standard per capita values for constituent concentration can be used to estimate the future conditions based upon population projection. **Table 3-2** summarizes the projected average future loading and constituent concentrations in the WRRF influent. The analysis presented assumes that I/I does not change and that I/I does not contribute BOD_5 or TSS to the system.

Table 3-2: Future Influent Wastewater Flow and Pollutant Load Projections

Parameter	Current						Year 2043				
	Flow gpd	Flow gpcd	BOD_5 lb/day	TSS lb/day	TKN[3] lb/day	TP lb/day	Flow gpd	BOD_5 lb/day	TSS[2] lb/day	TKN[3] lb/day	TP[4] lb/day
Dry Season (June, July, August)	80,440	89	198	198	42	6.6	98,434	243	243	51	8
Wet Season (March, April)	152,867	170	198	198	42	6.6	188,020	243	243	51	8
Average Day	106,587	118	198	198	42	6.6	130,508	243	243	51	8
Max Month Average Day	166,400	185	247[5]	247[5]	48[6]	7.5[6]	204,610	303[5]	303[5]	59[6]	9.3[6]
Maximum Day	219,000	243	*	*	*	*	268,758	*	*	*	*
Peak Hour	426,346	474	*	*	*	*	524,244	*	*	*	*

Notes:
**Not needed for a lagoon system.*
1. Based on 0.22 lb./BOD^5/cap.day
2. Based on 0.22 lb TSS/ cap.day
3. Based on 0.046 lb. TKN_3/cap.day
4. Based on 0.0073 lb. TP/cap.day
5. 25% Peaking Factor, Metcalf and Eddie
6. 15% Peaking Factor, Metcalf and Eddie

3.6 Future Surface Water Discharge Permit Considerations

The City of Troy's planning area is bisected by West Fork Little Bear Creek (WFLBC). At the southern end of the planning area West Fork Little Bear Creek is fed by Big Meadow Creek (also referred to as part of the 1st and 2nd orders of West Fork Little Bear Creek), which supplies the City's public drinking water system from a reservoir upstream of its confluence with Little Bear Creek. The EPA reports that both waterbodies have been assessed as overall impaired, specifically for fish, shellfish, and wildlife protection and propagation as well as recreation. Both creeks have Total Maximum Daily Loads (TMDLs) for *E. coli*, total nitrogen, and sediment.

As part of the 2019 WWFP and given the uncertainty at that time associated with the requirements of the next permit and its impact on WRRF treatment processes, Dr. Erik R. Coats of the Department of Civil Engineering at the University of Idaho was consulted to develop estimated nutrient limits that could be implemented in the next permit. Dr. Coats' analysis is included in **Appendix I** and is based in part on the 2008 *Potlatch River Subbasin Assessment and TMDLs* developed by IDEQ (*3*) as well as extensive water quality studies of the West Fork Little Bear Creek conducted by Sanchez-Murillo et. al (*6*) and Brooks et. al (*7*). Conclusions of the analysis related to the potential for future nutrient limits were as follows:

- **BOD_5 and TSS:** No changes to current permit limits were anticipated.
- **Temperature:** Implementation of temperature limits was not anticipated.
- **Disinfection:** *E. coli* removal requirements were not expected to change. Dechlorination will be required as long as chlorine is used to provide disinfection.
- **Ammonia:** The next permit is likely to include limits on ammonia nitrogen to protect aquatic life from exposure to harmful chronic and acute ammonia concentrations as well

as dissolved oxygen (DO) depletion during the summer. It is anticipated that ammonia limits will first be implemented to approximately 12 mg-N/L with a compliance schedule of a few years. Then, a seasonal ammonia limit during the low streamflow period from April – October of approximately 2 mg-N/L is possible to be recommended to protect aquatic life. A compliance schedule will also be included with the lower ammonia limit that may extend as long as a permit cycle of five years. During the winter period from mid-October to mid-April flow in Little Bear Creek is higher and the impact of ammonia discharge from the WRRF is reduced. During this period an ammonia limit may not be necessary, or a less restrictive limit may suffice. In other communities ammonia limits at 0.2 mg-N/L have been encountered. Treatment to that level, although possible, is quite expensive both from a capital and operational standpoint. At that level the only practical alternative for a small community is to abandon discharge to the surface water and use land application for effluent disposal.

- **Total Inorganic Nitrogen (TIN; ammonia + nitrate and nitrite):** The target TIN concentration in the Potlatch River watershed is 3 mg-N/L under the current TMDL (*3*). Based on data included in the TMDL the WRRF would be limited to discharge approximately 6.6 pounds of nitrogen per day during the late summer when streamflow in West Fork Little Bear Creek consists almost entirely of treated effluent from the WRRF. This would require the WRRF to achieve both nitrification and denitrification. However, the available water quality data is very contradictory with respect to the need to achieve TIN limits, because reports also indicate the steelhead population thrives primarily due to Troy's effluent discharge. IDEQ has acknowledged the need to collect additional data to establish a waste load allocation for the facility. No TIN limits are anticipated at this time. However, fish populations are sensitive to ammonia-N and much less so to nitrate-N, so it is logical to biologically convert the ammonia-N to the nitrate-N as part of any work done at the WRRF.
- **Phosphorus:** Although the TMDL targets 0.1 mgP/L within the Potlatch River watershed, no data currently exists indicating there is a need to regulate phosphorus in the next permit. The TMDL states aquatic plant growth in West Fork Little Bear Creek is nutrient limited by nitrogen and not phosphorus. The cost of phosphorus removal to very low levels frequently drive smaller communities to reduce or eliminate surface water discharge and move to land application of treated effluent. If the City were to pursue land application, the loss of flow in West Fork Little Bear Creek during the summer months would likely have a devastating impact on fish populations. Given the benefit provided by treated effluent in maintaining year-round streamflow to support aquatic life, effluent phosphorus limits are not anticipated.

With the City's IPDES permit issued since the 2019 WWFP was completed, the following assessment addresses known new and potential future criteria.

- The IPDES permit for Troy includes new ammonia-N limits (in effect October 1, 2031; **Table 2-8**) that can only be viewed as "interim" and exclusively applying to this current permit cycle. While a Reasonable Potential Analysis was performed to produce the new ammonia-N limits, IDEQ acknowledges in the Fact Sheet that required in-stream water quality monitoring performed under this new IPDES permit will ultimately yield stricter future effluent total inorganic nitrogen limits that will include nitrate-N (since the watershed as a whole has a TMDL with a target in-stream TIN concentration of 3.0 mg/L). The fundamental problem with this incremental, interim limit approach is that the City of Troy will need to implement expensive treatment facility upgrades to comply with this new permit, but will ultimately need to implement more expansive, expensive, yet uncertain upgrades again with the next permit cycle after IDEQ has sufficient data to implement the effects of the receiving stream waste load allocation.
- Further interrogating IDEQ's nitrogen concerns in WFLBC, in 2008 IDEQ completed a TMDL analysis for WFLBC (*3*), which is a tributary of the Potlatch River. According to the TMDL, IDEQ concluded that excess nutrients, including contributions from the Troy WRRF, are the primary cause of low in-stream DO concentrations. More specifically, the TMDL states that WFLBC is a nitrogen-limited system, based on an observed dissolved inorganic nitrogen (DIN)-to-orthophosphate (OP) ratio of 6.6-6.8; in other words, nitrogen limits periphyton growth and thus prevents DO depletion and adverse pH effects. This conclusion is based exclusively on guidance from Stevenson et al. (*4*), who note that DIN:OP ratios < 10 indicate a nitrogen limitation to periphyton growth. In fact, the TMDL does not explore any other potential causes, nor remedies to, low DO in WFLBC. Thus, IDEQ is exclusively focused on controlling nitrogen concentrations in WFLBC to sustain DO.
- Building from the apparent N limited condition articulated in the TMDL, the Fact Sheet for Troy's recent IPDES permit (Tables 16, 19 therein) states that DIN data collected during the proposed new permit cycle will be used by IDEQ to develop a total nitrogen WLA, including NO_x, for a future permit. The ultimate aim is to sustain high in-stream concentrations. However, in reviewing the TMDL, it would appear that data used in the nitrogen assessment are based on measurements of DIN and OP **downstream** of the WRRF. Thus, the Troy WRRF implementing nitrification – to comply with NH_3 toxicity requirements – simply shifts the form of DIN from NH_3 to NO_x, and thus the DIN:OP ratio **will not change**. In other words, data in the TMDL suggests that decreasing the existing DIN:OP ratio by requiring Troy to remove NO_x will likely not affect WFLBC DO.
- Significantly augmenting the TMDL analyses, several studies have been conducted on WFLBC by Dr. Erin Brooks and his team at the University of Idaho, with an emphasis on better understanding in-stream water quality, the effect of the Troy WRRF discharge on WFLBC water quality, and the existence of a high juvenile salmonid densities in WFLBC. Regarding observed DO concentrations below the State regulatory target of 6 mg/L, Brooks et al. (*5*) concluded that WRRF NH_3-N concentrations exceeding 5 mgN/L were a

most likely cause (and not DIN nor the DIN:OP ratio). Similarly, Sanchez-Murillo et al. (*6*) concluded that in-stream nitrification was the primary cause of low WFLBC DO concentrations. In seeking potential remedies to the occasional low DO concentrations in WFLBC, Brooks et al. (*7*) determined that an increase in stream flow of 0.05-0.10 cfs (released from Big Meadow Reservoir upstream of the WRRF) could remedy the DO problem. Perhaps just as critically, Brooks et al. (*5*) and Sanchez-Murillo et al. (*6*) also concluded that otherwise imposing such strict IPDES permit limits on the Troy WRRF would lead to discharge removal during the summer.

- While Troy could speculate on future permit limits, and act accordingly to upgrade the treatment facility in a manner that hopefully will be permit compliant with the next IPDES permit, such actions now would be unwise and financially irresponsible given the permit uncertainty.

Discharge Permit limitations at best can be difficult to predict and at worst can be very surprising. Today's regulatory environment has become highly uncertain and volatile, given evolving targets for in-stream water quality criteria. While science ideally drives water quality criteria and IPDES limits, such processes do not always comprehensively factor in environmental adaptability of aquatic life, etc. Given the regulatory uncertainty and recognizing that potential new limits often are imposed to at least allow time for the WRRF to implement necessary improvements, the following potential discharge permit implementation schedule has been prepared (**Table 3-3**) to help the City better plan future upgrades.

Table 3-3: Potential Discharge Permit Implementation Schedule (Average Monthly Limits)

Parameter	2022	2027+
BOD_5	30 mg/L	30 mg/L
TSS	30 mg/L	30 mg/L
Ammonia	2.2 mg/L	0.2 mg/L
Temperature	NA	10^0C
Phosphorous	NA	1 mg/L
TIN	NA	3 mg/L

Section 4 DEVELOPMENT AND SCREENING OF ALTERNATIVES

4.1 Alternative Selection Impact Factors

Improvement alternatives have been identified for the collection system and WRRF based upon the preceding analysis. To assist the City with decision-making and alternative selection, the alternatives have been separated into two categories:

1. Collection system alternatives
2. Wastewater treatment system (WRRF) alternatives

Within the treatment system category there are two main subcategories:

- Improvements independent of the permit limitations;
- Improvements dependent upon the permit limitations.

The collection system and wastewater treatment system alternatives are described in detail in the following sections.

4.2 Do Nothing Alternative

The do nothing alternative is always an option and needs to be considered. When considering the do nothing alternative it is important to realize that all components of the entire system have a useful life and that once exceeded, action is necessary to maintain a functioning and operational system. The City also has required compliance tasks included in their IPDES permit that will need to be addressed in some manner with IDEQ.

As the collection system continues to age the community should expect the condition of the piping and manholes to deteriorate and subsequently increase flows to the WRRF. Ultimately the increased flows will overwhelm the WRRF and permit violations will occur. Without mitigating I/I, treatment facilities must be upsized to treat the combination of actual wastewater flow plus I/I to the requirements of the discharge permit. These upgrades will result in higher capital and operational costs at the treatment facility. As pipe, particularly concrete and DI, deteriorates to a condition where the top of the pipe collapses sinkholes can develop as material is transported down the pipe. The same conditions can exist when the concrete in manholes deteriorates and allows excessive I/I to enter the collection system. The primary benefit of the do nothing alternative is to push the costs associated with replacement to a later time.

The WRRF is more complicated than the collection system and the do nothing alternative would cause increased frequency of discharge permit violations. The treatment facility is not capable of meeting the ammonia discharge limit without improvements. A potential benefit of the do nothing alternative at the WRRF would be to delay capital costs, but this apparent savings may be rapidly offset by discharge violation fines.

The Do Nothing Alternative is not recommended for either the collection system or WRRF.

4.3 Collection System Improvements

A manhole condition assessment (**Appendix C**) was conducted by Mountain Waterworks and Idaho Rural Water Association in 2017 to:

- Develop an accurate map of the City's collection system showing manhole locations, pipe material, and pipe diameter that can be used as the basis for future collection system work and serve as a resource for City operation staff to facilitate collection system maintenance. A copy of the map is provided in **Appendix D**.
- Summarize manhole construction details such as size and approximate depth to invert. This information is contained in **Appendix C.**
- Record deficiencies related to construction materials, leaks, root intrusion, and corrosion that could be used as a basis to prioritize pipe and manhole replacement.

After the condition assessment was complete, the results were used to identify current and anticipated problem areas in the collection system that expose the Cities WRRF to higher volumes of I/I and subsequent reduced treatment performance. Pipes and manholes were grouped in three replacement priority areas based on the following criteria, with Priority 1 being the highest priority for replacement (**Figure 4-1**).

1. **Pipe Age and Material:** The Troy collection system contains pipes constructed of four different materials:
    - Concrete
    - AC transite
    - DI
    - Plastic (PVC)

    Originally, sewer collection systems were constructed from clay, concrete, and later, AC pipe. PVC became the material of choice after it was introduced as corrosion resistant, lighter, and easier to install. Additionally, heath concerns arose with asbestos material and production of AC pipe ceased in the U.S in the early 1970s. The collection system contains approximately 15,750 feet of concrete or AC pipe, indicating that these areas likely contain the oldest infrastructure. Combined, these pipe materials make up 49% of the collection system. No clay pipe is believed to be incorporated in the collection system. It is likely that the concrete and AC pipe are in excess of 50 years old and portions may be in relatively poor condition.

    Concrete pipes and manholes are prone to corrosion damage caused by acids present in the soil or produced through the breakdown of organic material present in wastewater. Consequently, concrete pipes have a relatively short design life of 50 – 60 years compared to modern pipe materials that are resistant to acid attack, such as PVC or high-density polyethylene (HDPE). Due to its weight, concrete pipe was typically installed in 4-foot lengths. Consequently, concrete pipe networks have many joints that can fail and allow groundwater infiltration into the system. The concrete pipe in the collection system is approaching or beyond the end of its design life and is due for replacement to prevent additional leaks or breaks that contribute to I/I. The AC pipe is also likely over 50 years

old; however, it appears to have been less susceptible to deterioration than the concrete pipe. Three areas in the community have AC pipe and its condition should be evaluated prior to a determination as to whether it should be replaced. In some cases, it is advisable to leave AC pipe in place. Based on the combination of these factors, pipe material and age were given the most weight in assigning pipes a priority replacement areas. All pipes included in the replacement priority 1 are concrete or AC.

2. **Pipe Location:** Pipes located in low-lying areas and near surface water are more prone to groundwater infiltration than pipes located in areas where ground water levels are only intermittently above the pipe elevation. This is especially true of concrete pipe sections, which has more joints per foot of installed length than other pipe material. Pipe location was given the second highest weight in assigning pipes a priority.
3. **Manhole Condition:** If the manholes in a sewer line are in poor condition it is more likely the pipe segments connecting the manholes are also in poor condition. Manhole condition was also used to identify individual manholes for spot repairs or replacement.

All manholes connecting pipe segments are included for replacement in each respective priority area. Several individual manholes not included in the three priority areas have been identified for spot repair (e.g., polyurethane or epoxy-based spray-on coatings) or replacement. All new manholes will be precast concrete with sealed pipe penetrations and joints.

Priority area replacement will be completed using either conventional open-trench construction or pipe bursting (i.e., trenchless replacement). Pipe bursting consists of pulling new HDPE pipe through an existing pipe between two manholes behind a cone-shaped expander head that is larger in diameter than the existing pipe. The expander head breaks the existing pipe into fragments that are left in the soil and the existing pipe is replaced without the need to completely excavate city streets. The new pipe is pulled through the hole left by the expanding head. Excavation is required to reconnect all services and to provide for manhole reconnections and replacement. Although, surface restoration is also still required, and it is usually not as extensive as would be required for replacement using open trench technologies. However, pipe bursting will not correct existing pipeline and grade (bellies in piping) issues. Therefore, it should not be used without some prior investigative work.

NORTH

0 400 800 1200

SCALE: 1" = 800'

LEGEND:

TROY CITY BOUNDARY

SEWER LINE:

UNKNOWN

ASBESTOS CEMENT

CONCRETE

DUCTILE IRON

PVC

PRIORITY 1 COLLECTION SYSTEM
6,375 FT

PRIORITY 2 COLLECTION SYSTEM
7,140 FT

PRIORITY 3 COLLECTION SYSTEM
20,640 FT

TOTAL PIPE LENGTH = 34,155 FT±

STATE HWY 8 - TO MOSCOW

HWY 8

WRRF

STATE HWY 99

PROJECT	170.0020.01
DATE	9/18/2019
FIGURE NO.	4-1

Mountain WATERWORKS

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IDAHO OFFICES
BOISE · LEWISTON · COEUR D'ALENE

WASTEWATER FACILITY PLAN

TROY, IDAHO

COLLECTION SYSTEM PRIORITIES

Path: B:\Projects\S-Z\Troy_170\0020_Study and Report\CSD\170020 Collection System_Fig 4-1.dwg File Name: 170020 Collection System_Fig 4-1.dwg Plot Date: 10/8/2019 11:47 AM SBennett

4.3.1 Alternative CS-1: Collection System CCTV Inspection

The City has not conducted any recent CCTV surveys to determine the condition of the collection system. At a minimum, the City should conduct a CCTV survey of all pipes included in the Priority 1 – 2 areas (**Figure 4-1**) to:

- Identify if piping is structurally deficient.
- Identify if piping is contributing to I/I.
- Confirm pipe condition and segments included in each priority area.
- Confirm pipe locations, lengths, and terminations on segments for which terminal manholes could not be located during the manhole condition assessment.
- Confirm pipe construction and manhole locations in the following areas:
    - The sewer line under Duthie Park Road. This is a long section of pipe for which no manholes could be located during the condition assessment and that appears to serve few if any active connections.
    - The sewer line under City Park and along Highway 8 between Manholes 21C-2 and 21E. This section includes sewer lines for which terminal manholes could not be located.

Accumulated solids and debris were observed in many manholes during the condition assessment, indicating much of the system should be hydro-jetted to remove debris. This work can be performed by City staff, or by the CCTV contractor for an additional cost, and is required prior to the CCTV survey.

Additional CCTV survey of newer PVC and DI pipe sections (Priority 3), could also be conducted to identify locations where spot repairs could be made to correct construction deficiencies, such as rolled gaskets or pipe breaks, if desired by the City. In the event the City elects to initially replace only a portion of its concrete and AC pipe, the CCTV records will be used as the basis for determining the extent of the work necessary and which methods of replacement are most appropriate.

4.3.2 Alternative CS-2: Priority 1 Pipe and Manhole Replacement

Given that there is I/I arriving at the WRRF, and considering the age and material or the collection pipe, it is likely the CCTV inspection will show that some, if not all, of the collection system lines identified as Priority 1 will need to be replaced. Therefore CS-2 has been preliminary identified as the minimum amount of collection system pipe that will need to be replaced.

The Priority 1 Area includes approximately 2,400 feet of concrete pipe installed under Front Street and two stub lines under W. Cleveland and South Bentz streets in a relatively low-lying area near West Fork Little Bear Creek. Based on the age and type of the pipe and condition assessment, manholes in this section are generally in poor condition with multiple leaks and construction defects, or damage to channels, aprons, and grade rings. Given the condition of the manholes and proximity to the creek, this line is at elevated risk for I/I. Pipe and manholes included in the Priority 1 area are shown in **Figure 4-1.** Based on the manhole condition assessment survey, the

individual manholes listed in **Table 4-1** are proposed for replacement as part of Priority 1 in addition to all manholes included in the Priority 1 pipe sections.

Table 4-1: Priority 1 Individual Manhole Repair/Replacement

Manhole Number	Proposed Action	Observed Defects
36J	Repair	Leaking joints, debris on apron
3	Replace	Concrete spalling, root intrusion
13	Replace	Concrete damaged by H_2S corrosion
14B	Replace	Three large leaks in bottom section and base
14F	Replace	Root intrusion

After Priority 1 and Priority 2 lines have been CCTV'd it may be necessary to adjust how much of the collection system needs to be replaced.

Collection system piping and manhole replacements can be packaged into different sized projects based on amount and type of similar work, as well as community area. This work can also be partitioned to align with the City finding strategies. These issues will need to be revisited after the CCTV work is complete.

4.3.3 Alternative CS-3: Priority 2 Pipe and Manhole Replacement

The Priority 2 piping includes those areas where piping is likely to need to be replaced due to age, and pipe type but it is less likely to contribute to I/I. Piping and manholes identified as Priority 2 may be reclassified as either Priority 1 or 3 based on the CCTV survey results. However, the identified Priority 2 sections includes a large amount of aging pipe and manholes that are in poor condition. This area contains approximately 2,800 feet of concrete pipe and 1,750 feet of AC pipe. Many manholes in the Priority 2 area are leaking, have root intrusion through the joints, or are not grouted, indicating the pipe segments may be in poor condition as well. Roots or lack of grout can result in high I/I during times of high groundwater. The individual manholes listed in **Table 4-2** are proposed for repair or replacement as part of the Priority 2 work in addition to all manholes included in the Priority 2 pipe sections.

Redesigning the likely funding situation for the City will need to prioritize many other collection and WRRF upgrades ahead of Priority 2 pipe and manhole work. It is most likely that only the worst of pipe segments and manholes will garnish attention.

Table 4-2: Priority 2 Individual Manhole Repair/Replacement

Manhole Number	Proposed Action	Observed Defects
4	Repair	Joints were not grouted
10	Repair	Broken channel with missing pieces
12	Repair	Channel damaged, does not match pipe invert
49	Repair	Ram-Nek joint sealant applied improperly; wall has hole patched with Ram-Nek
14D-1	Repair	Cone damage, pieces missing
14E	Repair	Grade rings not grouted
21B	Repair	Grade rings not grouted
21C	Repair	Grade rings not grouted
21C-2	Repair	Grade rings not grouted
26E	Repair	Risers not grouted
14A	Replace	Brick risers likely to leak, rungs in poor condition
14C	Replace	Brick risers likely to leak, concrete spalling, rungs in poor condition
34A	Repair	Offset cone section
34B	Repair	Offset grade rings
14F-1	Replace	Brick construction, likely to leak

4.4 Treatment Facility Improvements

The IPDES permit requires compliance with an ammonia effluent limit of 2.2 mg/L based on a monthly average by October 1, 2031. The facility is not capable of meeting the ammonia limit without treatment upgrades, and if further nutrient and/or other stringent pollutant limitations are imposed in future permits, additional extensive upgrades will be required. Given the wide range of potential discharge limit requirements, the improvements described in this section are generally categorized into:

- Level of treatment improvements considering current IPDES permit limits
- Level of treatment improvements considering potential reuse permit limits (discontinue surface water discharge)
- Level of treatment improvements considering stringent future IPDES permit limits

Treatment system needs to be considered under the current IPDES permit include:

- Headworks upgrade including influent flow measurement
- Aeration system and nitrification upgrade
- Improved disinfection effectiveness
- Solids management
- Operations audit and training

4.4.1 Alternative TF-1: Headworks Upgrade

The function of a headworks is to remove inorganic, non-biodegradable solids contained in the raw wastewater to prevent damage and maintenance problems in downstream unit processes and equipment. Headworks components include screening and grit removal. Independent of the method of secondary treatment and final disposition of the effluent, influent screening (1/4 inch or less openings) is recommended for the Troy WRRF. There are several screen makes/models that have proven effective in many installations for decades.

Automated mechanical screens use an electric motor auger drive to remove inert solids from the influent flow. An example of the type of mechanical screen that would typically be installed in a facility similar to Troy's is shown in **Figure 4-2** and a conceptual drawing of the headworks with the mechanical screen installed is shown in **Figure 4-3**. As solids (plastics, trash, organics) collect on the screen the water level rises upstream. Once the water level reaches a predetermined height, a level sensor starts an auger to transport the captured inert solids out of the channel. Organics are washed off the screen and back to the influent. The unit washes and compacts the inert solids before they are discharged into a trash collection bin and transported to a landfill for disposal by the local trash collector. Operational requirements are typically limited to removing dewatered solids, ensuring the screen and auger are working correctly, and performing regular maintenance on mechanical components. Influent flow metering utilizing a new flume would also be part of the headworks upgrade.

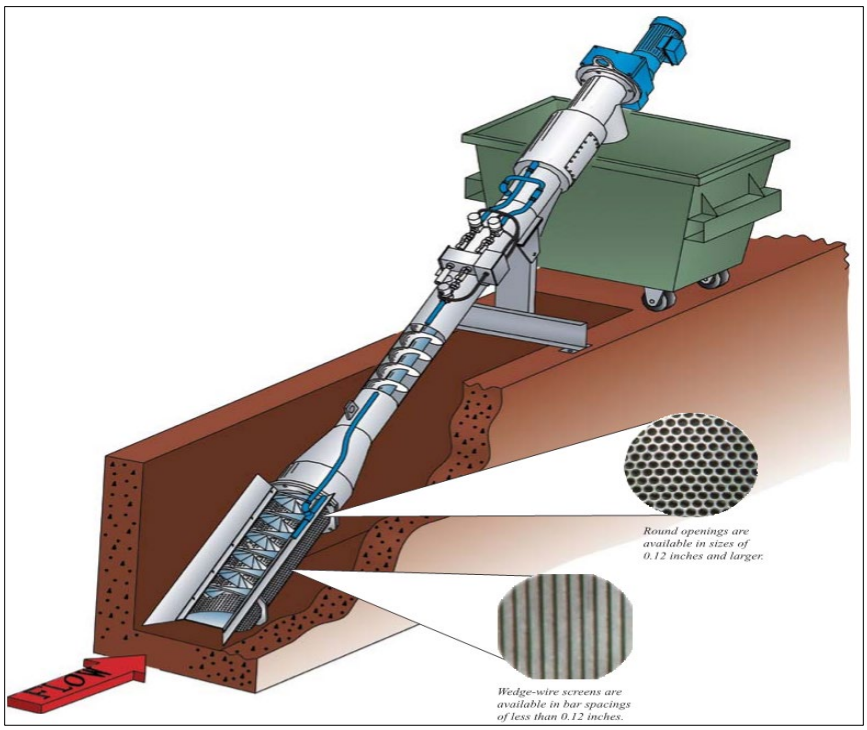
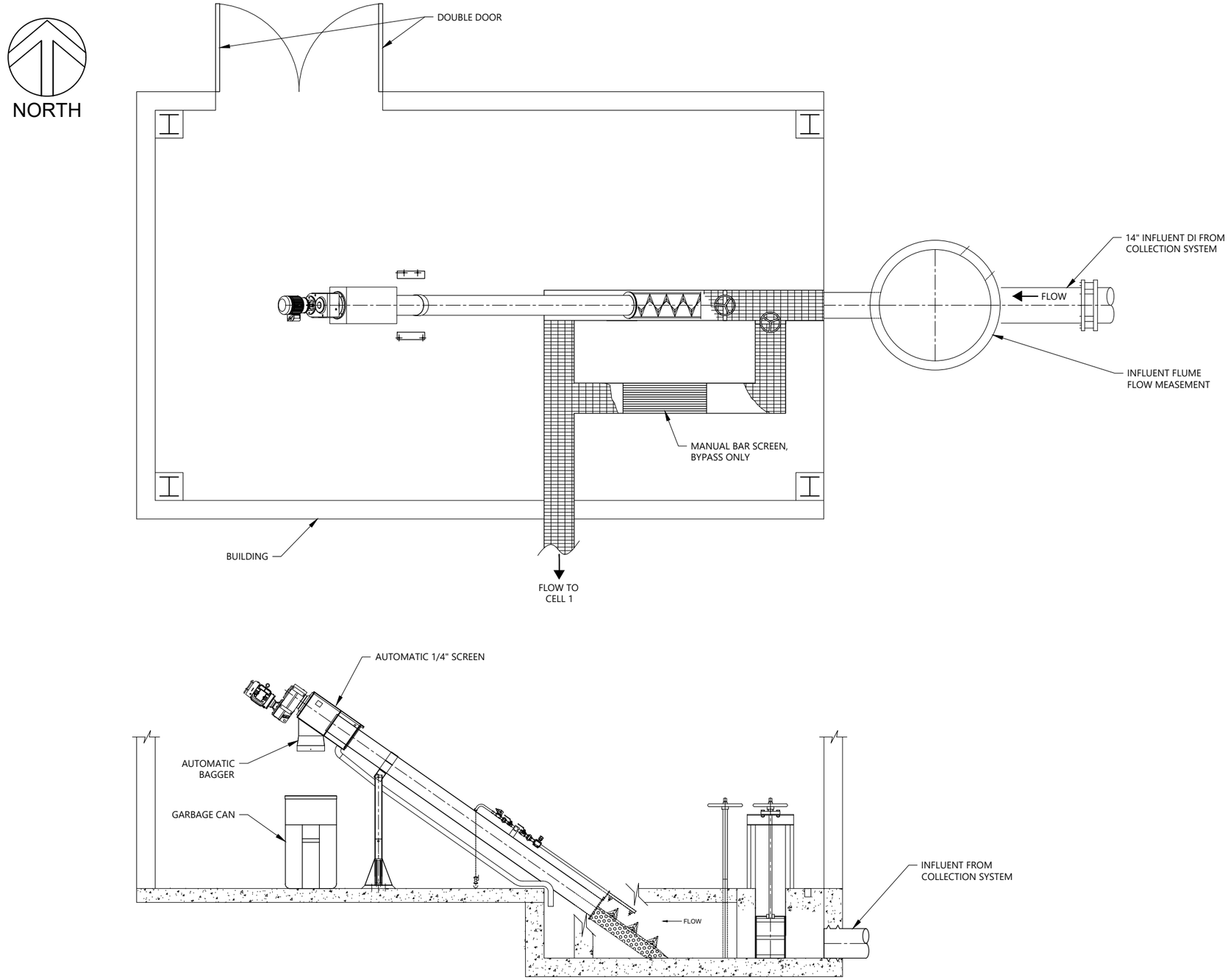


Figure 4-2: Typical Mechanical Screen



HEADWORKS AND SCREEN SECTION

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DATE	9/18/2019
FIGURE NO.	4-3

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ALTERNATIVE TF-1 HEADWORKS
AUTOMATIC SCREEN

The existing WRRF headworks does not have screening or flow measurement capability. Instead, trash passes through the comminutor and accumulates in the treatment cells and contact basin and can exit the plant in the treated effluent. A new mechanical screen with ¼-inch openings will remove plastics, rags and larger solids upstream of the treatment cells. Benefits of mechanical screens include:

- Lower solids accumulation rate: Inert material is removed upstream and will not accumulate in the treatment cells.
- Improved effluent quality: Solids removal reduces the load on the treatment process and lessens the likelihood that trash will make it through the process and be discharged in the effluent.
- Decreased maintenance requirements: The potential for fouling or clogging of pumps and air diffusers is reduced, and operations staff will need to remove trash from the treatment basins, the sedimentation basin, or the weirs between the cells on a much less frequent basis.
- Increased operator safety: Trash and rags are automatically removed and bagged prior to entering the treatment process, resulting in decreased contact time with wastewater by operations staff.

Due to snow and below-freezing weather during winter months, the new mechanical screen should be housed in an insulated building to lessen maintenance requirements and eliminate the need to heat trace and insulate the screen to prevent freezing. The building will be classified as a Class I Division I hazardous location due to the potential accumulation of ignitable gases (e.g., methane) that are associated with raw wastewater. All electrical equipment installed inside the building will be NEC-rated as explosion proof. The building will be constructed over the influent channel to minimize site and process disturbance.

Influent flow measurement utilizing a flume and liquid level indicator will be integrated into the headworks process.

Alternative TF-1 is recommended in all treatment upgrade alternatives.

4.4.2 Alternative TF-2: Aeration System and Nitrification Upgrades (Meet Current Permit)

The existing WRRF is a partially mixed aerated lagoon system. Since construction in the early 1990s the facility has operated continuously and has produced a generally acceptable effluent relative to the City's historic NPDES and current IPDES permit. The realized permit violations are likely due to a non-flow paced disinfection system and excessive WRRF HRT causing favorable conditions for productions of sizable quantities of algae and duckweed in the lagoon effluent.

Acceptable effluent BOD_5 and TSS from a lagoon system can be achieved by first addressing the reduction of the organic load and second by controlling algae (which happens when HRT is excessive). Generally, soluble BOD_5 can be expected to be below 10 mg/L (20°C) at HRTs of approximately 2 days. Most of the BOD_5 reduction occurs in this time frame in a completely mixed environment. A complete mix cell requires power levels above 30 hp/MG. Based on the 20-year predicted maximum month average day influent flow (204,610 gpd) and the existing Cell 1

Volume of 500,000 gallons, the resultant HRT is approximately 2.4 days. At predicted average day flows (130,508 gpd), cell 1 HRT increases to 3.8 days. As long as adequate mixing power levels are maintained, algae growth will be inhibited and Cell 1 effluent BOD_5 of less than 30 mg/L should be expected.

Using diffused air for mixing requires 20-30 ft^3 per minute per 1,000 ft^3 of treatment basin volume. For Cell 1, that equates to 1,336 to 2,000 SCFM of diffused air. Two-40 hp positive displacement blowers, each at 1,000 SCFM would be needed to meet this requirement. A third 40 hp unit would need to be available as a standby unit.

Alternatively, floating down-draft mechanical mixers could be used to provide mixing energy and a static tube coarse bubble diffused air system could be used to meet oxygen requirements. Mixing energy could be met by 3-5 hp floating units with a fourth unit purchased as standby. BOD_5 reduction would require approximately 275 SCFM using coarse bubble diffusers. Oxygen requirements could be met with a 15-horsepower positive displacement blower. A second blower would be required for redundancy. **Table 4-3** summarizes the horsepower requirements for the two types of systems. The equipment would operate continuously; clearly the "Hybrid" system provides for the least long-term cost and will be the system proposed.

Table 4-3: Horsepower Requirements

System	Total Operating Horsepower
Diffused Air Complete Mix System 2-40 hp Blowers Plus Diffused Air Aerators	80
Hybrid Floating Mixers Diffused Air Complete Mix System 3-5 hp mixers, plus 1-15 hp blower, plus Diffused Air Aerators	30

Addressing ammonia reduction will require process modifications beyond single pass aerated lagoons. Utilizing Troy's concrete lined basins, two options were developed. The first option is to include recycle of the mixed liquor from the end of reactor basin (Cell 1) and return a portion of it to the head of the plant with the other portion being intermittently discharged to Cell 2. Operationally this system is simple and will require only a submersible pump station, piping, DO control, and a programmable logic controller (PLC). The submersible pump station already exists, although its location is not desirable; DO control and the PLC can be added. During warmer months this type of system will nitrify. However, its performance will be difficult to predict during cooler times of the year and during the coldest time of the year may not nitrify to a level that will produce the <2.2 mg/L ammonia permit limitation.

The second option is to install a suspended fixed film media designed to provide surface area to help concentrate the nitrifying bacteria in the front of Cell 2. An HRT of < 1 day would be satisfactory in this unit process and correspondingly, the existing Cell 2 would need to be partitioned. Floating HDPE curtains would be appropriate to achieve partitioning.

Following nitrification, sufficient basin volume needs to be provided for solids to settle, accumulate, and further decompose. This volume needs to be aerated and mixed at a power level of between 5 and 8 hp/MG. Sufficient oxygen needs to be provided to ensure an oxygenated cap remains in the upper/top of the water column. Two basins downstream of the nitrification unit process, each with an HRT of approximately one day, should be incorporated. Providing HRT in

excess of 1 day gives an opportunity for conditions to foster algae growth. The existing Cell 3 can be used during maintenance periods or as a redundant treatment cell if an emergency should arise. The existing Cell 4 is un-necessary and can be completely bypassed. The proposed treatment system upgrade is summarized as follows:

- Existing Cell 1: Convert to complete mix using 3-5 hp floating mixers and a 15 hp diffused air system. At ten feet of water depth, the HRT will vary between 6.25 days (current) and 2.45 days (future). This upgrade provides required BOD_5 reduction.
- Existing Cell 2: Partition the 0.5-million-gallon basin into three zones as follows.
    - Convert first 0.2 million gallons to an aerated suspended growth system for nitrification. At ten feet of water depth, the HRT will vary between 2.5 days (current) and 1.0 day (future). This upgrade provides ammonia reduction to less than 2 mg/L.
    - Using HDPE curtains, convert second 0.2 million gallons to a lightly aerated and lightly mixed (5-8 hp/MG) settling cell. Use a 1 hp floating mixer and a pair of static tube diffusers. The resultant HRT will vary between 2.5 days (current) and 1.0 day (future). The mixing energy is sufficient and HRTs are low enough to minimize algae production.
    - Convert the last 0.1 million gallons to a lightly aerated settling cell; no separate mixing is required. Ten feet of water depth. HRTs of between 1.25 days (current) and 0.49 (future). Short HRTs minimize algae production.
- Bypass existing Cell 3. This cell can be used as short-term emergency storage basin to facilitate maintenance activities for Cells 1 and 2.
- Bypass existing Cell 4. This cell could be utilized to facilitate future contract sludge removal.
- Maintain the existing pump station; it could be used to facilitate transfer of water from one cell to another for maintenance purposes.
- Abandon the existing solids tank and system.
- Construct new disinfection facility to house chlorination/dechlorination and effluent flow measurement equipment. Remove disinfection equipment from existing building.

In addition to biological treatment, the purpose of this alternative is to lessen the negative impacts of algae production on disinfection and provide an environment conducive to concentrating solids where they can decompose (Cell 2). By concentrating solids in Cell 2, future sludge removal efforts can be better predicted and managed. Furthermore, by lessening HRT heat in the process can be better retained and nitrification efforts will be more successful. **Section 5** details the breakout of selected portions in this alternative. **Figure 4-4** presents the components of this alternative superimposed over the existing treatment facility. Note that Alternative TF-1 would be included with Alternative TF-2.

NORTH

0 20 40 60

SCALE: 1" = 40'

NEW DISINFECTION AND FLOW RECORDING FACILITY

EXISTING FRP CHLORINE BUILDING TO REMAIN

NEW 5 hp BLOWERS

NEW AIR PIPING

NEW 15 hp BLOWERS

NEW HEADWORKS

NEW DIFFUSED AIR AERATOR

NEW 5hp FLOATING MIXER CELL 1

NEW SUSPENDED FIXED FILM NITRIFICATION MODULES

NEW HDPE BAFFLE CURTAIN

NEW 1hp FLOATING MIXER *CELL2 AND *CELL3

EXISTING CELL 3 BYPASSED

EXISTING CELL 4 BYPASSED

* EXISTING CELL 2 BECOMES NEW CELL 2 AND CELL 3

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FIGURE NO.	FIGURE 4-4

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ALTERNATIVE TF-2
WRRF IMPROVEMENTS

4.4.3 Alternative TF-3: Land Application

Given the uncertainties with the City's future IPDES permit, Alternative TF-3 focuses on effluent land application or beneficial reuse. The land application alternative is directed towards eliminating the WRRF's discharge to surface water and abandoning the IPDES permit in favor of a land application permit. To implement this alternative, it will be necessary to store the portion of the effluent that cannot be used for irrigation during the non-growing season. The amount of winter storage volume and crop land area required vary depending on what type of crop is grown. Summarized in **Table 4-4** are several different combinations of crop, storage, and land requirements. For the purposes of facility planning, the recommended crop is mixed-culture conifers (natural forest-like).

Table 4-4: Land Application Crop, Storage and Land Requirements

Land Application Alternative			
Moscow, ID NWS Station			
Crop	**Growing Season**	**Land Area (acres)**	**Storage Volume (MG)**
Grass Hay	Apr - Jul	180	32.5
Cottonwoods	Apr - Sep	55	30.5
Conifer Mixed Culture	Apr - Sep	60	29.5
IWR Source data: http://data.kimberly.uidaho.edu/ETIdaho/			

The WRRF will store effluent in the winter (non-growing) season and there will be no surface water discharge from the WRRF. **Figure 4-5** represents a water balance for a mixed-culture conifer forest using "Orchards – no ground cover" as the surrogate ET Idaho crop selection, as recommended in the 2012 draft forested land application guidance published by IDEQ. Based on the calculations provided in **Appendix J**, the forested land application site is anticipated to be approximately 60 acres in size. However, additional acreage should be acquired, if available, to afford the City flexibility in the crop(s) ultimately selected for use.

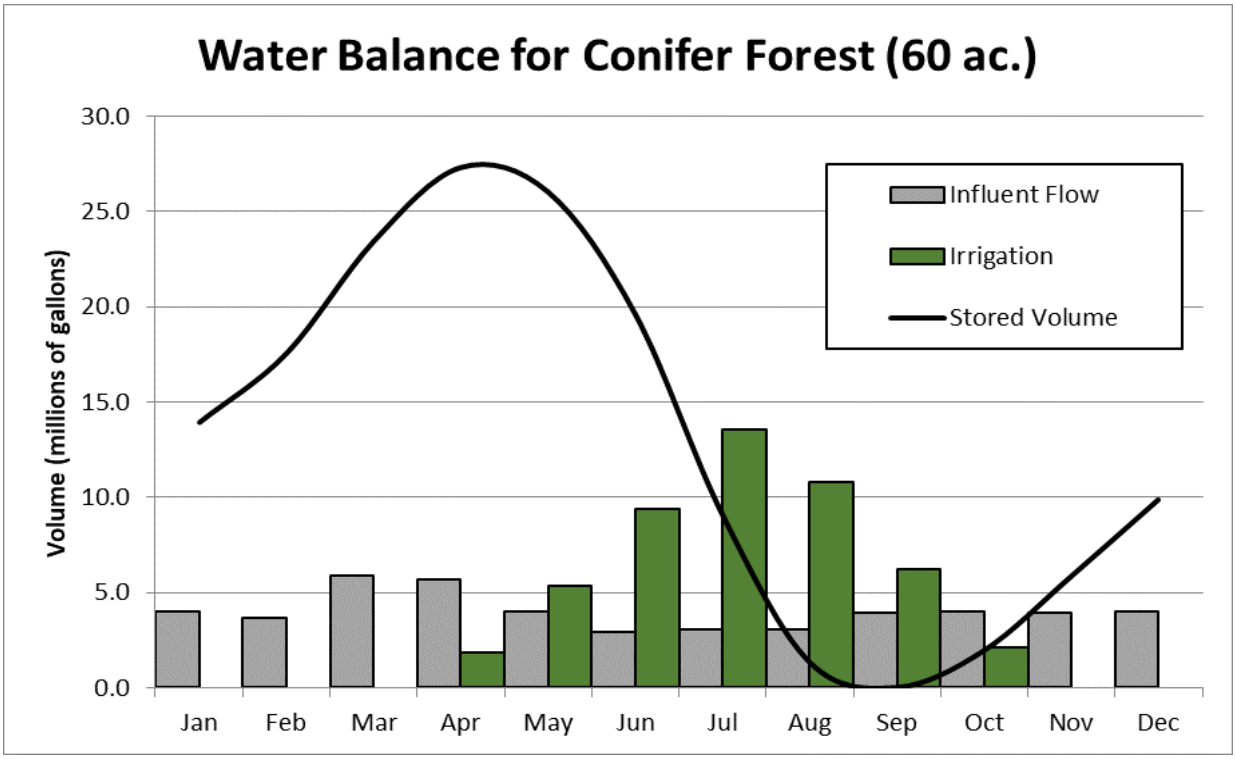

Figure 4-5: Water Balance for Mixed Conifer Forest

In the land application alternative, there remains a need to adequately measure and screen influent, treat the wastewater to lessen the likelihood of odors at the effluent storage site and provide appropriate disinfection for pathogen reduction. The headworks and treatment system proposed in Alternatives TF-1 and TF-2 can provide those function, except there is no need for the nitrification system. The treatment system modifications are summarized as follows:

- Existing Cell 1: Convert to complete mix using 3-5 hp floating mixers and a 15 hp diffused air system. At ten feet of water depth, the HRT will vary between 6.25 days (current) and 2.45 days (future). This upgrade provides required BOD_5 reduction.
- Existing Cell 2: Convert into 3-equally sized cells (0.167 million gallon [MG]), separated by HDPE curtains. At ten feet of water depth, each cell's HRT between 2 days (current) and 0.8 days (future). The cells would be lightly aerated using diffused air and incorporate 1 hp downward acting floating mixers. Mixing energy is sufficient and HRTs are sufficiently short to minimize algae production.
- Bypass existing Cell 3: the cell can be used as equalization storage, if needed, for pumping to the main storage cell at the land application site. Biosolids removal from Cell 3 is required.
- Existing Cell 4: Bypass.
- Existing Pump station: Bypass.
- Existing solids tank and system: Demolish.
- Construct new disinfection facility to house chlorination and effluent flow measurement equipment. Remove disinfection equipment from existing building.
- Construct new pump station to pump effluent to winter storage cell.

- Construct 32-MG winter storage cell.
- Construct irrigation pump station at land application site.
- Construct irrigation system at land application site.

At this facility planning stage, a proof of concept is presented. A conceptual layout of the land application assuming a 100-acre site is presented in **Figure 4-6**; with the land application site either to the West or East of the WRRF. The selected site could be constructed on the lands indicated or other nearby sites. There are many different possibly combinations of land application and storage sites. However, the farther the land application and storage site are away from the WRRF the more it will cost to construct and operate the system.

A new reuse permit will be required for implementation of Alternative TF-3. A permit application and technical report will be prepared and submitted to IDEQ for permit issuance. The permit conditions will be specific to the site, crops grown, and local conditions. Based on other reuse permits issued with similar conditions as Troy, the anticipated reuse permit monitoring requirements are summarized in **Table 4-5**.

Table 4-5: Anticipated Land Application Monitoring Requirements

Sample Location/Type	Frequency	Constituents/Parameters
Recycled water prior to irrigation	Weekly during periods of use	Total Coliform
Recycled water prior to irrigation	Monthly during periods of use	Total Kjeldahl nitrogen, Nitrite + nitrate nitrogen, Total phosphrus, TDS, COD, pH
Recycled water prior to irrigation	Daily	Flow
Recycled water site	Daily	Record location of recycled water application
Recycled water site groundwater well(s)	Twice annually (before and after recycled water application)	Total phosphorus, Chloride, Nitrate-nitrogen, Nitrite-nitrogen, TDS, Specific conductance, Total Coliform, pH, groundwater elevation
Recycled water site soils	Annually	Electrical conductivity, Nitrate-nitrogen, Ammonium nitrogen, Plant available phosphorus, pH, SAR, Iron, Manganese
Harvested crops	Each harvest	Crop type, Harvest date, Harvested acreage, Crop yield, Moisture content, Ash, Total Kjeldahl nitrogen, Nitrate nitrogen, Phosphrous

An annual report summarizing the above data and information is required to be prepared and submitted to IDEQ.

NORTH

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SCALE: 1" = 2000'

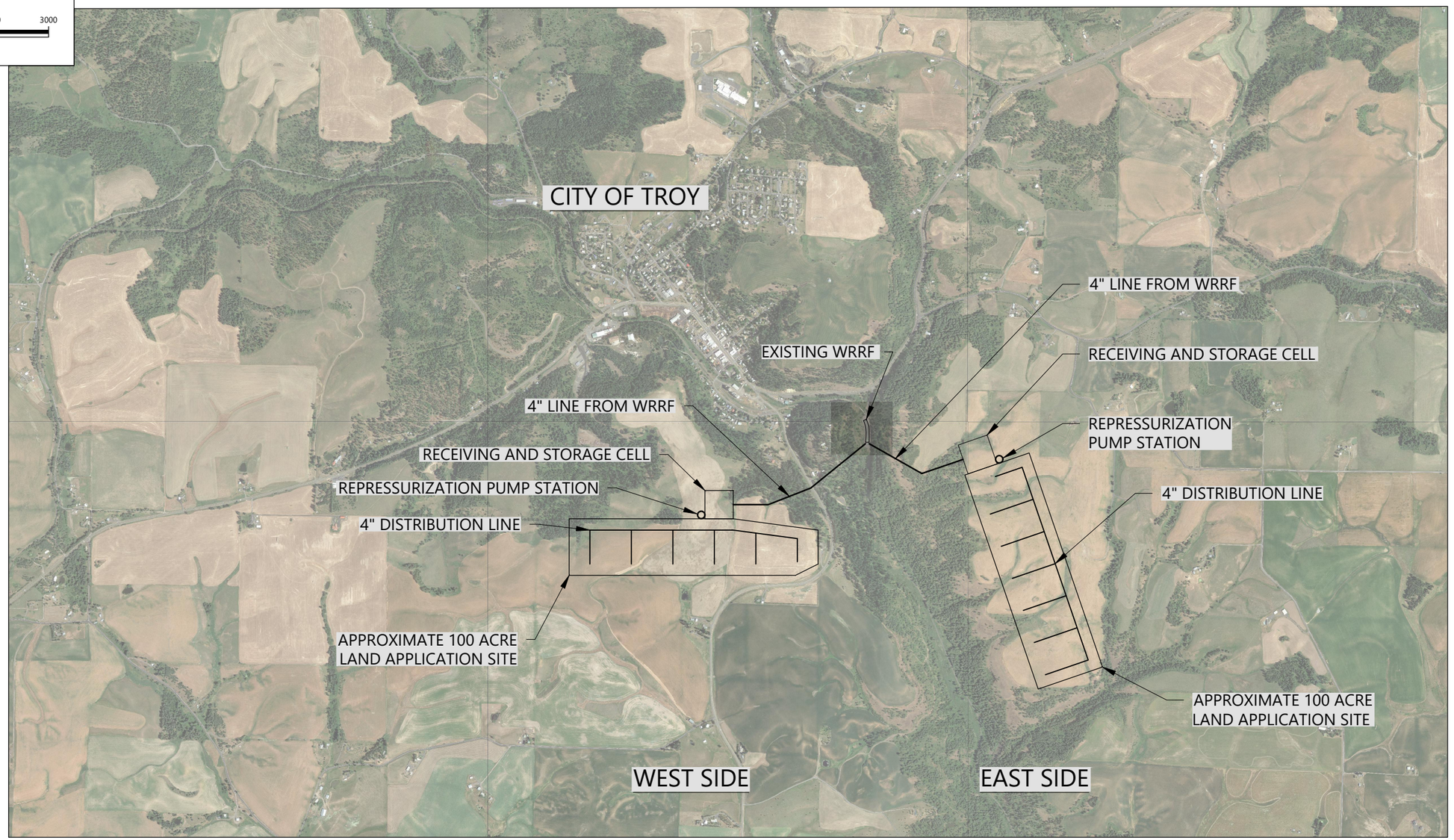

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FIGURE NO.	4-6

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ALTERNATIVE TF-3 SLOW RATE LAND APPLICATION ALTERNATIVES

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4.4.4 Alternative TF-4: Future IPDES Permit-Dependent Treatment Alternatives

It is not known what future IPDES permits will include: however, various potential limitations under future IPDES permits can be used to demonstrate how a change in permit limits can impact the treatment process and subsequent costs.

Future permits may include more stringent effluent limits on ammonia, total nitrogen, and possibly phosphorus (see **Table 3-3**). These limits could be seasonal, could be year-round, or could vary with streamflow in the receiving water body. Addressing limitations associated with existing stream flows are expected to be exceptionally problematic, as the WRRF discharge accounts for the majority of the stream flow during what would be the most critical time of the year (July, August, September). The recommended treatment method that could be implemented to meet ammonia (NH3), total nitrogen (TN), and total phosphorus (TP) limits includes a mechanical activated sludge process.

- Activated sludge refers to a wide array of process configurations that utilize suspended biomass and completely mixed tanks or basins to provided treatment. Depending on how the system is configured, activated systems are termed Biological Nutrient Removed (BNR) systems. These systems are very energy intensive, mechanically and biologically complex, and require a higher operator classification than the existing treatment process. They are smaller in treatment volume than lagoon systems and are consequently more sensitive to upsets associated with high flows caused by I/I. Meeting TN and TP limitations require sophisticated biological process control and operational attention to detail. The current WRRF cannot be used to provide for TN and TP reduction. However, the existing Cell 1 could be reconfigured to provide flow equalization to improve performance. Portions of the remaining WRRF may prove useful for sludge handling. The current process configuration cannot be adapted to activated sludge treatment without significant and costly modifications. A proposed BNR upgrade can provide necessary treatment to achieve nutrient removal, but it does so at great capital cost, high operation and maintenance expenses, and operational complexity.
- In addition to the activated sludge process, tertiary treatment for TN and/or TP could require filtration, chemical addition, and advanced processes such as ion exchange and reverse osmosis.
- A new headworks as described in Alternative TF-1 would be required for the necessary treatment improvements.

4.4.5 Project BM-1: Solids Holding Tank Demolition

The solids holding tank was apparently intended to allow the City to produce Class B biosolids using aerobic digestion and thicken sludge to roughly 2–3 percent solids content using the decant ports. However, the tank is in poor condition and in need of recoating to prolong its life. Biosolids produced by lagoon systems typically meet Class B standards without additional treatment, and the volume reduction provided by the decant system is not sufficient to provide a substantial reduction in trucking costs to the disposal site. Although the tank could provide flexibility in solids disposal, it has been used infrequently by the City. Overall, it appears the benefits provided by the

storage tank do not justify the costs of recoating it and keeping it in service. It can be abandoned in place or demolished and removed for the site.

4.4.6 Alternative TF-5: Operations Audit and Training

- **Plant Flow Monitoring:** Due to an incorrect setting in the plant flow meter controller, the most recent accurate flow data available is from 2014, and is still unreliable. Professional calibration of the equipment is recommended to confirm its accuracy.
- **Plant Influent TSS/BOD_5 Data:** Influent wastewater characteristics reported from 2013 to the present are much greater than typical values for domestic wastewater. Additional investigation is required to determine the actual cause and develop an accurate data set.

These issues are largely due to the uniqueness of this hybrid lagoon treatment system. Additional operator training is a cost-effective method that will help ensure staff understanding of how the treatment process is intended to function, how to monitor process performance, and what corrections to make to maintain process stability.

The audit portion of this alternative includes on-site observation of current operational procedures to identify areas where improvements could be made. Items included in the operator training portion could include the following:

- Sample collection and evaluation for process monitoring and compliance reporting.
- Laboratory procedures.
- Record keeping and data evaluation.
- Cell mixing and dissolved oxygen monitoring for aeration control.
- Solids monitoring and management including lagoon cell sludge level monitoring.
- Disinfection, dechlorination and operation theory.
- Algae reduction control.
- Process operation and troubleshooting both for complete mix aeration and/ or land application.

Section 5 CAPITAL IMPROVEMENT PLAN ALTERNATIVES AND ENGINEER'S RECOMMENDATION

5.1 General Screening

The existing WRRF was constructed nearly 30 years ago. Although the plant appears to be structurally sound, much of the existing mechanical equipment is past its design life and replacement should be considered. Operationally, long treatment system HRTs are believed to be the primary culprit contributing to permit violations. I/I in the collection system can be attributed to pipe material, type, and age, which will only get worse as pipe deterioration continues.

Although the City has many potential and a wide range of upgrades as described in the previous sections, certain minimum upgrades need to be accomplished to allow the WRRF to continue to function and prepare for inevitable component failure. The discussion below presents the two most reasonable capital improvement plan alternatives compared to the option of no action. These alternatives are:

- Alternative 1: No Action Alternative
- Alternative 2: WRRF Improvements with Effluent Discharge
- Alternative 3: WRRF Improvements with Effluent Land Application

It is recommended the City take the potential impact of added nutrient removal requirements into account when selecting wastewater system improvement projects to construct within the next five years to ensure funding capacity is available to construct modifications that may be necessary for compliance with the next permit without requiring large user rate increases. If additional nutrient limits are imposed, the permit will likely provide a multi-year schedule for development, approval, and construction of the process upgrades necessary for compliance.

5.2 Alternative 1: No Action (Not Recommended)

The City may choose to do nothing, which is listed as the No Action Alternative, also known as run-to-failure. Under the No Action Alternative nothing would be done to improve, repair, or replace any portion of the treatment or collection systems.

Advantages:

- Least costly in the short-term

Disadvantages:

- Leaves City unprepared for equipment/piping failure
- Does not address action items outlined in the City's Consent Agreement with EPA
- Current system challenges will only get worse

Alternative 1 Costs:

This approach has the advantage of minimizing the City's immediate capital costs and user rate payments. The disadvantages of the No Action Alternative are continued and increasing permit violations, equipment failure, trash and biosolid accumulation in the treatment cells, operational safety hazards, as well as continued depreciation of wastewater collection and treatment infrastructure. This alternative is not recommended.

5.3 Alternative 2: WRRF Improvements with Effluent Discharge (Not Recommended)

Alternative 2 involves constructing Alternatives TF-1 headworks and TF-2 treatment improvements to meet the current permit, CCTVing the Priority 1 and 2 collection system area, and replacement and rehabilitation of Priority 1 manholes and piping. This alternative should be viewed as a medium-term solution and that additional future improvements are anticipated based on limits contained in the next IPDES permit.

Advantages:

- Accomplishes consent order requirements
- City would prepare for moderate ammonia limits as part of their discharge permit

Disadvantages:

- Highest capital cost
- Increased operation costs
- Likely need to re-evaluate treatment system depending on future, potentially more stringent, IPDES Permit limitations
- Solids handling and disposal

Alternative 2 Costs:

The estimated capital cost of $13.8 million includes improvements needed to meet the current IPDES permit and a $5 million placeholder for anticipated future improvements focusing on stringent nutrient limits anticipated in the next IPDES permit cycle. The $5 million represents the minimum anticipated amount to address nutrient limits and significantly higher amount is possible. If the continued surface water discharge alternative is selected and once the next generation of permit limits is known, a subsequent addendum should be made to this plan that addresses those limits. The alternative will also result in a moderate to extensive increase in operating costs and facility classification, compared to current operating costs and operational requirements. This alternative is not recommended.

5.4 Alternative 3: WRRF Improvements with Effluent Land Application and No Discharge (Recommended)

Alternative 3 involves CCTVing the Priority 1 and 2 collection system area, and replacement and rehabilitation of Priority 1 manholes and piping, installing a headworks, improving the disinfection system, upgrading the aeration system for land application, and constructing the infrastructure required for slow rate land application, including land acquisition. This work assumes the City will choose to no longer discharge into the West Fork Little Bear Creek and will no longer be regulated under an IPDES discharge permit. A new reuse permit will be required.

Advantages:

- Accomplishes consent order requirements
- City will not be affected by more stringent discharge limits for discharge into the West Fork Little Bear Creek
- Operational staff are familiar with the system
- Lowest capital cost

Disadvantages:

- Increase operation costs
- Land must be leased or acquired

Alternative 3 Cost:
The estimated capital cost is $13.2 million and will moderately increase operation costs. Due to the uncertainty associated with selecting a land application location, the cost estimate of this alternative has a higher factor of variability. This alternative is recommended.

5.5 Recommended Capital Improvement Plan (Alternative 3)

The uncertainty associated with the new discharge permit presents a challenging situation for the City. **Table 5-1** shows the net present value (NPV) of the viable alternatives. The NPV represents 20-year values incorporating estimated capital outlay, annual operations and maintenance costs, as well as short lived assets for each alternative. The NPV can be considered to represent the life-cycle costs of each alternative; the lower the NPV, the less money the alternative will cost over the lifespan of the project. Detailed NPV tables for each alternative are included as **Appendix K**. Operation and maintenance (O&M) and short-lived asset depreciation cost estimates are included in **Appendix L**.

Table 5-1: Net Present Value of Alternatives

Description	Alternative 2 WRRF Improvements with Discharge	Alternative 3 WRRF Improvements with Effluent Land Application and No Discharge
Total Annual O&M&R Expenses	$122,100	$180,000
Capital Cost Estimate	$13,839,000	$13,162,000
Salvage Value	$1,342,000	$3,323,000
Net Present Value	$14,657,000	$13,023,000

The recommended alternative has the lowest NPV cost over the projected life cycle of 20 years. **Table 5-2** summarizes the Engineer's Opinion of Probable Cost. Detailed Alternative 3 cost estimates are included in **Appendix M**.

Table 5-2: Summary of Recommended Alternative Project Costs

Alternative Identifier	DESCRIPTION	TOTAL
CS-1	Priority 1 & 2 CCTV Inspection	$18,000
CS-2	Priority 1 Pipe and Manhole Replacement	$1,400,000
TF-1	Headworks Upgrade	$758,000
TF-2	Aeration System Upgrades – No Ammonia Reduction	$1,166,000
	Biosolids Removal	$115,000
	Effluent Disinfection – No Dechlorination	$388,000
TF-3	Land Application	$3,724,000
TF-5	Operations Audit and Training	$25,000
	TOTAL DIRECT COST	**$7,594,000**
	Mobilization/Demobilization (7.5%)	$569,550
	CONTINGENCY @ 20%	$1,519,000
	TOTAL ESTIMATED CONSTRUCTION COST	**$9,682,550**
	Engineering, Permitting, and Construction Observation (25%)	$1,899,000
	Administration and Legal (5%)	$380,000
	Land Acquisition 120 ac at $10,000/ac	$1,200,000
	TOTAL ESTIMATED COST	**$13,162,000**

Note:
The cost estimate herein is based on our perception of current conditions at the project location. This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Mountain Waterworks has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Mountain Waterworks cannot and does not warrant or guarantee that bids or actual construction costs will not vary from the costs presented herein.

Section 6 FUNDING APPROACH

6.1 Project Funding Overview

Financing for the rehabilitation or replacement of aging public wastewater systems is typically provided through one of the four following funding agencies:

- Idaho Department of Environmental Quality (IDEQ)
- USDA Rural Development (USDA-RD)
- Idaho Department of Commerce (IDOC)
- US Army Corp of Engineers (USACE)

6.1.1 IDEQ State Revolving Fund (SRF)

The State Revolving Fund (SRF) is administered by IDEQ and consists of subsidized below-market rate interest loans that may be used to repair or construct new wastewater treatment and collection facilities. Loans of up to 100 percent of eligible project costs may be awarded at 1.75 to 3.00 percent interest on a 20 or 30-year repayment term. In addition, disadvantaged communities may qualify for zero interest rates and/or principal forgiveness (PF). PF is an additional subsidy provided through the SRF program to communities that would otherwise experience significant rate increases to pay for the total amount of a loan.

In January 2023, the Mountain Waterworks worked alongside the City to produce a Letter of Interest (LOI) package to IDEQ to procure SRF funding for proposed wastewater utility improvements. A total amount of $13.2 million was requested and based on **Alternative 3**.

In July 2023, IDEQ published its final Intended Use Plan (IUP) and fundable list based on the LOI submittals, and the City qualified for a proposed funding package, that includes a combination of SRF low-interest loan and PF and a Leading Idaho Funds (LIF) grant. Proposed loan terms include 30-years at 1.75% annual interest.

Additional steps will be required from the City to apply for and secure the funding package prior to March 31, 2024. The following table (**Table 6-1**) summarizes IDEQ's funding offer to the City of Troy.

Table 6-1: IDEQ Funding Offer

Funding Source	Loan ($ million)	PF/Grant ($ million)	Total ($ million)
State Revolving Fund (SRF)	$4.32	$2.54	**$6.86**
Leading Idaho Funds (LIF) Grant	N/A	$6.34	**$6.34**
		Total Funding Offer	**$13.20**

Note:

1. *30-year, 1.75% interest terms*

USDA-RD Rural Utility Service Water and Environmental Program (WEP)

USDA-RD provides funding to small and rural public wastewater purveyors through its Rural Utility Services Water and Environmental Program (WEP). WEP is designed to help communities in rural areas provide essential infrastructure and services. Funding available through WEP includes low interest loans and grant funding for eligible communities. Loan repayment terms may not exceed the applicant's authority as defined under state law or organizational structure, the useful life of the facility, or a maximum of 40 years. Interest rates are determined based on applicant need, with disadvantaged communities qualifying for additional reduced interest rates and grant monies. WEP funding may be used to construct or improve public facilities to improve the quality of life and increase economic opportunities for rural communities. For the current fiscal year (2024), the City would qualify for the market interest rate of 3.875% on a 40-year loan. Due to the City's median household income (MHI) level, the City is not eligible for WEP grant funds.

IDOC Community Development Block Grant (CDBG)

The Community Development Block Grant (CDBG) program is administered by the Idaho Department of Commerce, Division of Economic Development, with funds received annually from the US Department of Housing and Urban Development (HUD). The program provides qualifying Idaho cities and counties with 100% grant funds to repair or construct necessary public infrastructure, including wastewater facilities. CDBG funds must be used to construct project benefitting low to moderate income (LMI) persons, help prevent or eliminate slum and blight conditions, or address health and safety threats in local areas. Incorporated cities with a population under 50,000 or counties and applicable MHI limits may apply for CDBG funds. Because the City's MHI is above the HUD LMI limits, the City is not eligible to pursue CDBG funding.

USACE Section 595 Program

The Army Corps of Engineers (USACE) administers the Section 595 Program which provides design and construction financial assistance to non-federal municipal governments in Idaho, Montana, and Nevada for water-related environmental infrastructure projects. Project costs are shared by USACE (75%) and a non-federal sponsor (25%). Given the recent federal cuts to this program, USACE does not currently have available funds to provide to the City.

6.2 Demographics

The American Community Survey (ACS) Census Reporter estimates the City's current MHI is $76,181, which is approximately 20% higher than the State of Idaho's MHI ($63,400). Approximately 4.8% of persons in the City currently live below the poverty level, which is about two-fifths of the State's average (11.4%). Given these factors, and as stated above in **Section 6.1**, the City does not currently qualify for USDA grant or poverty interest rate) or CDBG funding.

Instead, and stated in **Section 6.1** above, the SRF/LIF package option is available to the City and is currently being pursued.

6.3 Rate Impacts

Given the available funding program options, it is recommended the City consider the potential impact debt financing will have on the current customer base. Additionally, the impact of debt on each customer will be dependent on how the City decides to proceed. In forming its decision, the City is encouraged to factor in short-lived asset replacement costs (pumps, blowers, mixers, etc.). A detailed rate impact analysis will be conducted once the City receives technical approval of this document and selects an alternative. To offer the City an understanding of the potential rate impacts, a range of loan amounts with estimated rate impact are summarized in **Table 6-2**. In addition to the loan expense, additional O&M along with short-lived asset replacement must be considered in an updated rate analysis.

To offer the City an understanding of potential rate impacts, a range of loan amounts has been provided and is summarized in **Table 6-2** below. The rate impact calculation is based on the number of current equivalent users (413), with a proposed 30-year term at an interest rate of 1.75%. Terms are based on the proposed fiscal year 2024 (FY24) loan offer from IDEQ.

Table 6-2: Potential Rate Impacts (Debt Financing)

Loan Amount	User Rate Impact[1]
$1,000,000	$9.57
$2,000,000	$19.15
$3,000,000	$28.72
$4,000,000	$38.29
$5,000,000	$47.86
$6,000,000	$57.44
$7,000,000	$67.01

Note:

1. *The user rate impacts are estimates based on the current loan terms offered through IDEQ and current equivalent users. The rate impact does not incorporate additional O&M and short-lived asset replacement costs. Once technical approval is received from IDEQ and an alternative is selected by the City, it is encouraged to conduct an updated rate analysis.*

Section 7 ENVIRONMENTAL CONDITIONS

7.1 Soil, Geology, and Topography

Much of the City is located in a narrow valley with residential development on adjacent hillsides. A topographic map of the area is shown in **Appendix N**. The planning area is in the Palouse region of Latah County, Idaho, underlain by loess hills deposited above Miocene Columbia River basalt and Cretaceous granite. Miocene and younger sediments were deposited upstream of the ends of these basalt flows and under-lie much of the farming community surrounding the planning area. The valley floor in which the majority of the planning area is located includes unique Oligocene Potlach Volcanics that are comprised of alkali-rich basalts.

In general, the soils are comprised of loam, most of which have ashy, silty characteristics. The soils do not transmit water well and have an average depth of 4 feet. **Appendix O** includes an NRCS soils report and map.

7.2 Water Quantity, Quality, and Uses

7.2.1 Sole Source Aquifer

The planning area is not located in any designated sole source aquifers or contribution zones.

7.2.2 Surface Water

The City of Troy's planning area is bisected by West Fork Little Bear Creek. At the Southern end of the planning area the West Fork Little Bear is fed by Big Meadow Creek (also referred to as part of the 1st and 2nd orders of West Fork Little Bear Creek), which supplies a portion of the City's public drinking water system upstream of its confluence with Little Bear Creek. The EPA reports that both waterbodies have been assessed as overall impaired, specifically for fish, shellfish, and wildlife protection and propagation as well as recreation. Both creeks have TMDLs for E. coli, nitrogen, and sediment as specified in the 2008 *Potlatch River Subbasin Assessment and TMDLs*.

The Troy WRRF currently discharges into the West Fork Little Bear Creek. The proposed upgrades to the WRRF are intended to provide stable operating conditions and maintain compliance with their IPDES Permit (No ID0023604). By complying with the Clean Water Act via the IPDES Permit, the WRRF will promote and improve aquatic habitat in the West Fork Little Bear Creek.

7.2.3 Ground Water

A review of various well driller's reports (**Appendix P**) was completed for wells throughout the planning area. Well driller reports in the northern portion of the planning area are typically completed in the granitic bedrock with very low to low production rates. Wells in the southern portion of the planning area are generally completed basalt bedrock and exhibit low to moderate production rates. Some of the deeper wells and wells along the contact between basalt and granite penetrate relatively thick clay layers near the interface between basalt and granitic rocks.

The city has three active ground water wells that supplement the City's surface water source to supply the public drinking water. All produced groundwater meets primary drinking standards.

7.3 Flora and Fauna

The Information for Planning and Conservation (IPaC) online tool was used to export a US Fish and Wildlife Service (USFWS) Trust Report for the planning area (**Appendix Q**). No species were designated to have critical habitat in the planning area, nor were there any National Wildlife Refuge Lands or Fish Hatcheries.

The Spalding's Catchfly (threatened) is the only flowering plant species listed. The plant prefers open, moist grasslands; however, it could also be found in sagebrush-steppe habitats and pine forests. Spalding's catchfly grasslands are comprised of Idaho fescue and bluebunch wheatgrass. The proposed improvement location occurs in City limits of the City, specifically where there is already existing infrastructure and the land has been previously disturbed.

Prior to project design and construction, an environmental review will be conducted in which the USFWS, Idaho Fish and Game, and other interested agencies will be provided the opportunity to review the proposed project and consult on any potential impact to species as well as mitigation efforts.

7.4 Land Use and Development

A convenience station, small sawmill, local retail and office, restaurants, and two schools make up the commercial entities in the planning area. The remainder of the City is comprised of low-density residential development. Undeveloped land within City limits generally consists of forested land. The zoning map for the City was last updated in 1972 and is provided in **Appendix R**.

7.5 Cultural Resources

The five listed properties are in the National Register of Historic Places:

- Bohman, Axel House
- Bohman, Ole House
- Hotel Rietmann
- Troy Downtown Historic District
- Troy Hospital

The proposed work will not disturb or adversely affect any cultural or historic resources. Prior to construction an environmental assessment will be conducted and tribal consultation will take place. The Idaho State Historic Preservation Office (SHPO) will be consulted during the environmental review process to determine necessary mitigation measures to reduce potential impacts to historic and cultural resources in the planning area.

7.6 Utility Use

The City owns and operates the public drinking water and sanitary sewer system. Residents in the City limits are required to connect to the public water and sewer services and are prohibited from installing private septic systems. Electrical service in the planning area is provided by both Avista and Clearwater Power.

7.7 Flood Plains

The City participates in the National Flood Insurance Program (NFIP) established by the Federal Emergency Management Agency (FEMA). Map No 1600910001B and 1600860265B (**Appendix S**) are the designated flood insurance rate maps (FIRM) for the City and surrounding area. There are Zone A flood zones immediately along the West Fork Little Bear Creek; however, the majority of the City is not in a Zone A flood zone. Any construction in a flood zone will meet the requirements of FEMA.

7.8 Wetlands

A wetlands map from the USFWS National Wetlands Inventory online tool is included in **Appendix T**. There are stretches of the West Fork Little Bear Creek that contain wetland habitat. Wetland disturbance along the West Fork Little Bear Creek is not anticipated and upgrades to the WRRF lagoon system will be within the current, concrete, AC paved and gravel surface area.

7.9 Wild and Scenic Rivers

No wild or scenic rivers are in or near the planning area.

7.10 Agricultural Lands

The planning area includes soils indicative of prime farmland, as defined by the USDA NRCS and shown in the soils map and report (**Appendix O**); however, the topography of the planning area is generally not conducive to farming.

7.11 Climate

The Troy area climate is dominated by Pacific maritime air masses and prevailing westerly winds which lead to mild summers and freezing winter temperatures. Historically January has been the coldest month, with an average temperature of approximately 29ºF, and July has been the warmest month with an average temperature of approximately 67ºF. The majority of precipitation events occur March through June with an average total yearly precipitation of approximately 23 inches and average yearly snowfall of approximately 49 inches. The majority of precipitation occurs during late fall, winter, and spring months. There are no unusual or site-specific meteorological constraints in the planning area that will affect the feasibility of the facility upgrades.

7.12 Air Quality and Noise

The planning area is not in an area of concern for air quality as regulated by IDEQ. **Appendix U** shows a map of areas of air quality concern in Idaho. Due to the proximity to forested land, temporary smoke from regional forest fires can become a concern in the valley in the summer months. The rural location of the planning area lends itself to relatively quiet noise levels. Noise is primarily generated from normal highway and street traffic.

7.13 Energy Production and Consumption

The project will have a slight impact on energy consumption in the area, and the energy requirement will vary depending on the alternative selected. Each of the treatment alternatives considered will include electrical equipment for wastewater processing. All of the equipment will be specified with premium efficiency motors and variable frequency drives will be installed where applicable to reduce power consumption.

Section 8 REFERENCES

1. G. Tchobanoglous, *Wastewater Engineering: Collection and Pumping of Wastewater*. Mcgraw-Hill Series in Water Resources and Environmental Engineering (Mcgraw-Hill College, New York, NY, ed. 3rd, 1981), pp. 448.
2. G. Tchobanoglous, F. L. Burton, H. D. Stensel, *Wastewater Engineering, Treatment and Reuse*. (McGraw-Hill, New York, NY, USA, ed. Fourth, 2003).
3. IDEQ, "Potlatch River Subbasin Assessment and TMDLs," (IDEQ, Lewiston, ID, 2008).
4. R. J. Stevenson, M. L. Bothwell, R. L. Lowe, *Algal Ecology: Freshwater benthic ecosystems*. J. H. Thorp, Ed., (Academic Press, Inc., San Diego, CA, 1996), pp. 753.
5. E. S. Brooks, J. Treasure, "Big Meadow Reservoir Management: Baseflow Augmentation," (University of Idaho, Moscow, Idaho, 2014).
6. R. Sánchez-Murillo, E. S. Brooks, L. Sampson, J. Boll, F. Wilhelm, Ecohydrological analysis of Steelhead (Oncorhynchus mykiss) habitat in an effluent dependent stream in the Pacific Northwest, USA. *Ecohydrology* **7**, 557-568 (2014).
7. E. S. Brooks, R. Sanchez-Murillo, J. Boll, "Ecological assessment of current impacts and future management of the city of Troy WWTP on Steelhead (*Oncorhynchus mykiss*) habitat in the West Fork Little Bear Creek drainage," (University of Idaho, Idaho, 2011).

Appendix A

2019 Wastewater Facility Plan Approval

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

1118 F Street Lewiston, Idaho 83501 (208) 799-4370
www.deq.idaho.gov

Brad Little, Governor
John H. Tippets, Director

December 30, 2019

Honorable Kenneth Whitney
City of Troy
P.O. Box 595
Troy, ID 83871
troycityhall@tds.net

Subject: Approved for Public Comment – Wastewater Facility Plan - City of Troy

Dear Mayor Whitney:

The Idaho Department of Environmental Quality (DEQ) received draft wastewater planning document entitled Wastewater System Facility Plan; Technical Draft; City of Troy, Idaho (Draft). The Draft is dated October 26, 2019, and prepared by Emily Nicholas, PE. The planning effort is being partially funded by DEQ wastewater planning grant WWG 392-2018-2. We have reviewed the Draft for general conformance with DEQ Rules[1] and determined it is approved for public comment. The next step is a minimum 14 day public comment period regarding the report and at least one (1) public meeting during the comment period. The purpose of the comment period and meeting is for the public to comment on the recommended alternatives presented in the report. After the comment period is over, the final facility plan will need to be submitted to DEQ for review and approval with the results from the comment period added to the report.

Additional information regarding the public comment period can be found at DEQ grant and loan website http://www.deq.idaho.gov/water-quality/grants-loans.aspx. We look forward to assisting the City in this endeavor. If you have any questions or comments, please contact me at (208) 799-4370 or nicolas.hiebert@deq.idaho.gov.

Regards,

Nicolas Hiebert, PE
Senior Water Quality Engineer

c: Danny Haskell, City of Troy
Emily Nicholas, PE, Mountain Waterworks
Ryan Rehder, PE, Mountain Waterworks
MaryAnna Peavey, DEQ
Michael Camin, PE, DEQ
Justin Walker, DEQ
File: 2019AGD7708

[1] IDAPA 58.01.04 - Rules for Administration of Wastewater Treatment Facility Grants and IDAPA 58.01.16 - Wastewater Rules

Appendix B

City of Troy Sewer Ordinances

Chapter 6
SEWER REGULATIONS

7-6-1: SEWER CONNECTIONS REQUIRED:

A. The water commissioner is hereby empowered and it is hereby made his duty in all cases where there is a public sewer in any street, highway or alley in the city to compel every owner or occupant of lands, buildings or premises, fronting or abutting on streets, highways or alleys or within three hundred feet (300') of the same in case of unplatted land, to construct or cause to be constructed a sewer service connection in the manner hereinafter described, which shall connect such lands, buildings or premises with the nearest accessible public sewer (unless such connections be impracticable by reason of the topography of the ground). The water commissioner shall have power and authority to examine all buildings, as to plumbing, drainage and ventilation thereof, and when in his judgment, the plumbing fixtures or the sewerage connection fixtures are found to be defective or unsanitary he shall have the power to order their removal, repair or substitution and require the ventilation and drainage of such building to be placed in a sanitary condition and he shall thereupon give the owner or any person occupying any building or premises notice in writing, specifying the time when any defective drainage sewerage connection or unsanitary fixtures must be completed or corrected. The water commissioner shall make a copy of such notice which shall be kept in the office of the clerk and open to the inspection of the public during the hours of said clerk's office. After the time fixed by the water commissioner for the completion of said connection and repairs, the owner or occupant shall be held responsible for refusal to comply with such notice.

B. The term "private dwelling house" shall mean and constitute all houses occupied by persons or owners for the use of themselves and family, and this shall not be construed to mean the houses used or occupied as private or public boarding, lodging or rooming houses. (1968 Code)

7-6-2: DRAINS REQUIRED:

Every person owning any land or premises in all cases where there is a public sewer in any street, highway or alley shall make a sufficient drain, from his lot or premises, connected with such sewer, and the water commissioner shall have the power in all cases where there is a public sewer as aforesaid to cause such connection to be made, and shall give such owner or occupant notice in writing, specifying the time at which said drain or improvement must be completed, provided such time shall not exceed ten (10) days. If such owner or occupant shall fail, neglect or refuse to comply with the same within the time specified, the water commissioner shall report the same to the council and the council shall immediately, either at a regular meeting or at a special meeting called for that purpose, cause said drain or improvements to be constructed and the amount paid for the construction of the same shall be assessed against the lands or premises so drained and improved, and the same shall be reported to the council as to the amount of such assessments for said work and improvements and upon confirmation by the council, the same shall constitute a lien upon said lands and premises so drained or improved. (1968 Code)

7-6-3: PERMITS; SEWER CONNECTIONS:

When any private drainpipe connected with any public sewer or drain becomes obstructed, broken or out of order, the water commissioner shall, if the owner or occupant of such premises fails to repair the same after two (2) days' notice so to do, cause such drainpipe to be removed, reconstructed, repaired, altered or cleaned as he may deem expedient, at the expense of the owner or occupant of said premises as aforesaid, to be collected as provided in section 7-6-2 of this chapter. No person shall make any connection with any of the public sewers, nor shall any opening be made into the same until the person making the same shall obtain from the water commissioner a permit so to do and upon obtaining such permit, the person shall perform said work in strict conformity with the provisions of this chapter and under the supervision of the water commissioner, and he shall also replace and repair the streets, alleys or highways over, in or through which the same may pass, to as good a state and condition as at the time of the commencement of said work and maintain the same in good order to the satisfaction of the water commissioner, and shall conform in all respects to the rules and regulations of the city relative to the streets, alleys and highways thereof. (1968 Code)

7-6-4: APPLICATION:

A. All applications for permits shall be made by the owner or agent and must state the location of the sewer, the number of the lot and block, the number of the buildings to be connected and how they are occupied.

B. It shall be unlawful for any person to extend any private sewer or drain beyond the limits of the building or property for which the permit has been issued, or to connect with any private or general sewer without having first obtained such permit. (1968 Code)

7-6-5: REVOCATION OF PERMIT:

All permits to connect sewers and drains shall be upon the express condition that the council may at any time revoke or annul the same and the person making such connection, or their successors in interest, shall have no right to claim any damage in consequence of such permit being revoked or annulled. (1968 Code)

7-6-6: SEWER RATES:

The rates for sewer service shall be determined from time to time by resolution of the council. Sewer rates shall be adjusted annually based on the city costs of sewer operations, maintenance and replacement. Any future modification to the rate shall, to the fullest extent possible, be based upon

and utilize a rate determination process based on an evaluation of equivalent users (EU), one EU being the sewage flow from one typical family residence. (Ord. 280, 7-16-1990)

7-6-7: DUE DATES:

All sewer service charges shall be due and payable as set forth in section 7-5-6 of this title. (1968 Code; amd. Ord. 336, 11-10-1997)

7-6-8: WATER TURNOFF:

On the twenty fifth day of each month it shall be the duty of the water commissioner and he is hereby authorized and empowered to shut off and discontinue all city water service to any premises, whether owner or tenant of any premises, where such owner, tenant or occupant of the premises has become delinquent in the payment of his sewer charges or sewer penalties for the previous month, and has failed, refused or neglected to pay the sewer charges and penalties as herein provided; and when such water is so turned off, the same shall not be reinstated or turned on again until all delinquent sewer charges and penalties have been paid, together with the further sum of two dollars fifty cents ($2.50) as compensation for the turning on of the water on or in said delinquent premises. (1968 Code)

7-6-9: WATER AND SEWER:

In cases where a charge is made and paid for both water and sewer service to the same premises, the delinquent owner, tenant or occupant of the premises shall be obligated to pay the delinquency charges and penalties under this chapter, and, upon payment of the delinquency charges and penalties under this chapter, shall be excused from again paying the same delinquency charges and penalties under the water rate provisions of this code. (1968 Code)

7-6-10: CONNECTION SPECIFICATIONS:

All connections with public sewers or drains shall be made in a workmanlike manner, and even with the inside surface of the sewer. Where the connecting "Y" has been left or in case the water commissioner shall deem best, any person making such connection shall remove a joint of the sewer pipe and insert in its place a "Y" properly placed and securely cemented before making connection therewith. When a "Y" has been left, the connection shall be made without damage or breaking the same. The street must be opened and the paving or planking deposited in a manner that will occasion the least inconvenience to the public and to provide for free passage. One-half ($^1/_2$) of the street must be kept clear for the purpose of passage of vehicles, and bridgeways must be provided on sidewalks for foot passengers. In refilling the trenches, the earth must be deposited in layers of not more than six

inches (6") in depth and well rammed and tamped to prevent settlements. As soon as any such drain or sewer is completed, the paving or planking of streets or sidewalks must be reconstructed in as good a condition as previous to the excavation and all rubbish and surplus earth immediately removed. (1968 Code)

7-6-11: DRAINS, MATERIAL, GRADE:

The drains which enter into any public sewer or drain in any street, alley, avenue or highway, shall be built of such fixed material and with such grade and in such manner as is specified by the council. (1968 Code)

7-6-12: CONNECTION NOTICE REQUIRED:

Notice in writing must be given to the water commissioner at the office of the clerk, when such work shall be ready for inspection, by any person desiring to make connection with any public sewer or drain, at least six (6) hours previous to the time of making such connections. The water commissioner or his authorized agent shall inspect the same and the connections must be made in the manner prescribed in this chapter as well as to the satisfaction of the water commissioner before the trench is filled. (1968 Code)

7-6-13: SPECIFICATIONS FOR DRAINS:

It shall be unlawful to construct or extend any drainpipe for the reception of sewerage or wastewater under or into any building, or to connect the same with a public sewer unless said drain shall in its plan and construction conform with the following requirements:

A. There shall be in said drain a trap so constructed as to bar the passage of air from beyond the trap into the house by an obstacle equal to one inch (1") in depth of water.

B. Between said trap and the foot soil pipe, there shall be connected with the drain an inlet pipe for the admission of fresh air, and the soil pipe within the building shall be continued above the earth and left above the same, so that the whole drain may be thoroughly and constantly ventilated.

C. The owner or occupant, where the building is used as a hotel, tenement house, boarding house or restaurant, must provide a properly constructed grease trap, through which all slops of a greasy nature shall be drained and the water commissioner is hereby authorized and directed to compel any person to provide and use a grease trap as aforesaid, whenever, in his judgment, the same is

necessary. In all cases, the connection with a cast iron soil pipe, whether inside the building or otherwise, shall be made with pig lead and oakum and thoroughly caulked. (1968 Code)

7-6-14: PLANS TO ACCOMPANY APPLICATION:

Whenever any person desires to construct a house drain to be connected with or discharged into any sewer, he shall, before beginning work upon the same, deposit with the clerk a plan thereof, which shall show the whole course of the drain from the connection with the sewer to its termination within the house, with the location of all branches and fixtures to be connected therewith, said plans or a copy thereof to be left on file in the office of the clerk. If upon investigation the water commissioner shall find that the plans do not conform with the requirements of this chapter, the commissioner shall issue no permit for its construction or connection, with any sewer, and it shall be unlawful to construct said drain or to connect the same either directly or indirectly with any sewer. (1968 Code)

7-6-15: RIGHT OF ENTRY, INSPECTION:

The water commissioner shall have the right to enter upon any premises drained by any house drain or connected with any public sewer at all reasonable hours to ascertain whether the provisions of this chapter or any other regulation in regard to house drains has been complied with, and if he should find that said drain or its attachments are in conflict with the provisions of any law, he shall notify the owner of said premises, or the agent of such owner, of the fact. It shall thereupon be the duty of said owner or agent to cause said drain or its attachments to be so altered, repaired or reconstructed, so as to make them conform to the requirements stated herein, within ten (10) days after the time of receiving such notice. (1968 Code)

7-6-16: INJURY TO SEWER PROHIBITED:

No person shall injure, break or remove any portion of any manhole, lamphole, flush tank, septic tank or any part of the public sewer or sewer system. (1968 Code)

7-6-17: DRAIN PERMIT REQUIRED:

When any person shall desire to lay any pipe or pipes in any of the streets on which sewerage pipes are laid, he shall give at least twenty four (24) hours' notice to the water commissioner of the intention so to do and procure a permit therefor before proceeding. (1968 Code)

7-6-18: USE OF PUBLIC SEWERS:

The use of the public sewers within the city system shall be in accordance with the following regulations:

A. No person shall discharge or cause to be discharged any stormwater, ground water, roof runoff, subsurface drainage, or processed waters into any sanitary sewer.

B. Stormwater and all other unpolluted drainage shall be discharged to such sewers as are specifically designated as storm sewers, or to dry wells. Industrial cooling water or unpolluted process waters may be discharged, on approval of the city council and health department, to dry wells or other disposal areas.

C. No person shall discharge or cause to be discharged any of the following described waters or wastes to any public sewers:

1. Any gasoline, benzene, naphtha, fuel oil, or other flammable or explosive liquid, solid or gas.

2. Any waters or wastes containing toxic or poisonous solids, liquids, organic chemicals, or gases in sufficient quantity, either singly or by interaction with other wastes, to injure or interfere with any sewage disposal process, constitute any hazard to humans or animals, create a public nuisance, or create any hazard in the receiving waters of the sewage treatment plant, including, but not limited to, cyanides in excess of two milligrams per liter (2 mg/l) as CN in the wastes as discharged to the public sewer.

3. Any waters or wastes having a pH lower than 5.5, or having any other corrosive property capable of causing damage or hazard to structures, equipment, and personnel of the sewage works.

4. Solid or viscous substances in quantities or of such size capable of causing obstruction to flow in sewers, or other interference with the proper operation of the sewage works, such as, but not limited to, ashes, cinders, sand, mud, straw, shavings, metal, glass, rags, feathers, tar, plastics, wood, underground garbage, whole blood, paunch manure, hair and fleshings, entrails, paper dishes, cups, milk containers, etc., either whole or ground by garbage grinders.

D. No person shall discharge or cause to be discharged the following substances, materials, or waters if it appears likely in the opinion of the city council or the health district that such wastes can harm either the sewers, sewage disposal process or equipment, or have an adverse effect on the receiving stream or ground water, or can otherwise endanger life, limb, public property, or constitute a nuisance. In forming its opinion as to the acceptability of these wastes, the council or health district will give consideration to such factors as the quantities of subject wastes in relation to flows and velocities in the sewers, materials of construction of the sewers, nature of the sewage disposal process, capacity of the sewage disposal system, and other pertinent factors. The substances prohibited are those listed as hazards or hazardous wastes by the environmental protection agency (EPA) in the EPA priority pollutant list, or other substances deemed unacceptable by the city council, the health district or the state department of health and welfare, division of environment.

E. All new connections to the sewer system must conform to the latest edition of the plumbing code as adopted by the International Conference of Building Officials. (Ord. 280, 7-16-1990)

7-6-19: CITY EMPLOYEES RESPONSIBLE:

It shall be the duty of any city employee, in all cases where they shall find any person engaged in the breaking of ground for the purpose of making connection with the public sewer, to ascertain at once if such person is duly authorized to perform such work and in the event that such person is not duly authorized or does not have a permit, to order them to desist under penalty of this code and to immediately report the facts to the chief of police and the water commissioner. (1968 Code)

7-6-20: WORKMANSHIP AND MATERIALS:

All materials used in connections must be of good quality, free from defects and the work must be executed in a thorough and workmanlike manner and to the entire satisfaction and approval of the water commissioner. (1968 Code)

7-6-21: DRAINS TO SEWERS, SPECIFICATIONS:

A. Every house or building connected with the public sewer, or private cesspool, must have a house drain through which sewerage is carried, constructed of cast iron pipe which shall extend five feet (5') outside of the building or foundation. The drains are to be laid in trenches of uniform grade or securely suspended from floor timbers by strong iron hangers; and shall have proper fall of not less than one-fourth ($^1/_4$) of an inch per foot towards the main sewer and in as straight a line as possible.

B. All changes in direction or connections of soil or waste pipes shall be made by means of "Y" branches with one-eighth ($^1/_8$) and one-sixteenth ($^1/_{16}$) bends. Sanitary tees shall only be made in vertical lines of pipe. Heel outlets shall not be used for vent connections. Saddle hubs and saddle bands are strictly prohibited. There shall be a cleanout put in the sewer at the last change of direction or at the end of the horizontal main drain of the building. All cleanouts shall be closed by brass screw covers, and shall be kept accessible. When sewers are laid beneath the floor, manholes must be constructed to give access to cleanouts. (1968 Code)

7-6-22: GALVANIZED IRON PIPE:

Where cast iron pipe is specified in any of these provisions, galvanized iron pipes of standard thickness may be used; provided, that the fittings are so constructed as to form a uniform bore with the pipe of any building; provided, however, that all pipes used shall be of a grade known as standard and to conform to all provisions as to weight and thickness. No opening shall be provided in a sewer pipe in any building for the purpose of receiving the drainage of the cellar unless special permission is granted and any opening so made must be immediately and firmly closed. (1968 Code)

7-6-23: TERRA COTTA SEWERS PROHIBITED:

In no case shall terra cotta or Orangeburg sewers be laid under any building, nor shall any owner or occupant of any building, or any plumber interested in the plumbing work, about such building, allow any terra cotta sewers to be laid within five feet (5') of such building, and in all cases before a new or old building is placed on any lot which has terra cotta sewer, which would come under any part of the foundation, said sewer or terra cotta pipe must be replaced by an iron sewer which must be extended five feet (5') outside of the building or area. Terra cotta sewers running parallel with any building or within ten feet (10') of such building must be at least one and one-half feet ($1^1/_2$') below the foundation or level with the basement floor. Where it is practicable to do so, cast iron pipes must be laid and used. All terra cotta sewer pipes used for house drainage shall not be less than four inches (4") in diameter, thoroughly vitrified and glazed, straight and free from defect and laid in trenches, in as straight a line as possible, with a fall of not less than one-fourth ($^1/_4$) of an inch to the foot. All joints must be made of the best quality of number one cement and clean, sharp sand. Each joint shall be carefully cleaned on the inside when laid. The cement must be pressed into the hub, and beveled outside the sockets, made smooth and solid and left uncovered until examined by the water commissioner. Said examination to be made within eight (8) hours after being notified. It shall be unlawful for any person to lay sewer pipe to connect any building with the public sewer or private cesspool or to construct cesspools, except under the direction of the water commissioner and after having obtained a permit as hereinbefore provided, except as to such lateral sewers as may be put in under the direction of the water commissioner and in no case shall the laterals extend inside the property line. (1968 Code)

7-6-24: SOIL PIPE SPECIFICATIONS:

All cast iron soil pipes and fittings must be sound and free from holes or cracks and of a grade known in commerce as standard. Said standard pipes to be plain and uncoated. The following weights per linear foot will be accepted as complying with the provisions of this chapter:

	Pounds Per Linear Foot	
2 inch		$3^1/_2$
3 inch		$4^1/_2$
4 inch		$6^1/_2$

6 inch		$10^1/_2$
7 inch		$14^1/_2$
8 inch		18

(1968 Code)

7-6-25: SPECIFICATIONS FOR JOINTS:

Joints in cast iron pipe must be made of pure pig lead, well caulked and no paint, varnish or putty be allowed in caulking said joints. Joints in galvanized pipe shall be screwed joints. Joints on lead or brass pipe shall be in all cases wiped, soldered joints or screwed joints, with standard pipe thread. All joints shall be made with galvanized iron pipes or lead pipes. Approved combination ferrules may be used on outside fixtures. No rubber couplings or washers shall be used to connect vent pipes. (1968 Code)

7-6-26: CONNECTING SEWER, CONNECTION DEFINED:

The words "connecting sewer" or "connection", as used herein, shall mean that portion of any sewer pipe or line which is located within any street or alley and which is or has been constructed at private expense and connected with the city sewer system. (1968 Code)

7-6-27: SEWER CONNECTION APPLICATION; FEES:

The water commissioner is hereby authorized to permit connections to be made with the city sewer system; provided, that any person desiring to so connect with sewer system shall make application therefor, in writing to the water commissioner, and in which application he shall describe in particular the connection to be made and along what streets or alleys the applicant proposes to construct any sewer, the probable cost of such connection along said street or alley, and the applicant shall give such other information as the water commissioner may demand. If a permit is granted, such connecting sewer shall be of such size and shall be built of such materials and at such point and of such grade and depth as the water commissioner and city engineer may direct, taking into consideration future connections which may be made with such connecting sewer. The water commissioner may refuse to issue such permit if the proposed connection would overload any existing sewer or drain. All decisions of the water commissioner hereunder may be reviewed and modified or reversed by the council. (1968 Code; amd. Ord. 292, 2-15-1993)

7-6-28: SEWERS PROPERTY OF CITY; FILING OF COSTS:

(Rep. by Ord. 292, 2-15-1993)

7-6-29: ADDITIONAL CONNECTIONS; COSTS:

(Rep. by Ord. 292, 2-15-1993)

7-6-30: CONNECTION BUILDER MAY RECEIVE REBATE:

(Rep. by Ord. 292, 2-15-1993)

7-6-31: CONTENTS OF COST STATEMENT:

(Rep. by Ord. 292, 2-15-1993)

7-6-32: PRIVATE SEWERS PROHIBITED:

All connections with the city sewer system in any street or alley shall belong to the city and no private sewer, except as otherwise provided in this chapter, shall be deemed valid and binding upon the city or any of its inhabitants. (1968 Code)

7-6-33: PRIVATE SEWERS ABOLISHED:

It is the intent and purpose to abolish all private sewer connections with the city sewer system and the city shall own all sewer connections made by private persons along any street or alley, and the city shall own, control and operate all sewers laid or placed along any street or alley. (1968 Code)

7-6-34: CITY NOT LIABLE:

The city shall in no circumstances become liable to any person who has constructed a connecting

sewer except to the extent of the money collected for his use and benefit as herein provided. In the event that the city has paid monies so collected to any person claiming to be the rightful owner of the land to which the right to be reimbursed for subsequent connections may be appurtenant, it shall not be liable to any other person for and on account of such monies. (1968 Code)

7-6-35: ILLEGAL CONNECTIONS PROHIBITED:

No person shall connect with the sewer system of the city without a permit as hereinbefore set forth. Any illegal connection may be prevented by the city by severing such connection or by injunction or other appropriate action, instituted in the name of either the city or the property owner entitled to reimbursement. The right to collect reimbursement for connecting with a sewer connected at private expense on which cost statements have been filed as herein provided may be enforced by the property owner beneficially interested in an ordinary civil action in any court of competent jurisdiction. (1968 Code)

ARTICLE A. WATER AND SEWER FACILITIES CONNECTION FEES

7-6A-1: PURPOSES AND FINDINGS:

The city council finds, determines and declares that:

A. This article is intended to assist in the improvement and increased capacity of the city water and sewer systems.

B. The purpose of this article is to assure that new development bears a proportionate share of the cost of capital expenditures necessary to provide water and sewer facilities in the city.

C. This article is also intended to permit the city to recover its installation costs. (Ord. 292, 2-15-1993)

7-6A-2: BASIS FOR FEES:

A. The city must expand its water and sewer facilities if new development is to be accommodated without decreasing current standards of public health.

B. The imposition of connection fees is one of the preferred methods of ensuring that development bears a proportionate share of the cost of water and sewer facilities necessary to accommodate such development. This must be done in order to promote and protect the public health, safety and welfare.

C. Connecting to the city water and/or sewer system will create a need for the construction, equipping or expansion of water and sewer facilities.

D. The fees established by section 7-6A-6 of this article do not exceed the costs of providing additional water and sewer facilities necessitated by the connection to the county water and sewer systems.

E. The sewer connection fee analysis and water connection fee analysis prepared by the city engineer dated February 15, 1993, set forth a reasonable methodology for the determination of the need of and costs related to participation in the water and sewer facilities of the city. (Ord. 292, 2-15-1993)

7-6A-3: SHORT TITLE AND APPLICABILITY:

A. This article shall be known and may be cited as the *TROY WATER AND SEWER FACILITIES CONNECTION FEE ORDINANCE.*

B. This article shall apply in incorporated areas of the city. (Ord. 292, 2-15-1993)

7-6A-4: DEFINITIONS:

As used in this article:

CAPITAL EQUIPMENT: Equipment with an expected use life of three (3) years or more.

CITY: The city of Troy.

CONNECTION TO THE WATER AND/OR SEWER SYSTEM: The physical connection of a building, structure or land use to the city water and/or sewer lines, no matter if such connection is made through or by intermediate lines.

DEVELOPMENT ORDER: A regulatory approval by the city.

ENGINEER: The city engineer of the city of Troy.

FEE PAYER: A person applying for connection to the city water and/or sewer system. Water and sewer facilities are city of Troy owned facilities. (Ord. 292, 2-15-1993)

7-6A-5: IMPOSITION OF WATER AND SEWER FACILITIES CONNECTION FEES:

A. Any person who, after the effective date hereof, seeks to connect to the city water system is hereby required to pay a water facilities connection fee in the manner and amount set forth in this article.

B. Any person who, after the effective date hereof, seeks to connect to the city sewer system is hereby required to pay a sewer facilities connection fee in the manner and amount set forth in this article.

C. Any person who, after the effective date hereof, seeks to connect to the water or sewer systems of the city shall also pay an installation fee reimbursing the city costs in physically connecting the user to the water and/or sewer system. (Ord. 292, 2-15-1993)

7-6A-6: COMPUTATION OF FEES:

A. At the option of the fee payer, the amount of the water and/or sewer facilities connection fee may be determined by the fee schedules established by resolution of the city council.

B. In the case of change of use, redevelopment, or expansion or modification of an existing use which requires a new, replacement, or additional connection to the city water and/or sewer system, the connection fee shall be based upon the net increase in the size of the meter for the new connection over the size of the meter for the previous connection.

C. If a fee payer opts not to have the connection fee determined according to subsection A of this section, then the fee payer shall prepare and submit to the city council an independent fee calculation study for the land development activity for which a connection to the city water and/or sewer system is sought. The independent fee calculation study shall follow the prescribed guidelines adopted by motion of the city council. The documentation submitted shall show the basis upon which the independent fee calculation was made. The city shall consider the documentation submitted by the fee payer, but is not required to accept such documentation as he/she shall reasonably deem to be inaccurate or not reliable and may, in the alternative, require the fee payer to submit additional or different documentation for consideration. If an acceptable independent fee calculation study is not presented, the fee payer shall pay water and sewer

facilities impact fees based upon the schedule as adopted by resolution. If an acceptable independent fee calculation study is presented, the city council may adjust the fee to that appropriate to the particular fee payer. (Ord. 292, 2-15-1993)

7-6A-7: PAYMENT OF FEES:

A. The fee payer shall pay the water and sewer facilities connection fee required by this article to the city clerk or his or her designee prior to obtaining a building permit and at least five (5) days prior to connection to the city water and/or sewer system.

B. All funds collected shall be properly identified by and promptly transferred for deposit in the appropriate water and sewer facilities connection fee trust fund to be held in separate accounts as determined in section 7-6A-8 of this article and used solely for the purposes specified in this article. (Ord. 292, 2-15-1993)

7-6A-8: CONNECTION FEE TRUST FUNDS ESTABLISHED:

A. There are hereby established two (2) separate dedicated water and sewer facilities connection fee trust funds:

1. The water facilities connection fee trust fund; and

2. The sewer facilities connection fee trust fund.

B. Funds withdrawn from these accounts must be used in accordance with the provisions of section 7-6A-9 of this article. (Ord. 292, 2-15-1993)

7-6A-9: USE OF FUNDS:

A. Funds collected from water and sewer facility connection fees shall be used solely for the purpose of acquiring, constructing, equipping and/or making capital improvements to water and sewer facilities under the jurisdiction of the city, and shall not be used for maintenance or operations.

B. Funds from the water facilities connection fee trust fund may only be used for water facilities purposes and funds from the sewer facilities connection fee trust fund may only be used for sewer

facilities purposes. Funds shall be deemed expended in the order in which they are collected.

C. In the event that bonds or similar debt instruments are issued for advanced provision of capital facilities for which water and sewer facilities connection fees may be expended, connection fees may be used to pay debt service on such bonds or similar debt instruments to the extent that the facilities provided are of the type described in subsection A of this section.

D. At least once each fiscal period, the city water and sewer commissioners shall present to the city council a proposed capital improvement program for water and sewer facilities, assigning funds from the several water and sewer facilities connection fee trust funds to specific water and sewer facilities improvement projects and related expenses. Monies not assigned in any fiscal period shall be retained in the same water and sewer facilities connection fee trust funds until the next fiscal period, except as provided by the refund provisions of this article.

E. Funds may be used to provide refunds as described in section 7-6A-10 of this article.

F. Funds may be used to rebate developer costs for providing water and/or sewer capital facilities in excess of the capacity required to the individual developer making the provision. Any rebates must be pursuant to a refunding agreement entered between the developer and city after the effective date hereof. (Ord. 292, 2-15-1993)

7-6A-10: REFUND OF FEES PAID:

Any funds not expended or encumbered by the end of the calendar quarter immediately following ten (10) years from the date the water or sewer facilities impact fee was paid shall, upon application of the then current landowner, be returned to such landowner; provided, that the landowner submits an application for a refund to the city clerk within one hundred eighty (180) days of the expiration of the ten (10) year period. (Ord. 292, 2-15-1993)

7-6A-11: EXEMPTIONS AND CREDITS:

A. Exemptions: The following shall be exempted from payment of the connection fee:

1. Alterations or expansion of an existing building where no additional or larger water and/or sewer connections are requested and where the use is not changed.

2. The replacement of a building or structure with a new building or structure of the same size and use where no additional or larger water and/or sewer connections are requested and where the use is not changed.

3. The installation of a replacement mobile home on a lot or other such site when a water and/or sewer capital facilities connection fee for such mobile home site has previously been paid pursuant to this article, or where a mobile home legally existed on such site on or prior to the effective date hereof.

4. Any claim of exemption must be made no later than the time of application for a building or mobile home placement permit. Any claim not so made shall be deemed waived.

B. Services Disconnected: No exemption will exist where water and/or sewer services have been disconnected either physically for six (6) months or more or after notice, as indicated on the city records.

C. Credit Or Reimbursement:

1. Water and sewer facilities capital improvements may be offered by the fee payer as total or partial payment of the required connection fee. The fee payer must request a water and sewer facilities connection fee credit. If the city council accepts such an offer, the credit shall be determined and provided in the following manner:

a. Credit for the dedication of land shall be valued:

(1) At one hundred percent (100%) of the most recently assessed value by the Latah County appraiser;

(2) By such other appropriate method as the city council may have accepted prior to the effective date hereof for particular water and sewer facilities improvement; or

(3) By fair market value established by private appraisers acceptable to the city. Credit for the dedication of water and sewer facilities land shall be provided when the property has been conveyed at no charge to, and accepted by, the city or county in a manner satisfactory to the city council.

b. Applicants for credit for construction of water and sewer facilities improvements shall submit acceptable engineering drawings and specifications, and construction cost estimates to the city. The city council shall determine credit for construction based upon either these cost estimates or upon alternative engineering criteria and construction cost estimates if the city council determines that such estimates submitted by the applicant are either unreliable or inaccurate. The city clerk shall provide the applicant with a letter or certificate setting forth the dollar amount of the credit, the water and sewer facilities connection fee components to which the credit will apply, the reason for the credit, and the legal description or other adequate description of the project or development to which the credit may be applied. The applicant must sign and date a duplicate copy of such letter or certificate indicating his agreement to the terms of the letter or certificate and return such signed document to the city clerk before credit will be given. The failure of the applicant to sign, date and return such document within sixty (60) days shall nullify the credit.

c. Except as provided in subsection C1d of this section, credit against connection fees otherwise due will not be provided until:

(1) The construction is completed and accepted by the city; or

(2) A suitable maintenance and warranty bond is received and approved by the city clerk, when applicable.

d. Credit may be provided before completion of specified water and sewer facilities improvements if adequate assurances are given by the applicant that the standards set out in subsection C1c of this section will be met and if the fee payer posts security as provided below for the costs of such construction. Security in the form of a performance bond, irrevocable letter of credit, or escrow agreement shall be posted with and approved by the city clerk in an amount determined by the city council. If the water and sewer facilities construction project will not be constructed within one year of the acceptance of the offer by the city, the amount of the security shall be increased by ten percent (10%), compounded for each year of the life of the security. The security shall be reviewed and approved by the city council prior to acceptance of the security by the city clerk. If the water and sewer facilities construction project is not to be completed within one year of the date of acceptance of the fee payer's offer, the city council must approve the water and sewer facilities construction project and its scheduled completion date prior to the acceptance of the offer by the city clerk.

2. Any request for credit consideration must be made no later than the time of application for connection. Any claim not so made shall be deemed waived.

3. Credits shall not be transferable from one project or development to another without the approval of the city council.

4. Credits shall not be transferable from one component of the water and sewer facilities connection fee to another component of this fee. (Ord. 292, 2-15-1993)

7-6A-12: INSTALLATION FEES:

In addition to the foregoing connection fees, any person requesting connection to the city water or sewer system shall pay installation fees based on the city cost of connecting the applicant to the system.

A. The basic water installation fee shall be as established by resolution of the city council.

B. The basic sewer installation fee shall be as established by resolution of the city council.

C. Any installation requiring materials or labor in excess of the basic installation or requiring repair of a curb, sidewalk or roadway shall pay for additional services according to a fee schedule adopted by resolution.

D. Basic installation fees shall be paid at the time of building permit application or at least five (5) days prior to installation where no building permit is required.

E. Any additional fee shall be billed after installation, paid within thirty (30) days of billing. Services may be terminated for nonpayment. (Ord. 292, 2-15-1993)

7-6A-13: REVIEW:

The fees contained in sections 7-6A-6 and 7-6A-12 of this article should be reviewed by the city council at least once each fiscal year. After careful review, amended fees may be adopted by a duly adopted resolution. (Ord. 292, 2-15-1993)

7-6A-14: PENALTY:

A violation of this article shall be prosecuted as a misdemeanor and, upon conviction, the violator shall be punishable; however, in addition to or in lieu of any criminal prosecution, the city shall have the power to sue in civil court to enforce the provisions of this article. If convicted a person shall be punished by a fine not to exceed three hundred dollars ($300.00), by imprisonment in the county jail for a period not to exceed thirty (30) days, or by both such fine and imprisonment. (Ord. 292, 2-15-1993)

Appendix C

Manhole Condition Assessment Survey Notes

Manhole		Date Assessed	Location	Access	Elevation	Invert Out Pipe		Elevation	Priority	Condition	Cone	Risers	Defects	Proposed Action	Approx Flow Direction	Size	Material	Notes
City OLD#	*New #*				*MH Top, ft*	*Ft, in*	*feet*	*MH Bottom*	#							*in*		
7	1	9/29/2017	T.P.		2417.139	3'7.25"	3.6	2414	H			2-4"	debris on apron			12	ductile	backs up if muffin monster shuts down
6	2	9/29/2017			2430.774	4'5.25"	4.4	2426	N	good		2-4"			southwest	12	ductile	
5	3	9/29/2017		visible	2444.235	6'3.5"	6.3	2438	1				spalling - concrete on apron, root through riser joints	Replace	southwest	12	ductile	
4	4	9/29/2017			2447.351	7'1.5"	7.1	2440	2	good	no grout, ring on cone			Spot Repair	west/southwest	12	ductile	
3	5	10/17/2017			-	10'1"	10.1		N			2-6"			west	12	ductile	
2	6	9/29/2017			2439.728	9'	9.0	2431	N	good		none			southwest	12	ductile	
1A	7	9/29/2017			-				I									not found
1	8	9/29/2017			2442.067	9'10.5"	9.9	2432	N	good					west	12	ductile	93' west of 0M
0C	9	9/29/2017	Shopyard, north fench		2448.581	9'7.5"	9.6	2439	P1				12" in has pieces missing from trough, 2-3" lip at transition	Replace	west	12	PVC	8" connection from south
0M	10	9/29/2017	In shopyard N fence		2441.309	9'1"	9.1	2432	2	good		4 risers	trough broken, pieces missing, poured in place base	Spot Repair	west	12	PVC	7' from manhole 0C, good condition except floor
0	11	9/29/2017							I									not found
1M	12	9/29/2017	Hwy 99 and 8	Pavement	2458.685	6'11"	6.9	2452	2			1-2", no grout	trough at outlet chipped out - deeper than pipe	Spot Repair	West	12	PVC	
2M	13	9/29/2017			2461.851	7'1.5"	7.1	2455	1			Brick	H2S inside, concrete soft, 10" pipe	Replace	South/SouthWest	10		
3M	14	9/29/2017			2464.153	8'11"	8.9	2455	P3				Line to east up, 6th plugged, road base/plastic orange, H2S Inside	Replace	South	10		(2) 8" connections coming from East and West
1B	15	9/29/2017	W 6th and Eagly Alley		2454.02	7"4'	7.3	2447	P3			2 coarse brick risers	lots of debris, sloped floor, no channels, steps rotted		West	8	concrete	2 connections from South, bend in 8" main
2B	16	9/29/2017			2452.824				P3									Paved Over
3B	17	10/6/2017	4th st and alley - front	visible, pavement	2456.119	10'4"	10.3	2446	P3			4", 1', 2 course bricks	constant flow, clean water 15-20 gpm, steps rotted (metal)		south	8	concrete	10" pipe from north drops into trough
4B	18	10/6/2017			2457.561	7'5.5"	7.5	2450	P3		block		block cone bottom section shows leaks, debris on apron, steps rotted		south	10	concrete	12" concrete connection from north (abandoned?)
5B	19				-				P3									
6B	20	10/6/2017			2469.753	5'6.5"	5.5	2464	P3		block		leaks in base, lower wall		west		concrete	connection from east, may be 8 or 10"
7B	21	10/6/2017	Bridge - beside bike path		2476.285	13'0"	13.0	2463	P3					Replace	southwest		concrete	8" PVC connection from E was 30-40' visible on ground w section of DIP under bridge 10 or 12"?
7B1	22	10/6/2017	20' off SE corner Preachers House		2483.935	14'2.5"	14.2	2470	P3			1-6' and 1-2"	top steps metal (rotted), root in joints, debris on apron, leaks at base?		southwest	8		8" concrete connection from south, may be concrete or PVC
7-B2	23	10/6/2017	beside woodshed-Preachers Backyard		2490.305	12'5"	12.4	2478	A		concentric	3-6"	debris in channel, leak at base		northwest		unknown	may be 8 or 10", used as overflow
7B3	24	10/6/2017	Backyard 204, 10' from large stump		2477.123	5'1"	5.1	2472	A		ring, no grout		ring slid over 8", debris, dry		west/southwest			appears abandoned, may be concrete or PVC, used as overflow
10B	25	10/6/2017	SW corner of House		2485.63	5'7"	5.6	2480	P3		block		debris/roots		southwest	8	concrete	8" concrete into 4" PVC connection from east
11B	26				-				P3									
12B	27	10/17/2017			2508.417	5'11"	5.9	2503	P3	fair	block		rotted steps		south			
12B1	28	10/17/2017	Big Meadow	visible, pavement	2500.515	12'8.5"	12.7	2488	P3		block				southeast	8	concrete	drop MH, concrete over block
13B	29	10/17/2017	104 Big Meadow - Driveway		2518.282	4'2.5"	4.2	2514	P3		block on base				southeast	8	concrete	6" PVC connection from southwest
14B	30	10/17/2017	Main and Big Meadow	visible, roadbase	2530.41	8'4"	8.3	2522	P3		block		rotted steps		east	8	concrete	8" concrete abandoned from southwest
14B1	31	10/17/2017	246 Big Meadow between house and road	dirt	2551.818	7'10"	7.8	2544	N			4' of rings			east/southeast	8		may be concrete AC?
15B	32	10/17/2017	252 Big Meadow, 35' yards south of road	dirt	2569.017	4'2"	4.2	2565	N	good					east	8	concrete	
1Z	33	10/17/2017			2587.957	4'0.5"	4.0	2584	N						east/northeast	8	concrete	6" PVC (Connection?) from west/northwest
2Z	34	10/17/2017			2592.487	4'6.5"	4.5	2588	N						east	8	concrete	
3Z	35	10/17/2017			2603.03	4'6"	4.5	2599	P2				roots		East	8	concrete	
4Z	36	10/17/2017			2592.634	4'11"	4.9	2588	P2			1-4", 3-2"	roots all over base			8	concrete	(2) concrete connections: (1) 4" serivce line from northwest, (1) 8" from southwest
5Z	37	10/17/2017	west of Monica		2632.968	10'6"	10.5	2622	P2						east	8	concrete	
6Z	38				-				P2									
7Z	39	10/17/2017			2639.439	3'9"	3.8	2636	P2						South	6	PVC	
8Z	40	10/17/2017			2643.149	5'0.5"	5.0	2638	P2			4 course brick	roots, infil all around base, roots all over in swamp		east	6	PVC	
9Z1	41	10/17/2017			2663.079	4'4"	4.3	2659	P2	good					east	6	concrete	8" PVC connection from northwest
9Z	42	10/17/2017			2663.042	4'3"	4.3	2659	P2						east	6		may be concrete AC?
9A	43	10/17/2017			2683.443	6'2"	6.2	2677	P2		tall ring on cone				north			8" PVC connection from east
10	44	10/17/2017	in backyard N end Rachel		2712.441	4'2"	4.2	2708	P2		ring on cone				north/northwest	8	concrete	4" PVC connection from south/southwest
11	45	10/17/2017	101 Rachel		2727.115	6'8"	6.7	2720	P2			3-4"	Bad roots, blocking portal, channel debris		northwest	8	concrete	root mat
A-1	46	10/17/2017			2753.733	8'1"	8.1	2746	I			3-4", slid downhill			north	8	PVC	material out unknown, foam sealant around pipes
A-2	47	10/17/2017	801 Rachel		2769.332				H	fair	deep ring on cone		standing water in channel		north		PVC	may be 10"
A-3	48	10/17/2017	Rachel and Mtn View		2764.271	14'1"	14.1	2750	N			3-6"			north		PVC	connection from west, ramneck joints, may be 8 or 10"
A-4	49	10/17/2017	mtn view		2775.86	10'9"	10.8	2765	2			2-6" rings, 1 course block	hole filled with Ramneck, Ramneck joints squeezed out	Repair	west			may be PVC?, , may be 8 or 10"
A5	50	10/17/2017	111 mtnview		2797.484	12'11.5"	13.0	2785	N			1-8"			west			
9M	14 E -1				-				N									
10M	14 E -2	10/17/2017	main and 1st - just north	visible, pavement	2550.843	10'1"	10.1	2541	H			13 course brick	rotted steps, debris			8	Clay	may be concrete?
10m(s)	14 E -3				-				N									
1A	14-1	9/29/2017	E 6th and Swan Alley		2459.709	8'0.5"	8.0	2452	N	Good					East	8		4 way 8"
2A	14-1A	9/29/2017			2475.663	8'3.5"	8.3	2467	N	Good		2-4", offest 1"			East			No manhole north
3A	14-2	9/29/2017			2474.926	8'8.5"	8.7	2466	H	Good			uphill (Conncetion) line clogged, debris and gravel		South			connection from West
4A	14-2A	9/29/2017			2488.375	7'11"	7.9	2480	N			2-4"			East	8	PVC	connection from North
5A	14-2B	9/29/2017	Elm St and 5th		2519.329	6'7.5"	6.6	2513	N	Good		1-4"			East	8	PVC	
5A (0)	14-2C	9/29/2017			2536.784	6'10.5"	6.9	2530	N	Good		2-4"			East	8	PVC	connection from North
5A (1)	14-2D	9/29/2017			2560.568	6'11"	6.9	2554	H	Good		2-4"	gravel		East	8	PVC	
6A-1	14-3	10/6/2017	Swan Alley between 4th and 5th		2476.434	4'9.5"	4.8	2472	N	good					south	8	PVC	not shown on map
6A	14-4	10/6/2017	4th st and swan alley, edge of street	visible, pavement	2487.255	5'8"	5.7	2482	H				debris in channel		south	8	PVC	8" PVC connection from west
7A	14-5	10/6/2017	4th and Pine	visible, pavement	2506.568	6'0"	6.0	2501	H			2", broken	debris in line		east	8	PVC	map not correct, snown as possible CO in Pine Street
7A-1	14-6	10/6/2017	in drive at 404 Pine	visible, roadbase	-	5'3"	5.3		H	good			debris in line		south/southeast	8	PVC	lid -10 holes water in, 8" PVC connection from southwest
7A2	14-7	10/17/2017	310 Pipe above road in drive		-	5'5"	5.4		N	good					south	8	PVC	
4M	14A	9/29/2017	5th St. and Hwy		2463.401	11'1.5"	11.1	2452	2	Fair		5 coarse brick risers	steps rattled	Replace		10	PVC	
5M	14B	10/6/2017	4th and hwy	visible, pavement	2467.87	11'2"	11.2	2457	1		5 courses brick onto cone	2-2"	3 large leaks in bottom section and base, ferric coming in	Replace	south	10	unknown	
6M	14C	10/6/2017	3rd and Main (Hwy)		2472.661				2			1-6", 1-2", 4 course bricks	steps rotted, some spalling	Replace	south	10	unknown	8" connection from west
7M	14D	10/6/2017			-	9'10"	9.8		I	good		1-6", 3-2"	odor		south			newer MH w old base, 8" PVC pipe from N, 10" PVC from NE 10or12" Clay going S, trough=clay pipe
1D-A	14D-1	10/6/2017	In FB Hwy8	visible, pavement	2476.02	9'5"	9.4	2467	P2	good	pieces missing	6", 3-2"		Spot Repair	west	10	PVC	
8D	14D-10	10/17/2017			2625.909	13'9"	13.8	2612	N	good		1-6"			east?		PVC	6" stubbed in, 8" out
1D	14D-2	10/6/2017			2477.245	9'5.25"	9.4	2468	N	good		2-4"			west	10	unknown	8" or 10" connection from north east, potentially PVC
6.7D	14D-2A	10/17/2017	1st and front		2503.924	7'10.5"	7.9	2496	N	good		2-4"			south			
6.6D	14D-2B	10/17/2017	1st st and alley		2522.453	7'11.5"	8.0	2514	N		ring on cone				east			
6.5D	14D-2C	10/17/2017	in alley		2530.44	4'3"	4.3	2526	H				gravel and debris on apron		south	8	PVC	
2D	14D-3	10/17/2017	behind fence above hwy		2473.66	9'1.75"	9.1	2465	P3			4-6" risers, 12 course bricks			southwest	8		2 MH assessment sheets, 8" clay in, 10"PVC out
3D	14D-4	10/17/2017	middle of road		2508.662	8'2.5"	8.2	2500	P3	fair		1-4"			south	8	clay	
4D	14D-5				2521.948				P3									
5D	14D-6				-				P3									
6D1	14D-7	10/17/2017	main and A st, W side		2560.518	3'4"	3.3	2557	P3			metal ring and 4" metal extender leaking	gravel and debris on apron		east	8		PVC in and concrete out
6D	14D-8	10/17/2017	Main and A st, E side		2568.718	5'1"	5.1	2564	P3		flat top, no cone	2-6"	gravel and debris on apron		east	8	PVC	
7D	14D-9	10/17/2017			2602.779	5'5.5"	5.5	2597	N	good		1-4"			east	8	PVC	
8M	14E	10/17/2017			2506.991	5'2"	5.2	2502	2		ring not grouted on cone		high flow down, 2nd st	Spot Repair	south	8		8" clay connection from west
X1	14F	10/17/2017			2530.756	8'7.5"	8.6	2522	1		none	1-6",1-4",7 course block	roots, beavers slides	Replace	east	8	concrete	4" PVC connection from northwest
X2	14F-1	10/17/2017			2556.855	3'9.5"	3.8	2553	3		none	1 course brick, 2-6"		Replace	south	4	concrete	
X3	14F-2	10/17/2017			2583.805	3'11"	3.9	2580	N	OK		2-4"			south	4	concrete	
X4	14F-3				2596.607				N									
19	14G	10/17/2017			2614.988	10'5.25"	10.4	2605	P2		extend a ring on cone, no grout				south		PVC	may be 8"
20	14H	10/17/2017			2618.591	5'3.25"	5.3	2613	P2		none		roots, sloped floor		east			PVC in, Concrete out, with 2 concrete connections (1 from south and 1 from west), 2 MH Assessment Sheets
21	14H-1	10/17/2017			2625.435	3'9"	3.8	2622	P2			1-4"	solids-lots		east	6	PVC	
23	14I	10/17/2017			2678.9	3'7"	3.6	2675	P2			4", 2"			south	6	concrete	block MH
24	14J	10/17/2017			2719.864	5'5"	5.4	2714	P2			block	roots in joint		northeast	6	concrete	
25	14K				2739.558				P2									
26	14K-1	10/17/2017	505 Christie in Pavement Beside House		2731.742	6'2.5"	6.2	2726	P2		block on base	9-2"			northeast	8	AC	
26A	14K-2	10/17/2017	Backyard on fench 513 Christie		2735.684	3'3"	3.3	2732	P2						north	6	PVC	4" PVC (connection?) from east
27	14K-3	10/17/2017			2753.628	5'7"	5.6	2748	P2				leaks around base and perforations		north	8	concrete	DE from southeast, 4" PVC connection from southwest
28	14L	10/17/2017	N of 510 Christie - cone exposed on one side		2736.962				P2	fair			step rotted, debris in channel		north	8	concrete	
29	14M	10/17/2017	512 Christie in Drive (Concrete)		2740.518	11'5"	11.4	2729	P2	good		2-2" not grouted			northeast			
30	14N	10/17/2017			2753.136	8'11"	8.9	2744	P2			ring slid, 3" - not grouted	no channel, debris		northeast	8	concrete	channel in is above floor, then no channel/sloped floor, then channel out
31	14O	10/17/2017	516 Christie	visible, roadbase	2759.708	6'4"	6.3	2753	P2		above ground, ring not grouted		full of gravel		northeast	8	concrete	8" concrete out, D.E. MH
CW	20A	10/6/2017	beside bike path at carwash		2457.511	5'8.5"	5.7	2452	P3			2-4"	Joint Leaking		north	8	PVC	
Park 3	21A	10/6/2017	36' west of bike bridge, 100' w of MH park 2 on slope		-	7'6.75"	7.6		N			4-6" risers			west/southwest	8	PVC	
Park 2	21B	10/6/2017	Across from conoco - in barrow pit	visible, dirt	2470.644	4'8"	4.7	2466	2		ring, no grout			Repair	southwest	8	PVC	
Park MH	21C	10/6/2017	Hwy and park - in borrow pit	visible, dirt	2484.399	4'7.5"	4.6	2480	2		ring, no grout			Repair	west	8	PVC	4 way connection (from East, North and South), all 8" PVC
Pk1A	21C-1	10/17/2017			2478.812	4'6"	4.5	2474	N	good					south			ramneck joint
Park 4	21C-2	10/6/2017	in front of Gazebo in park		2489.705	4'8.75"	4.7	2485	2		ring, no grout			Repair			PVC	
-	21D				2471.676				N									
-	21E				2477.99				N									
11-B4	26 E -1	10/17/2017	504 Mark	Visible, pavement	2578.775	8'6"	8.5	2570	N			2-4"			south		PVC	4" in, 8" out
11-B1	26A	10/17/2017	210 Randall Flat		2492.63	4'2.5"	4.2	2488	P3		block	2-4"			west	8	concrete	8" PVC connection from North
53	26A-1	10/17/2017	in from of 119 W B St		-	7'3.5"	7.3		N	new					south/southeast	8	PVC	
52	26A-2	10/17/2017	North side Michael St	visible, dirt	-	6'1.5"	6.1		N			1-2"			south	8	PVC	
54	26A-3	10/17/2017	between Micheal St. and north main, Nelson Property		-	6'4"	6.3		N			1-6"			south	8	PVC	
11-B2	26B	10/17/2017			2497.292	12'10.5"	12.9	2484	P3	fair		no grout under ring			west	8	concrete	
11-B5	26C	10/17/2017			2497.675	5'4"	5.3	2492	P3			2-4"	risers craked, debris		southwest	8	concrete	8" concrete connection from northwest
11B3	26D				-				N									
11B3A	26E	10/17/2017		Visible, pavement	2521.136	7'0"	7.0	2514	2			3-4", 1-2 no grout		Repair	south/southwest	8	PVC	

51	26F	10/17/2017			2558.384	7'6.5"	7.5	2551	N			2-6", 1-4", foam			southeast	8	concrete	4" (ABS?) connection from west
-	28A				2512.641				P3									not found
22B	34A	10/17/2017	in yard beside house, 304 Big Meadow		-	3'0.5"	3.0		3		flat top - offset			Repair	southeast	6	PVC	
22A	34B	10/17/2017	304 Big Meadow		2596.537	5'1"	5.1	2591	3	new		ring slid 4"		Repair	south?	6	PVC	
12	36A				-				P2									
13	36B				2638.04				P2									
14	36C				-				P2									
15	36D				2700.57				P2									
16	36E	10/17/2017			2704.82	6'10.5"	6.9	2698	P2			1-4"			north west	6		beaver slide, may be AC?
17	36F	10/17/2017			2717.48	5'4"	5.3	2712	P2			4", 2", 4"			northwest	6		4" AC? Connection from southwest, may be AC?
18	36G	10/17/2017			2758.018	5'10.5"	5.9	2752	P2			2-4			north			8" PVC turns into 6" AC
B1	36H	10/17/2017			2772.389	8'1"	8.1	2764	P2			2-4"	ramneck joints leak		north			connection from west
B-5	36H-1	10/17/2017	Backyard		2784.762	8'10.5"	8.9	2776	P2				leak around base		north/northwest	8	PVC	
B2	36I	10/17/2017			2781.563	11'5.5"	11.5	2770	N	good		2-6"			north	8	PVC	8" PVC connection from West
B3	36J	10/17/2017			2785.527	11'7"	11.6	2774	1			2-6', slid 3"	ramneck joints leak, debris on apron	Repair	east	8	PVC	
B4	36K	10/17/2017			2797.036	6'9.5"	6.8	2790	H			1-6"	debris/gravel in apron and pipe		east			ramneck joints, DE MH
10Z	42A	10/17/2017			2671.176	4'0"	4.0	2667	N			1-6", 2-2" ramneck joints			southeast			ramneck joints
11Z	42B	10/17/2017			2682.615	4'11"	4.9	2678	N			1-6", 1-4"			east	8	PVC	
12Z	42C	10/17/2017			2687.096	5'4"	5.3	2682	I		flat top	2-6", ring slid 4"			east	8	PVC	bend in pipe
13Z	42D	10/17/2017			2714.032	6'10"	6.8	2707	N			2-6"			south	8	PVC	
14Z	42E	10/17/2017	school road		2714.533	4'7"	4.6	2710	N			1-4"			south/southeast	8	PVC	4" PVC connection from west
15Z	42F	10/17/2017	school road		2714.209	4'11.5"	5.0	2709	N			1-4", 1-2"			south?		PVC	(2) 4" lines in, (1) 8" line out
0C-1	9A				-				P1									
1C	9B	9/29/2017	In shopyard fence	visible	2442.031	8'10"	8.8	2433	P1			3 coarse risers, no grout	no trough, floor sloped, mit surcharged		north	8	concrete	5" concrete liner original, 2' base ring, no ring no lid, inflow from all directions?
2C	9C	9/29/2017	NE of Hwy 3 in field NE of creek		2441.619	8'8"	8.7	2433	P1				leaking, ferric oxide		north	8	concrete	overflow to creek
3C	9D	9/29/2017			2449.934	9'4.5"	9.4	2441	P1	Poor			1 grade ring - broken, not leaking at present		northwest	8	concrete	
4C	9E	9/29/2017	S Front St		2448.802	7'10"	7.8	2441	P1				leaking - X places, ferric stains		West	8	concrete	
5C	9F	9/29/2017	S. Front and Bentz St		2449.913	10'10"	10.8	2439	P1			2 risers	multiple leaks, base and up 5', block cone not grouted, solids in line and trough		West	8		8" PVC connection from south, may be concrete?
6C	9F-1	9/29/2017		Roadbase	2463.986				P1									Buried
7C	9G	9/29/2017	S. Front and Cleveland St.	Pavement	2453.39	7'1"	7.1	2446	P1		block ungrouted	1-4" riser	solids in trough, leaks around base and pipes, ring and cover slid		West	8	concrete	8" concrete connection from south
?	9G-1	10/6/2017	cleveland and Bentz		2474.625	6'1.5"	6.1	2469	P1		block	brick	debris on apron, bolted metal steps		north		concrete	3 connections (service lines?) from southeast, south, and southwest, may be 6 or 8"
8C	9H	9/29/2017	701 S. Front St	Roadbase	2458.04	4'5"	4.4	2454	P1		Block	1 riser	Ringslid 8"		West	8	concrete	off pavement on South
9C	9I	9/29/2017	S Front and 5th St. approx	Roadbase	2462.376				P1									Buried
10C	9J	9/29/2017	150' NW of pavement end on N. Front St.		-	7'5.5"	7.5		P1			block	road base - apron, bad trough, solids - no grade		West			See insp sheet for location drawing

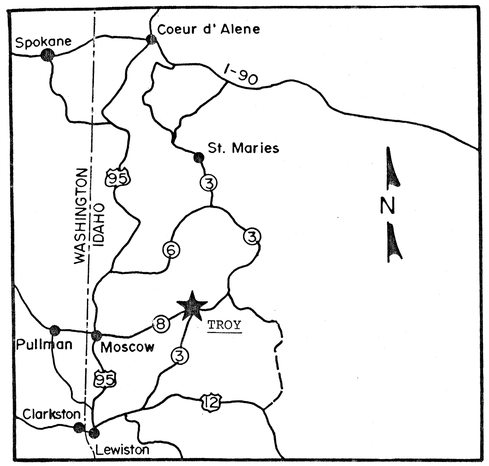
Appendix D

Collection System GIS Map

CITY OF TROY, IDAHO

PHASE III
WASTEWATER TREATMENT FACILITY PROJECT

CONSTRUCTION PLANS



VICINITY MAP

INDEX TO PLANS

NOTES:

1. BIDDERS MUST ASSUME ALL RESPONSIBILITY FOR DEDUCTIONS AND CONCLUSIONS AS TO THE NATURE OR CONDITION OF MATERIALS TO BE EXCAVATED, AND FOR THE DIFFICULTIES OF MAKING AND MAINTAINING THE REQUIRED EXCAVATIONS.
2. SAFETY RAILING SHALL BE INSTALLED CONTINUOUSLY ALONG THE NORTHERLY WALL OF CELL 1, ALONG THE WESTERLY WALLS OF CELL 1, CELL 2, AND CELL 3, ALONG THE SOUTHERLY WALL OF CELL 3, ALONG THE WESTERLY WALL OF CELL 4 AND CELL 5, ALONG THE SOUTHERLY WALL OF CELL 5 AND AT SUCH OTHER LOCATIONS CALLED FOR ON THE PLANS OR AS REQUIRED BY OSHA. SAFETY RAILING IS NOT REQUIRED ALONG THE RAILROAD SIDE OF THE FACILITIES BECAUSE OF THE FENCE LOCATION.
3. GRATING SHALL BE INSTALLED ON ALL CHANNELS, PITS, WELLS AND AT SUCH OTHER LOCATIONS CALLED FOR ON THE PLANS OR AS REQUIRED BY OSHA.

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FEB 15 1991
IDHW-DEQ
Coeur d'Alene Field Office

RECEIVED
FEB 15 1991
IDHW-DEQ
Coeur d'Alene Field Office

AS-BUILT PLAN AND SPECIFICATION REVIEW
By John Tindall, Environmental Engineer — 3/22/91, Date

These plans and specifications depicting the actual construction, alteration or modification performed have been reviewed for compliance with IDAHO DEPARTMENT OF HEALTH AND WELFARE regulations and have been found acceptable. This review does not relieve the owner, engineer or contractor of the responsibility of having designed and constructed these facilities in compliance with all applicable federal, state and local laws, rules, regulations or ordinances.

Refer to letter of 3/22/91 to Mayor Vogel

REGISTERED PROFESSIONAL ENGINEER
2102
STATE OF IDAHO
JACK S. HAMMOND

5/11/90

MAY, 1990

Set No. 021

Hammond Engineering and Development Co.
P.O. Box 460 — Spence Road
Troy, Idaho — 83871-0460
(208) 835-8443

REVISIONS

REV LTR	DATE	DESCRIPTION	CHECKED	APPD

SCALE N/A
DRAWN BY JSH — CHECKED BY
DATE 5/11/90 — JOB NUMBER 933E
SHEET 0 — DRAWING NUMBER 933E0

CITY OF TROY, IDAHO
Title Sheet

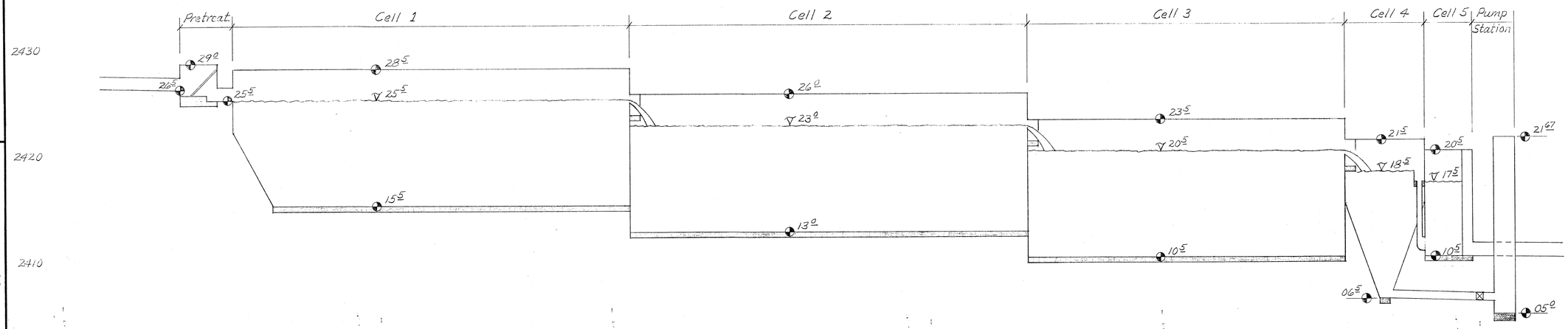
HEDCO
Box 460 Spence Road
Troy, ID 83871-0460
(208) 835-8443

SHEET 0
DRAWING NO. 933E0

ASSESSMENTED
APP'D JSH DATE 2/6/91

TROY WWTP - 1990 - PHASE III
RECORD DRAWS.

HYDRAULIC PROFILE



DESIGN SUMMARY

	Initial Conditions	Design Conditions
1. Design Year	1990	2010
2. Population	850	1250
3. Wastewater Flow – Gals./Day		
• Min. Day	60,000	95000
• Ave. Day	85,000	150,000
• Max. Day	150,000	190,000
4. Organic Load – lbs. BOD/Day		
• Min. Day	110	165
• Ave. Day	140	225
• Max. Day	170	250
5. Solids Load – lbs. S.S./Day		
• Min. Day	110	165
• Ave. Day	140	225
• Max. Day	170	250

6. Pretreatment
   Comminution – Bypass Course Bar Screen

7. Treatment Process
   - Cell 1 – Aerated Completely Mixed Lagoon with provision for Biomass Recycle
   - Cell 2 – Aerated Partially Mixed Lagoon
   - Cell 3 – Aerated Polishing Lagoon
   - Cell 4 – Quiescent Clarification Basin
   - Cell 5 – Chlorine Contact Basin

8. Aeration Equipment: 2-20 H.P. P.D. Blowers – 430 SCFM @ 6 psi Each
   - Cell 1 – Ten 12"Ø X 5' Submerged Tube Aerators
   - Cell 2 – Eight " " " "
   - Cell 3 – Six " " " "

   Design Wastewater Oxygen Transfer Rate – 1.2 lbs. O_2/hr./Tube @ 15 SCFM
   – 1.5 lbs. O_2/hr./Tube @ 20 SCFM

9. Oxygen Transfer – lbs. O_2/Hour	15 SCFM/Tube	20 SCFM/Tube
• Cell 1	12.0	15.0
• Cell 2	9.6	12.0
• Cell 3	7.2	9.0

10. Volume – Gallons		
• Cell 1	500,000	500,000
• Cell 2	500,000	500,000
• Cell 3	400,000	400,000
• Cell 4	45,000	45,000
• Cell 5	13,500	13,500

11. Detention Time – Days (Ave. Flow)		
• Cell 1	5.88	3.33
• Cell 2	5.88	3.33
• Cell 3	4.71	2.67
• Cell 4	0.53	0.30
• Cell 5	0.16	0.09

12. Volumetric Loading – lbs. BOD/Day/1000 Cu. Ft.		
• Cell 1 – Ave. Day	2.1	3.4
– Max. Day	2.5	3.7
• Cell 2 – Ave. Day	0.9	1.4
– Max. Day	1.1	1.6
• Cell 3 – Ave. Day	0.7	1.1
– Max. Day	0.9	1.3

13. Oxygen Required – lbs. O_2/Hour (2.0 lbs. O_2/lb. BOD Removed)		
• Cell 1 – Ave. Day	6.4	10.3
– Max. Day	7.8	11.5
• Cell 2 – Ave. Day	2.1	3.4
– Max. Day	2.6	3.8
• Cell 3 – Ave. Day	0.8	1.3
– Max. Day	1.0	1.5

14. Mixing Energy Supplied – HP/Million Gals. (16.6 HP – High Speed/11.1 HP – Low Speed)		
• Cell 1	9.3 (1 Blower-Low)	13.8 (1 Blower-High)
• Cell 2	7.4	11.1
• Cell 3	6.9	10.4

15. Predicted Effluent Quality – mg/l.		
• BOD	30-40	35-45
• S.S.	20-60	30-70
• Fecal Coliform	<100/100ml.	<100/100ml.

REVISIONS

REV. NO.	DESCRIPTION	DATE	CHECKED	APP'D

VSH 2/6/91

REGISTERED PROFESSIONAL ENGINEER STATE OF IDAHO 2102 Dennis M. Thompson

SCALE N/A | DRAWN BY VSH | CHECKED BY | DATE 12/19/89 | JOB NUMBER 933E | SHEET 1 | DRAWING NUMBER 933E1

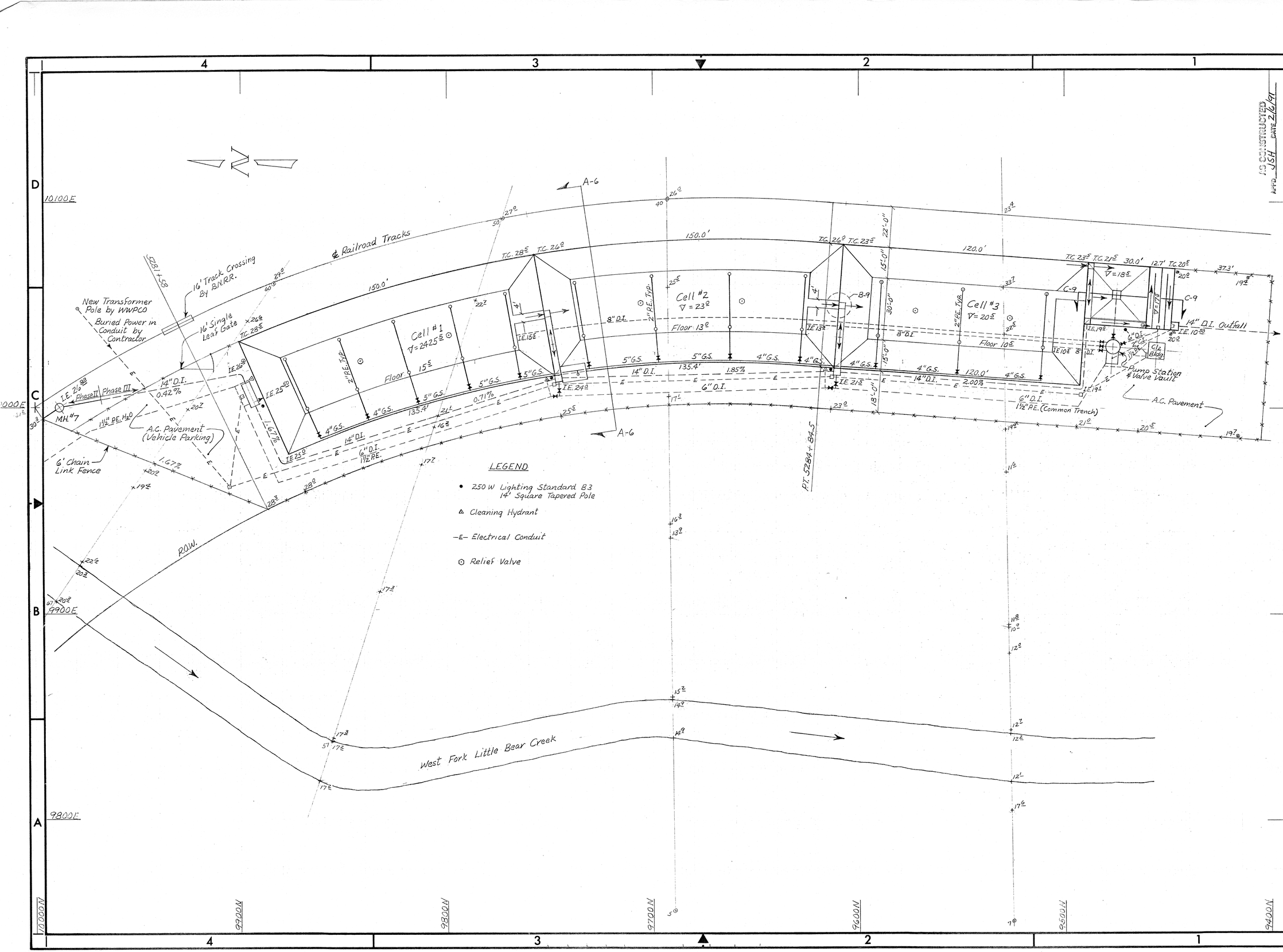
CITY OF TROY, IDAHO
Hydraulic Profile and Design Summary

HEDCO
Box 460 Spence Road
Troy, ID. 83871-0460
(208) 835-8443

SHEET 1

DRAWING NO. 933E1


CITY OF TROY, IDAHO
Access Road & Grading Plan
HEDCO
Box 460 Spence Road
Troy ID. 83871-0460
SCALE 1" = 40'
DRAWN BY JSH
DATE 3/16/90
JOB NUMBER 933E
SHEET 2
DRAWING NUMBER 933E2
REVISIONS
DESCRIPTION
DATE
CHECKED
APP'D
AS CONSTRUCTED
APP'D JSH DATE 2/6/91
REGISTERED PROFESSIONAL ENGINEER
2102
STATE OF IDAHO
SHEET 2
DRAWING NO. 933E2
Access Road Typical Section
6" Crushed Rock Surface
3' 2' 6' 6' 2'
8' 8'
2%
1.5'
Begin 16' Wide Access Road
P.C. 0+00
Δ = 35°15'
R = 400'
T = 127.1'
L = 246.1'
Borrow Source
P.C. 2+46.1
P.T. 2+46.1
P.I. 3+10.1
Δ = 77°20'
R = 80'
T = 64.0'
L = 108.0'
P.T. 3+54.1
P.I. 1+27.1
Big Meadow Creek
West Fork Little Bear Creek
℄ Railroad Tracks
ROW
Riprap Limits
Old Channel
S 9°22'20" W 564.37'
14" D.I. Outfall 2.00%
Floor 15.5
Floor 13.0
Floor 10.5
MH #7
MH #6
MH #5
MH #4
P.C.C. 5279+41.7 Ah
5279+20.0 Bk
P.T. 5284+84.5
P.C. 5274+91.2
2460
2440
2430
2425
2420
2415
2410
10,200 E
10,100 E
10,000 E
9900 E
9800 E
9700 E
9600 E
10300 N
10200 N
10100 N
10000 N
9900 N
9800 N
9700 N
9600 N
9500 N
9400 N
9300
9200 N
H & V ENGINEERING FORM NO. 103



REVISIONS				
NO.	DATE	DESCRIPTION	CHECKED	APP'D

AS CONSTRUCTED
APP'D. JSH DATE 2/6/91

REGISTERED PROFESSIONAL ENGINEER — STATE OF IDAHO — 2103 — Jack S. Hammond

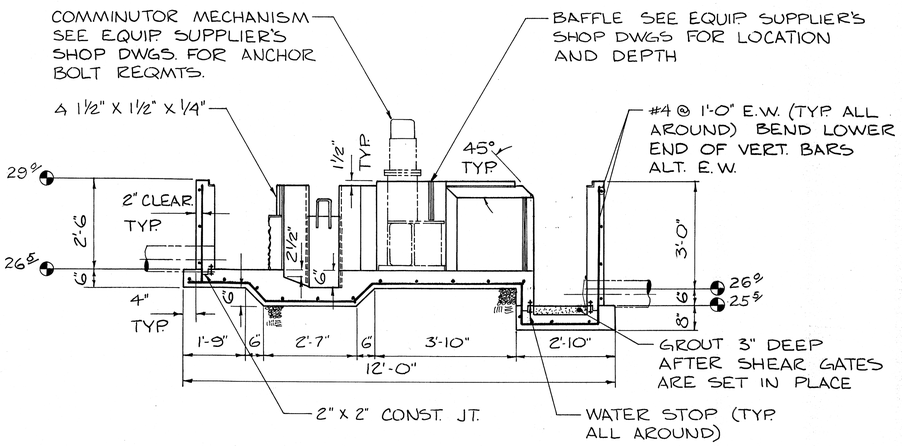
SCALE	1" = 20'
DRAWN BY	JSH
CHECKED BY	
DATE	12/6/89
JOB NUMBER	933E
SHEET	3
DRAWING NUMBER	933E3

CITY OF TROY, IDAHO
Aerated Lagoon Layout

HEDCO
Box 460 Spence Road
Troy, ID. 83871-0460
(208) 835-4448

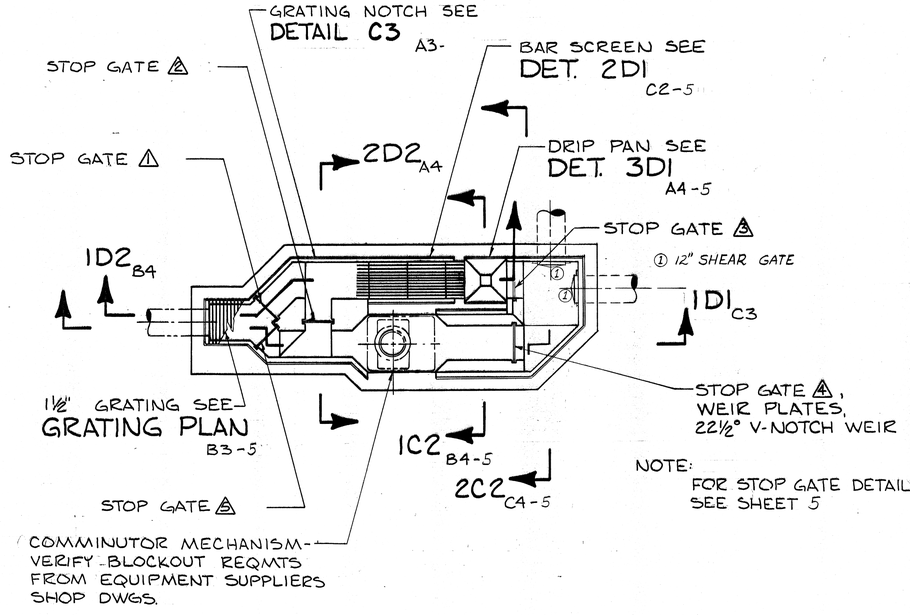
SHEET 3

DRAWING NO. 933E3



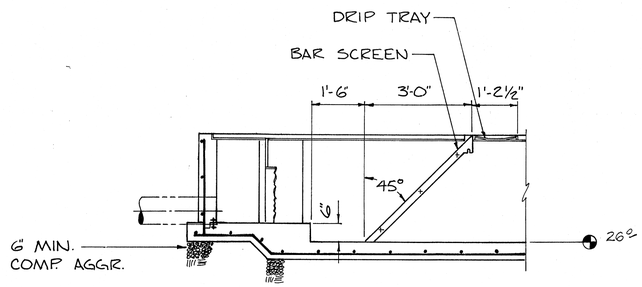
SECTION 1D1

1/2" = 1'-0"



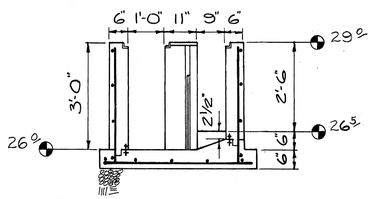
PLAN

1/2" = 1'-0"



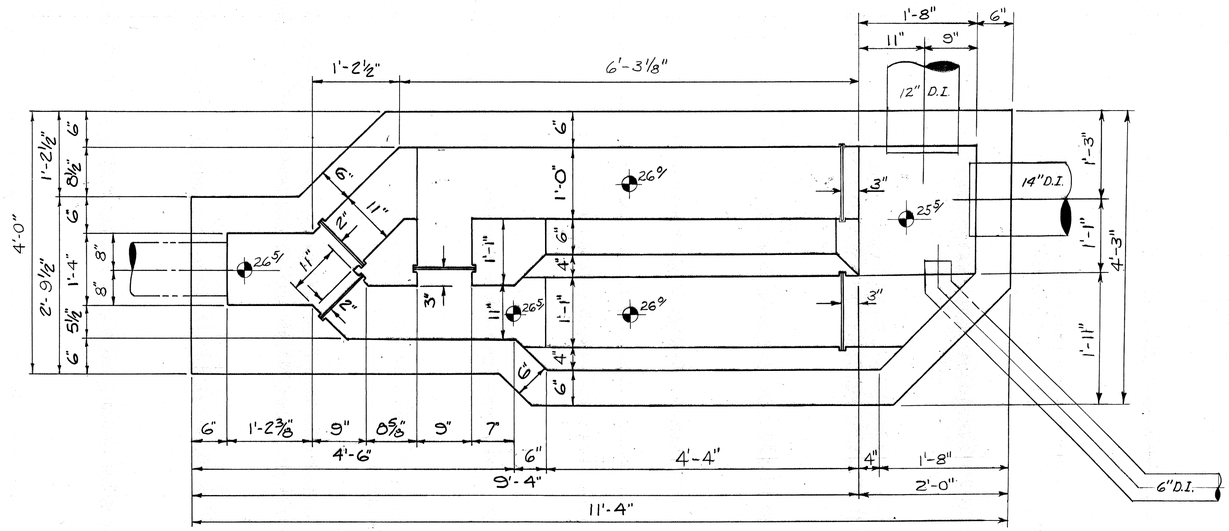
SECTION 1D2

1/2" = 1'-0"



SECTION 2D2

1/2" = 1'-0"



DIMENSION DETAIL

1" = 1'-0"

AS CONSTRUCTED
APPD. JSH DATE 2/6/91

REVISIONS

NO	DATE	DESCRIPTION	CHECKED	APPD

REGISTERED PROFESSIONAL ENGINEER 21102 STATE OF IDAHO JAMES S. HAMMOND

SCALE AS NOTED
DRAWN BY PFR
CHECKED BY JSH
DATE 3/14/90
JOB NUMBER 933E
SHEET 4
DRAWING NUMBER 933 E4

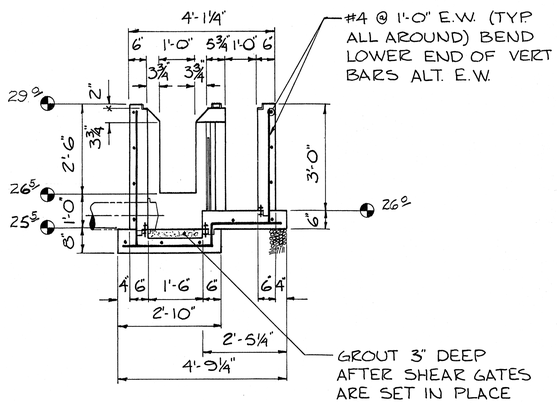
CITY OF TROY, IDAHO

PRETREATMENT STRUCTURAL

HEDCO
Box 460 Spence Road
Troy, ID. 83871-0460
(208) 835-8448

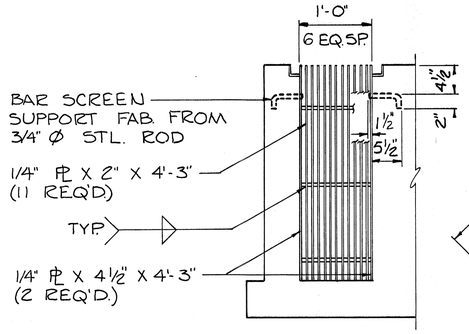
SHEET 4

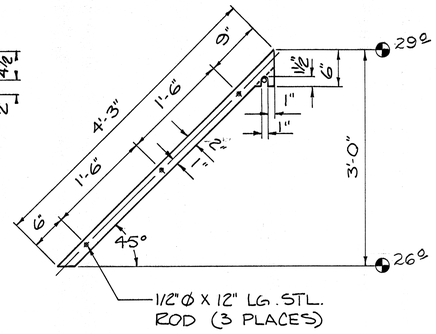
DRAWING NO. 933 E4



SECTION 2C2-4

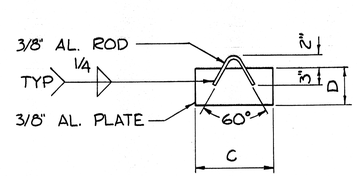
1/2" = 1'-0"





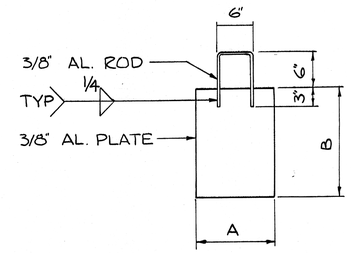
DETAIL 2D1-4

1" = 1'-0"

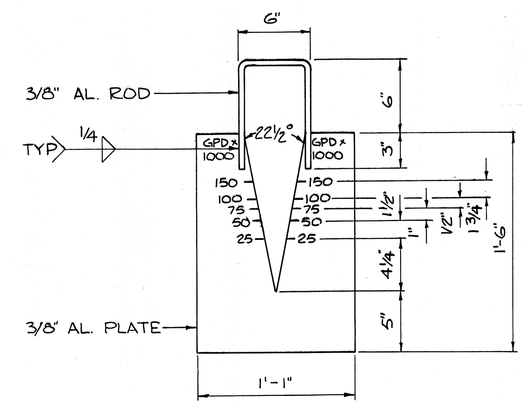


WEIR PLATE

NOTE:
PROVIDE TWO AL. STOP GATE GROOVES FOR EACH STOP GATE. WHERE NECESSARY NOTCH GRATING SUPPORT ANGLE TO CLEAR STOP GATE.



STOP GATE



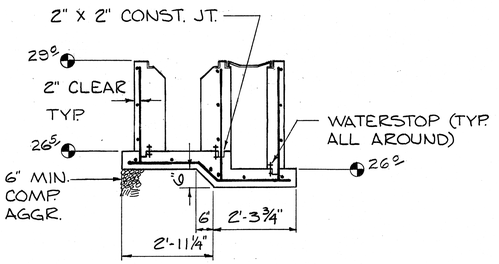
22½° V-NOTCH WEIR (1 Req'd.)

STOP GATE SCHEDULE			
GATE NO.	A DIM.	B DIM.	NO. REQ'D.
1	1'-0"	1'-6"	1
2	10"	2'-0"	1
3	1'-1"	2'-0"	1
4	1'-2"	1'-6"	1
5	1'-0"	1'-6"	1

WEIR PLATE SCHEDULE			
GATE NO.	C DIM.	D DIM.	NO. REQ'D.
4	1'-2"	3"	2
4	1'-2"	6"	2

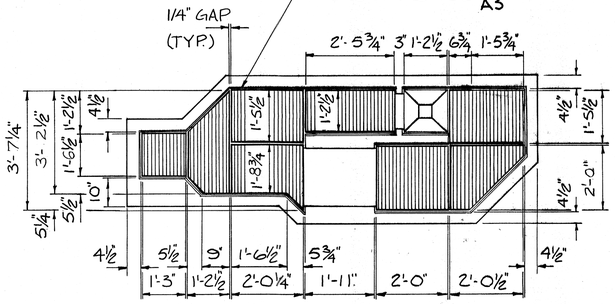
STOP GATE DETAILS

NO SCALE



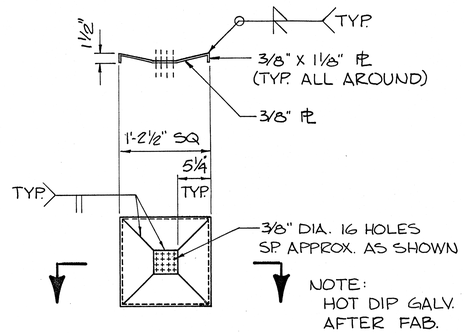
SECTION 1C2-4

1/2" = 1'-0"



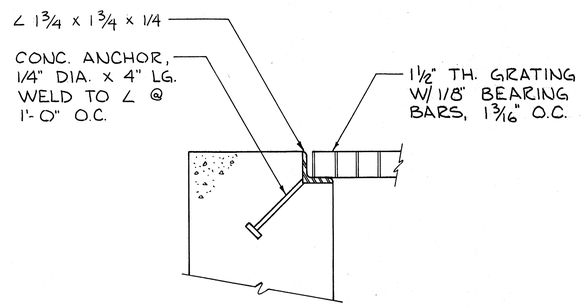
GRATING PLAN

1/2" = 1'-0"



DETAIL 3D1-4

1" = 1'-0"



DETAIL C3

1/4" = 1"

AS CONSTRUCTED
APPD. JSH DATE 2/6/91

REVISIONS			
NO.	DESCRIPTION	DATE	APPD

CHECKED

REGISTERED PROFESSIONAL ENGINEER 2102 STATE OF IDAHO JACK S. HAMMOND

SCALE	DRAWN BY	CHECKED BY	FOR NUMBER
AS NOTED	PFR	JSH	933E
	DATE	SHEET	DRAWING NUMBER
	3/15/90	5	933E5

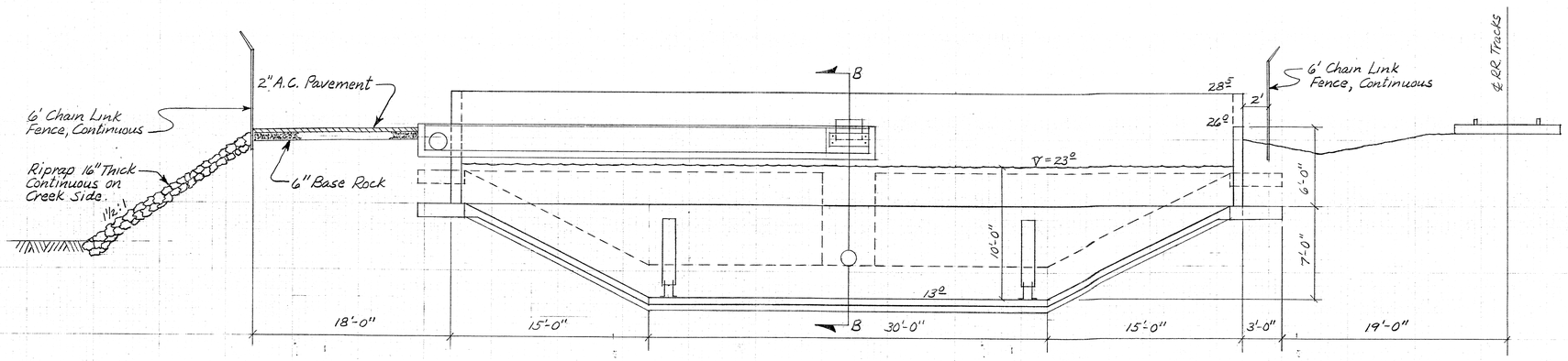
CITY OF TROY, IDAHO

PRETREATMENT STRUCTURAL DETAILS

HEDCO
Box 460 Spence Road
Troy, ID. 83871-0460
(208) 835-4448

SHEET 5

DRAWING NO. 933E5



SECTION A-A
Scale: 1"=5'

SECTION A-A
Scale: 1"=2'

SECTION B-B
Scale: 1"=2'
(Also Typical Section For Cell 2 - Cell 3)

AS CONSTRUCTED
APPD. JSH DATE 2/6/91

REVISIONS			
NO.	DATE	DESCRIPTION	CHECKED APPD

REGISTERED PROFESSIONAL ENGINEER 2102 STATE OF IDAHO JACK S. HANNA

SCALE As Noted
DRAWN BY JSH
CHECKED BY
DATE 2/19/90
FOR NUMBER 933E
SHEET 6
DRAWING NUMBER 933E6

CITY OF TROY, IDAHO
Aerated Lagoon Cells
Structural & Mechanical Details

HEDCO
Box 460 Spence Road
Troy, ID. 83871-0460
(208) [illegible]

SHEET 6

DRAWING NO. 933E6

H & V ENGINEERING FORM NO. 103

AS CONSTRUCTED
APPD. JSH DATE 2/6/91

REVISIONS			
NO.	DATE	DESCRIPTION	CHECKED APPD

REGISTERED PROFESSIONAL ENGINEER
JOHN S. HAMMOND
STATE OF IDAHO
2102

SCALE 1"=2'
DRAWN BY JSH
CHECKED BY
DATE 3/8/90
FOR NUMBER 933E
SHEET 7
DRAWING NUMBER 933E7

CITY OF TROY, IDAHO
Clarification Cell & Pump Station
Structural & Mechanical Details

HEDCO
Box 460 Spence Road
Troy, ID. 83871-0460
(208) 835-8443

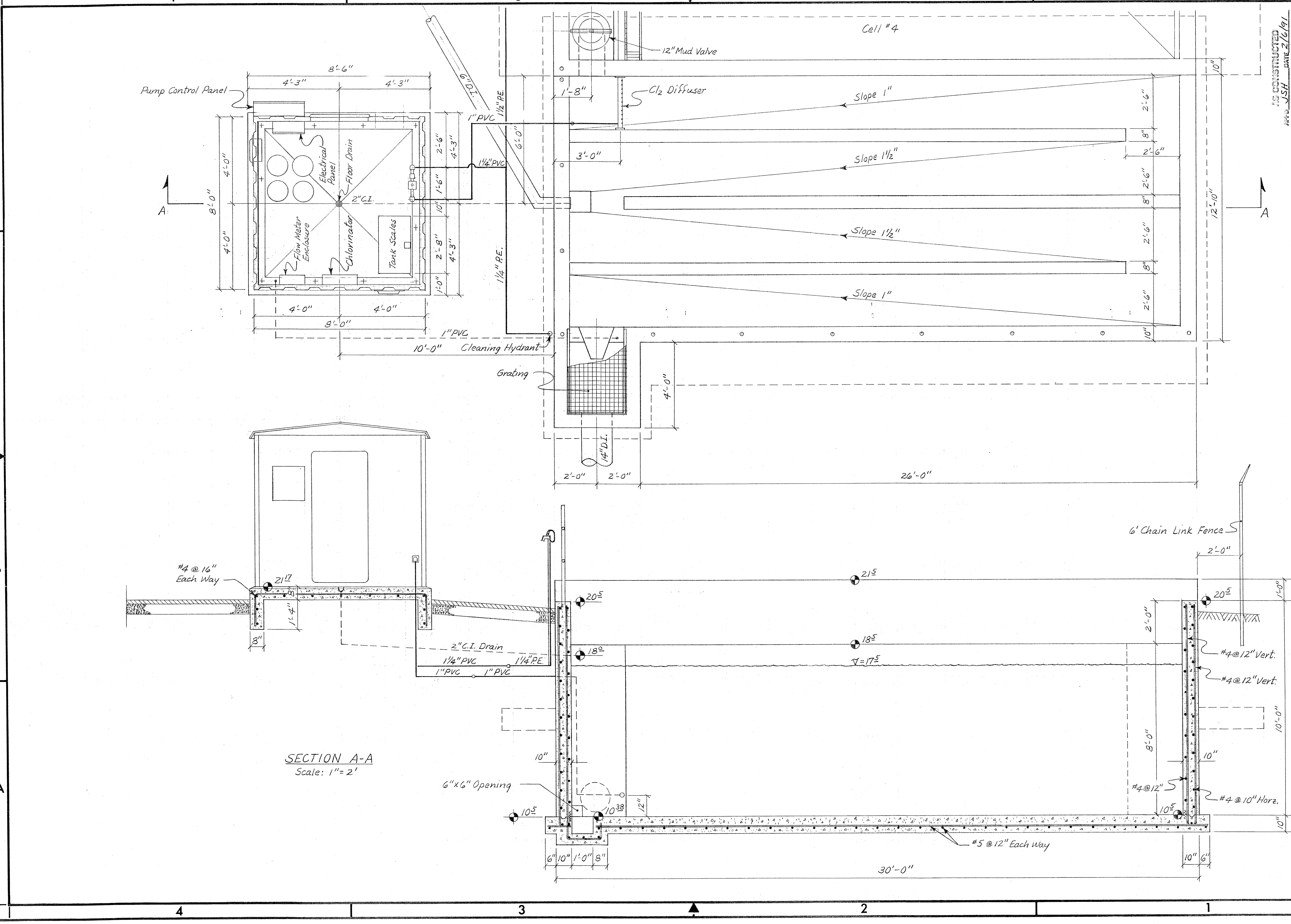
SHEET 7

DRAWING NO. 933E7

8"D.I. From Cell 3
8"D.I. From Cell 2
8"D.I. From Cell 1
14" D.I.
1'-8"
15'-0"
7"
3'-0"
6"D.I.
4"C.I.
4"C.I.
2"C.I.
8"D.I.
8" Plug Valve, Typ.
6"D.I.
3'-0"
1'-11"
13"
3'-0"
13"
13"
10"
8"
Typ.
8'-0"
3'-7"
10'-0"
2'-0"
Aluminum Stop Gate, Typ.
Grating, Continuous
Cell #3
Cell #4
17 66
0.60%
1'-10"
4'-0"
4'-0"
2'-0"
2'-0"
12"D.I.
14'-0"
2'-0"
10"
2'-0"
6"
12"
2'-0"
6"
12"
2'-0"

5'-0"
4'-0"
4" Galv. Steel Pipe
10'-0"
6'-0"
3'x4' Aluminum Hatches See Specifications
4" Welded Steel Vent With Insect Screen. Hot-dip Galv. After Fab.
21 67
8"
#4 @ 12" Each Way, Each Face
6'-0"
12"
M.H Steps 6 Req'd.
Elec. Junction Box NEMA 4X
8" Sludge Valve
4"C.I.
8"Typ.
4"Typ.
1'-0"
8"
14 0
6" Crushed Rock
L 2"x2"x3/8" Welded Support Bracket With 4" Square 1/4" End Plates. Hot-dip Galvanized After Fabrication. Mount with 1/2"x3" Expansion Bolts.
Precast 6'-0" Manhole Sections. A.P.W.A. Std. Spec. & ASTM C-478. 6' & 4' Sections Required. Precast Lid & Base Acceptable.
See Pump Mfgr. Shop Drawings For Anchor Bolt Location and Access Hatch Location Requirements.
9'-0"
05 0
6" Crushed Rock
8"
3/4" PVC Pipe, Clamp To Supports With S.S. Clamps.
14" D.I.
19 0
19 5/8
#4@12" Vert.
#4@9" Horz.
#5@12"
#4
Aluminum Stop Gate, Typ.
#4@12" Each Way
19 5/8
Weir & Scum Baffle Assembly
#5@12"
10"
2'-0"
6"
8"
Alarm 15 0
#4@9"
#4@12"
4'-8"
1'-4"
2'-6"
1'-0"
Lag On 12 0
Lead On 10 0
7'-3"
07 5/8
Off 06 0
4"C.I.
8" O.D.I.
23 5
21 5
19 5
15 5
10 3
06 5
05 6/7
2'-0"
3'-0"
3'-0"
9'-0"
5 1/2"
10"
14'-0"
2'-0"
14'-0"
1'-6"
3'-0"
2'-0"
6"
12"
3/8" AL PL
#6@12" Vert.
#4@6" Horz.
#4@12" Each Way
#5@9"
#5@12"
12"
2'-6"
2'-0"
10"
1'-0"
3'-0"
#4@12"
#6@12"
#5@12" Each Way, Typ. All Sides & Floor
4" Crushed Rock, Typ.

① This Section Typical on Railroad Side for Cells 1, 2, 3 & 4.



AS CONSTRUCTED APPD JSH DATE 2/6/91

REVISIONS

REV LTR	DATE	DESCRIPTION	CHECKED	APPD

REGISTERED PROFESSIONAL ENGINEER 2102 STATE OF IDAHO JACK S. HAMMOND

SCALE 1" = 2'	
DRAWN BY JSH	CHECKED BY
DATE 3/15/90	JOB NUMBER 933E
SHEET 8	DRAWING NUMBER 933E8

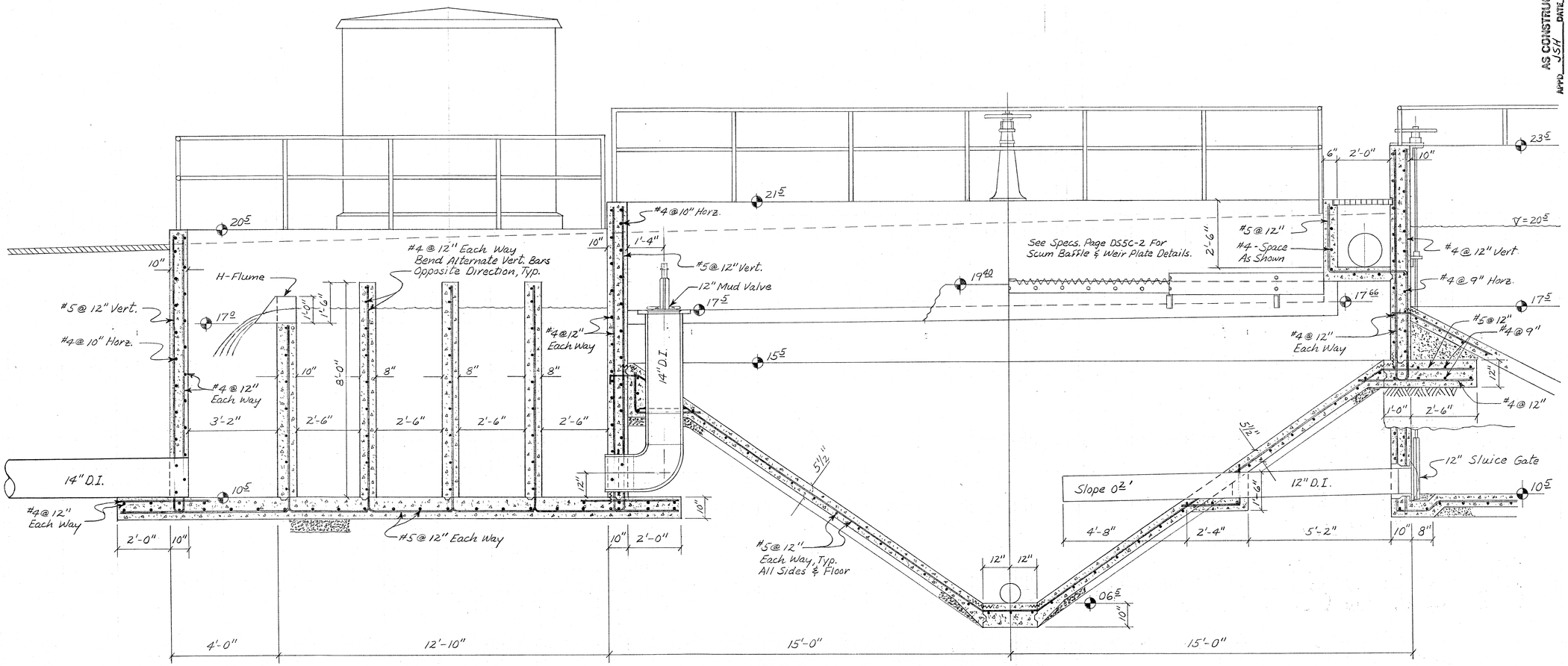
CITY OF TROY, IDAHO
Effluent Chlorination System
Structural & Mechanical Details

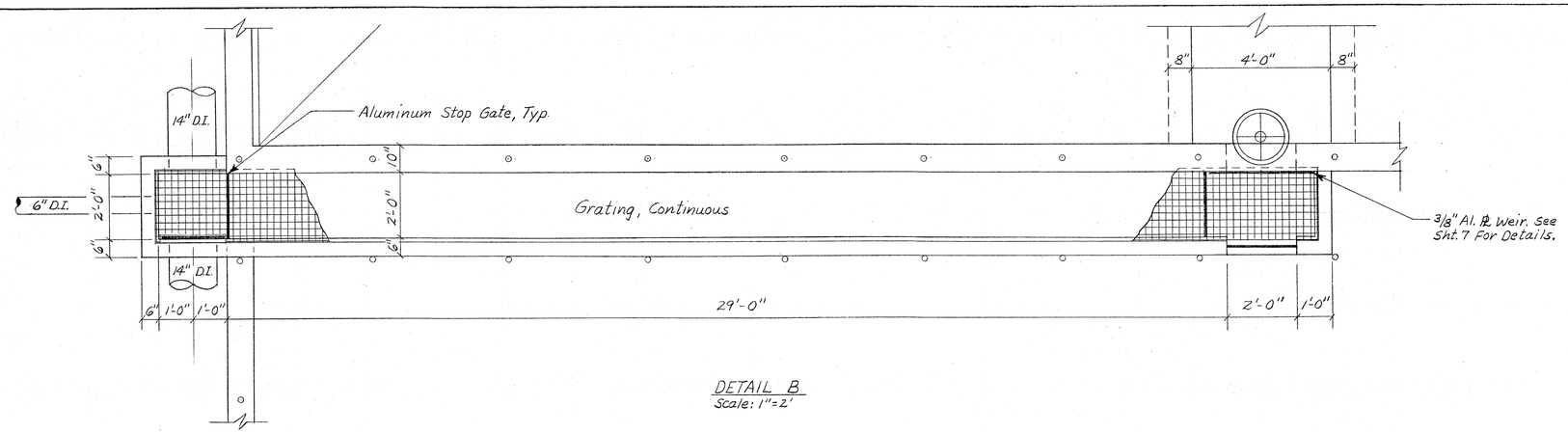
HEDCO
Box 460 Spence Road
Troy, ID. 83871-0460
(208) 835-8443

SHEET 8

DRAWING NO. 933E8

AS CONSTRUCTED
APPD. JSH DATE 2/6/91





DETAIL B
Scale: 1"=2'

REVISIONS

NO.	DATE	DESCRIPTION	CHECKED	APPD

REGISTERED PROFESSIONAL ENGINEER 2102 STATE OF IDAHO JAMES S. HAMMOND

SCALE	1"=2'
DRAWN BY	JSH
CHECKED BY	
DATE	3/17/90
JOB NUMBER	933.E
SHEET	9
DRAWING NUMBER	933 E9

CITY OF TROY, IDAHO
Clarification & Chlorination Cells
Structural & Mechanical Details

HEDCO
Box 460 Spence Road
Troy, ID. 83871-0460
(208) 835-8443

SHEET 9

DRAWING NO. 933 E9

Legend

- Troy City Boundary
- Manholes

Sewer Line

- Unknown
- 4"
- 6"
- 8"
- 10"
- 12"
- 14"

C:\Users\jkaminsky\Dropbox (Mountain Waterworks)\Proj\S to Z\Troy_170\Wastewater\0020_Facility Plan\Assessment and mapping\GIS\Pipe Size Portrait 11x17.mxd

0 125 250 500 750 1,000 Feet

Mountain WATERWORKS

Sewer Line Size
Collection System
City of Troy

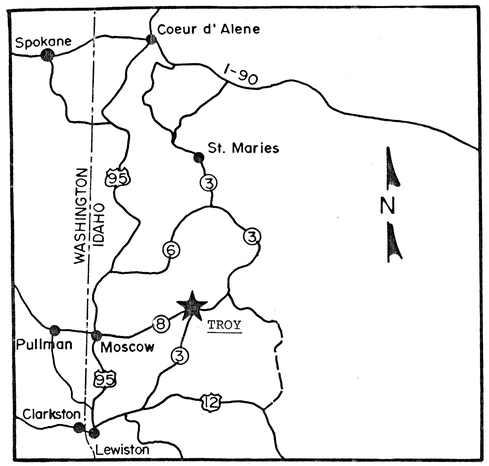
Appendix E

Original WWTP Upgrade Plans,
Hammond Engineering and Development Co.

CITY OF TROY, IDAHO

PHASE III
WASTEWATER TREATMENT FACILITY PROJECT

CONSTRUCTION PLANS



VICINITY MAP

INDEX TO PLANS

NOTES:

1. BIDDERS MUST ASSUME ALL RESPONSIBILITY FOR DEDUCTIONS AND CONCLUSIONS AS TO THE NATURE OR CONDITION OF MATERIALS TO BE EXCAVATED, AND FOR THE DIFFICULTIES OF MAKING AND MAINTAINING THE REQUIRED EXCAVATIONS.
2. SAFETY RAILING SHALL BE INSTALLED CONTINUOUSLY ALONG THE NORTHERLY WALL OF CELL 1, ALONG THE WESTERLY WALLS OF CELL 1, CELL 2, AND CELL 3, ALONG THE SOUTHERLY WALL OF CELL 3, ALONG THE WESTERLY WALL OF CELL 4 AND CELL 5, ALONG THE SOUTHERLY WALL OF CELL 5 AND AT SUCH OTHER LOCATIONS CALLED FOR ON THE PLANS OR AS REQUIRED BY OSHA. SAFETY RAILING IS NOT REQUIRED ALONG THE RAILROAD SIDE OF THE FACILITIES BECAUSE OF THE FENCE LOCATION.
3. GRATING SHALL BE INSTALLED ON ALL CHANNELS, PITS, WELLS AND AT SUCH OTHER LOCATIONS CALLED FOR ON THE PLANS OR AS REQUIRED BY OSHA.

RECEIVED
FEB 15 1991
IDHW-DEQ
Coeur d'Alene Field Office

RECEIVED
FEB 15 1991
IDHW-DEQ
Coeur d'Alene Field Office

AS-BUILT PLAN AND SPECIFICATION REVIEW
By John Tindall, Environmental Engineer — 3/22/91, Date

These plans and specifications depicting the actual construction, alteration or modification performed have been reviewed for compliance with IDAHO DEPARTMENT OF HEALTH AND WELFARE regulations and have been found acceptable. This review does not relieve the owner, engineer or contractor of the responsibility of having designed and constructed these facilities in compliance with all applicable federal, state and local laws, rules, regulations or ordinances.

Refer to letter of 3/22/91 to Mayor Vogel

REGISTERED PROFESSIONAL ENGINEER
2102
STATE OF IDAHO
JACK S. HAMMOND

5/11/90

MAY, 1990

Set No. 021

Hammond Engineering and Development Co.
P.O. Box 460 — Spence Road
Troy, Idaho — 83871-0460
(208) 835-8443

REVISIONS

REV LTR	DATE	DESCRIPTION	CHECKED	APPD

SCALE N/A
DRAWN BY JSH — CHECKED BY
DATE 5/11/90 — JOB NUMBER 933E
SHEET 0 — DRAWING NUMBER 933E0

CITY OF TROY, IDAHO
Title Sheet

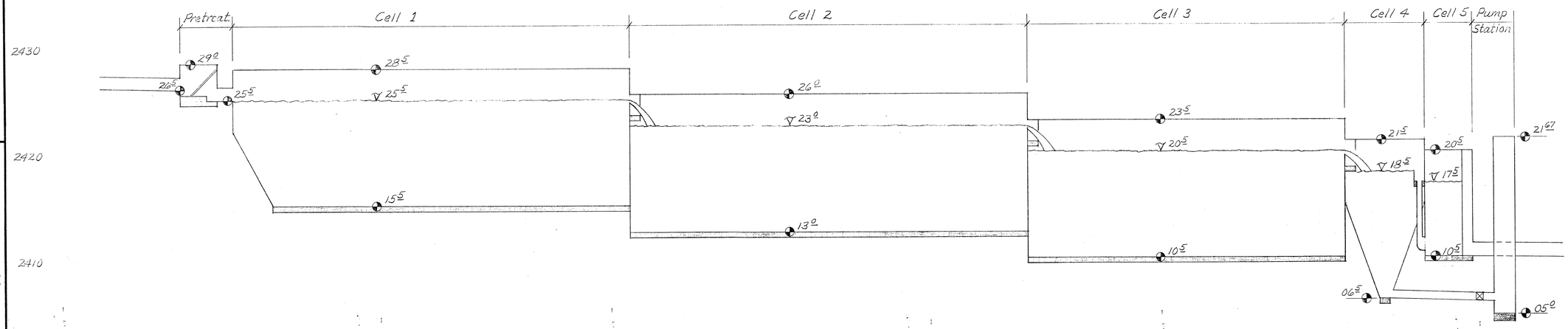
HEDCO
Box 460 Spence Road
Troy, ID 83871-0460
(208) 835-8443

SHEET 0
DRAWING NO. 933E0

ASSESSMENTED
APP'D JSH DATE 2/6/91

TROY WWTP - 1990 - PHASE III
RECORD DRAWS.

HYDRAULIC PROFILE



DESIGN SUMMARY

	Initial Conditions	Design Conditions
1. Design Year	1990	2010
2. Population	850	1250
3. Wastewater Flow – Gals./Day		
• Min. Day	60,000	95000
• Ave. Day	85,000	150,000
• Max. Day	150,000	190,000
4. Organic Load – lbs. BOD/Day		
• Min. Day	110	165
• Ave. Day	140	225
• Max. Day	170	250
5. Solids Load – lbs. S.S./Day		
• Min. Day	110	165
• Ave. Day	140	225
• Max. Day	170	250

6. Pretreatment
   Comminution – Bypass Course Bar Screen

7. Treatment Process
   - Cell 1 – Aerated Completely Mixed Lagoon with provision for Biomass Recycle
   - Cell 2 – Aerated Partially Mixed Lagoon
   - Cell 3 – Aerated Polishing Lagoon
   - Cell 4 – Quiescent Clarification Basin
   - Cell 5 – Chlorine Contact Basin

8. Aeration Equipment: 2-20 H.P. P.D. Blowers – 430 SCFM @ 6 psi Each
   - Cell 1 – Ten 12"Ø X 5' Submerged Tube Aerators
   - Cell 2 – Eight " " " "
   - Cell 3 – Six " " " "

   Design Wastewater Oxygen Transfer Rate – 1.2 lbs. O_2/hr./Tube @ 15 SCFM
   – 1.5 lbs. O_2/hr./Tube @ 20 SCFM

9. Oxygen Transfer – lbs. O_2/Hour	15 SCFM/Tube	20 SCFM/Tube
• Cell 1	12.0	15.0
• Cell 2	9.6	12.0
• Cell 3	7.2	9.0

10. Volume – Gallons		
• Cell 1	500,000	500,000
• Cell 2	500,000	500,000
• Cell 3	400,000	400,000
• Cell 4	45,000	45,000
• Cell 5	13,500	13,500

11. Detention Time – Days (Ave. Flow)		
• Cell 1	5.88	3.33
• Cell 2	5.88	3.33
• Cell 3	4.71	2.67
• Cell 4	0.53	0.30
• Cell 5	0.16	0.09

12. Volumetric Loading – lbs. BOD/Day/1000 Cu. Ft.		
• Cell 1 – Ave. Day	2.1	3.4
– Max. Day	2.5	3.7
• Cell 2 – Ave. Day	0.9	1.4
– Max. Day	1.1	1.6
• Cell 3 – Ave. Day	0.7	1.1
– Max. Day	0.9	1.3

13. Oxygen Required – lbs. O_2/Hour (2.0 lbs. O_2/lb. BOD Removed)		
• Cell 1 – Ave. Day	6.4	10.3
– Max. Day	7.8	11.5
• Cell 2 – Ave. Day	2.1	3.4
– Max. Day	2.6	3.8
• Cell 3 – Ave. Day	0.8	1.3
– Max. Day	1.0	1.5

14. Mixing Energy Supplied – HP/Million Gals. (16.6 HP – High Speed/11.1 HP – Low Speed)		
• Cell 1	9.3 (1 Blower-Low)	13.8 (1 Blower-High)
• Cell 2	7.4	11.1
• Cell 3	6.9	10.4

15. Predicted Effluent Quality – mg/l.		
• BOD	30-40	35-45
• S.S.	20-60	30-70
• Fecal Coliform	<100/100ml.	<100/100ml.

REVISIONS

REV. NO.	DESCRIPTION	DATE	CHECKED	APP'D

VSH 2/6/91

REGISTERED PROFESSIONAL ENGINEER STATE OF IDAHO 2102 Dennis M. Thompson

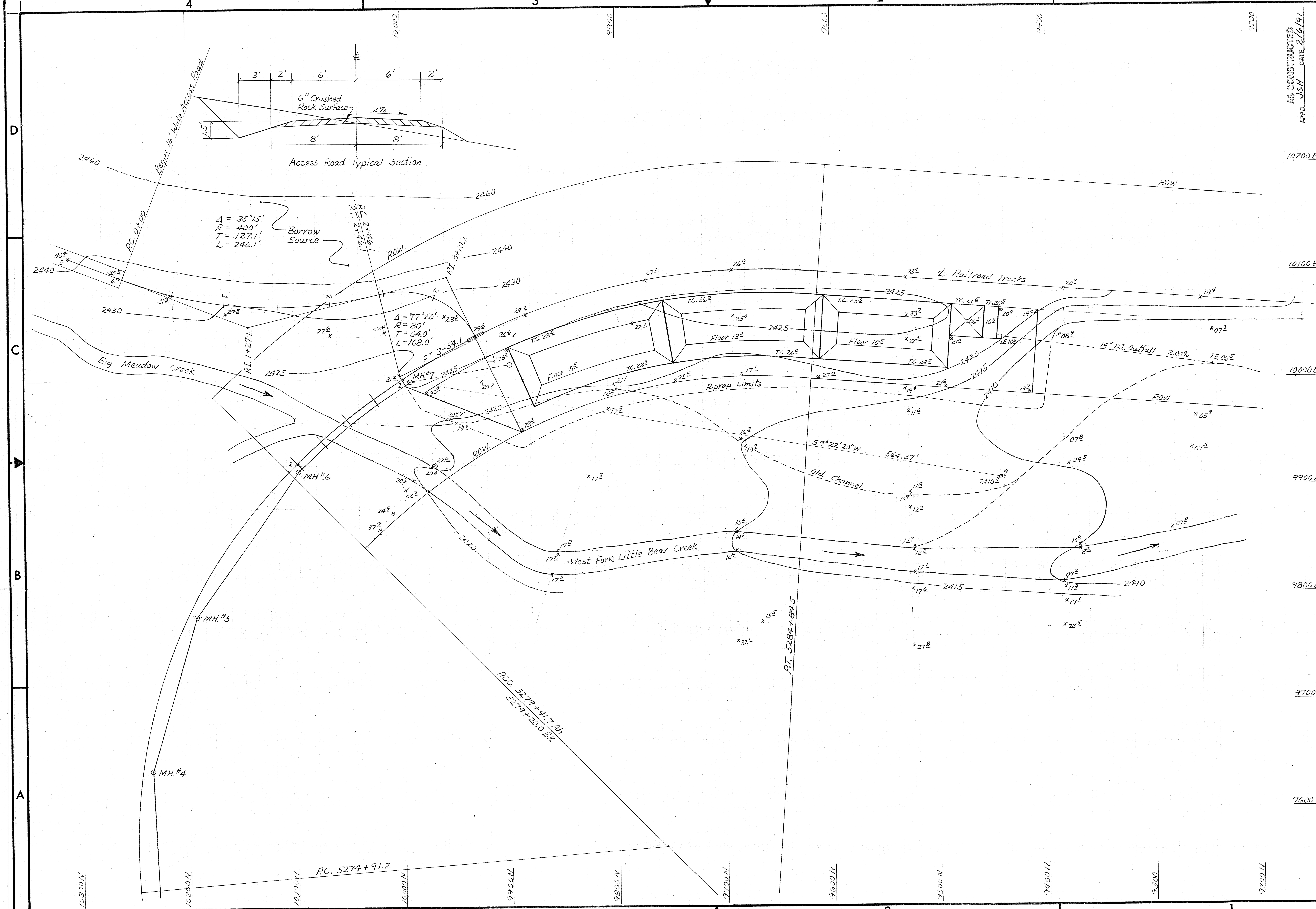
SCALE N/A | DRAWN BY VSH | CHECKED BY | DATE 12/19/89 | JOB NUMBER 933E | SHEET 1 | DRAWING NUMBER 933E1

CITY OF TROY, IDAHO
Hydraulic Profile and Design Summary

HEDCO
Box 460 Spence Road
Troy, ID. 83871-0460
(208) 835-8443

SHEET 1

DRAWING NO. 933E1



AS CONSTRUCTED
APP'D JSH DATE 2/6/91

REVISIONS

NO.	DATE	DESCRIPTION	CHECKED	APP'D

REGISTERED PROFESSIONAL ENGINEER 2102 STATE OF IDAHO

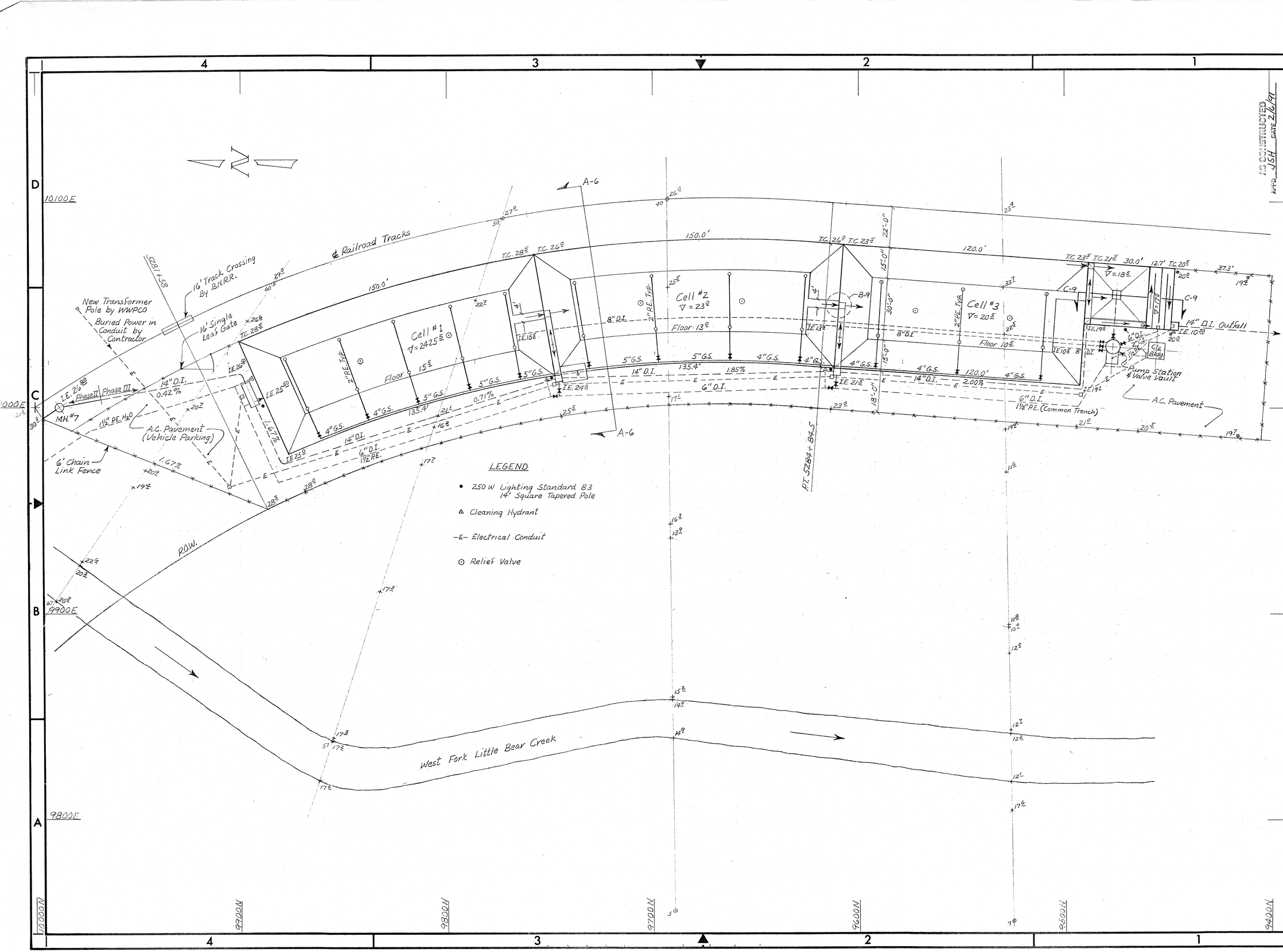
SCALE 1" = 40'
DRAWN BY JSH
CHECKED BY
DATE 3/16/90
JOB NUMBER 933E
SHEET 2
DRAWING NUMBER 933E2

CITY OF TROY, IDAHO
Access Road ¢ Grading Plan

HEDCO
Box 460 Spence Road
Troy, ID. 83871-0460
(208) 835-8445

SHEET 2
DRAWING NO. 933E2

H & V ENGINEERING FORM NO. 103



REVISIONS				
NO.	DATE	DESCRIPTION	CHECKED	APP'D

AS CONSTRUCTED
APP'D. JSH DATE 2/6/91

REGISTERED PROFESSIONAL ENGINEER — STATE OF IDAHO — 2103 — Jack S. Hammond

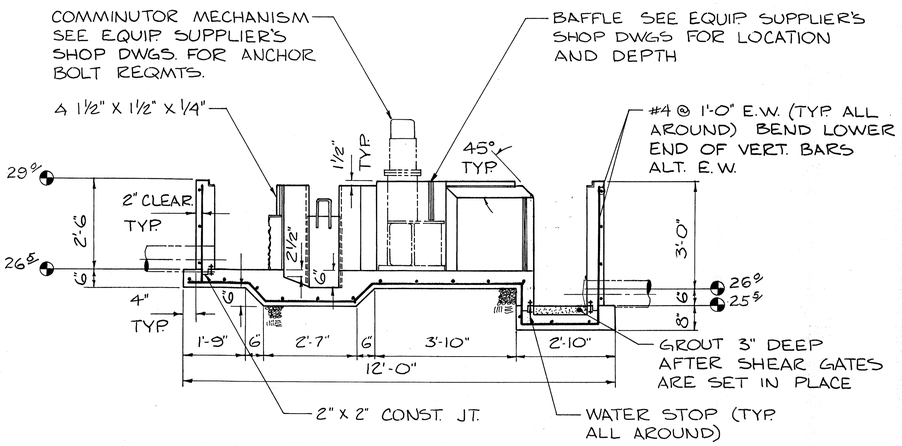
SCALE	1" = 20'
DRAWN BY	JSH
CHECKED BY	
DATE	12/6/89
JOB NUMBER	933E
SHEET	3
DRAWING NUMBER	933E3

CITY OF TROY, IDAHO
Aerated Lagoon Layout

HEDCO
Box 460 Spence Road
Troy, ID. 83871-0460
(208) 835-4448

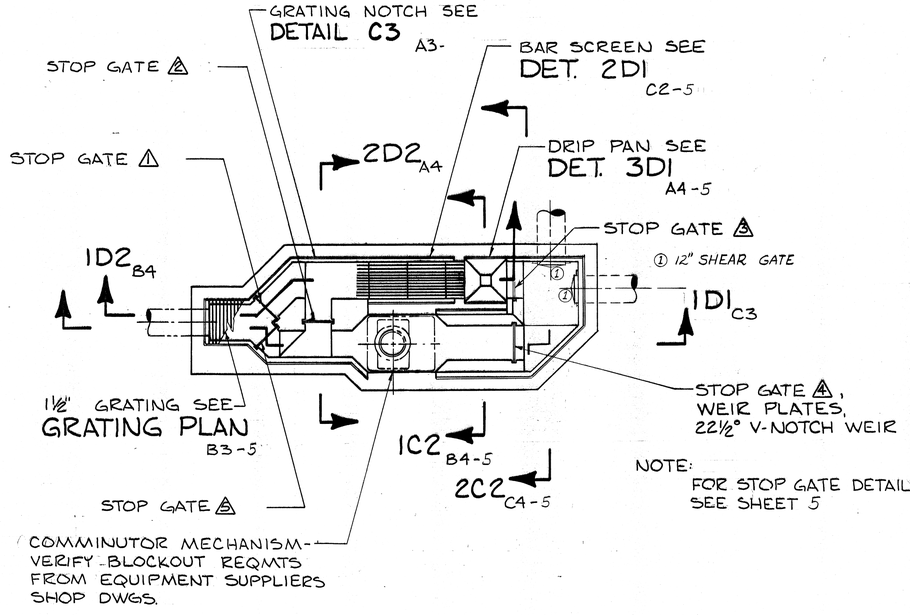
SHEET 3

DRAWING NO. 933E3



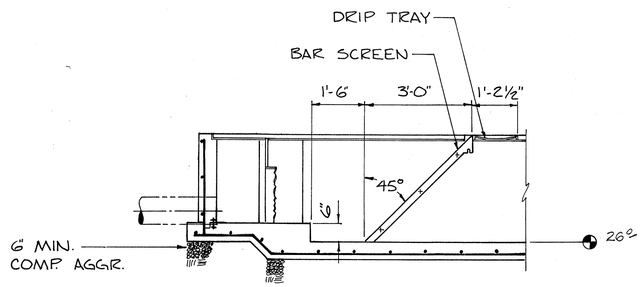
SECTION 1D1

1/2" = 1'-0"



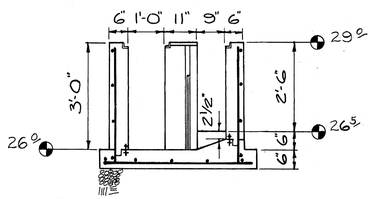
PLAN

1/2" = 1'-0"



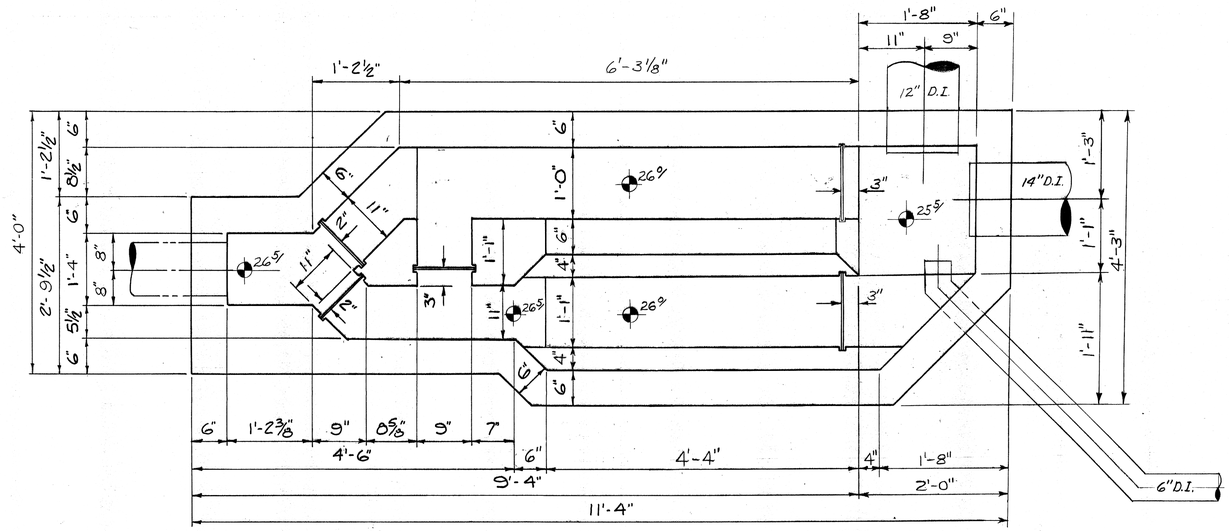
SECTION 1D2

1/2" = 1'-0"



SECTION 2D2

1/2" = 1'-0"



DIMENSION DETAIL

1" = 1'-0"

AS CONSTRUCTED
APPD. JSH DATE 2/6/91

REVISIONS

NO	DATE	DESCRIPTION	CHECKED	APPD

REGISTERED PROFESSIONAL ENGINEER 21102 STATE OF IDAHO JAMES S. HAMMOND

SCALE AS NOTED
DRAWN BY PFR
CHECKED BY JSH
DATE 3/14/90
JOB NUMBER 933E
SHEET 4
DRAWING NUMBER 933 E4

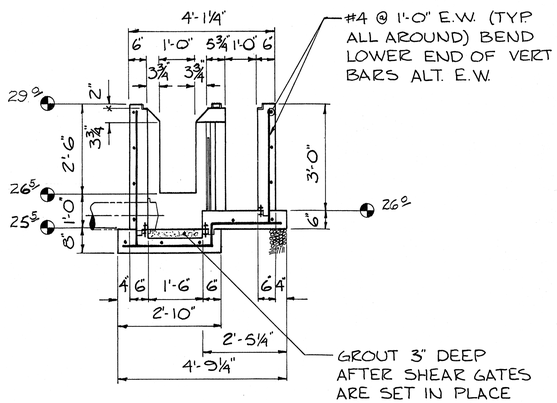
CITY OF TROY, IDAHO

PRETREATMENT STRUCTURAL

HEDCO
Box 460 Spence Road
Troy, ID. 83871-0460
(208) 835-8448

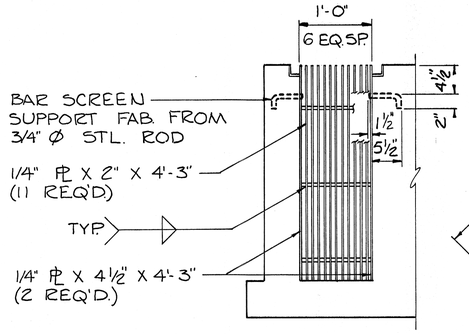
SHEET 4

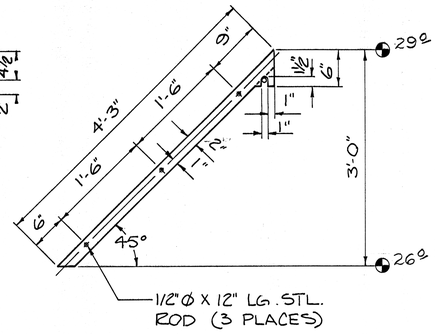
DRAWING NO. 933 E4



SECTION 2C2-4

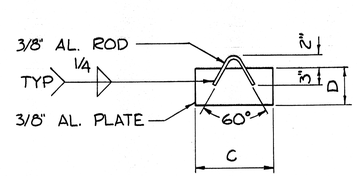
1/2" = 1'-0"





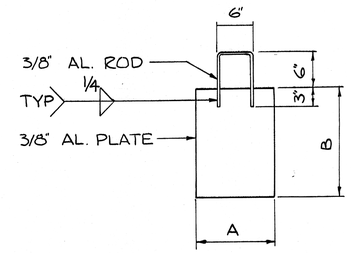
DETAIL 2D1-4

1" = 1'-0"

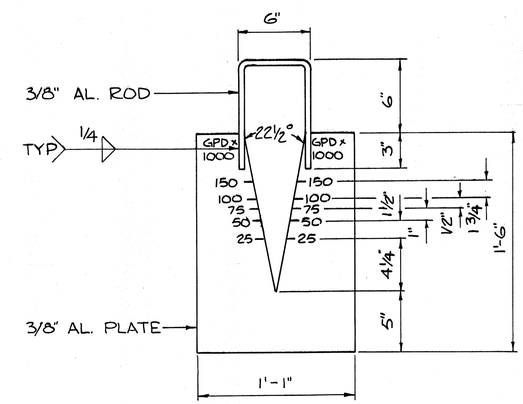


WEIR PLATE

NOTE:
PROVIDE TWO AL. STOP GATE GROOVES FOR EACH STOP GATE. WHERE NECESSARY NOTCH GRATING SUPPORT ANGLE TO CLEAR STOP GATE.



STOP GATE



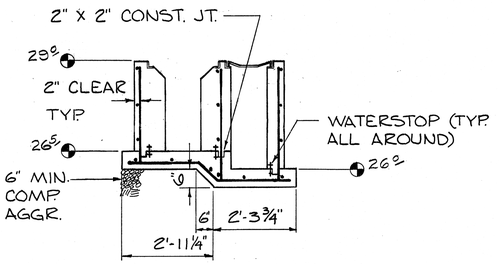
22½° V-NOTCH WEIR (1 Req'd.)

STOP GATE SCHEDULE			
GATE NO.	A DIM.	B DIM.	NO. REQ'D.
1	1'-0"	1'-6"	1
2	10"	2'-0"	1
3	1'-1"	2'-0"	1
4	1'-2"	1'-6"	1
5	1'-0"	1'-6"	1

WEIR PLATE SCHEDULE			
GATE NO.	C DIM.	D DIM.	NO. REQ'D.
4	1'-2"	3"	2
4	1'-2"	6"	2

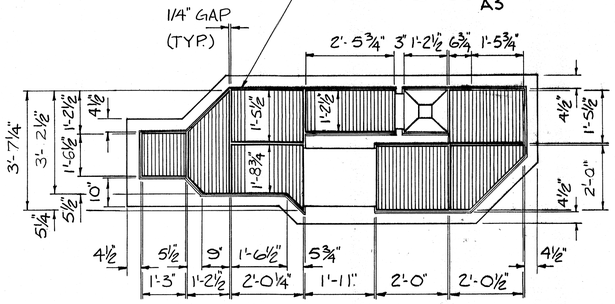
STOP GATE DETAILS

NO SCALE



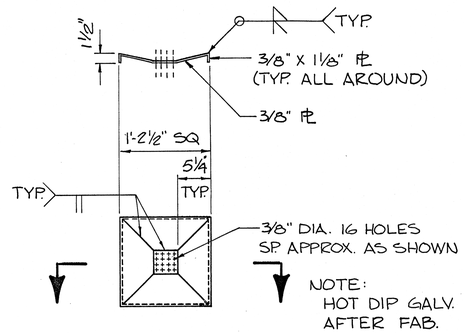
SECTION 1C2-4

1/2" = 1'-0"



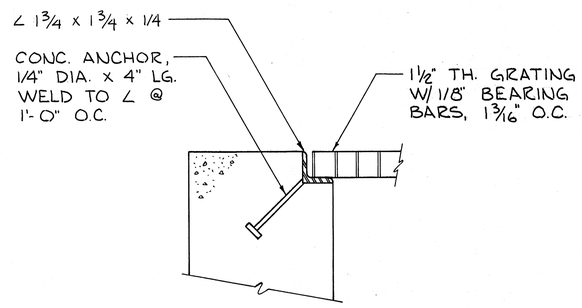
GRATING PLAN

1/2" = 1'-0"



DETAIL 3D1-4

1" = 1'-0"



DETAIL C3

1/4" = 1"

AS CONSTRUCTED
APPD. JSH DATE 2/6/91

REVISIONS			
NO.	DESCRIPTION	DATE	APPD

CHECKED

REGISTERED PROFESSIONAL ENGINEER 2102 STATE OF IDAHO JACK S. HAMMOND

SCALE	DRAWN BY	CHECKED BY	FOR NUMBER
AS NOTED	PFR	JSH	933E
	DATE	SHEET	DRAWING NUMBER
	3/15/90	5	933E5

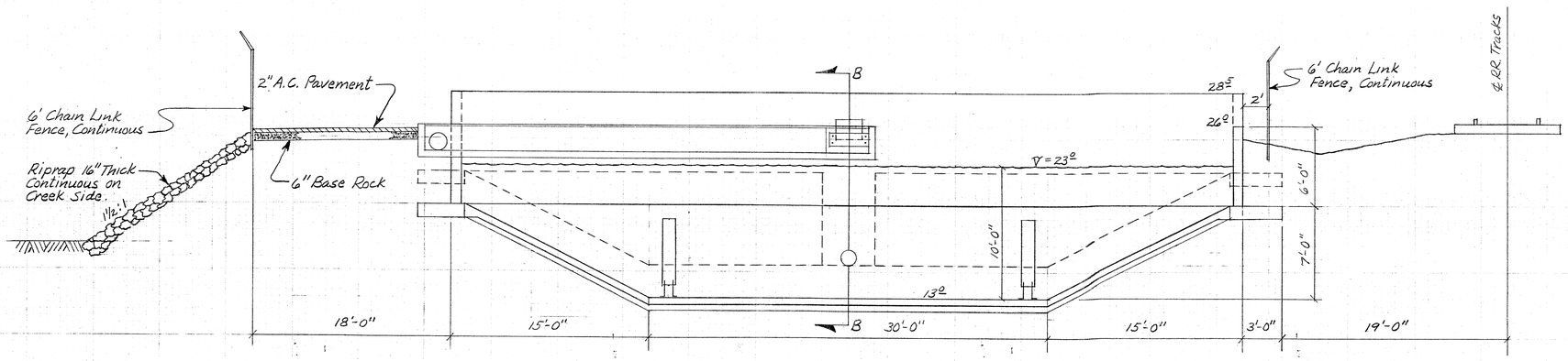
CITY OF TROY, IDAHO

PRETREATMENT STRUCTURAL DETAILS

HEDCO
Box 460 Spence Road
Troy, ID. 83871-0460
(208) 835-4448

SHEET 5

DRAWING NO. 933E5



SECTION A-A
Scale: 1"=5'

SECTION A-A
Scale: 1"=2'

SECTION B-B
Scale: 1"=2'
(Also Typical Section For Cell 2 - Cell 3)

AS CONSTRUCTED
APPD. JSH DATE 2/6/91

REVISIONS			
NO.	DATE	DESCRIPTION	CHECKED APPD

REGISTERED PROFESSIONAL ENGINEER 2102 STATE OF IDAHO JACK S. HANNA

SCALE As Noted
DRAWN BY JSH
CHECKED BY
DATE 2/19/90
FOR NUMBER 933E
SHEET 6
DRAWING NUMBER 933E6

CITY OF TROY, IDAHO
Aerated Lagoon Cells
Structural & Mechanical Details

HEDCO
Box 460 Spence Road
Troy, ID. 83871-0460
(208) [illegible]

SHEET 6

DRAWING NO. 933E6

H & V ENGINEERING FORM NO. 103

AS CONSTRUCTED
APPD. JSH DATE 2/6/91

REVISIONS			
NO.	DATE	DESCRIPTION	CHECKED APPD

REGISTERED PROFESSIONAL ENGINEER
JOHN S. HAMMOND
STATE OF IDAHO
2102

SCALE 1"=2'
DRAWN BY JSH
CHECKED BY
DATE 3/8/90
FOR NUMBER 933E
SHEET 7
DRAWING NUMBER 933E7

CITY OF TROY, IDAHO
Clarification Cell & Pump Station
Structural & Mechanical Details

HEDCO
Box 460 Spence Road
Troy, ID. 83871-0460
(208) 835-8443

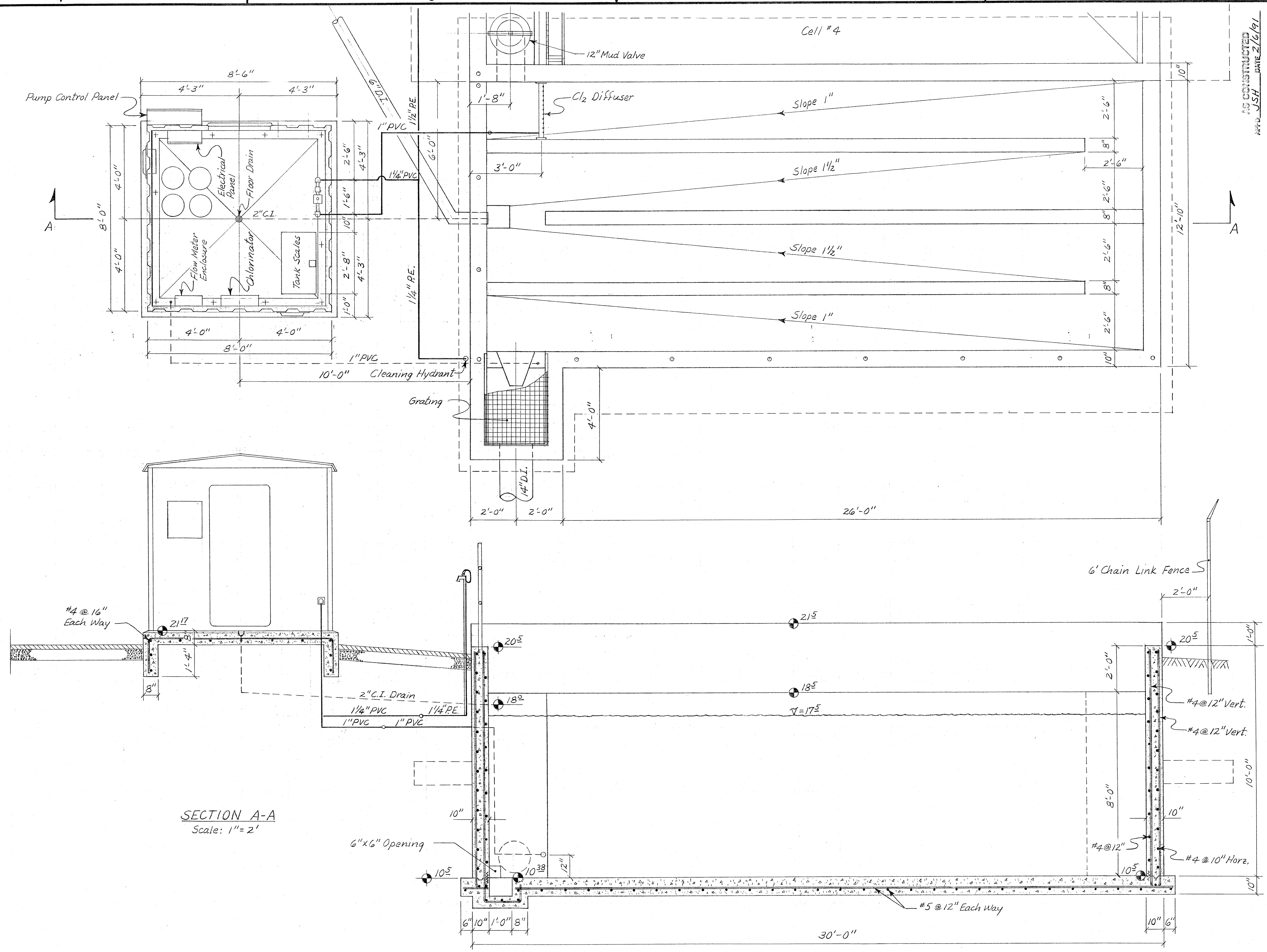
SHEET 7

DRAWING NO. 933E7

8"D.I. From Cell 3
8"D.I. From Cell 2
8"D.I. From Cell 1
14" D.I.
1'-8"
15'-0"
7"
3'-0"
6"D.I.
4"C.I.
4"C.I.
2"C.I.
8"D.I.
8" Plug Valve, Typ.
6"D.I.
3'-0"
1'-11"
13"
3'-0"
13"
13"
10"
8"
Typ.
8'-0"
3'-7"
10'-0"
2'-0"
Aluminum Stop Gate, Typ.
Grating, Continuous
Cell #3
Cell #4
17 66
0.60%
1'-10"
4'-0"
4'-0"
2'-0"
2'-0"
12"D.I.
14'-0"
2'-0"
10"
2'-0"
6"
12"
2'-0"
6"
12"
2'-0"

5'-0"
4'-0"
4" Galv. Steel Pipe
10'-0"
6'-0"
3'x4' Aluminum Hatches See Specifications
4" Welded Steel Vent With Insect Screen. Hot-dip Galv. After Fab.
21 67
8"
#4 @ 12" Each Way, Each Face
6'-0"
12"
M.H Steps 6 Req'd.
Elec. Junction Box NEMA 4X
8" Sludge Valve
4"C.I.
8"Typ.
4"Typ.
1'-0"
8"
14 0
6" Crushed Rock
L 2"x2"x3/8" Welded Support Bracket With 4" Square 1/4" End Plates. Hot-dip Galvanized After Fabrication. Mount with 1/2"x3" Expansion Bolts.
Precast 6'-0" Manhole Sections. A.P.W.A. Std. Spec. & ASTM C-478. 6' & 4' Sections Required. Precast Lid & Base Acceptable.
See Pump Mfgr. Shop Drawings For Anchor Bolt Location and Access Hatch Location Requirements.
9'-0"
05 0
6" Crushed Rock
8"
3/4" PVC Pipe, Clamp To Supports With S.S. Clamps.
14" D.I.
19 0
19 5/8
#4@12" Vert.
#4@9" Horz.
#5@12"
#4
Aluminum Stop Gate, Typ.
#4@12" Each Way
19 5/8
Weir & Scum Baffle Assembly
#5@12"
10"
2'-0"
6"
8"
Alarm 15 0
#4@9"
#4@12"
4'-8"
1'-4"
2'-6"
1'-0"
Lag On 12 0
Lead On 10 0
7'-3"
07 5/8
Off 06 0
4"C.I.
8" O.D.I.
23 5
21 5
19 5
15 5
10 3
06 5
05 6/7
2'-0"
3'-0"
3'-0"
9'-0"
5 1/2"
10"
14'-0"
2'-0"
14'-0"
1'-6"
3'-0"
2'-0"
6"
12"
3/8" AL PL
#6@12" Vert.
#4@6" Horz.
#4@12" Each Way
#5@9"
#5@12"
12"
2'-6"
2'-0"
10"
1'-0"
3'-0"
#4@12"
#6@12"
#5@12" Each Way, Typ. All Sides & Floor
4" Crushed Rock, Typ.

① This Section Typical on Railroad Side for Cells 1, 2, 3 & 4.



AS CONSTRUCTED
APPD JSH DATE 2/6/91

REVISIONS

NO.	DATE	DESCRIPTION	CHECKED	APP'D

REGISTERED PROFESSIONAL ENGINEER 2102 STATE OF IDAHO JACK S. HAMMOND

SCALE 1" = 2'
DRAWN BY JSH
CHECKED BY
DATE 3/15/90
JOB NUMBER 933E
SHEET 8
DRAWING NUMBER 933E8

CITY OF TROY, IDAHO
Effluent Chlorination System
Structural & Mechanical Details

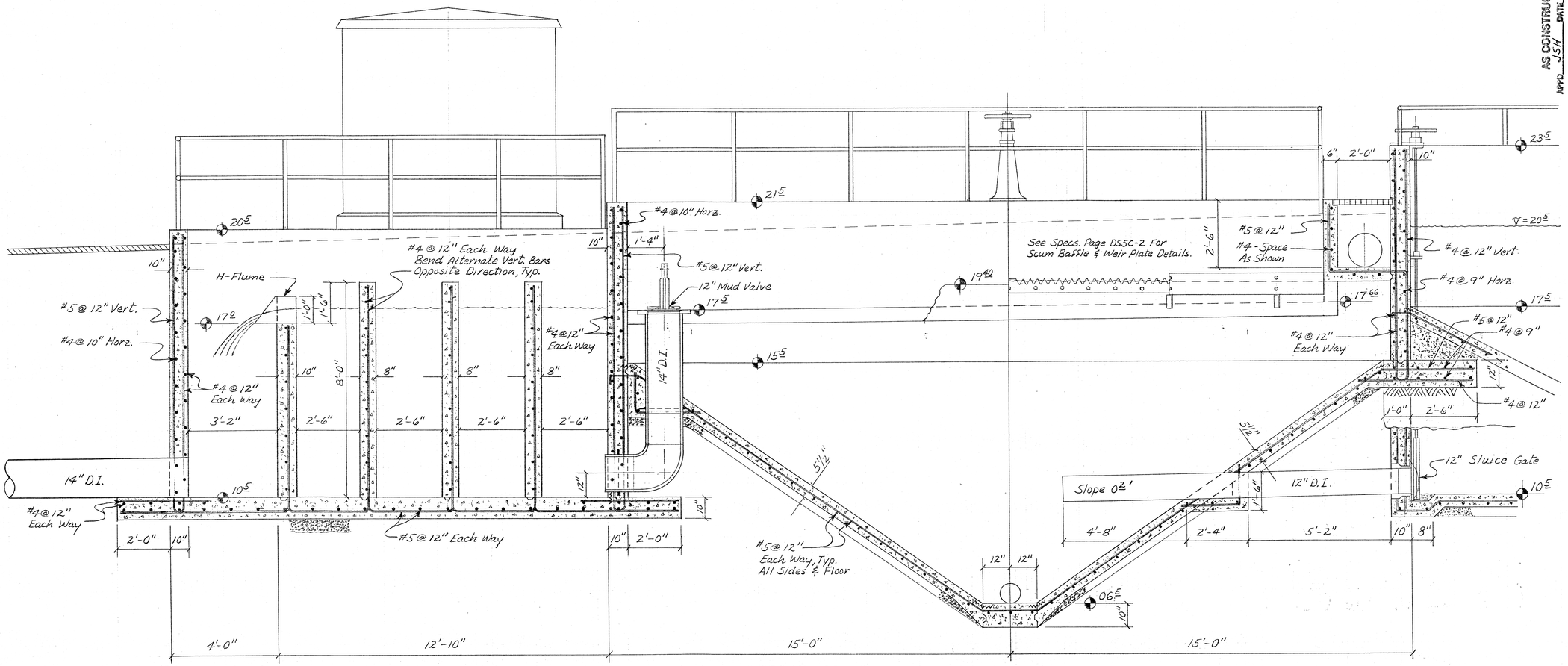
HEDCO
Box 460 Spence Road
Troy, ID. 83871-0460
(208) 835-8443

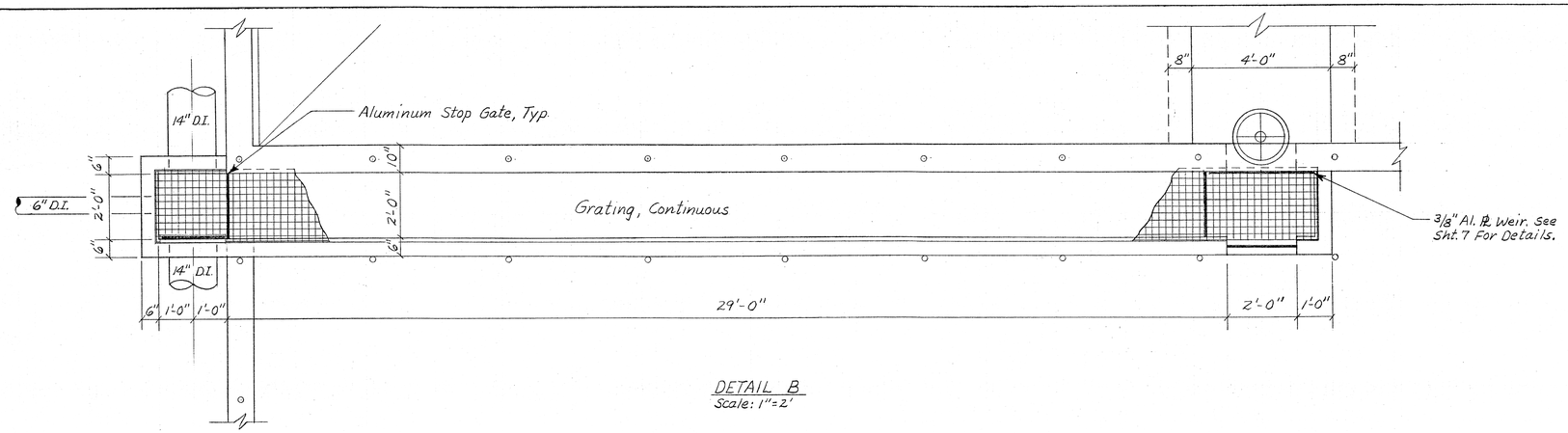
SHEET 8

DRAWING NO. 933E8

H & V ENGINEERING FORM NO. 103

AS CONSTRUCTED
APPD. JSH DATE 2/6/91





DETAIL B
Scale: 1"=2'

REVISIONS

NO.	DATE	DESCRIPTION	CHECKED	APPD

REGISTERED PROFESSIONAL ENGINEER 2102 STATE OF IDAHO JAMES S. HAMMOND

SCALE	1"=2'
DRAWN BY	JSH
CHECKED BY	
DATE	3/17/90
JOB NUMBER	933.E
SHEET	9
DRAWING NUMBER	933 E9

CITY OF TROY, IDAHO
Clarification & Chlorination Cells
Structural & Mechanical Details

HEDCO
Box 460 Spence Road
Troy, ID. 83871-0460
(208) 835-8443

SHEET 9

DRAWING NO. 933 E9

Appendix F

Lagoon Sludge Summary

TECHNICAL MEMORANDUM

DATE: October 4, 2016

TO: City of Troy

FROM: Mountain Waterworks

SUBJECT: Lagoon Sludge Evaluation

INTRODUCTION

Through discussions with City operations staff, we understand the City is evaluating sludge removal from the lagoon wastewater treatment facility. On September 26, 2016 Mountain Waterworks conducted an on-site visit with City operations staff to evaluate sludge buildup in the lagoons. The facility consists of three aerated concrete cells operated in series followed by clarification and disinfection.

ON-SITE TESTING

The total depth of water and sludge in the treatment cells is approximately 10 feet. Sludge samples were drawn from various locations within the three treatment cells. Sample results indicate a sludge layer approximately 8-inches to 16-inches in depth, with an average of approximately 12 inches, is contained within the treatment facility. Operating the facility with an average sludge depth of 12 inches is within normal operation conditions. A photo of the sampling is shown below.

SUMMARY AND RECOMMENDATIONS

A good indicator for considering sludge removal is the total suspended solids (TSS) concentrations contained in the effluent being discharged from the facility. The EPA TSS discharge permit limits are 30 mg/L as an average monthly limit and 45 mg/L as an average weekly limit. A summary of the 2016 TSS values are included in the table below.

Month	TSS Concentration (mg/L)
January	24
February	13
March	15
April	13
May	12
June	17
July	13
August	15

The effluent TSS concentrations are well below the permit limits. Historically, the City has had some permit compliance issues related to disinfection, but has been in compliance for TSS.

Based on the on-site sludge testing results and the effluent TSS concentrations being below permit compliance levels, immediate sludge removal is not required at the City's treatment facility. The facility is designed with the ability to remove sludge, and the City is taking steps to allow disposal at the Moscow wastewater treatment facility. It is recommended to complete the sampling requirements for sludge disposal at Moscow and as a maintenance activity remove, haul, and dispose of sludge periodically. Sludge buildup within the facility should continue to be monitored and limit the sludge buildup within the system to a maximum of 18-inches, or if TSS concentrations increase in the effluent conduct sludge removal.

In anticipation of the EPA renewing the City's NPDES discharge permit, it is also recommended to conduct monthly ammonia sampling on the plant effluent. Ammonia is a pollutant that could possibly be included in the City's new discharge permit and having data available to provide to the EPA can assist with their evaluation of setting permit limits.

Appendix G

City of Troy IPDES Permit No. ID0023604

Issuance Date:	07/01/22
Effective Date:	08/01/22
Expiration Date:	07/31/27
Modification Issuance Date:	08/11/22
Modification Effective Date:	08/11/22
Application for Permit Renewal Due:	02/01/27

Idaho Pollutant Discharge Elimination System Discharge Permit No. ID0023604

Idaho Department of Environmental Quality

Surface and Wastewater Division
IPDES Program
1410 N. Hilton
Boise, ID 83706

In compliance with the provisions of the State of Idaho Environmental Protection and Health Act Title 39, Chapter 1, "Rules Regulating the Idaho Pollutant Discharge Elimination System Program" (IDAPA 58.01.25) and the Federal Water Pollution Control Act (Clean Water Act) Title 33 United States Code, Section 1251 *et seq*.

City of Troy

is authorized to discharge in accordance with the permit conditions that follow.

Facility Location: **4008 Highway 8 Troy, ID 83871** Receiving Water: West Fork Little Bear Creek

Outfall Name: 001 Latitude: 46.7297 Longitude: -116.7573

Treatment Type: Aeration basins with a secondary clarifier, followed by chlorination and dechlorination.

Mary Anne Nelson, PhD,
Surface and Wastewater Division Administrator
Idaho Department of Environmental Quality

Submission Schedule

The following list contains a summary of some of the items the permittee must complete and/or submit to the Idaho Department of Environmental Quality (DEQ) during the term of this Idaho Pollutant Discharge Elimination System (IPDES) permit. Please refer to the permit sections for specific submittal requirements.

Permit Section	Submittal Item	Frequency	Initial Submittal Date
2.2.7	24-Hour Notice of Noncompliance	As required	--
2.2.8	5-Day Written Submission for Noncompliance	As required	--
2.2.5	Notice of New Introduction of Toxic Pollutants	As required	--
2.1.3	Sludge Management Plan	As required	--
2.2.3	Discharge Monitoring Report (DMR)	Monthly	DMRs are due monthly and must be postmarked on or before the 20th of the month following the monitoring month.
2.1.4	Receiving Water Monitoring Station Approval Request	Once	October 30, 2022
2.1.4	Receiving Water Monitoring Report	Annually	January 20th
3.1	Compliance Schedule	As required	July 31, 2023
3.12	Spill Control Plan Notification	As required	February 1, 2024
4.1.1	Quality Assurance Project Plan (QAPP) Notification	As required	February 1, 2024
4.1.2	Operation and Maintenance (O&M) Manual Notification	As required	February 1, 2024
4.1.3	Emergency Response Plan Notification	As required	February 1, 2024
2.1.3	Sludge Depth Report	Once	February 1, 2027
2.1.5	Permit Renewal Effluent Individual Sample Results Spreadsheet	Once	February 1, 2027
4.2.2	Application for Permit Renewal	Once	February 1, 2027
3.4	Master List of Nondomestic Users	Once	February 1, 2027
3.11	Inflow and Infiltration (I&I) Evaluation	Once	February 1, 2027

Table of Contents

List of Tables

1 Effluent Limits

1.1 Discharge Authorization

During the effective period of this permit, the permittee is authorized to discharge pollutants to West Fork Little Bear Creek at the permitted locations in Table 1 subject to compliance with the limits shown in Table 2 and all other conditions of this permit. This permit authorizes discharge of only those pollutants from the specified outfalls resulting from facility processes, waste streams, and operations clearly identified in the permit application process.

Compliance with this permit during its term constitutes compliance, for purposes of enforcement, with Clean Water Act §§ 301, 302, 306, 307, 318, 403, and 405(a) through (b); except for any toxic effluent standards and prohibitions imposed under the Clean Water Act section 307, and standards for sewage sludge use or disposal under the Clean Water Act section 405(d).

The issuance of, or coverage under, this permit does not convey any property rights or any exclusive privilege, nor does it authorize any injury to persons or property or invasion of other private rights, or any infringement of state or local law or regulations (including but not limited to Clean Water Act § 311, Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) § 106, 40 CFR 503, IDAPA 58.01.16, and IDAPA 58.01.17). The issuance of, or coverage under, this permit does not constitute authorization of the permitted activities by any other state or federal agency or private person or entity and does not excuse the permit holder from the obligation to obtain and comply with any other necessary approvals, authorizations, or permits.

1.2 Effluent Limits and Associated Monitoring Requirements

The permittee must operate the facility to limit pollutant discharges from Outfall 001 as described in Table 2 and meet all other permit conditions. This permit also requires the permittee to monitor discharges at effluent monitoring locations described in Table 1 to verify compliance with the permit limits. The permittee must comply with the effluent limits in Table 2 at all times unless otherwise indicated, regardless of the frequency of monitoring or reporting required by other provisions of this permit.

Table 1. Monitoring site locations.

Site Name	Site Location	Site Description
Outfall 001	Effluent	Sample directly after dechlorination
Headworks	Influent headworks	Before the comminutor or any grinder process.
Upstream West Fork Little Bear Creek	Upstream of the discharge	Site must be located below the confluence of West Fork Little Bear Creek and Big Meadow Creek but also above the discharge.
Downstream West Fork Little Bear Creek	Downstream of the discharge	After the effluent is fully mixed with the receiving water

The permittee must report all effluent data results with units of measure and level of precision (and significant figures, when applicable) identified in section 1.2 and report effluent monitoring results on the appropriate DMR as described in section 2.2.3. For all effluent monitoring, the permittee must use sufficiently sensitive analytical methods that achieve a minimum level (ML) less than the effluent limit unless otherwise specified in Table 2.

This permit authorizes a compliance schedule for Ammonia. Until compliance with the final effluent limits, at a minimum, the permittee must meet monitoring requirements in Table 2, report monitoring results on the appropriate DMR, and accomplish the tasks required in section 3.1.

Table 2. Pollutants with effluent limits and monitoring requirements for Outfall 001.

Parameter	Discharge Period	Units	Effluent Limits						Monitoring Requirements		Reporting Period (DMR Months)
			Monthly Average	Weekly Average	Monthly Geometric Mean	Instan-taneous Minimum	Instan-taneous Maximum	Daily Maximum	Sample Type	Sample Frequency	
Biochemical Oxygen Demand (BOD_5)	01/01 to 12/31	mg/L	30	45	—	—	—	—	8-Hour Composite[j]	2/month	Monthly (All Months)
		lb/day	48	71	—	—	—	—	Calculation[a]		
BOD_5 Percent Removal[b]	01/01 to 12/31	%	85 (minimum)	—	—	—	—	—	Calculation[b]	1/month	
Total Suspended Solids (TSS)	01/01 to 12/31	mg/L	30	45	—	—	—	—	8-Hour Composite[j]	2/month	
		lb/day	42.8	71	—	—	—	114.1	Calculation[a]		
TSS Percent Removal[b]	01/01 to 12/31	%	85 (minimum)	—	—	—	—	—	Calculation[b]	1/month	
E. coli[c,i]	01/01 to 12/31	#/100 ml	—	—	126[d]	—	—	406[e]	Grab[f]	5/month	
Enterococcus[c,i]	01/01 to 12/31	#/100 ml	—	—	35[d]	—	—	130[e]	Grab[f]	5/month	
Total Residual Chlorine[c,g]	01/01 to 12/31	mg/L	0.01	—	—	—	—	0.03	Grab[f]	1/week	
		lb/day	0.02	—	—	—	—	0.04	Calculation[a]		
pH[c]	01/01 to 12/31	standard units (s.u.)	—	—	—	6.5	9.0	—	Grab[f]	2/week	
Ammonia (final limits)[h]	01/01 to 12/31	mg/L	2.2	—	—	—	—	7.4	8-Hour Composite[j]	1/Week	
		lb/day	3.5	—	—	—	—	11.7	Calculation[a]		

a. Loading (lb/day) is calculated by multiplying the concentration (mg/L) by the corresponding flow (mgd) for the day of sampling by a conversion factor of 8.34. For more information on calculating, averaging, and reporting loads and concentrations see the NPDES Self-Monitoring System User Guide (EPA 833-B-85-100, March 1985).

b. Percent Removal. The monthly average percent removal must be calculated from the arithmetic mean of the influent values and the arithmetic mean of the effluent values for that month using the following equation: (average monthly influent concentration – average monthly effluent concentration) ÷ average monthly influent concentration x 100. Influent and effluent sampled must be taken over approximately the same time period.

c. Exceedance of a maximum daily limit, instantaneous minimum limit, or instantaneous maximum limit for this parameter requires 24-hour reporting in accordance with 2.2.7 of the permit.
d. Geometric mean of five or more samples collected 3-11 days apart over a calendar month.
e. Idaho's water quality standard for contact recreation for permitting (IDAPA 58.01.02.251.02.c) include a Statistical Threshold Value (STV), which is represented as an instantaneous maximum limit. The STV requires that no more than 10% of valid samples collected over a 30-day period contain *E. coli* bacteria in concentrations exceeding an STV of 406 *E. coli* counts per 100 mL or 130 *Enterococci* counts per 100 mL.
f. A grab sample is an individual sample collected over a 15-minute period or less.
g. The limits for chlorine are not quantifiable using EPA-approved analytical methods. DEQ will use 50 µg/L (the Minimum Level) as the compliance evaluation level for this parameter. The permittee will be in compliance with the total residual chlorine limits if the average monthly and maximum daily concentrations are less than 50 µg/L and the average monthly and maximum daily mass loadings are less than 0.08 lb/day. For purposes of calculating the monthly averages, see Section 2.2.2 of the permit.
h. This effluent limit is subject to a compliance schedule as described in Section 3.1.
i. The permittee is required to monitor for and meet the applicable limits for either *E. coli* or *Enterococci*, but not both.
j. 8-hour composites in this permit must be collected between 9:00 a.m. and 5:00 p.m., comprised of at least 2 discrete aliquots with at least 4 hours between aliquots, and be flow-proportional. If the permittee collects 3 or more discrete aliquots between 9:00 a.m. and 5:00 p.m., then there must be at least 3 hours between aliquots.

Table 3. Pollutants with interim effluent limits for Outfall 001.

Parameter	Interim Limit Period	Units	Effluent Limits		Monitoring Requirements		Reporting Period (DMR Months)
			Monthly Average	Daily Maximum	Sample Type	Sample Frequency	
Ammonia	August 1, 2022 to September 30, 2031	mg/L	20.75	28.0	8-Hour Composite[a]	1/Week	Monthly (All months)
		lb/day	32.9	44.4	Calculation[b]		

a. 8-hour composites in this permit must be collected between 9:00 a.m. and 5:00 p.m., comprised of at least 2 discrete aliquots with at least 4 hours between aliquots, and be flow-proportional. If the permittee collects 3 or more discrete aliquots between 9:00 a.m. and 5:00 p.m., then there must be at least 3 hours between aliquots

b. Loading (lb/day) is calculated by multiplying the concentration (mg/L) by the corresponding flow (mgd) for the day of sampling by a conversion factor of 8.34. For more information on calculating, averaging, and reporting loads and concentrations see the NPDES Self-Monitoring System User Guide (EPA 833-B-85-100, March 1985).

1.2.1 Narrative Limits

The permittee must comply with all narrative criteria at IDAPA 58.01.02.200. The permittee must observe the receiving water once per week in the vicinity of where the effluent enters the surface water. The permittee must maintain a log of each observation that includes photos, date, time, observer, and whether there is presence of floating, suspended or submerged matter; or other indication that the discharge causes a violation of IDAPA 58.01.02.200 narrative criteria. The log must be retained onsite and made available to DEQ upon request.

1.3 Regulatory Mixing Zone

Pursuant to IDAPA 58.01.02.060, DEQ authorizes the mixing zone in **Error! Reference source not found.**4 for Outfall 001 into West Fork Little Bear Creek.

Table 4. Authorized mixing zone for Outfall 001.

Parameter	Discharge Period	Authorized Mixing zone			
		Aquatic Life		Human Health	
		Acute	Chronic	Water and Fish	Fish Only
Ammonia	01/01 to 12/31	25%	25%	—	—
TRC	01/01 to 12/31	25%	25%	—	—

This permit requires monitoring for ammonia to ensure appropriateness of authorized mixing zone. Specific monitoring requirements are in sections 1.2 and 2.1.4.

2 Monitoring and Reporting Requirements

For all influent, effluent, and receiving water monitoring; the permittee must use sufficiently sensitive analytical methods:

- To detect and quantify the pollutant to a level of precision that is at or below the level of the applicable water quality criterion for parameters without effluent limits.

- For parameters that have effluent limits the method used must have an ML equal to or below the required limit. When a specific ML for any parameter is prescribed in permit section 2.1.6 the method used must be able to achieve an ML less than or equal to that which is specified.
- The permittee may request different MLs in writing, subject to DEQ approval.

All samples and measurements collected under this permit must be representative of the waste stream or receiving water at the monitoring point in Table 1. In order to verify that the effluent limits set forth in this permit are not violated, the permittee must collect additional samples at times other than when routine samples are taken at the appropriate outfall whenever any discharge occurs that may reasonably be expected to cause or contribute to a violation that is unlikely to be detected by a routine sample. The permittee must analyze the additional samples for those parameters likely to be present in the discharge and limited in section 1.2 of this permit in accordance with section 2.1.6. The permittee must collect such additional samples as soon as any spill, discharge, or bypassed effluent reaches an appropriate monitoring point. The permittee must report all additional monitoring in accordance with section 2.2.

2.1 Monitoring Schedules and Requirements

The permittee must monitor in accordance with the requirements specified in this section.

2.1.1 Influent Monitoring

The permittee must monitor influent at the headworks and report results on the appropriate DMRs as listed in **Error! Reference source not found.**5.

Table 5. Influent monitoring.

Item or Parameter	Monitoring Period	Units	Monthly Average	Daily Maximum	Sample Frequency	Sample Type	Reporting Period (DMR Months)
Flow	01/01 to 12/31	mgd	Report	Report	Continuous	Recording	Monthly (All Months)
BOD_5	01/01 to 12/31	mg/L	Report	Report	2/month	8-hour composite	
TSS	01/01 to 12/31	mg/L	Report	Report	2/month	8-hour composite	

2.1.2 Additional Effluent Monitoring

Pollutants that must be monitored for averaging periods not associated with effluent limits are presented in Table 6. The permittee must monitor effluent at the location specified in Table 1 and report results on appropriate DMRs as identified in Table 6.

Table 6. Additional effluent monitoring for Outfall 001.

Parameter	Monitoring Period	Units	Monthly Average	Instan-taneous Maximum	Daily Maximum	Sample Frequency	Sample Type	Reporting Period (DMR Months)
Flow	01/01 to 12/31	mgd	Report	—	Report	Continuous	Recording	Monthly (All Months)
Nitrate plus Nitrite	01/01 to 12/31	mg/L	Report	—	Report	1/Week	8-hour Composite	
Temperature[a]	01/01 to 12/31	°C	Report	Report	—	Continuous[c]	Recording	
Dissolved Oxygen[b]	01/01 to 12/31	mg/L	Report	—	Report	1/Week	Grab	

a. Sample must be taken concurrently with Ammonia and pH samples.
b. Sample must be taken concurrently with Temperature sample.
c. Temperature data must be recorded using DEQ-approved temperature monitoring devices set to record at one-hour or more frequent intervals. DEQ's Protocol for Placement and Retrieval of Temperature Data Loggers contains protocols for continuous temperature sampling. This document is available online at: http://www.deq.idaho.gov/media/487602-wq_monitoring_protocols_report10.pdf. Report the following temperature monitoring data on the DMR: monthly average.

2.1.3 Sewage Sludge Monitoring

The permittee must keep the sludge depth monitoring and management plan section in the facility's Operation and Maintenance (O&M) manual updates. This will address monitoring of sewage sludge accumulation in the lagoons, identify at what sludge depth additional actions are required, and be updated when the O&M manual notification is submitted through the IPDES E-Permitting System as required in section 4.1.2. Additionally, the permittee must submit a sludge depth report, once per permit cycle through the IPDES E-Permitting System with the permit renewal application due February 1, 2027.

If the permittee determines sludge removal and disposal (or beneficial use) is necessary during this permit cycle, the permittee must meet requirements of IDAPA 58.01.16.650 and Code of Federal Regulations (CFR), Title 40 Part 503 (40 CFR 503). To meet the requirements of IDAPA 58.01.16.650, DEQ approval of a plan is required prior to sludge removal. If the facility does not already have a DEQ-approved sludge management plan they must submit a sludge management plan or a biosolids management plan through the IPDES E-Permitting System before removing and disposing of the sludge. Sludge removal may also require seepage testing (permit section 3.13) to meet the requirements of IDAPA 58.01.16.493 before the lagoon may be returned into service.

2.1.4 Receiving Water Monitoring

The permittee must conduct receiving water monitoring at the locations and dates in Table 7 for parameters identified for each site in Table 8 and Table 9. Monitoring must begin by the monitoring start dates listed in Table 7. Monitoring must meet the following requirements:

Table 7. Receiving water monitoring site start date requirements.

Receiving Water	Location	Location Approval Type	Location Approval Due Date	Site Description	Monitoring Start Date	Monitoring Duration
West Fork Little Bear Creek	Upstream	Location must be submitted and approved	October 30, 2022	Site must be located below the confluence of West Fork Little Bear Creek and Big Meadow Creek but also above the discharge.	November 1, 2022[a]	For the duration of the permit
West Fork Little Bear Creek	Downstream	Location must be submitted and approved	October 30, 2022	After the effluent is fully mixed with the receiving water	November 1, 2022	For the duration of the permit

a. Flow monitoring must commence no later than August 1, 2023.

1. Submit the request for monitoring station location approval through the IPDES E-Permitting System by October 30, 2022.
2. A failure to obtain DEQ approval of receiving water monitoring stations does not relieve the permittee of the receiving water monitoring requirements of this permit.
3. To the extent practicable, receiving water sample collection must occur on the same day as effluent sample collection.
4. When flow monitoring is required in Table 8, the flow rate must be measured as near as practicable to the time that other ambient parameters are sampled.
5. Samples must be analyzed for the parameters listed in Table 8 and Table 9.
6. Quality assurance project plans (QAPPs) must address all receiving water monitoring.
7. Samples for metals, pH, ammonia, temperature, dissolved organic carbon, conductivity, and hardness, if applicable, must be collected on the same day (see Table 8 and Table 9).
8. The permittee must submit all receiving water monitoring results for the current permit year for all parameters in the receiving water monitoring report spreadsheet that is uploaded to the IPDES E-Permitting System by January 20th of the next year. The file must be in the format of one analytical result per row and include the following information: name and contact information of laboratory, sample identification number, sample location in latitude and longitude (decimal degrees format), method of location determination (e.g., GPS, survey), date and time of sample collection, water quality parameter (or characteristic being measured), analytical result, result unit, detection limit and definition (e.g., method detection limit [MDL]), analytical method, date completed, and any applicable notes.

Table 8. Receiving water monitoring requirements for upstream West Fork Little Bear Creek.

Parameter	Monitoring Period	Units	Instantaneous Minimum	Instantaneous Maximum	Daily Maximum	Sample Frequency	Sample Type	Reporting Period (DMR Months)
Flow[a]	01/01 to 12/31	cfs	Report	Report	—	1/month	Measured	Monthly (All Months)
Ammonia[b]	01/01 to 12/31	mg/L	—	—	Report	1/month	Grab	
Nitrate plus Nitrite[b]	01/01 to 12/31	mg/L	—	—	Report	1/month	Grab	
pH[b]	01/01 to 12/31	SU	Report	Report	—	1/month	Grab	
Temperature[b,c]	01/01 to 12/31	°C	—	Report	—	Continuous	Recorded	
Dissolved Oxygen[b]	01/01 to 12/31	mg/L	Report	—	—	1/month	Grab	

a. Monitoring must occur with all receiving water monitoring as practicable. Flow monitoring must commence no later than August 1, 2023.

b. Monitoring must occur the same day as effluent sampling for the parameter with all samples taken in the same sampling event.

c. Temperature data must be recorded using DEQ-approved temperature monitoring devices set to record at one-hour or more frequent intervals. DEQ's Protocol for Placement and Retrieval of Temperature Data Loggers contains protocols for continuous temperature sampling. This document is available online at: *https://www2.deq.idaho.gov/admin/LEIA/index.html?view=folder&id=2537* . Report the following temperature monitoring data on the DMR: monthly average.

Table 9. Receiving water monitoring requirements for downstream West Fork Little Bear Creek.

Parameter	Monitoring Period	Units	Instantaneous Minimum	Instantaneous Maximum	Daily Maximum	Sample Frequency	Sample Type	Reporting Period (DMR Months)
Temperature[a,b,c]	01/01 to 12/31	°C	—	Report	—	Continuous	Recorded	Monthly (All Months)
Dissolved Oxygen[a,b]	01/01 to 12/31	mg/L	Report	—	—	1/month	Grab	Monthly (All Months)

a. Monitoring must occur with all receiving water monitoring.

b. Monitoring must occur the same day as effluent sampling for the parameter with all samples taken in the same sampling event.

c. Temperature data must be recorded using DEQ-approved temperature monitoring devices set to record at one-hour or more frequent intervals. DEQ's Protocol for Placement and Retrieval of Temperature Data Loggers contains protocols for continuous temperature sampling. This document is available online at: *https://www2.deq.idaho.gov/admin/LEIA/index.html?view=folder&id=2537*. Report the following temperature monitoring data on the DMR: monthly average.

2.1.4.1 Receiving Water Continuous Temperature Monitoring

The permittee must collect continuously recorded data for pollutants that have a sample frequency of 'continuous' in the receiving water monitoring table(s) above. Data collection must meet the following minimum requirements:

1. Monitoring in the receiving water must be adequately addressed in the sampling plan and QAPP.
2. Begin monitoring on or before the specified start listed in for each receiving water monitoring site.
3. Recording devices must be set to record at the specified interval in the receiving water monitoring requirement table above
4. Submitted continuous monitoring data must include the following information for both deployment and retrieval:
    a. Date
    b. Time
    c. Device manufacturer ID
    d. Location
    e. Depth
    f. Parameter measured
    g. Any other details that may explain data anomalies
5. DEQ-approved temperature monitoring devices must be used. DEQ's *Protocol for Placement and Retrieval of Temperature Data Loggers* contains protocols for continuous temperature sampling. This document is available online at *https://www2.deq.idaho.gov/admin/LEIA/api/document/download/15037*

2.1.5 Permit Renewal Effluent Monitoring

The renewal application for this permit requires data collected to characterize the effect of the effluent on West Fork Little Bear Creek (section 2.1.4). The permittee must conduct three scans of the final wastewater effluent for the parameters listed in Table 10 and Table 11 so that DEQ can assess the surface water impacts. Each scan consists of a minimum of four grab samples taken during the same 24-hour period, analyzed individually, for those parameters in the tables below requiring collection via grab samples. For parameters requiring a 24-hour composite sample, only one analysis of the composite of aliquots (samples) is required for each scan. All 24-hour composite samples collected for permit renewal monitoring must be time-based and composed of four aliquots (samples). Monitoring results collected to achieve other permit conditions may be used to meet permit renewal effluent monitoring requirements. The permittee must enter summary data in their permit renewal application.

The permittee must also upload a permit renewal effluent individual sample results spreadsheet to the IPDES E-Permitting System by February 1, 2027.

The permittee must conduct full scans of the final effluent according to the following schedule:

- 2024: One time between January 1st and April 30th
- 2025: One time between May 1st and August 31st
- 2026: One time between September 1st and December 31st

Table 10. Effluent testing required for permit renewal.

Parameter	Units	Sample Type	Report
pH	s.u.	Grab	Minimum and maximum value
Flow	mgd	Continuous	Maximum daily value, average daily value, number of samples
Temperature (January)	°C	Grab	
Temperature (July)	°C	Grab	
BOD_5	mg/L	24-hour composite	Maximum daily value, average daily value, analytical method and ML or MDL
TSS	mg/L	24-hour composite	
E. Coli	#/100 mL	Grab	

The facility has a design flow of 0.19 mgd which is greater than or equal to 0.1 mgd and therefore, must also complete three sampling scans of effluent testing for the parameters in Table 11.

Table 11. Effluent testing required for permit renewals with flow greater than or equal to 0.1 mgd.

Parameter	Units	Sample Type	Report
Ammonia (as N)	mg/L	24-hour composite	Maximum daily value, average daily value, analytical method and ML or MDL
Total residual chlorine	mg/L	Grab	
Dissolved oxygen	mg/L	24-hour composite	
Total Kjeldahl nitrogen (as N)	mg/L	24-hour composite	
Nitrate plus nitrite (as N)	mg/L	24-hour composite	
Oil and grease	mg/L	Grab	
Phosphorus (total) (as P)	mg/L	24-hour composite	
Total dissolved solids	mg/L	24-hour composite	

2.1.6 Analytical and Sampling Procedures

Required monitoring must be completed using sufficiently sensitive methods and conducted according to test procedures approved under 40 CFR 136, unless:

- Another method is required under 40 CFR subchapters N or O.
- This permit requires the use of a specific EPA approved method for a particular parameter.

For parameters with effluent limits, the permittee must use methods that can achieve a minimum level (ML) less than the current applicable effluent limit. For parameters that do not have effluent limits, or have effluent limits that are less than the most sensitive 40 CFR 136 approved method, the permittee must use sufficiently sensitive methods. The permittee may

request different MLs. The request must be in writing and must be approved by DEQ. If the permittee is unable to attain the required ML in its effluent due to matrix effects, the permittee must submit a matrix-specific detection limit and a ML to DEQ with appropriate laboratory documentation.

2.1.6.1 Laboratory Quality Assurance and Quality Control

The permittee must develop and implement a QAPP that conforms to the quality assurance and quality control requirements of 40 CFR 136.7. The requirements for a QAPP are in section 4.1.1 of this permit.

If a sample or measurement (analysis) does not meet the QAPP requirements, the permittee must reanalyze the sample. If the original sample cannot be reanalyzed, the permittee must resample and analyze at the earliest possible opportunity. All samples/measurements results not meeting the QAPP requirements must still be maintained by the permittee reported in the DMR along with a notation (data qualifier) and explanation of unmet QAPP requirements. The permittee must not use this result in any calculation required by this permit unless authorized by the DEQ.

2.2 Recording and Reporting Requirements

The permittee must record and report information to DEQ as specified in the following subsections.

2.2.1 Recording of Results

For each measurement or sample taken, the permittee must record the following information:

1. The date, exact place, and time of sampling or measurements
2. The names of the individuals who performed the sampling or measurements
3. The dates analyses were performed
4. The names of the individuals who performed the analyses
5. The analytical techniques or methods used
6. The results of all analyses
7. The record of the information collected in 1 – 6 of this section must be maintained and made available to DEQ upon request.

2.2.2 Reporting Procedures

1. If the permittee did not discharge wastewater, the no data indicator (NODI) code “C” (No Discharge) should be entered for the outfall DMR during a given reporting period. Receiving water monitoring and reporting is required during months with no effluent discharge.
2. If the permittee did not discharge wastewater for all days of a reporting period:

a. Calculate values using the actual number of samples collected and include a comment on the DMR indicating the shortened discharge time and sample results obtained.

b. When the days with discharge are insufficient to calculate a geometric mean for *E. coli* according to IDAPA 58.01.02.251, the permittee should enter the NODI Code "F" (Insufficient Flow for Sampling) and include collected sample values in a comment on the reporting period DMR.

3. The permittee must report, at least, the same level of precision (and significant figures, when applicable) as the permit limit for a given parameter. Level of precision of a permit limit refers to the place value of the last significant digit in the permit limit for a given parameter. Regardless of the rounding conventions used by the permittee, the permittee must use the conventions consistently.

4. To calculate average pollutant concentrations, assign zero for each individual lab result that is less than the MDL, and use the numeric value of the MDL for each individual lab result that is between the MDL and the ML. When concentration data are equal to or greater than the ML, use the laboratory reported value to calculate the average pollutant concentration. The resulting average value must be compared to the permit limit in assessing compliance.

5. For reporting on the DMR for a single sample or average concentration, if a value is less than the MDL, the permittee must report "< {numeric value of the MDL}." If a value is less than the ML but greater than the MDL, the permittee must report "< {numeric value of the ML}." If a value is equal to or greater than the ML, report and use the actual value. For example, if the MDL is 1.0 µg/L and the result is ND (not detected), report "<1.0 µg/L" on the DMR.

6. To calculate the geometric mean pollutant concentration when an individual result is reported as:

   a. '< {numeric value}', use the {numeric value} to calculate the geometric mean concentration. On the DMR, the permittee must report the geometric mean as '< {calculated geometric mean}'.

   b. '> {numeric value}', use the {numeric value} to calculate the geometric mean concentration. On the DMR, the permittee must report the geometric mean as '> {calculated geometric mean}'.

7. The permittee must calculate mass loads on each day the parameter is monitored using the following equation:

$$Flow\ (mgd) * Concentration\ (\frac{mg}{L}) * 8.34\ (\frac{lb * L}{mg * MG}) = lb\ per\ day$$

   Calculating and reporting mass loads must consider the following:

   a. When concentration data are greater than or equal to the MDL but less than the ML: Use the ML to calculate the mass load, then report as less than (<) the calculated mass load. For example, if flow is 2 MGD and the reported sample result is <0.0050 mg/L (<5.0 µg/L), for mass load on the DMR: 2 MGD * 0.0050 mg/L * 8.34

(conversion factor) = 0.0834 lb/day, round to 0.08 lb/day), and report "<0.08 lb/day."

b. When concentration data are less than the MDL: Use the MDL to calculate the mass load, then report the mass load as less than (<) the calculated mass load. For example, if flow is 2 MGD and the reported sample result is non detect at <0.0010 mg/L (1.0 µg/L), for mass load on the DMR: 2 MGD * 0.0010 mg/L * 8.34 (conversion factor) = 0.01668 lb/day, round off to 0.02 lb/day, and report to "<0.02 lb/day."

c. To report a "daily maximum" load, use the day's parameter concentration and the corresponding day's average flow in the equation above. Compare each day's calculation and report the maximum of the daily loads for the month. The maximum daily load reported may not necessarily occur on the same day as the maximum daily parameter concentration.

D. To report a "monthly average" load, use the average of all flow data and the average of all concentration data in the equation above.

8. To calculate monthly averages, add all individual lab results or calculated mass loadings, adjusted as necessary per section 2.2.2, item 4 or 6, for the entire calendar month being reported and divide by the number of analytical results.
9. To calculate weekly averages, add all individual results for each week (Sunday-Saturday per 2.2.2 item 3 or item 6) and divide by the number of samples in the calendar week. Partial weeks at the end of a calendar month (one to six days) should be included in the following month's weekly average calculation. Assess the resulting averages and report the maximum value for the reporting period.
10. The reported minimum daily value on the DMR is the smallest individual result for the reporting period.
11. The reported maximum daily value on the DMR is the largest individual result for the reporting period.
12. The mean weekly maximum temperature (MWMT) is the mean of the daily maximum temperatures measured over a period of seven consecutive days (Sunday-Saturday). The reported value on the DMR is the maximum of these calculated seven-day values for the reporting period.

2.2.3 Discharge Monitoring Report

NetDMR Submittal—The permittee must submit influent, effluent and receiving water monitoring data electronically using NetDMR, an EPA web-based tool that allows permittees to electronically submit DMRs. All other reports must be submitted electronically to DEQ through the IPDES E-Permitting System. See Appendix A for all DMR reportable parameters and the associated required significant figures.

Monitoring data must be submitted electronically using NetDMR no later than the 20th of the month following the completed monitoring period. All other reports required under this permit must be submitted as a legible electronic document using the IPDES E-Permitting System. The

permittee must sign and certify all DMRs, and all other reports, in accordance with the requirements of section 4.2.11.

2.2.4 Permit Submittals and Schedules

The permittee must use the IPDES E-Permitting System (unless otherwise specified in the permit) to submit all other written reports by the date specified in the permit.

2.2.5 Notice of New Introduction of Toxic Pollutants

The permittee must provide adequate notice per IDAPA 58.01.25.301.02 to DEQ through the IPDES E-Permitting system as soon as the permittee becomes aware of the following:

1. Any new introduction of pollutants into the POTW from an industrial user or other indirect discharger that would be subject to Sections 301 or 306 of the Clean Water Act if it were directly discharging those pollutants.
2. Any substantial change in the volume or character of pollutants being introduced into the POTW by an authorized source at the time of issuance of the permit.

For the purposes of this section, adequate notice must include the following:

1. The quality and quantity of effluent to be introduced into the POTW;
2. Any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW; and
3. Any anticipated impact of the change on the quantity or quality of sewage sludge accumulated at the POTW.

2.2.6 Elective Monitoring by Permittee

If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR 136 or as specified in this permit, the permittee must include the results of this monitoring in the calculation and reporting of data submitted in the DMR. If requested by DEQ, the permittee must submit results of any sampling, regardless of the parameter monitored or test method used.

2.2.7 24-Hour Notice of Noncompliance Reporting

The permittee must report the following occurrences of noncompliance by telephone within 24 hours of the time the permittee becomes aware of the circumstances:

1. Any noncompliance that may endanger public health or the environment;
2. Any unanticipated bypass which exceeds any permit effluent limit;
3. Any upset which exceeds any permit effluent limit;
4. Any violation of a maximum daily effluent limit for toxic pollutants identified in Table 2*;* or
5. Any overflow prior to the treatment works over which the permittee has ownership or has operational control, or an overflow from a contributing collection system that the

permittee accepts wastewater from. An overflow is any spill, release, or diversion of municipal sewage including:

a. An overflow that results in a discharge to waters of the United States; or
b. An overflow of wastewater, including a wastewater backup into a building (other than a backup caused solely by a blockage or other malfunction in a building service line), or discharged to the soil's surface that does not reach waters of the United States.

The permittee must report these occurrences to DEQ at 1-833-IPDES24 (473-3724).

Additionally, for any sanitary sewer overflow (SSO) that discharges to a municipal separate storm sewer system (MS4), the permittee must notify the appropriate MS4 owner or operator.

2.2.8 5-Day Written Submission for Noncompliance

For any event requiring 24-hour notification as specified in section 2.2.7, the permittee must provide a written submission within 5 days of the time the permittee becomes aware of an event.

The submission must contain:

1. A description of the noncompliance and its cause;
2. The period of noncompliance, including exact dates and times;
3. The estimated time noncompliance is expected to continue if it has not been corrected; and
4. Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

Five-day written reports must be submitted through the IPDES E-Permitting System.

When the occurrence is a noncompliance event that may endanger human health or the environment, an unanticipated bypass, an upset, or an overflow, the permittee must complete and submit the 5-day Written Report form through the IPDES E-Permitting System within 5 days of the time the permittee becomes aware of the event.

2.2.9 Other Noncompliance Reporting

The permittee must report all instances of noncompliance not required to be reported under 2.2.7 or 2.2.8 concurrently with the DMR submittal, submitted electronically to DEQ through the IPDES E-Permitting System. The permittee immediately take action to stop, contain, and clean up unauthorized discharges or otherwise stop the noncompliance and correct the problem.

2.3 Permit Renewal

Submit permit renewal application including required monitoring data in Section 2.1.4.1 through the IPDES E-Permitting System as required in section 4.2.2, by 180 days before the expiration date of the permit.

If the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to DEQ, it must submit the correct facts or information promptly as required in IDAPA 58.01.25.300.12.h.

3 Special Conditions

3.1 Compliance Schedule

The permittee must comply with all effluent limits and monitoring requirements identified in this permit beginning on the effective date of this permit, except those for which a compliance schedule is authorized. The permittee cannot immediately achieve effluent limits for the pollutants identified in this section upon issuance of this permit. DEQ is authorizing a compliance schedule for these permit conditions consistent with IDAPA 58.01.25.305. Until compliance with the final effluent limits is achieved, at a minimum, the permittee must complete the tasks and reports listed in Table 12. There is no penalty for completing tasks or submitting deliverables in advance of the due dates.

The permittee must achieve compliance with the final effluent limits for ammonia in Table 2 of this permit no later than October 1, 2031.

Table 12. Tasks required under the compliance schedule for Ammonia.

Task Number	Date Due	Task Activity
1	July 31, 2023	**Progress Report on Facility Plan** The permittee will report its progress on a facility plan. Deliverable: Provide the DEQ with a Progress Report on Facility Planning through the IPDES E-Permitting system.
2	July 31, 2024	**Facility Plan** The permittee will complete a facility plan that evaluates alternatives to meet the ammonia final effluent limit and select a preferred alternative. Deliverable: Submit a complete Facility Plan to DEQ through the E-Permitting System.
3	July 31, 2025	**Progress Report on Final Design and I/I Reduction** The permittee will report on its progress toward completing a final design plan, funding plan, and I/I reduction. Deliverable: Submit a report on final design progress, funding plan, and I/I evaluation to DEQ through the E-Permitting System.
4	July 31, 2026	**Progress Report on Final Design and I/I Reduction** The permittee will report on its progress toward completing a final design plan, funding plan, and I/I reduction. Deliverable: Submit a report on final design progress, funding plan, and I/I evaluation to DEQ through the E-Permitting System.

Task Number	Date Due	Task Activity
5	July 31, 2027	**Preliminary Engineering Report, Plans & Specifications, and Progress Report on I/I Reduction** The permittee must complete its preliminary engineering report, accompanied by the proposed Plans & Specifications, and final design selection. The permittee will report on its progress of I/I reduction. Deliverable: Submit the preliminary engineering report, funding plan update, and final design selection to DEQ. Submit a report on progress of I/I reduction to DEQ through the E-Permitting System.
6	July 31, 2028	**Award Bid for Construction and Progress Report on I/I Reduction** The permittee must report on awarding the construction bid and progress on I/I reduction. Deliverable: Provide DEQ with notice that the construction bid has been awarded and submit a report on progress of I/I reduction to DEQ through the E-Permitting System.
7	July 31, 2029	**Progress Report on Construction and Progress Report on I/I Reduction** The permittee must report on the progress of construction and report on I/I reduction. Deliverable: Submit a progress report on construction progress to DEQ. Submit a progress report on I/I reduction to DEQ through the E-Permitting System.
8	July 31, 2030	**Progress Report on Construction and Progress Report on I/I Reduction** The permittee must report on the progress of construction and report on I/I reduction. Deliverable: Submit a progress report on construction progress to DEQ. Submit a progress report on I/I reduction to DEQ through the E-Permitting System.
9	July 31, 2031	**Construction Complete** Construction to achieve ammonia limit must be complete. Deliverable: Submit a complete construction report to DEQ. Submit a final I/I report to DEQ through the E-Permitting System.
10	October 1, 2031	**Full Compliance with effluent limits** Optimization process must be complete, and the permittee must be in full compliance with the ammonia and all other effluent limits. Deliverable: Provide written notice to DEQ that the ammonia effluent limit has been achieved through the E-Permitting System.

Written notice of compliance or noncompliance with each scheduled task must be submitted through the IPDES E-Permitting System within 14 days following each task due date in the tables in section 3.1.

Annual progress reports required in Table 12 must include the following:

1. An assessment of the previous year of ammonia data and comparison to the final effluent limits.
2. A report on progress made toward meeting the ammonia effluent limits, including the applicable deliverable required under each associated task relevant to the reporting year.
3. Further actions and milestones targeted for the upcoming year.

3.2 Facility Capacity

This section is not applicable to this permit.

3.3 Whole Effluent Toxicity Testing

This section is not applicable to this permit.

3.4 Nondomestic Waste Management

The permittee has nonsignificant, nondomestic (industrial/commercial) users, which are not subject to the pretreatment standards in 40 CFR 405 through 471; therefore, DEQ does not require an authorized pretreatment program. Nondomestic user refers to any industrial or commercial source authorized to discharge process or nonprocess wastewater to the municipal system. The permittee must ensure that pollutants from nondomestic wastes discharged to their system do not negatively impact system operation or pass-through the facility. The permittee must not authorize discharges of pollutants that would inhibit, interfere, or otherwise be incompatible with operation of the treatment works, including interference with the use or disposal of municipal sludge.

The permittee must not allow, under any circumstances, the introduction of the following pollutants to the POTW from any source of nondomestic discharge:

1. Any pollutant that, alone or in conjunction with a discharge or discharges from other sources, may pass-through or interfere with the POTW's operation;
2. Regulated pollutants in amounts that would cause, have the reasonable potential to cause, or contribute to a violation of the POTW's permit;
3. Pollutants that create a fire or explosion hazard in the POTW, including, but not limited to, waste streams with a closed cup flashpoint of less than 60 °C (140 °F) using the test methods specified in 40 CFR 261.21;
4. Pollutants that may cause corrosive structural damage to the POTW, including the collection system, but in no case indirect discharges with a pH of lower than 5.0 standard units, unless the treatment facilities are specifically designed to accommodate such indirect discharges;
5. Solid or viscous pollutants in amounts that may cause obstruction to the flow to or in the POTW, or other interference with the operation of the POTW;
6. Any pollutant, including oxygen-demanding pollutants (e.g., BOD_5 or COD), released in an indirect discharge at a flow rate and/or pollutant concentration that may cause interference with any treatment process at the POTW;
7. Heat in amounts that may inhibit biological activity in the POTW resulting in interference, but in no case heat in such quantities that the temperature at the POTW treatment plant exceeds 40 °C (104 °F) unless DEQ, upon request of the POTW, approves alternate temperature limits;

8. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that may cause interference or pass-through at the POTW;
9. Pollutants that may result in the presence of toxic gases, vapors, or fumes within the collection system or POTW in a quantity that may cause acute worker health and safety problems; or
10. Any trucked or hauled pollutants, except at discharge points designated by the POTW.

The permittee must have or develop a legally enforceable municipal code or sewer use ordnance to authorize or enable the POTW to apply and enforce the requirements of sections 307 (b) and (c) and 402(b)(8) and (9) of the Act and comply with the minimum requirements of 40 CFR 403.8(f)(1). Within three years of the effective date of the permit, the permittee must adopt, implement, and enforce the local pretreatment legal authority. The permittee must submit a copy of the municipal code or sewer use ordnance through the IPDES E-Permitting System once the code/ordnance is adopted.

The permittee must develop and implement an industrial user survey and compile a master list of the nondomestic users introducing pollutants to the POTW. This list must identify the following:

1. Names and addresses of all nondomestic users;
2. A description of all processes that affect or contribute to the user's wastewater;
3. The principal products and raw materials of each user that affects or contributes to the user's wastewater;
4. The average daily volume of wastewater discharged by each user, indicating the amount attributable to process flow and non-process flow;
5. A statement whether the user is a significant industrial user (SIU) and why (e.g., flow, nutrients, hydraulic load);
6. A statement whether the user is subject to one or more categorical standards, and if so, under which category and subcategory;
7. A statement whether the user is subject to local restrictions;
8. The top four Standard Industrial Classification or North American Industry Classification System codes for the user's processes and business activities; and
9. A statement whether any problems at the POTW, including upsets, pass-through, or interference have been attributed to the user in the past 4.5 years.

The permittee must submit the master list, along with a summary description of the sources and information gathering methods used to develop this list, through the IPDES E-Permitting System by February 1, 2027.

The permittee must use this list to assess whether they accept waste from an SIU and, therefore, need to develop a pretreatment program. For the purposes of this list development, the term SIU means all nondomestic indirect dischargers (users) subject to categorical pretreatment standards under 40 CFR 403.6 and 40 CFR chapter I, subchapter N or any other nondomestic indirect discharger that meets any of the following:

- Discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling and boiler blowdown wastewater)
- Contributes a process or nonprocess waste stream that makes up 5% or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant
- Is designated as such by DEQ or the permittee on the basis that the nondomestic indirect discharger has a reasonable potential to adversely affect the POTW's operation

3.5 Pretreatment Program Application

This section is not applicable to this permit.

3.6 Pretreatment Program Control Authority

This section is not applicable to this permit.

3.7 Pretreatment Requirements

This section is not applicable to this permit.

3.8 Mercury Minimization Plan

This section is not applicable to this permit.

3.9 Methylmercury Fish Tissue Monitoring Plan

This section is not applicable to this permit.

3.10 Phosphorus Management Plan

This section is not applicable to this permit.

3.11 Inflow and Infiltration Evaluation

The permittee must submit an inflow and infiltration (I&I) evaluation of the sewer collection system to DEQ through the IPDES E-Permitting System by February 1, 2027.

The evaluation must include the following:

1. Summary of measurable I&I. Refer to the EPA publication *I/I Analysis and Project Certification* (Publication No. 97-03) to determine excessive I&I.
2. A plan and a schedule to locate the sources of I&I.

The permittee must submit an annual report on I&I reduction progress through the IPDES E-Permitting System by January 31st of each year. The report must include the following:

1. Identify any I&I reduction activities performed during the previous permit cycle.
2. Identify future planned I&I reduction activities.

3.12 Spill Control Plan

The permittee must develop and implement a spill control plan to prevent releases to surface water of petroleum and other chemicals used or stored on-site at the treatment facility.

3.12.1 Spill Control Plan Submittals and Requirements

The permittee must do the following:

1. Submit to DEQ through the IPDES E-Permitting System a notification of completion of a new spill control plan by February 1, 2024.
2. Review the plan at least annually and update the spill plan as needed.
3. Send notification of plan changes to DEQ, as soon as possible.
4. Follow the plan and any supplements throughout the term of the permit.

3.12.2 Spill Control Plan Components

The spill control plan must include the following:

1. A list of all oil and petroleum products and other materials used and/or stored on-site, which when spilled, or otherwise released into the environment, pose a potential threat to human health or the environment. Include other materials used and/or stored on-site that may become pollutants or cause pollution upon reaching surface water.
2. A description of preventive measures and facilities (including an overall facility plot showing drainage patterns) that prevent, contain, or treat spills of these materials.
3. A description of the reporting system the permittee will use to alert responsible managers and legal authorities in the event of a spill.
4. A description of operator training to implement the plan.

The permittee may submit plans and manuals required by applicable sections of the Code of Federal Regulations, contingency plans, or other plans required by other agencies, which meet the intent of this section.

3.13 Lagoon Seepage Testing

The permittee must comply with the “Wastewater Rules” in IDAPA 58.01.16, including the seepage testing requirements in IDAPA 58.01.16.493 for municipal lagoons. Prior to lagoon seepage testing, the permittee must consult DEQ. The seepage test report submittals to DEQ must be up-to-date per the IDAPA 58.01.16 timelines.

3.14 Biosolids

This section is not applicable to this permit.

3.15 Combined Sewer Systems

This section is not applicable to this permit.

3.16 Best Management Practices Plan

This section is not applicable to this permit.

3.17 Water Quality Trading

This section is not applicable to this permit.

3.18 Intake Credit

This section is not applicable to this permit.

3.19 Variance

This section is not applicable to this permit.

3.20 Waiver

This section is not applicable to this permit.

4 Standard Conditions

4.1 Documents Applicable to all Permits

4.1.1 Quality Assurance Project Plan

The permittee must develop a Quality Assurance Project Plan (QAPP) for all monitoring required by this permit. The permittee must submit the QAPP Notification (upload signature page) to DEQ through the IPDES E-Permitting System that the plan has been developed and implemented by February 1, 2024. Any existing QAPPs may be modified for compliance with this section.

1. The QAPP must be designed to assist in planning for the collection and analysis of effluent, influent, and receiving water samples in support of this permit and handling data anomalies when they occur.

2. Throughout all sample collection and analysis procedures, the permittee must use the EPA-approved QA/QC and chain-of-custody procedures described in *EPA Requirements for Quality Assurance Project Plans* (EPA/QA/R-5) and *Guidance for Quality Assurance Project Plans* (EPA/QA/G-5). The QAPP must be prepared in the format that is specified in these documents.
3. At a minimum, the QAPP must include the following:
    a. Details on the number of samples, type of sample containers, preservation of samples, holding times, analytical methods, analytical detection and quantitation limits for each target compound, type and number of quality assurance field samples (e.g. blanks, spikes), precision and accuracy requirements, sample preparation requirements, sample shipping methods, and laboratory data delivery requirements.
    b. Maps indicating the location of each sampling point.
    c. Qualification, training and licensure of personnel.
    d. Names, addresses and telephone numbers of the laboratories used by or proposed to be used by the permittee.
4. The permittee must update the QAPP, and notify DEQ in writing of the QAPP update, within 1 month as needed to reflect current requirements and procedures. The permittee must notify DEQ of all significant QAPP modifications (i.e. modifications to sample collection, sample analysis, or other procedures).
5. Copies of the QAPP must be retained on site and made available to DEQ upon request.

4.1.2 Operation and Maintenance Manual

In addition to the requirements specified in section 4.2.5, the permittee must submit an Operation and Maintenance (O&M) Manual Notification to DEQ through the IPDES E-Permitting System by February 1, 2024. that an operation and maintenance (O&M) manual for the current wastewater treatment facility has been developed and implemented. The manual must be consistent with IDAPA 58.01.16.425. The manual must be retained on site and made available to DEQ upon request. Any significant changes occurring in the daily operation of the plant must be concurrently reflected within the O&M manual.

4.1.3 Emergency Response Plan

The permittee must develop and implement an emergency response plan that identifies measures to protect public health and the environment. At a minimum, the plan must include mechanisms for the following:

1. Ensure that the permittee is aware (to the greatest extent possible) of all overflows from portions of the collection system over which the permittee has ownership or operational control as well as any unanticipated treatment unit bypass or upset that may exceed any effluent limit in the permit.
2. Ensure that reports of an overflow or of an unanticipated bypass or upset that may exceed any effluent limit in this permit are immediately dispatched to appropriate personnel for investigation and response as required in sections 2.2.7 and 2.2.8.

3. Ensure immediate notification to DEQ of any noncompliance that may endanger public health or the environment and identify the public health district and other officials who will receive immediate notification for items that require 24-hour reporting in section 2.2.7.
4. Ensure that appropriate personnel understand, are appropriately trained on, and follow the Emergency Response Plan; and
5. Provide emergency facility operation.

The permittee must submit an Emergency Response Plan Notification to DEQ through the IPDES E-Permitting System that the plan has been developed and implemented by February 1, 2024. The plan must be available at the facility for DEQ review.

4.2 Conditions Applicable to All Permits

The following conditions apply to all IPDES permits. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by Section 510 of the Clean Water Act.

4.2.1 Duty to Comply

The permittee must comply with all permit requirements. Any permit noncompliance constitutes a violation of this permit and the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

The permittee must comply with standards for sewage sludge use or disposal established in 40 CFR 503 within the time provided in those regulations, even if the permit has not yet been modified to incorporate the requirement.

4.2.2 Duty to Reapply

If the permittee intends to continue an activity regulated by this permit after the expiration date, the permittee must apply for a new permit by the date below. In accordance with IDAPA 58.01.25.105, and unless DEQ authorizes the permittee to submit the application at a later date, the permittee must submit a new, complete application on or before February 1, 2027. If the permittee complies with the application date requirements of IDAPA 58.01.25.105, and a permit is not issued prior to the permit's expiration date, the permit shall remain in force as stipulated in IDAPA 58.01.25.101.02.

4.2.3 Need to Halt or Reduce Activity Not a Defense

The permittee cannot assert as a defense in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with this permit.

4.2.4 Duty to Mitigate

The permittee must take all reasonable steps to minimize or prevent any discharge in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

4.2.5 Proper Operation and Maintenance

The permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit. In order to attain proper operation and maintenance, facility operations must be overseen by an appropriately licensed operator per IDAPA 58.01.16.203. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. The O&M manual required in section 4.1.2 describes how the facility will ensure proper operation and maintenance. The permittee must operate backup or auxiliary facilities or similar systems that are installed by the permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

4.2.6 Permit Actions

This permit may be modified, revoked, and reissued or terminated for cause as specified in IDAPA 58.01.25.201 and 58.01.25.203. The filing of a request by the permittee for a permit modification, revocation, and reissuance, termination, or notification of planned changes or anticipated noncompliance does not stay any permit condition.

4.2.7 Property Rights

The issuance of, or coverage under, an IPDES permit does not convey any property rights or any exclusive privileges, nor does it authorize any injury to persons or property or invasion of other private rights, or any infringement of state or local laws or regulations. The issuance of, or coverage under, an IPDES permit does not constitute authorization of the permitted activities by any other state or federal agency or private person or entity and does not excuse the permit holder from the obligation to obtain any other necessary approvals, authorizations, or permits.

4.2.8 Duty to Provide Information

The permittee must furnish to DEQ, within the time specified in the request, any information that DEQ may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee must also furnish to DEQ, upon request, copies of records this permit requires. The permittee should submit the total population served or Annual Equivalent Dwelling Unit (EDU) Report to DEQ through the IPDES E-Permitting System by May 31 each year. This information is used to calculate the facility's annual fee.

4.2.9 Inspection and Entry

Pursuant to Idaho Code §39-108, the permittee must allow DEQ's compliance, inspection, and enforcement (CIE) personnel, or authorized representative (including an authorized contractor acting as a representative of DEQ), upon the presentation of credentials and other documents as may be required by law, to:

1. Enter the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
2. Have access at reasonable times to and copy any records that must be kept under the conditions of this permit;
3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
4. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise required by the Clean Water Act, any substances or parameters at any location.

4.2.10 Retention of Records

The permittee must retain records of all monitoring information, including all calibration and maintenance records, all original strip chart recordings for continuous monitoring instrumentation, electronic data files for continuous monitoring instruments, copies of all reports required by this permit, copies of DMRs, a copy of the IPDES permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report, or application. The permittee's sewage sludge use and disposal activities must be retained for a period of at least five (5) years or longer as required by 40 CFR 503. The retention period may be extended at DEQ's request at any time.

4.2.11 Signatory Requirements

All applications, reports, or information submitted to DEQ must be signed and certified as follows:

1. All permit applications must be signed as follows:
    a. For a corporation, by a responsible corporate officer as specified in IDAPA 58.01.25.090.
    b. For a partnership or sole proprietorship, by a general partner or the proprietor, respectively.
    c. For a municipality, or other public agency, by either a principal executive officer or ranking elected official
2. Any report or information required by this permit, a notice of intent, monitoring and reporting provisions, and any other information requested by DEQ must be signed by a person described in item 1 or by a duly authorized representative of that person. A person is a duly authorized representative only if the following is true:
    a. The authorization is made in writing by a person described in item 1 above;

b. The authorization specifies either an individual or position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company; and

c. The written authorization is submitted to DEQ.

3. Changes to authorization. If an authorization is no longer accurate due to a change in staffing or personnel for the overall operation of the facility, a new authorization satisfying the requirements of IDAPA 58.01.25.090.01 must be submitted to DEQ before or together with any report, information, or application to be signed by an authorized representative.

4. Certification. Any person signing a document under this section must make the following certification:

   I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

5. The permittee must ensure that any electronic submission of any report or information required by this permit, notice of intent, monitoring and reporting provisions, and information requested by DEQ satisfies all of the relevant requirements of 40 CFR 3 (Cross-Media Electronic Reporting) and 40 CFR 127 (NPDES Electronic Reporting Requirements.

4.2.12 Bypass of Treatment Facilities

Bypass is prohibited. DEQ may take enforcement action against a permittee for a bypass unless:

1. The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage. Severe property damage means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. “Severe property damage” does not mean economic loss caused by delays in production;
2. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
3. The permittee submitted notices as required under sections 2.2.7 and 2.2.8 of this permit if the bypass was unanticipated.

If the permittee knows in advance of the need for a bypass, it must submit a prior written anticipated bypass notification through the IPDES E-Permitting System, if possible at least ten (10) days before the date of the bypass. DEQ may approve an anticipated bypass, after considering its adverse effects, if the director determines that it will meet the conditions in this permit.

A bypass that does not cause effluent limits to be exceeded is allowed to occur and is not subject to the notice requirements in section 2.2.7 and 2.2.8, but only if it also is for essential maintenance to assure efficient operation.

4.2.13 Upset Terms and Conditions

An upset is an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

1. Effect of an upset -- An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limits if the permittee demonstrates, through properly signed, contemporaneous operating logs, or other relevant evidence the following:
    a. An upset occurred and the causes of the upset;
    b. The permitted facility was at the time being properly operated;
    c. The permittee submitted notice of the upset as required under section 2.2.7 and 2.2.8; and
    d. The permittee timely complied with any remedial measures required under section 4.2.4.
2. A determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is not a final administrative action subject to judicial review.
3. Burden of proof—In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

4.2.14 Penalties for Violations of Permit Conditions

Any person who violates any permit condition, filing or reporting requirement, duty to allow or carry out inspections, entry or monitoring requirements, or any other provision in this permit shall be subject to administrative, civil, or criminal enforcement.

Pursuant to Idaho Code §39-175E and §39-108, any person who violates any rule, permit or order related to the IPDES program shall be liable for a civil penalty not more than $10,000 per violation or $5,000 for each day of a continuing violation, whichever is greater.

Pursuant to Idaho Code §39-175E, §39-108 and §39-117, any person who willfully or negligently violates any IPDES standard or limitation, permit condition or filing requirement shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine of not more than $10,000 per violation or for each day of a continuing violation.

Pursuant to Idaho Code §39-175E, §39-108 and §39-117, any person who knowingly makes any false statement, representation or certification in any IPDES form, in any notice or report required by an IPDES permit, or who knowingly renders inaccurate any monitoring device or method required to be maintained shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine of not more than $5,000 per violation or for each day of a continuing violation.

Pursuant to Idaho Code §18-113, a misdemeanor violation of the IPDES program requirements as set forth in §39-117, is also punishable by imprisonment in a county jail not exceeding 6 months.

In addition to civil penalties as described above, pursuant to Idaho Code §39-175E and §39-108, any person who has been determined to have violated any provision of the rules, permits or orders relating to the IPDES program shall be liable for any expense incurred by the state in enforcing the program requirements, or in enforcing or terminating any nuisance, source of environmental degradation, cause of sickness or health hazard.

4.2.15 Planned Changes

The permittee must give written notice to DEQ through the IPDES E-Permitting System as soon as possible of any planned physical alterations or additions to the permitted facility whenever any of the following occurs:

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source as determined in IDAPA 58.01.25.101 and 58.01.25.120.
2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limits in this permit.
3. The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application site or sludge management plan.

4.2.16 Anticipated Noncompliance

The permittee must give written advance notice to DEQ through the IPDES E-Permitting System of any planned changes in the permitted facility or activity that may result in noncompliance with this permit.

4.2.17 Toxic Pollutants

The permittee must comply with effluent standards or prohibitions established under Section 307(a) for toxic pollutants and with standards for sewage sludge use or disposal established under Clean Water Act Section 405(d), IDAPA 58.01.25.380 (Sewage Sludge), and IDAPA 58.01.16.650 "Wastewater Rules", within the time provided in the regulations that establish those standards or prohibitions, or standards for sewage sludge use or disposal, even if this permit has not yet been modified to incorporate the requirement.

4.2.18 Permit Modification

4.2.18.1 *Causes to Modify Permits*

This permit may be modified either at the request of any interested person, including the permittee, or by DEQ's initiative for reasons specified in IDAPA 58.01.25.201.02. Only those conditions being modified shall be reopened when a draft permit is prepared (IDAPA 58.01.25.201.01). The request for permit modification or a notification of planned changes to the permit does not stay any permit condition (IDAPA 58.01.25.300.06).

4.2.18.2 *Sewage Sludge Standard Changes*

This permit may be reopened to include any applicable standard for sewage sludge use or disposal promulgated under Section 405(d) of the Clean Water Act. DEQ may modify or revoke and reissue this permit if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in the permit, or controls a pollutant or practice not limited in the permit.

4.2.19 Omitted/Erroneous Information

When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or that it submitted incorrect information in a permit application or any report to DEQ, it must promptly submit the omitted facts or corrected information in writing.

4.2.20 Availability of Reports

In accordance with IDAPA 58.01.21, "Rules Governing the Protection and Disclosure of Records in the Possession of the Department of Environmental Quality," information submitted to DEQ pursuant to this permit may be claimed as confidential by the permittee. In accordance with IDAPA 58.01.25.002, permit applications, permits, and effluent data are not considered confidential. Any confidentiality claim must be asserted at the time of submission by stamping the words "trade secret," "proprietary," or "confidential" on each page containing such information. If no claim is made at the time of submission, DEQ may make the information available to the public without further notice to the permittee. If a claim is asserted, the information will be treated in accordance with the procedures in IDAPA 58.01.21.

4.2.21 Transfers

This permit is not transferable to any person except as specified in IDAPA 58.01.25.202. DEQ may require modification, or revocation and reissuance of this permit to change the name of the permittee, and may incorporate such other requirements as may be necessary under IDAPA 58.01.25.202.

4.2.22 State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by Section 510 of the Clean Water Act. This includes, but is not limited to, IDAPA 58.01.02, 58.01.16, and 58.01.17.

5 Definitions

8-hour composite sample	A combination of discrete sample aliquots of at least 100 milliliters, collected over periodic intervals from the same location, during the operating hours of a facility over an 8-hour period. The permit may specify the number of aliquots and/or the time between aliquots that the facility must composite. Samples may be acquired using an auto-sampler or directly collected from the sampling location by an operator. Composite of samples can be based on flow or time.
24-hour composite sample	A combination of discreet sample aliquots of at least 100 milliliters, collected over periodic intervals from the same location over a 24-hour period. The composite may be flow or time proportional. The sample aliquots must be collected and stored in accordance with 40 CFR 136.
acute toxic unit (TU_a)	A measure of acute toxicity. TU_a is the reciprocal of the effluent concentration that causes 50% of the organisms to die by the end on the acute exposure period (i.e., 100/LC50).
aliquot	A sample taken as a portion of a larger whole sample for chemical analysis.
annual average	The annual average is the sum of all individual data points collected over a calendar year, divided by the number of data points.
best management practices (BMPs)	Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage areas.
biosolids	Organic materials resulting from the treatment of domestic sewage in a treatment facility.
bypass	The intentional diversion of waste streams from any portion of a treatment facility
chronic toxic unit (TU_c)	A measure of chronic toxicity. TU_c is the reciprocal of the effluent concentration that causes no observable effect on the test organisms by the end of the chronic exposure period (i.e., 100/NOEC).
composite sample	A sample derived from two or more discrete aliquots (samples) collected at equal time intervals or collected proportional to the flow rate over the compositing period. See also “24-hour composite sample” and “8-hour composite sample”.
daily average	An average of all continuously monitored data recorded in one calendar day.
daily discharge	The discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limits expressed in units of mass, the “daily discharge” is calculated as the total mass of the pollutant discharged over the day. For pollutants with limits expressed in other units of measurement, the “daily discharge” is calculated as the average measurement of the pollutant over the day.
daily maximum	The largest daily value recorded or calculated over the reporting period; alternatively, the limit established above which an excursion occurs.
Idaho Department of Environmental Quality (DEQ)	The entity responsible for implementing the Idaho Pollutant Discharge Elimination System program.

director	The director of DEQ, or an authorized representative
Discharge Monitoring Report (DMR)	The facility or activity report containing monitoring and discharge quality and quantity information and data required to be submitted periodically, as defined in the discharge permit.
DMR Month	The final month of a completed reporting period
United States Environmental Protection Agency (EPA)	The Agency responsible for implementation of the clean water act (CWA) and oversight of state NPDES programs.
geometric mean	The n^{th} root of a product of n factors, or the antilogarithm of the arithmetic mean of the logarithms of the individual sample values
grab sample	An individual sample collected over a period of time not exceeding 15 minutes
Idaho Pollutant Discharge Elimination System (IPDES)	The Idaho program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and enforcing pretreatment requirements, under IDAPA 58.01.25 and the Clean Water Act Sections 307, 402, 318, and 405
inhibition concentration (IC)	A point estimate of the toxicant concentration that causes a given percent reduction (p) in a nonquantal biological measurement (e.g., reproduction or growth) calculated from a continuous model (e.g., interpolation method)
indirect discharge	The introduction of pollutants into a POTW from any nondomestic source regulated under Section 307(b), (c), or (d) of the Clean Water Act
indirect discharger	A nondomestic discharger introducing pollutants to a publically or privately owned treatment works
industrial user (IU)	A source of "indirect discharge" to a publically or privately owned treatment works
instantaneous maximum	The maximum allowable concentration or other measure of a pollutant determined from the analysis of any discrete or composite sample collected, independent of the flow rate and the duration of the sampling event.
instantaneous minimum	The minimum allowable concentration or other measure of a pollutant determined from the analysis of any discrete or composite sample collected, independent of the flow rate and the duration of the sampling event.
interference	A discharge that, alone or in conjunction with a discharge or discharges from other sources, both (1) inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal and (2) therefore, is a cause of a violation of any requirement of the POTW's IPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent state or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.
LC50	The concentration of toxicant (e.g., effluent) that is lethal to 50% of the test organisms exposed in the time period prescribed by the test.
maximum daily average	The maximum of the daily averages for the reporting period.

maximum weekly average	The maximum of the weekly average of all data collected/recorded during a calendar week.
maximum weekly maximum temperature (MWMT)	The reported MWMT is the single highest weekly maximum temperature (WMT) that occurs during a given year or reporting period of interest. The WMT is the mean of daily maximum temperatures measured over a consecutive seven (7) day period ending on the day of calculation.
method detection limit (MDL)	The minimum concentration of a substance (analyte) that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.
minimum level (ML)	Either the sample concentration equivalent to the lowest calibration point in a method or a multiple of the method detection limit (MDL), whichever is higher. Minimum levels may be obtained in several ways: They may be published by method; they may be the lowest acceptable calibration point used by a laboratory; or they may be calculated by multiplying the MDL in a method, or the MDL determined by a laboratory, by a factor of 3.
monthly average (average monthly) effluent limit (AML)	Monthly average effluent limit is the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.
monthly total	The total of all waste accepted in a calendar month.
National Pollutant Discharge Elimination System (NPDES)	The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and enforcing pretreatment requirements, under Sections 307, 402, 318, and 405 of the Clean Water Act
new discharger	Any building, structure, facility, or installation: a. From which there is or may be a discharge of pollutants; b. That did not commence the discharge of pollutants at a particular site prior to August 13, 1979; c. Which is not a new source; and Which has never received a finally effective NPDES or IPDES permit for discharges at that site.
new source	Any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commenced: a. After promulgation of standards of performance under the Clean Water Act section 306 which are applicable to such source; or After proposal of standards of performance in accordance with the Clean Water Act section 306 which are applicable to such source, but only if the standards are promulgated in accordance with section 306 within one hundred twenty (120) days of their proposal.
no observed effect concentration (NOEC)	No observed effect concentration. The NOEC is the highest concentration of toxicant (e.g., effluent) to which organisms are exposed in a chronic toxicity test [full life-cycle or partial life-cycle (short term) test], that causes no observable adverse effects on the test organisms (i.e., the highest concentration of effluent in which the values for the observed responses are not statistically significantly different from the controls).
pass-through	A discharge that exits the POTW into waters of the United States in quantities or concentrations that, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of

	the POTW's IPDES permit (including an increase in the magnitude or duration of a violation).
quality assurance project plan (QAPP)	The QAPP documents the results of a project's technical planning process, providing in one place a clear, concise, and complete plan for the environmental data operation and its quality objectives and identifying key project personnel.
receiving water concentration (RWC)	The concentration of a toxicant or effluent in the receiving water after mixing. The RWC is the inverse of the dilution factor. It is sometimes referred to as the instream waste concentration (IWC).
recorded	A recorded parameter can be collected using an automated recording device (data logger, SCADA, pressure transducer, etc.) or can be manually recorded in a log reading from another measurement device (stage gage, float valve visual, or any other permanently installed equipment that does not record automatically).
reporting period	Monitoring results for parameters are required to be reported (see DMR Month definition).
scan	A scan for effluent testing may be composed of any of the following methods: 1. 4 separate grab samples collected within a 24-hour period, each individually analyzed for the specified pollutants 2. 4 separate grab samples collected within a 24-hour period, combined into a single composite sample and analyzed once for the specified pollutants (this method only applicable for pollutants with correspondingly long holding times) 3. A single 24-hour composite sample analyzed once for the specified pollutants.
seasonal average	The seasonal average is the highest allowable average of "daily discharges" over a defined season, calculated as the sum of all "daily discharges" measured during a defined season divided by the number of "daily discharges" measured during that season.
sewage sludge	Any solid, semisolid, or liquid residue removed during the treatment of wastewater. Sewage sludge includes, but is not limited to, solids removed during primary, secondary, or advanced wastewater treatment, scum, septage, portable toilet pumpings, type III marine sanitation device pumpings (33 CFR 159), and sewage sludge products. Sewage sludge does not include grit or screenings, or ash generated during the incineration of sewage sludge.
sufficiently sensitive	• The method minimum level is at or below the level of the applicable water quality criterion or permit limit for the measured pollutant or pollutant parameter; or • In the case of permit applications, the method minimum level is above the applicable water quality criterion, but the amount of the pollutant or pollutant parameter in a facility's discharge is high enough that the method detects and quantifies the level of the pollutant or pollutant parameter in the discharge; or • The method has the lowest minimum level of the EPA-approved analytical methods for the parameter.
upset	An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of

	factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
weekly average (average weekly) effluent limit (AWL)	Weekly average effluent limit is the highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week.

Appendix A. Significant Figures

The table below lists the significant figures for effluent limits in this permit for DMR reporting and IPDES E-Permitting system submissions. Significant figure reporting conventions can be found in the IPDES User's Guide to Permitting and Compliance Volume 1 – General information (DEQ 2017).

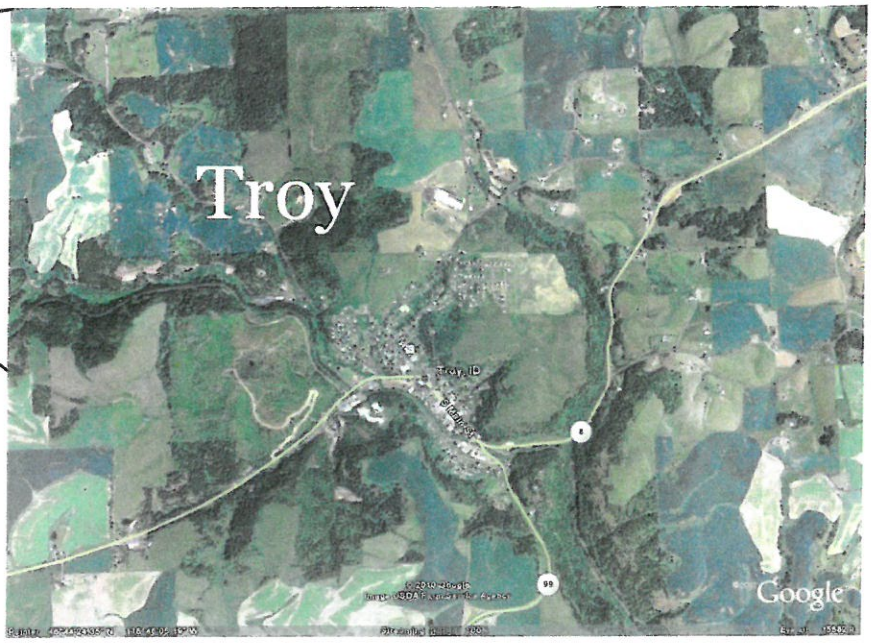
Table A-1. Effluent limit parameters.

Parameter	Limit Set	Significant Figures	Minimum place value (X)	Units
Biochemical Oxygen Demand (BOD_5)	Average Monthly Concentration	2	0X.00	mg/L
	Average Weekly Concentration	2	0X.00	mg/L
	Average Monthly Load	3	00X.0	lb/day
	Average Weekly Load	3	00X.0	lb/day
	Percent Removal	2	0X.0	%
Total Suspended Solids (TSS)	Average Monthly Concentration	2	0X.00	mg/L
	Average Weekly Concentration	2	0X.00	mg/L
	Average Monthly Load	3	00X.0	lb/day
	Average Weekly Load	3	00X.0	lb/day
	Percent Removal	2	0X.0	%
	Daily Maximum Load	3	00X.0	lb/day
E. coli	Monthly Geometric Mean	3	00.X	#/100mL
pH	Instantaneous Maximum	2	00.X	s.u.
	Instantaneous Minimum	2	00.X	s.u.
Chlorine, Total Residual	Average Monthly Concentration	2	00.0X	mg/L
	Daily Maximum Concentration	2	00.0X	mg/L
	Average Monthly Load	2	00.0X	lb/day
	Daily Maximum Load	2	00.0X	lb/day
Ammonia	Average Monthly Concentration	2	00.X	mg/L
	Daily Maximum Concentration	2	00.X	lb/day
	Average Monthly Load	2	00.X	lb/day
	Daily Maximum Load	2	00.X	mg/L

Appendix H

Martin Haar Development Conceptual Design

Location Map



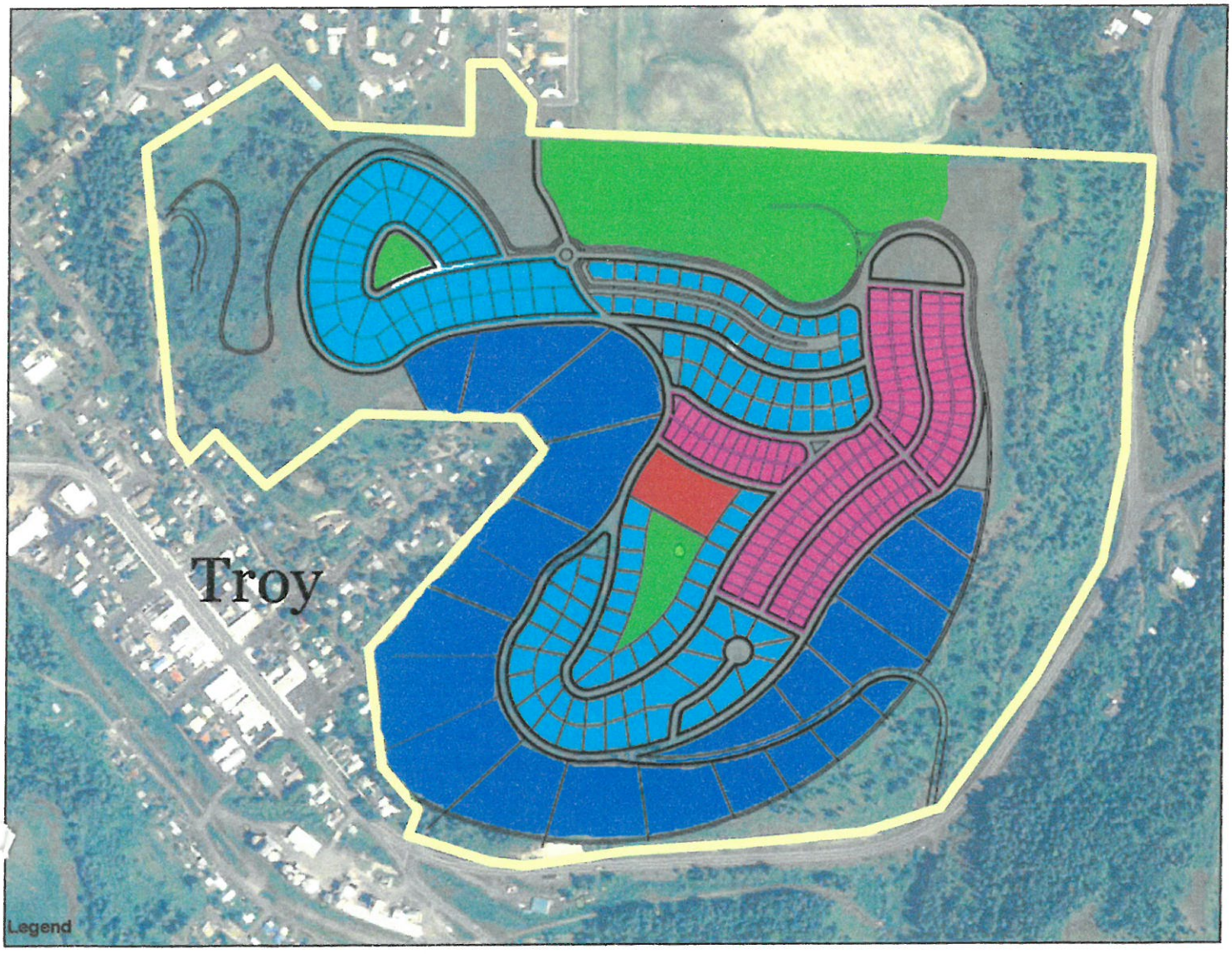
Parks

Small Lot

Single Family

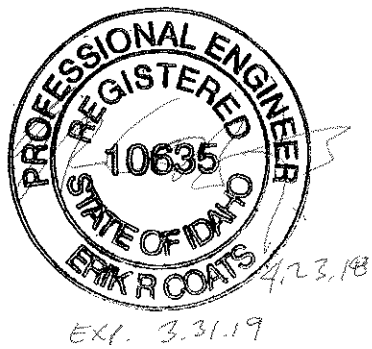
Community Center

Large Lot



Appendix I

Future Discharge Permit Analysis



MEMORANDUM

DATE: April 23, 2018

PROJECT: Troy, Idaho Wastewater Facilities Plan

TO: Ryan Rehder, Ed Stowe, Emily Nicholas – Mountain Waterworks

FROM: Erik R. Coats, P.E., Ph.D.

RE: Wastewater Treatment Plant – Future Permitting Requirements

Mountain Waterworks (MWW) is currently preparing a wastewater facilities plan for the city of Troy, Idaho. The purpose of this memorandum is to detail and describe anticipated future permitting requirements that will apply to the city as related to continued operation of their wastewater treatment plant (WWTP); the specific emphasis is on permit requirements that would apply to continued discharge of secondary effluent to the West Fork Little Bear Creek. These analyses and this memorandum have been prepared at the direction and authorization of MWW.

The city operates a biological WWTP that treats wastewater collected from the city of Troy sanitary sewer collection system. The WWTP is currently configured as an aerated lagoon, although the system includes a secondary clarification device. Chlorine disinfected secondary effluent is discharged into West Fork Little Bear Creek. The receiving stream lies in the Potlatch River watershed, ultimately draining into the Potlatch River, which discharges into the Clearwater River.

Current NPDES Permit Criteria. The City is currently operating its WWTP under an NPDES wastewater discharge permit issued by the EPA and dated May 1, 2004; while the permit expired April 30, 2009, the city continues to operate under the permit criteria therein until a new permit is issued. The Idaho DEQ, which is in the process of gaining regulatory primacy for administering the U.S. Clean Water Act, has indicated that no new permit is anticipated in the near future.

Current permit criteria on treated secondary effluent are as follows.

- 5-day Biochemical Oxygen Demand, BOD_5:
  - Average monthly: 30 mg/L, 48 lb/d
  - Average weekly: 45 mg/L, 71 lb/d
- Total Suspended Solids, TSS:
  - Average monthly: 30 mg/L, 48 lb/d
  - Average weekly: 45 mg/L, 71 lb/d
- E. coli bacteria: not to exceed a geometric mean of 126/100 mL, average monthly, and 406/100 mL instantaneous maximum
- Total residual chlorine:
  - Average monthly: 0.01 mg/L, 0.01 lb/d
  - Maximum daily limit: 0.02 mg/L, 0.03 lb/d

Receiving Stream Description and Water Quality Criteria. According to the Potlatch River TMDL Study [1]:

> "The Potlatch River watershed is a part of Hydrologic Unit 17060306, the Lower Clearwater River Subbasin. The watershed encompasses approximately 380,400 acres (594 square miles), draining into the Clearwater River between Myrtle and Spalding. The upper reaches of the Potlatch River are divided into two main tributaries, the East Fork and West Fork Potlatch Rivers. The East Fork originates in the northwest corner of Clearwater County and flows southwest to its confluence with the mainstem. The West Fork originates in the northeast corner of Latah County and flows southeast to its confluence with the Potlatch River. The Potlatch River drains the eastern two-thirds of Latah County, running from northeast to southwest."

According to the TMDL [1]:

- Beneficial uses for West Fork Little Bear Creek include cold water aquatic life; salmonid spawning; and secondary contact recreation.
- Dissolved oxygen in West Fork Little Bear Creek near the Troy WWTP outfall was observed to be < 4 mgO_2/L during middle to late summer.
- Waste load allocation (WLA) analyses have been conducted for West Fork Little Bear Creek, with WLAs focused on sediment, nutrients, and bacteria.
    - The city's current E. coli permit limit aligns with the TMDL
    - For nutrients:
        - The instream water quality target for total phosphorus (TP) and total inorganic nitrogen (TIN) is 0.1 and 3.0 mg/L, respectively.
        - Additionally, the TMDL presented an interim TIN load chart for the receiving stream (Figure 1).
        - However, the TMDL notes that one of the sampling points for establishing nutrient WLAs was in too close of proximity to Troy's outfall, and thus the data should not be used to establish WLAs for Troy.
    - For sediment, the TMDL allocates loads based on TSS. For Troy, the WLA is 42.8 lb/d monthly average and 114.1 lb/d maximum day.

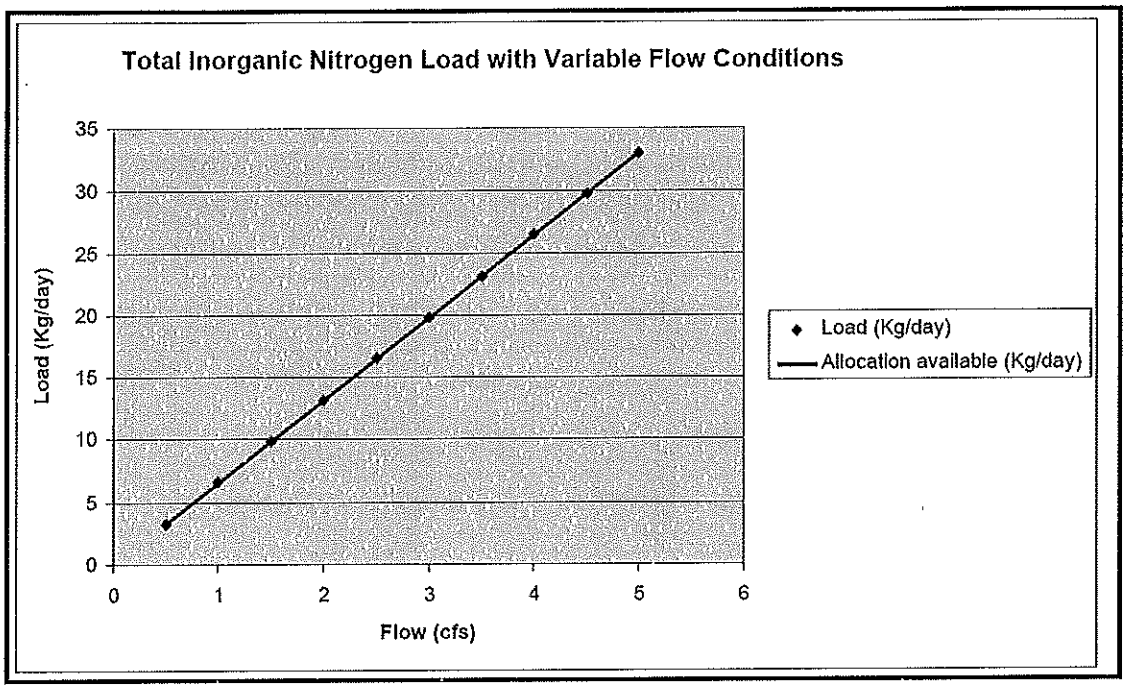


Figure 1. Total inorganic load allocation under various stream flows in W. Fork Little Bear Creek (Figure 22 in [1]; 1.0 kg/d = 2.2 lb/d)

According to the most recent 303(d) report prepared by the Idaho DEQ [2], West Fork Little Bear Creek is water quality limited on E. coli, sediment, and nitrogen; this assessment is consistent with water quality concerns described in the TMDL [1]. Thus, no additional water quality criteria concerns beyond the TMDL to-date have been established by the DEQ or EPA.

In addition to regulatory studies, multiple investigations between 2006 and 2013 have been completed on West Fork Little Bear Creek water quality [3-5]. Highlights relevant to this wastewater facility plan are as follows.

- Regarding in-stream flow, at times West Fork Little Bear Creek has been observed to be essentially dry upstream of the WWTP; thus, there are times when the Troy WWTP effluent discharge represents the only water in the creek. As such, West Fork Little Bear Creek is an effluent dominated stream at times during the summer.
- It has been observed that Troy WWTP effluent effects a decrease in water temperature in West Fork Little Bear Creek during the warmer summer months. During the period of analysis, in-stream temperatures exceeding 30 ° C above the WWTP have been observed, while the stream temperature did not exceed 25 ° C below the WWTP outfall. Thus, Troy's effluent provides a clear benefit to the receiving stream water quality, and the support of aquatic life therein.
- Regarding dissolved oxygen (DO), during late summer months the DO has been observed to be less than the 6 mg/L state standard, and at times less than 4 mg/L [4]. For example, Clark [5] reported a minimum value immediately downstream of the Troy effluent outfall of 2.32 mg/L.

- Ammonia concentrations in the creek have ranged from approximately 5 mgN/L to 12 mgN/L. Effluent ammonia concentrations were recorded to be highly variable, ranging from 10-25 mgN/L in both 2009 and 2010; however, during late summer (July-late August 2009; mid-August to October 2010), the WWTP achieved full nitrification and thus effluent ammonia-N concentrations were zero.
- In-stream phosphorus concentrations were highest during the summer months, ranging from near zero to approximately 3 mgP/L immediately downstream of the WWTP effluent discharge.

Required Receiving Stream Water Quality Criteria.

While the Potlatch River TMDL discusses and includes WLAs for West Fork Little Bear Creek, ultimately no formal TMDL for West Fork Little Bear Creek, with associated WLAs, has been prepared. Thus, requisite in-stream water quality criteria that will affect this wastewater facility planning effort were developed based on Idaho law. In this regard, a primary nutrient of concern is ammonia, which is both toxic to certain aquatic organisms and can also contribute to reduced dissolved oxygen association with nitrification processes. While DO effects are addressed through a TMDL process, ammonia toxicity is specifically addressed in Idaho Administrative Code 58.01.02. In-stream ammonia concentrations are regulated on both acute and chronic toxicity, as follows.

- Acute Criterion (Criterion Maximum Concentration (CMC)). The one (1) hour average concentration of total ammonia nitrogen (in mg N/L) is not to exceed, more than once every three (3) years, the value calculated using the following equation:

$$CMC = \frac{0.275}{1 + 10^{7.204-pH}} + \frac{39.0}{1 + 10^{pH-7.204}}$$

- For Chronic Concentration Criterion (CCC), the thirty (30) day average concentration of total ammonia nitrogen (in mg N/L) is not to exceed, more than once every three (3) years, the value calculated using the following equation:

$$CCC = \left(\frac{0.0577}{1 + 10^{7.688-pH}} + \frac{2.487}{1 + 10^{pH-7.688}}\right) x\ MIN(2.85;\ 1.45\ x\ 10^{0.028\ (25-T)}$$

  Note that this CCC equation applies when fish early life stages are likely present; based on studies performed on West Fork Little Bear Creek, it is assumed that such conditions will control Troy WWTP operations.

  The highest four-day (4) average within the thirty-day (30) period should not exceed two point five (2.5) times the CCC.

Figures 2 and 3 present in-stream ammonia concentrations based on CMC and CCC, respectively. Limited data was found on in-stream pH for West Fork Little Bear Creek, although Clark [5] reported a pH of 7.3-8.0; thus, analyses that yielded data presented in Figures 2 and 3 used a pH of 7-8. Since Troy's effluent is likely the principle source of water in the creek during

the late summer, these figures illustrate the potential consequences of CMC and CCC on Troy's WWTP effluent criteria.

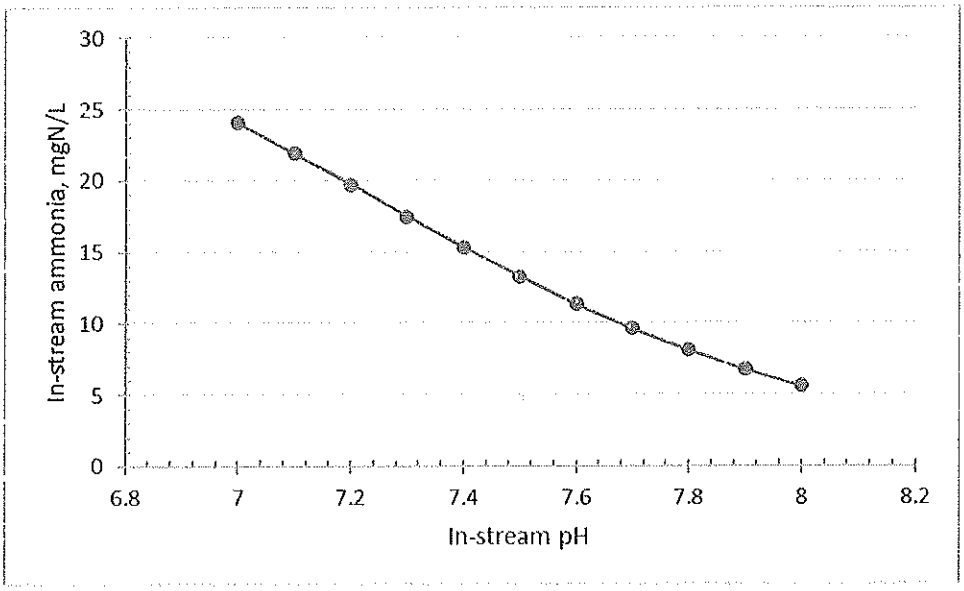


Figure 2: Ammonia-N CMC Criteria for West Fork Little Bear Creek

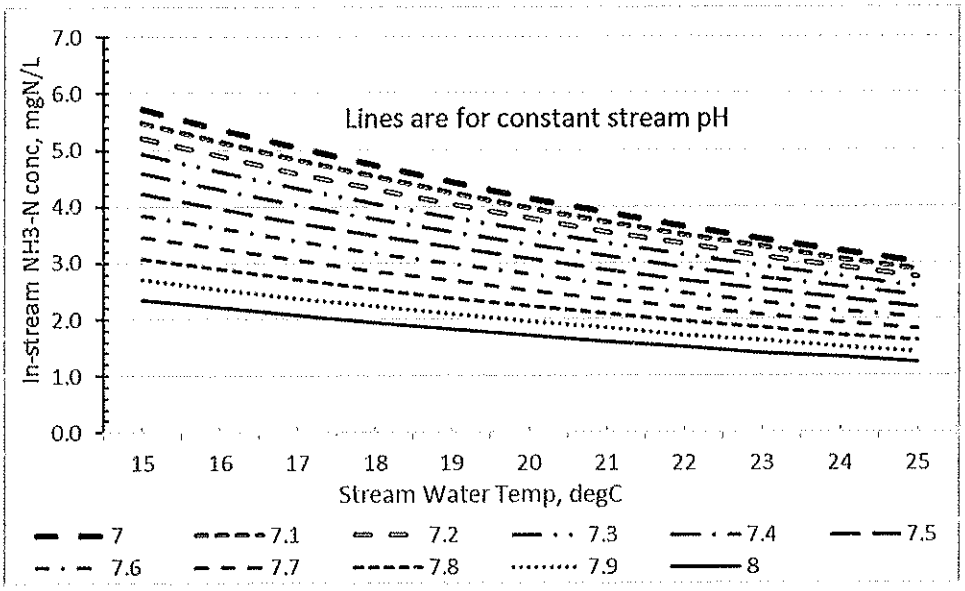


Figure 3: Ammonia-N CCC Criteria for West Fork Little Bear Creek

In-stream water quality is also regulated on temperature. With West Fork Little Bear Creek designated to support cold water biota, in accordance with state law the maximum day average and maximum stream temperatures are 19 and 22 ° C, respectively.

Projected Future NPDES Permit Criteria.

The following effluent criteria were developed based on data discussed and cited herein; note that the city lacks a current NPDES permit, and the Idaho DEQ has not provided input on

potential criteria. Recommendations below are a synthesis of available water quality data and Idaho regulations.

- BOD_5 and TSS:
  - There is no indication that current permitted conditions will change in the future permit.
- Disinfection:
  - Current E. coli criteria are not expected to change, nor are the disinfection requirements, which include dechlorination.
- Nutrients, general:
  - While in-stream N and P concentrations have been sufficiently high for algal growth, according to Brooks et al. [4] the resultant algal growth was not "excessive" relative to quantities associated with impaired water quality. Commensurately, based on these in-stream water quality and aquatic health studies, implementing comprehensive nutrient removal in the WWTP does not appear necessary.
- Ammonia-nitrogen:
  - The CCC at 25 ° C and a pH of 7.5 is 2.2 mgN/L, while the CMC at the same pH is 13.9 mgN/L. Historical water quality data showed the maximum stream temperature immediately downstream of the effluent discharge did not exceed 25 ° C.
  - According to Brooks et al. [4], while in-stream ammonia concentrations near the Troy WWTP outfall exceeded chronic standards in 2009 (but not in 2010), steelhead migrated downstream to avoid the potentially undesirable conditions. Indeed, no steelhead mortality was observed [4].
  - While ammonia concentrations have, at times, historically exceeded CCC and CMC standards, healthy steelhead populations were nonetheless sustained in West Fork Little Bear Creek [4].
  - Historic DO concentrations in the creek have been observed below the state-regulated level of 6 mg/L during periods in the summer; reducing ammonia concentrations in the Troy effluent will contribute to improved DO conditions.
  - Water quality modeling suggests that improved ammonia removal from the WWTP effluent could enhance conditions – particularly DO – to support steelhead in the vicinity of the WWTP outfall. Modeling results suggested a maximum effluent ammonia concentration of 11.4 mgN/L [4].
  - **Recommendations:** Considering the CCC, CMC, and the available water quality data/studies:
    - **During annual low streamflow periods – typically occurring from mid-April through mid-October – the recommended target ammonia effluent concentration is 2 mgN/L. This proposed "ammonia season" also aligns with Steelhead spawning season, which generally begins in mid-April.**
    - **During the winter period – mid-October to mid-April – the WWTP should simply maintain nitrification. Nitrifying bacteria grow quite slowly; as such, maintaining a critical mass of nitrifiers with the WWTP (through careful solids residence time (SRT) control) during the winter will allow the city to more rapidly modify process operations to achieve near-complete nitrification beginning in April.**

- Total Inorganic Nitrogen (TIN; ammonia + nitrate):
    - The TMDL identifies a target TIN of 3.0 mgN/L in-stream water quality target for waters within the Potlatch River watershed.
    - The TMDL includes a chart (Fig. 1 herein) that would vary TIN in-stream concentrations with streamflow. Note that during the drier late summer months, flow in West Fork Little Bear Creek immediately downstream of Troy's effluent outfall is nearly 100% treated effluent.
    - Using the low-end value for TIN as presented in Fig. 1, and considering observations that Troy's effluent constitutes the entire stream flow at times during late summer, suggests the Troy effluent will be limited to approximately 3.0 kgN/d, or approximately 6.6 lbN/d.
        - Such an effluent condition would require the WWTP to achieve both nitrification and denitrification.
    - However, the TMDL study acknowledges that water quality data presented therein was collected in a manner that overly represented Troy's effluent and did not sufficiently represent actual stream water quality characteristics. As such, TMDL data specifically pertaining to potential WLAs for Troy should not be used to establish new permit criteria.
    - Additionally, data collected for West Fork Little Bear Creek for the TMDL study occurred during a period of extreme drought; stream flow conditions were less than those that would be used to establish water quality criteria. Actual WLAs will need to be based on the lowest 7-day flow within a 10-year period (7Q10) for the receiving water, which is likely larger than reported in the TMDL; thus TIN loads will likely increase.
    - According to Clark [5], in-stream nitrate+nitrite concentrations at the terminus of West Fork Little Bear Creek, at the mouth of Big Bear Canyon, were 0.05 mgN/L.
    - **Recommendations: There is contradicting data ([1] vs. [4, 5]) on the need to achieve TIN limits, and the DEQ has acknowledged the need for more data. As such, and considering available data, no TIN removal recommendations are advised.**
- Phosphorus:
    - The TMDL describes a target of 0.1 mgP/L in-stream for waters within the Potlatch River watershed.
    - However, no data or other guidance from the Idaho DEQ is available to conclude that phosphorus will be regulated, or needs to be regulated, in Troy's NPDES permit.
    - According to Clark [5], in-stream phosphorus concentrations at the terminus of West Fork Little Bear Creek, at the mouth of Big Bear Canyon, were 0.07 mgP/L.
    - Given the dearth of data suggesting Troy's WWTP effluent should be treated to remove P, and also considering concerns DEQ has described in the TMDL study (see TIN narrative above) about the need for an improved data set from which to evaluate West Fork Little Bear Creek, **no effluent P criteria are recommended.**

- Temperature:
    - According to Brooks et al. [4], effluent temperature during summer 2009 and 2010 did not exceed 22 and 22.8 ° C, respectively; in other words, Troy's effluent has exhibited characteristics approximately at the state water quality standard.
    - Considering the broader value of Troy's effluent on West Fork Little Bear Creek, and without further input from the DEQ, **no temperature criteria are anticipated.**

As WWTP upgrade options are developed to address potential future more stringent water quality regulations, and as the Idaho DEQ contemplates new permit criteria, the following commentary from Brooks et al. [4] regarding the value of Troy's effluent on the health of West Fork Little Bear Creek, and specifically the option of land application in lieu of creek discharge, should be acknowledged:

> "The city of Troy WWTP effectively sustains 5.5 km of steelhead habitat by providing a constant supply of water and nutrients during late summer months."
>
> "Although this option (effluent land application) would bring the city of Troy WWTP into compliance with the CWA, this option would almost certainly have devastating consequences on the existing juvenile steelhead population in the creek."

Indeed, under current WWTP operational conditions Clark [5] noted a healthy fish population in West Fork Little Bear Creek, and Sanchez-Murillo [3] concluded that Troy's effluent was quite beneficial to supporting healthy steelhead populations in West Fork Little Bear Creek.

References.

1. IDEQ, *Potlatch River Subbasin Assessment and TMDLs*, 2008, 254 p.
2. Hastings, C. and J. Williams, *Idaho's 2014 Integrated Report*, 2017, 625 p.
3. Sanchez-Murillo, R., E.S. Brooks, L. Sampson, J. Boll, and F. Wilhelm, *Ecohydrological analysis of Steelhead (Oncorhynchus mykiss) habitat in an effluent dependent stream in the Pacific Northwest, USA.* Ecohydrology, 2013. **7**(2): p. 557-568.
4. Brooks, E.S., R. Sanchez-Murillo, and J. Boll, *Ecological assessment of current impacts and future management of the city of Troy WWTP on Steelhead (Oncorhynchus mykiss) habitat in the West Fork Little Bear Creek drainage*, 2011, 62 p.
5. Clark, K., *Potlatch River Monitoring Report 2006-2008*, 2010, 61 p.

Appendix J

Land Application Calculations

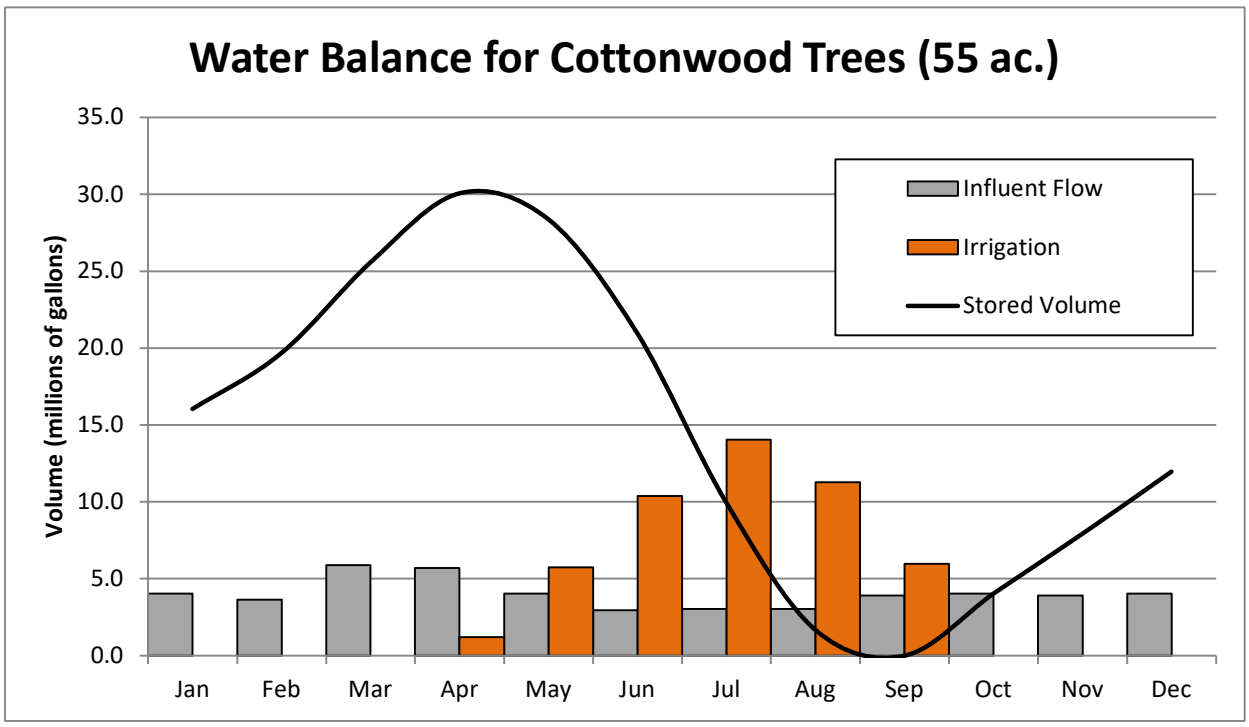
					Cottonwoods								
					Total Farmed Acres =	55							
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
	31	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**	
mm/d	0	0	0	0.51	2.36	4.41	5.78	4.64	2.54	0	0	0	
in/d	0	0	0	0.02	0.09	0.17	0.23	0.18	0.10	0	0	0	
in/mo	0.00	0.00	0.00	0.60	2.88	5.21	7.05	5.66	3.00	0.00	0.00	0.00	24.4
MG/mo*	0.00	0.00	0.00	1.20	5.74	10.37	14.05	11.28	5.98	0.00	0.00	0.00	48.6
cumulative	0.0	0.0	0.0	1.2	6.9	17.3	31.4	42.6	48.6	48.6	48.6	48.6	

Source: ET Idaho

* Assumes an irrigation efficiency of 0.75

			1	2	3	4	5	6	7	8	9	10	11	12	
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Influent	Avg. Flow		0.130	0.130	0.190	0.190	0.130	0.098	0.098	0.098	0.130	0.130	0.130	0.130	Applied per the Future Conditions flow projections
	No. days		31	28	31	30	31	30	31	31	30	31	30	31	
	Tot. Flow		4.0	3.6	5.9	5.7	4.0	2.9	3.0	3.0	3.9	4.0	3.9	4.0	
	Cumulative		4.0	7.7	13.6	19.3	23.3	26.2	29.3	32.3	36.2	40.2	44.1	48.2	
Disposal	Irr. Vol.		0	0	0	1.2	5.7	10.4	14.0	11.3	6.0	0	0	0	
	River Disch		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Stored Vol	12.0	16.0	19.7	25.6	30.1	28.4	20.9	9.9	1.7	0.0	4.0	7.9	12.0	30.1 Storage volume req'd (MG)

Start at "zero" then adjust cell to match December stored volume. If they don't converge, increase land app acreage and repeat.

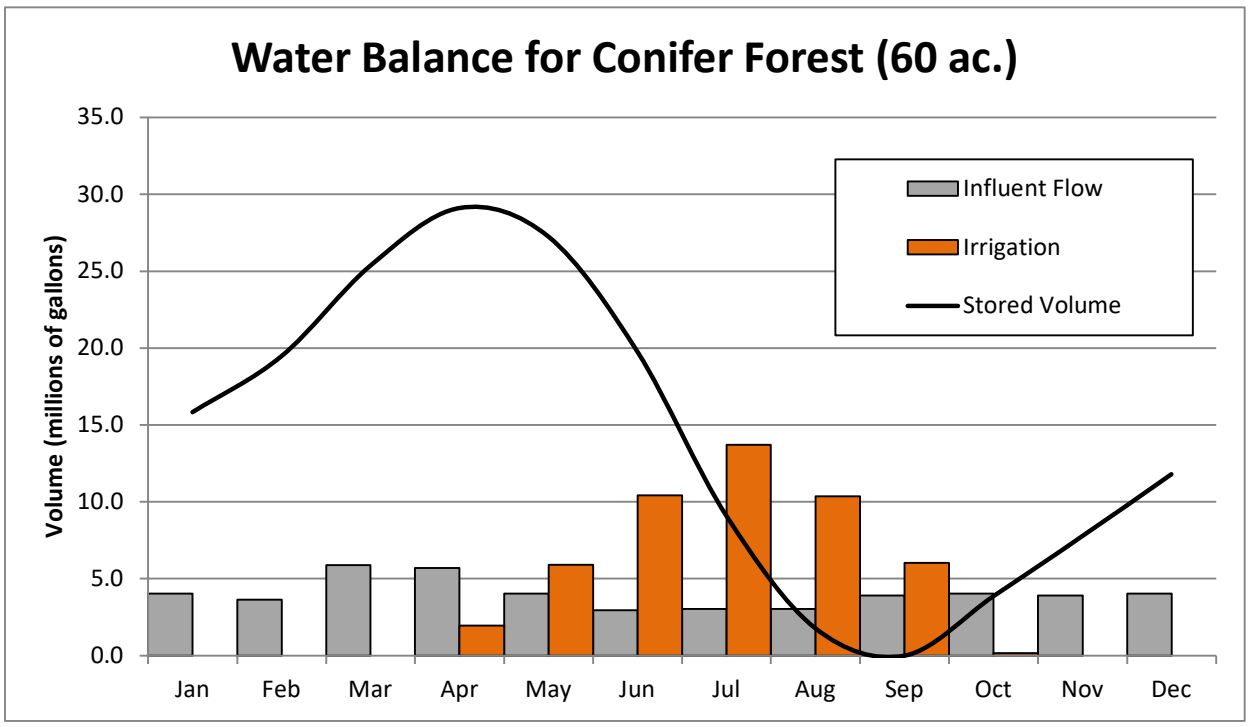

Water Balance for Cottonwood Trees (55 ac.)
Volume (millions of gallons)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Influent Flow
Irrigation
Stored Volume

					Conifer Forest									
					Total Farmed Acres =		60							
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**	
	31	**28**	**31**	**30**	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**		
mm/d	0	0	0	0.76	2.23	4.06	5.17	3.9	2.35	0.06	0	0		Source: ET Idaho
in/d	0.000	0.000	0.000	0.030	0.088	0.160	0.204	0.154	0.093	0.002	0.000	0.000		
in/mo	0.00	0.00	0.00	0.90	2.72	4.80	6.31	4.76	2.78	0.07	0.00	0.00	22.3	
MG/mo*	0.00	0.00	0.00	1.95	5.91	10.42	13.71	10.34	6.03	0.16	0.00	0.00	48.5	
cumulative	0.0	0.0	0.0	2.0	7.9	18.3	32.0	42.3	48.4	48.5	48.5	48.5		

* Assumes an irrigation efficiency of 0.75

			1	2	3	4	5	6	7	8	9	10	11	12	
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Influent	Avg. Flow		0.130	0.130	0.190	0.190	0.130	0.098	0.098	0.098	0.130	0.130	0.130	0.130	Applied per the Future Conditions flow projections
	No. days		31	28	31	30	31	30	31	31	30	31	30	31	
	Tot. Flow		4.0	3.6	5.9	5.7	4.0	2.9	3.0	3.0	3.9	4.0	3.9	4.0	
	Cumulative		4.0	7.7	13.6	19.3	23.3	26.2	29.3	32.3	36.2	40.2	44.1	48.2	
Disposal	Irr. Vol.		0.0	0.0	0.0	2.0	5.9	10.4	13.7	10.3	6.0	0.2	0.0	0.0	
	River Disch		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Stored Vol	11.8	15.8	19.5	25.4	29.1	27.2	19.7	9.1	1.8	0.0	3.9	7.8	11.8	29.1 Storage volume req'd

Start at "zero" then adjust cell to match December stored volume. If they don't converge, increase land app acreage and repeat.

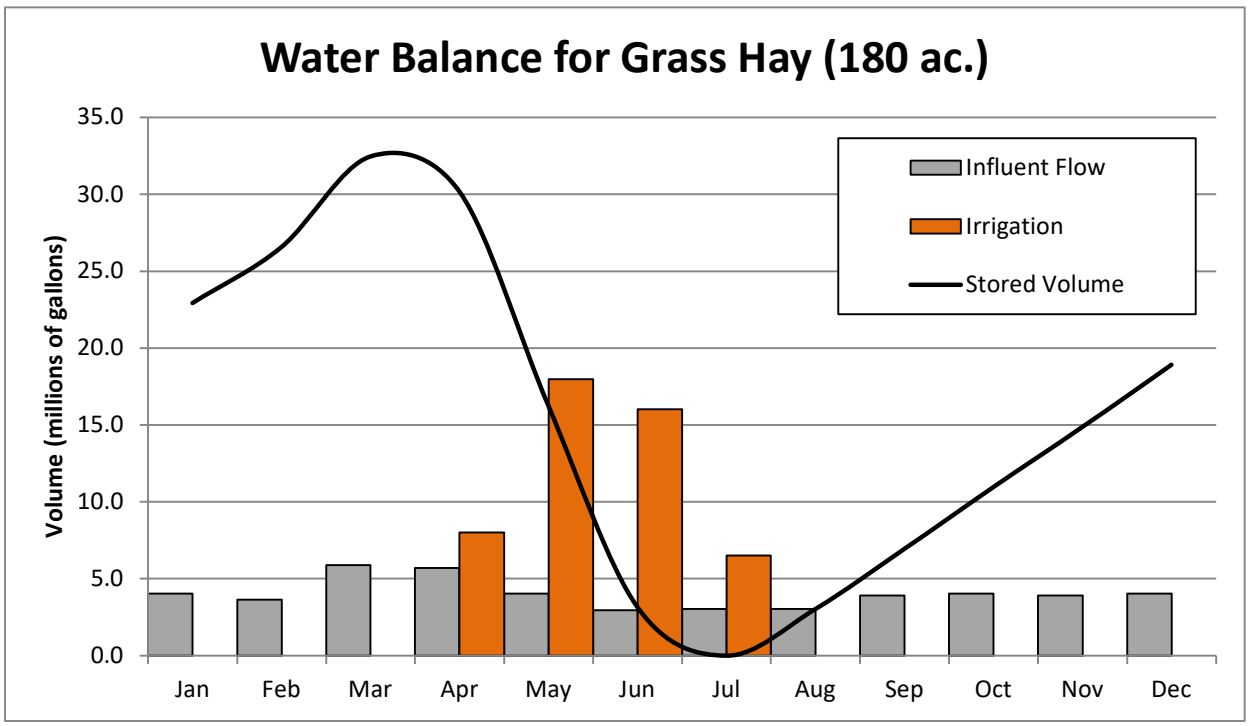

Water Balance for Conifer Forest (60 ac.)
Volume (millions of gallons)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Influent Flow
Irrigation
Stored Volume

					Grass Hay									
					Total Farmed Acres =		180							
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**	
	31	**28**	**31**	30	**31**	**30**	**31**	**31**	**30**	**31**	**30**	**31**		
mm/d	0	0	0	1.04	2.26	2.08	0.82	0	0	0	0	0		Source: ET Idaho
in/d	0.000	0.000	0.000	0.041	0.089	0.082	0.032	0.000	0.000	0.000	0.000	0.000		
in/mo	0.00	0.00	0.00	1.23	2.76	2.46	1.00	0.00	0.00	0.00	0.00	0.00	7.4	
MG/mo*	0.00	0.00	0.00	8.01	17.98	16.01	6.52	0.00	0.00	0.00	0.00	0.00	48.5	
cumulative	0.0	0.0	0.0	8.0	26.0	42.0	48.5	48.5	48.5	48.5	48.5	48.5		

* Assumes an irrigation efficiency of 0.75

			1	2	3	4	5	6	7	8	9	10	11	12	
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Influent	Avg. Flow		0.130	0.130	0.190	0.190	0.130	0.098	0.098	0.098	0.130	0.130	0.130	0.130	Applied per the Future Conditions flow projections
	No. days		31	28	31	30	31	30	31	31	30	31	30	31	
	Tot. Flow		4.0	3.6	5.9	5.7	4.0	2.9	3.0	3.0	3.9	4.0	3.9	4.0	
	Cumulative		4.0	7.7	13.6	19.3	23.3	26.2	29.3	32.3	36.2	40.2	44.1	48.2	
Disposal	Irr. Vol.		0	0	0	8.0	18.0	16.0	6.5	0	0	0	0	0	
	River Disch		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Stored Vol	18.9	22.9	26.6	32.5	30.2	16.2	3.1	0.0	3.0	6.9	11.0	14.9	18.9	32.5 Storage volume req'd (MG)

Start at "zero" then adjust cell to match December stored volume. If they don't converge, increase land app acreage and repeat.


Water Balance for Grass Hay (180 ac.)
Volume (millions of gallons)
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Influent Flow
Irrigation
Stored Volume

Appendix K

Net Present Value of Project Alternatives

PROJECT :	**Troy**	**LOCATION FACTOR:**	1
JOB # :	**170.0020.01**	**DATE :**	9/30/2023
LOCATION :	**Troy, ID**	**BY :**	RR
ELEMENT :	**Net Present Value**	**REVIEWED BY:**	SH

Mechanical Influent Screen	
Annual O&M Expenses	
Personnel	$10,000
Power	$1,200
Professional Fees	$1,000
Short Lived Asset Replacement	$6,800
Total Annual O&M&R Expenses	**$19,000**
Capital Cost Estimate	**$1,256,385**
Salvage Value (20 year useful life)	**$0**
Net Present Value (1.2% at 20 years)	**$1,593,000**
Aeration System Upgrades - Discharge	
Annual O&M Expenses	
Personnel	$20,000
Power	$25,300
Professional Fees	$5,000
Short Lived Asset Replacement	$19,000
Total Annual O&M&R Expenses	**$69,300**
Capital Cost Estimate	**$2,220,100**
Salvage Value (20 year useful life)	**$0**
Net Present Value (1.2% at 20 years)	**$3,446,000**
Aeration System Upgrades - No Discharge	
Annual O&M Expenses	
Personnel	$20,000
Power	$22,300
Professional Fees	$5,000
Short Lived Asset Replacement	$17,000
Total Annual O&M&R Expenses	**$64,300**
Capital Cost Estimate	**$1,894,750**
Salvage Value (20 year useful life)	**$0**
Net Present Value (1.2% at 20 years)	**$3,033,000**
Disinfection System Upgrades - Discharge	
Annual O&M Expenses	
Personnel	$5,000
Power and Chemical	$3,200
Professional Fees	$2,000
Short Lived Asset Replacement	$2,600
Total Annual O&M&R Expenses	**$12,800**
Capital Cost Estimate	**$548,800**
Salvage Value (20 year useful life)	**$0**
Net Present Value (1.2% at 20 years)	**$776,000**

Disinfection System Upgrades - No Discharge	
Annual O&M Expenses	
Personnel	$5,000
Power and Chemical	$2,400
Professional Fees	$2,000
Short Lived Asset Replacement	$2,000
Total Annual O&M&R Expenses	**$11,400**
Capital Cost Estimate	**$643,110**
Salvage Value (20 year useful life)	**$0**
Net Present Value (1.2% at 20 years)	**$845,000**
Slow Rate Land Application - No Discharge	
Annual O&M Expenses	
Personnel	$30,000
Power	$15,100
Professional Fees	$7,000
Short Lived Asset Replacement	$12,200
Total Annual O&M&R Expenses	**$64,300**
Capital Cost Estimate	**$6,172,530**
Salvage Value (20 year useful life)	**$0**
Net Present Value (1.2% at 20 years)	**$7,310,000**
Priority 1 Piping and Manholes	
Annual O&M Expenses	
Personnel	$20,000
Power	$0
Professional Fees	$1,000
Short Lived Asset Replacement	$0
Total Annual O&M&R Expenses	**$21,000**
Capital Cost Estimate	**$2,411,500**
Salvage Value (20 year useful life)	**$0**
Net Present Value (1.2% at 20 years)	**$2,783,000**

Appendix L

Short-Lived Assets

PROJECT : Troy

JOB # : 170.0020.01

LOCATION : Troy, ID

ELEMENT : Short Lived Assets

LOCATION FACTOR: 1

DATE : 9/30/2023

BY : RR

REVIEWED BY: SH

Interest Rates:	2%	4%

Influent Mechanical Screen						
Component	**Quantity**	**Unit Cost**	**Capital Cost**	**Useful Life**	**Replacement Cost (2%)**	**Annual Cost (4%)**
Screen	1	$ 115,000	$ 115,000	20	$ 170,883.95	$ 5,738.58
Wash Water Pumps	2	$ 1,500	$ 3,000	15	$ 4,037.61	$ 201.64
Class I Div I Elec. Equip	1	$ 12,000	$ 12,000	15	$ 16,150.42	$ 806.57
					Total	**$ 6,746.79**

Aeration System Upgrade - Discharge						
Component	**Quantity**	**Unit Cost**	**Capital Cost**	**Useful Life**	**Replacement Cost (2%)**	**Annual Cost (4%)**
1 HP Mixer	3	$ 17,500	$ 52,500	15	$ 70,658.09	$ 3,528.74
5 HP Mixer	4	$ 25,000	$ 100,000	15	$ 134,586.83	$ 6,721.41
5 HP Blower	2	$ 15,000	$ 30,000	15	$ 40,376.05	$ 2,016.42
15 HP Blower	2	$ 45,000	$ 90,000	15	$ 121,128.15	$ 6,049.27
Electrical Equipment	1	$ 10,000	$ 10,000	15	$ 13,458.68	$ 672.14
					Total	**$ 18,988.00**

Aeration System Upgrade - No Discharge						
Component	**Quantity**	**Unit Cost**	**Capital Cost**	**Useful Life**	**Replacement Cost (2%)**	**Annual Cost (4%)**
1 HP Mixer	3	$ 17,500	$ 52,500	15	$ 70,658.09	$ 3,528.74
5 HP Mixer	4	$ 25,000	$ 100,000	15	$ 134,586.83	$ 6,721.41
15 HP Blower	2	$ 45,000	$ 90,000	15	$ 121,128.15	$ 6,049.27
Electrical Equipment	1	$ 10,000	$ 10,000	15	$ 13,458.68	$ 672.14
					Total	**$ 16,971.57**

Disinfection System Upgrade - Discharge						
Component	**Quantity**	**Unit Cost**	**Capital Cost**	**Useful Life**	**Replacement Cost (2%)**	**Annual Cost (4%)**
Metering Pumps	3	$ 3,000	$ 9,000	10	$ 10,970.95	$ 913.78
Chemical Mixing Pumps	2	$ 3,000	$ 6,000	10	$ 7,313.97	$ 609.19
Flow Recording Equip.	1	$ 10,000	$ 10,000	15	$ 13,458.68	$ 672.14
Electrical Equipment	1	$ 5,000	$ 5,000	15	$ 6,729.34	$ 336.07
					Total	**$ 2,531.18**

Disinfection System Upgrade - No Discharge						
Component	**Quantity**	**Unit Cost**	**Capital Cost**	**Useful Life**	**Replacement Cost (2%)**	**Annual Cost (4%)**
Metering Pumps	2	$ 3,000	$ 6,000	10	$ 7,313.97	$ 609.19
Chemical Mixing Pumps	1	$ 3,000	$ 3,000	10	$ 3,656.98	$ 304.59
Flow Recording Equip.	1	$ 10,000	$ 10,000	15	$ 13,458.68	$ 672.14
Electrical Equipment	1	$ 5,000	$ 5,000	15	$ 6,729.34	$ 336.07
					Total	**$ 1,921.99**

Slow Rate Land Application - No Discharge						
Component	**Quantity**	**Unit Cost**	**Capital Cost**	**Useful Life**	**Replacement Cost (2%)**	**Annual Cost (4%)**
Delivery Pumps	2	$ 40,000	$ 80,000	10	$ 97,519.55	$ 8,122.50
Repressurization Pumps	2	$ 10,000	$ 20,000	10	$ 24,379.89	$ 2,030.62
Overland Flow Pumps	2	$ 5,000	$ 10,000	10	$ 12,189.94	$ 1,015.31
Electrical Equipment	1	$ 15,000	$ 15,000	15	$ 20,188.03	$ 1,008.21
					Total	**$ 12,176.64**

Appendix M

Detailed Alternative Cost Estimates

PROJECT : Troy Facility Plan Update

JOB # : 170.0020

LOCATION : Troy, Idaho

ELEMENT : CS-1 Priority 1 & 2 CCTV Inspection

LOCATION FACTOR: 1

DATE : 9/30/2023

BY : ZC

REVIEWED BY: SH

SPEC. NO.	DESCRIPTION	QUAN	UNIT	MATERIAL	LABOR	SUB	EQUIP	OTHER	UNIT COST	SUBTOTAL	TOTAL
DIV. 02000	**SITE WORK**										
	CCTV & Hydro Mobilzation	1	LS	$0.00	$0.00	$2,859.08	$0.00	$0.00	$2,859.08	$2,859	
	CCTV Priority 1 & 2 Line Segments	7,539	LF	$0.00	$0.00	$0.92	$0.00	$0.00	$0.92	$6,936	
	Hydro Clean Priority 1 & 2 Line Segments	7,539	LF	$0.00	$0.00	$1.04	$0.00	$0.00	$1.04	$7,803	
	TOTAL, DIVISION 02000										$17,598
DIV. 03000	**CONCRETE**										
	Not Used	0	CY	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 03000										$0
DIV. 04000	**MASONRY**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 04000										$0
DIV. 05000	**METALS**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 05000										$0
DIV. 06000	**WOOD, PLASTICS, COMPOSITES**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 06000										$0
DIV. 07000	**THERMAL AND MOISTURE PROTECTION**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 07000										$0
DIV. 08000	**OPENINGS**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 08000										$0
DIV. 09000	**FINISHES**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 09000										$0
DIV. 10000	**SPECIALTIES**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 10000										$0
DIV. 11000	**EQUIPMENT**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 11000										$0
DIV. 12000	**FURNISHINGS**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 12000										$0
DIV. 13000	**SPECIAL CONSTRUCTION**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 13000										$0
DIV. 14000	**CONVEYING EQUIPMENT**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 14000										$0
DIV. 15000	**MECHANICAL**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 15000										$0
DIV. 16000	**ELECTRICAL**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 16000										$0
DIV. 17000	**INSTRUMENTATION & CONTROLS**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 17000										$0
	Subtotal Unit Cost										**$18,000**
	Mobilization and Demobilization (7.5%)										$1,350
	Contingency (20%)										$3,600
	Estimated Construction Subtotal										**$22,950**
	Engineering and Construction Observation (25%)										$5,738
	Administration and Legal (5%)										$1,148
	Estimated Total Project Cost										**$29,835**

The cost estimate herein is based on our perception of current conditions at the project location.This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Mountain Waterworks has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Mountain Waterworks cannot and does not warrant or guarantee that bids or actual construction costs will not vary from the costs presented herein.

PROJECT : Troy Facility Plan Update

JOB # : 170.0020

LOCATION : Troy, Idaho

ELEMENT : CS-2 Priority 1 & 2 Pipe & Manhole Replacement

LOCATION FACTOR: 1

DATE : 9/30/2023

BY : ZC

REVIEWED BY: SH

SPEC. NO.	DESCRIPTION	QUAN	UNIT	MATERIAL	LABOR	SUB	EQUIP	OTHER	UNIT COST	SUBTOTAL	TOTAL
DIV. 02000	**SITE WORK**										
	Excavation & Backfill for Mainline <10'	5,175	LF	$0.00	$21.93	$0.00	$21.93	$0.00	$43.87	$227,010	
	Excavation & Backfill for Mainline 10' - 12'	500	LF	$0.00	$26.32	$0.00	$26.32	$0.00	$52.64	$26,320	
	Excavation & Backfill for Mainline 12' - 14'	400	LF	$0.00	$30.71	$0.00	$30.71	$0.00	$61.41	$24,565	
	Excavation & Backfill for Mainline 14' - 16'	300	LF	$0.00	$35.09	$0.00	$35.09	$0.00	$70.19	$21,056	
	Excavation & Backfill for Services (Various Depths)	600	LF	$0.00	$19.19	$0.00	$19.19	$0.00	$38.38	$23,030	
	Excavation & Backfill for Manholes (Various Depths)	34	EA	$0.00	$552.72	$0.00	$552.72	$0.00	$1,105.44	$37,585	
	Rock Excavation	35	HR	$0.00	$165.00	$0.00	$165.00	$0.00	$330.00	$11,509	
	Pipe Bedding (Type I Bedding)	1,738	CY	$17.10	$0.00	$0.00	$0.00	$10.30	$27.40	$47,630	
	Import Backfill (10%)	2,186	CY	$7.50	$0.00	$0.00	$0.00	$10.30	$17.80	$38,907	
	AC Pipe Removal & Disposal	1	LS	$0.00	$0.00	$0.00	$0.00	$12,500.00	$12,500.00	$12,500	
	Gravel Surface Repair (10' Width)	375	LF	$3.24	$3.19	$0.00	$3.19	$2.92	$12.55	$4,706	
	Asphalt Surface Repair (10' Width)	7,333	SY	$2.43	$2.40	$58.50	$2.40	$2.19	$67.91	$498,028	
	TOTAL, DIVISION 02000										$972,847
DIV. 03000	**CONCRETE**										
	Precast Concrete Manholes (Includes Ring, Lid, Grade Rings)	34	EA	$2,366.84	$982.50	$0.00	$245.63	$0.00	$3,594.97	$122,229	
	Concrete Collar	34	EA	$350.00	$196.50	$0.00	$49.13	$0.00	$595.63	$20,251	
	TOTAL, DIVISION 03000										$142,480
DIV. 04000	**MASONRY**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 04000										$0
DIV. 05000	**METALS**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 05000										$0
DIV. 06000	**WOOD, PLASTICS, COMPOSITES**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 06000										$0
DIV. 07000	**THERMAL AND MOISTURE PROTECTION**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 07000										$0
DIV. 08000	**OPENINGS**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 08000										$0
DIV. 09000	**FINISHES**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 09000										$0
DIV. 10000	**SPECIALTIES**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 10000										$0
DIV. 11000	**EQUIPMENT**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 11000										$0
DIV. 12000	**FURNISHINGS**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 12000										$0
DIV. 13000	**SPECIAL CONSTRUCTION**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 13000										$0
DIV. 14000	**CONVEYING EQUIPMENT**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 14000										$0
DIV. 15000	**MECHANICAL**										
	Sewer Service Connections	40	EA	$293.10	$655.00	$0.00	$163.75	$0.00	$1,111.85	$44,474	
	8" Sewer Mainline	6375	LF	$15.75	$17.47	$0.00	$4.37	$0.00	$37.58	$239,604	
	TOTAL, DIVISION 15000										$284,078
DIV. 16000	**ELECTRICAL**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 16000										$0
DIV. 17000	**INSTRUMENTATION & CONTROLS**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 17000										$0
	Subtotal Unit Cost										**$1,400,000**
	Mobilization and Demobilization (7.5%)										$105,000
	Contingency (25%)										$350,000
	Estimated Construction Subtotal										**$1,855,000**
	Engineering and Construction Observation (25%)										$463,750
	Administration and Legal (5%)										$92,750
	Estimated Total Project Cost										**$2,411,500**

The cost estimate herein is based on our perception of current conditions at the project location.This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Mountain Waterworks has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Mountain Waterworks cannot and does not warrant or guarantee that bids or actual construction costs will not vary from the costs presented herein.

PROJECT : Troy Facility Plan Update

JOB # : 170.0020

LOCATION : Troy, Idaho

ELEMENT : TF-1 Headworks Upgrade

LOCATION FACTOR: 1

DATE : 9/30/2023

BY : ZC

REVIEWED BY: SH

SPEC. NO.	DESCRIPTION	QUAN	UNIT	MATERIAL	LABOR	SUB	EQUIP	OTHER	UNIT COST	SUBTOTAL	TOTAL
DIV. 02000	**SITE WORK**										
	Building Excavation	197	CY	$0.00	$17.50	$0.00	$17.50	$0.00	$35.00	$6,888	
	Building Structural Fill	197	CY	$22.50	$0.00	$0.00	$0.00	$10.33	$32.83	$6,461	
	Site Grading	1	LS	$0.00	$3,500.00	$0.00	$3,500.00	$0.00	$7,000.00	$7,000	
	Testing	1	LS	$0.00	$0.00	$0.00	$0.00	$750.00	$750.00	$750	
	TOTAL, DIVISION 02000										$21,099
DIV. 03000	**CONCRETE**										
	Concrete Footings	20	CY	$350.00	$100.00	$0.00	$50.00	$0.00	$500.00	$10,000	
	Concrete Slab on Grade	13	CY	$350.00	$125.00	$0.00	$75.00	$0.00	$550.00	$7,150	
	Concrete Channel	7	CY	$350.00	$300.00	$0.00	$150.00	$0.00	$800.00	$5,600	
	TOTAL, DIVISION 03000										$22,750
DIV. 04000	**MASONRY**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 04000										$0
DIV. 05000	**METALS**										
	Concrete Reinforcement	1	LS	$5,000.00	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000	
	Metal Roof System	527	SF	$0.00	$0.00	$15.00	$0.00	$0.00	$15.00	$7,905	
	Metal Channel Grating	114	SF	$49.92	$12.48	$0.00	$2.50	$0.00	$64.90	$7,366	
	Misc. Metal Fabrications	1	LS	$0.00	$0.00	$0.00	$0.00	$5,000.00	$5,000.00	$5,000	
	TOTAL, DIVISION 05000										$25,271
DIV. 06000	**WOOD, PLASTICS, COMPOSITES**										
	Wood Structural Framing	527	SF	$0.00	$0.00	$75.00	$0.00	$0.00	$75.00	$39,525	
	Wood Trusses	1	LS	$5,928.75	$2,964.38	$0.00	$1,778.63	$0.00	$10,671.75	$10,672	
	TOTAL, DIVISION 06000										$50,197
DIV. 07000	**THERMAL AND MOISTURE PROTECTION**										
	Insulation	1	LS	$0.00	$0.00	$3,952.50	$0.00	$0.00	$3,952.50	$3,953	
	Moisture Wrap	1	LS	$0.00	$0.00	$1,976.25	$0.00	$0.00	$1,976.25	$1,976	
	TOTAL, DIVISION 07000										$5,929
DIV. 08000	**OPENINGS**										
	Entry Door	1	EA	$500.00	$1,250.00	$0.00	$250.00	$0.00	$2,000.00	$2,000	
	Roll Up Door	1	EA	$2,500.00	$3,000.00	$0.00	$500.00	$0.00	$6,000.00	$6,000	
	TOTAL, DIVISION 08000										$8,000
DIV. 09000	**FINISHES**										
	Siding (Including Painting) Interior & Exterior	1	LS	$0.00	$0.00	$9,881.25	$0.00	$0.00	$9,881.25	$9,881	
	TOTAL, DIVISION 09000										$9,881
DIV. 10000	**SPECIALTIES**										
	Building Signs	1	LS	$250.00	$150.00	$0.00	$50.00	$0.00	$450.00	$450	
	TOTAL, DIVISION 10000										$450
DIV. 11000	**EQUIPMENT**										
	Slide Gates	2	EA	$350.00	$750.00	$0.00	$1,250.00	$0.00	$2,350.00	$4,700	
	Misc. Interior Equipment	1	EA	$175.00	$500.00	$0.00	$1,750.00	$0.00	$2,425.00	$2,425	
	Automatic 1/4" Screen w/ Supports and Screen Wash	1	EA	$0.00	$19,185.00	$0.00	$127,900.00	$0.00	$147,085.00	$147,085	
	Interior Water Supply	1	LS	$637.50	$1,487.50	$0.00	$4,250.00	$0.00	$6,375.00	$6,375	
	HVAC Equipment (Fan & Heater)	1	LS	$1,250.00	$2,500.00	$0.00	$8,500.00	$0.00	$12,250.00	$12,250	
	TOTAL, DIVISION 11000										$172,835
DIV. 12000	**FURNISHINGS**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 12000										$0
DIV. 13000	**SPECIAL CONSTRUCTION**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 13000										$0
DIV. 14000	**CONVEYING EQUIPMENT**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 14000										$0
DIV. 15000	**MECHANICAL**										
	Yard Piping	1	LS	$50,000.00	$37,500.00	$0.00	$25,000.00	$0.00	$112,500.00	$112,500	
	Utility Water Piping - Size 3"	1500	LF	$9.08	$14.67	$0.00	$8.28	$0.00	$32.03	$48,049	
	Bulilding HVAC	1	LS	$0.00	$0.00	$35,000.00	$0.00	$0.00	$35,000.00	$35,000	
	TOTAL, DIVISION 15000										$195,549
DIV. 16000	**ELECTRICAL**										
	Building Electrical	1	LS	$0.00	$0.00	$175,718.00	$0.00	$0.00	$175,718.00	$175,718	
	TOTAL, DIVISION 16000										$175,718
DIV. 17000	**INSTRUMENTATION & CONTROLS**										
	I&C Subcontract	1	LS	$0.00	$0.00	$70,287.20	$0.00	$0.00	$70,287.20	$70,287	
	TOTAL, DIVISION 17000										$70,287
	Subtotal Unit Cost										**$758,000**
	Mobilization and Demobilization (7.5%)										$56,850
	Contingency (20%)										$151,600
	Estimated Construction Subtotal										**$966,450**
	Engineering and Construction Observation (25%)										$241,613
	Administration and Legal (5%)										$48,323
	Estimated Total Project Cost										**$1,256,385**

The cost estimate herein is based on our perception of current conditions at the project location.This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Mountain Waterworks has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Mountain Waterworks cannot and does not warrant or guarantee that bids or actual construction costs will not vary from the costs presented herein.

PROJECT : Troy Facility Plan Update

JOB # : 170.0020

LOCATION : Troy, Idaho

ELEMENT : TF-2 Aeration System Upgrades - Land Application

LOCATION FACTOR: 1

DATE : 9/30/2023

BY : ZC

REVIEWED BY: SH

SPEC. NO.	DESCRIPTION	QUAN	UNIT	MATERIAL	LABOR	SUB	EQUIP	OTHER	UNIT COST	SUBTOTAL	TOTAL
DIV. 02000	**SITE WORK**										
	Building Excavation	75	CY	$0.00	$17.50	$0.00	$17.50	$0.00	$35.00	$2,625	
	Building Structural Fill	75	CY	$22.50	$0.00	$0.00	$0.00	$10.33	$32.83	$2,462	
	Site Grading	1	LS	$0.00	$1,750.00	$0.00	$1,750.00	$0.00	$3,500.00	$3,500	
	Testing	1	LS	$0.00	$0.00	$0.00	$0.00	$450.00	$450.00	$450	
	TOTAL, DIVISION 02000										$9,037
DIV. 03000	**CONCRETE**										
	Concrete Footings	13	CY	$350.00	$100.00	$0.00	$50.00	$0.00	$500.00	$6,360	
	Concrete Slab on Grade	10	CY	$350.00	$125.00	$0.00	$75.00	$0.00	$550.00	$5,500	
	TOTAL, DIVISION 03000										$11,860
DIV. 04000	**MASONRY**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 04000										$0
DIV. 05000	**METALS**										
	Bollards	11	EA	$350.00	$500.00	$0.00	$250.00	$0.00	$1,100.00	$12,100	
	Concrete Reinforcement	1	LS	$3,500.00	$0.00	$0.00	$0.00	$0.00	$3,500.00	$3,500	
	Metal Roof System	252	SF	$0.00	$0.00	$15.00	$0.00	$0.00	$15.00	$3,780	
	Misc. Metal Fabrications	1	LS	$0.00	$0.00	$0.00	$0.00	$10,000.00	$10,000.00	$10,000	
	Blower Exhaust Hoods	1	EA	$2,500.00	$1,250.00	$0.00	$750.00	$0.00	$4,500.00	$4,500	
	TOTAL, DIVISION 05000										$33,880
DIV. 06000	**WOOD, PLASTICS, COMPOSITES**										
	Wood Structural Framing	252	SF	$0.00	$0.00	$75.00	$0.00	$0.00	$75.00	$18,900	
	Wood Trusses	1	LS	$2,835.00	$1,417.50	$0.00	$850.50	$0.00	$5,103.00	$5,103	
	HDPE Baffle Curtain	300	LF	$0.00	$10.00	$90.00	$0.00	$0.00	$100.00	$30,000	
	TOTAL, DIVISION 06000										$54,003
DIV. 07000	**THERMAL AND MOISTURE PROTECTION**										
	Insulation	1	LS	$0.00	$0.00	$1,890.00	$0.00	$0.00	$1,890.00	$1,890	
	Moisture Wrap	1	LS	$0.00	$0.00	$945.00	$0.00	$0.00	$945.00	$945	
	TOTAL, DIVISION 07000										$2,835
DIV. 08000	**OPENINGS**										
	Entry Door	1	EA	$500.00	$1,250.00	$0.00	$250.00	$0.00	$2,000.00	$2,000	
	Roll Up Door	1	EA	$2,500.00	$3,000.00	$0.00	$500.00	$0.00	$6,000.00	$6,000	
	TOTAL, DIVISION 08000										$8,000
DIV. 09000	**FINISHES**										
	Siding (Including Painting) Interior & Exterior	1	LS	$0.00	$0.00	$4,725.00	$0.00	$0.00	$4,725.00	$4,725	
	Coat Internal Building Air Piping	1	LS	$500.00	$1,500.00	$0.00	$500.00	$0.00	$2,500.00	$2,500	
	TOTAL, DIVISION 09000										$7,225
DIV. 10000	**SPECIALTIES**										
	Building Signs	1	LS	$250.00	$150.00	$0.00	$50.00	$0.00	$450.00	$450	
	TOTAL, DIVISION 10000										$450
DIV. 11000	**EQUIPMENT**										
	15 HP Blowers	2	EA	$3,250.00	$8,125.00	$0.00	$32,500.00	$0.00	$43,875.00	$87,750	
	5 HP Mixers	4	EA	$5,000.00	$12,500.00	$0.00	$50,000.00	$0.00	$67,500.00	$270,000	
	1 HP Mixers	3	EA	$2,500.00	$6,250.00	$0.00	$25,000.00	$0.00	$33,750.00	$101,250	
	Submerged Diffusers	11	EA	$1,500.00	$3,750.00	$0.00	$15,000.00	$0.00	$20,250.00	$222,750	
	TOTAL, DIVISION 11000										$681,750
DIV. 12000	**FURNISHINGS**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 12000										$0
DIV. 13000	**SPECIAL CONSTRUCTION**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 13000										$0
DIV. 14000	**CONVEYING EQUIPMENT**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 14000										$0
DIV. 15000	**MECHANICAL**										
	Internal Mechanical Air Piping & Valves	1	LS	$25,000.00	$18,750.00	$0.00	$7,500.00	$0.00	$51,250.00	$51,250	
	Buried Aeration Main - Size 4"	1500	LF	$14.76	$18.60	$0.00	$9.31	$0.00	$42.67	$64,003	
	Aeration Control Valves	11	EA	$2,000.00	$1,500.00	$0.00	$1,000.00	$0.00	$4,500.00	$49,500	
	TOTAL, DIVISION 15000										$164,753
DIV. 16000	**ELECTRICAL**										
	Electrical Aeration Builidng	1	LS	$0.00	$0.00	$125,917.50	$0.00	$0.00	$125,917.50	$125,918	
	Electrical Aeration	1	LS	$0.00	$0.00	$38,500.00	$0.00	$0.00	$38,500.00	$38,500	
	TOTAL, DIVISION 16000										$125,918
DIV. 17000	**INSTRUMENTATION & CONTROLS**										
	I&C Subcontract	1	LS	$0.00	$0.00	$65,767.00	$0.00	$0.00	$65,767.00	$65,767	
	TOTAL, DIVISION 17000										$65,767
	Subtotal Unit Cost										**$1,166,000**
	Mobilization and Demobilization (5%)										$58,300
	Contingency (20%)										$233,200
	Estimated Construction Subtotal										**$1,457,500**
	Engineering and Construction Observation (25%)										$364,375
	Administration and Legal (5%)										$72,875
	Estimated Total Project Cost										**$1,894,750**

The cost estimate herein is based on our perception of current conditions at the project location.This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Mountain Waterworks has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Mountain Waterworks cannot and does not warrant or guarantee that bids or actual construction costs will not vary from the costs presented herein.

PROJECT : Troy Facility Plan Update

JOB # : 170.0020

LOCATION : Troy, Idaho

ELEMENT : TF-2 Effluent Disinfection - No Dechlorination

LOCATION FACTOR: 1

DATE : 9/30/2023

BY : ZC

REVIEWED BY: SH

SPEC. NO.	DESCRIPTION	QUAN	UNIT	MATERIAL	LABOR	SUB	EQUIP	OTHER	UNIT COST	SUBTOTAL	TOTAL
DIV. 02000	**SITE WORK**										
	Building Excavation	86	CY	$0.00	$17.50	$0.00	$17.50	$0.00	$35.00	$3,017	
	Building Structural Fill	86	CY	$22.50	$0.00	$0.00	$0.00	$10.33	$32.83	$2,823	
	Site Grading	1	LS	$0.00	$2,000.00	$0.00	$2,000.00	$0.00	$4,000.00	$4,000	
	Testing	1	LS	$0.00	$0.00	$0.00	$0.00	$500.00	$500.00	$500	
	TOTAL, DIVISION 02000										$10,341
DIV. 03000	**CONCRETE**										
	Concrete Slab on Grade	7	CY	$350.00	$125.00	$0.00	$75.00	$0.00	$550.00	$3,850	
	Clorination Structure	1	EA	$15,000.00	$7,500.00	$0.00	$5,250.00	$0.00	$27,750.00	$27,750	
	TOTAL, DIVISION 03000										$31,600
DIV. 04000	**MASONRY**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 04000										$0
DIV. 05000	**METALS**										
	Concrete Reinforcement	1	LS	$1,000.00	$0.00	$0.00	$0.00	$0.00	$1,000.00	$1,000	
	Misc. Metal Fabrication	1	LS	$0.00	$0.00	$0.00	$0.00	$3,250.00	$3,250.00	$3,250	
	TOTAL, DIVISION 05000										$4,250
DIV. 06000	**WOOD, PLASTICS, COMPOSITES**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 06000										$0
DIV. 07000	**THERMAL AND MOISTURE PROTECTION**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 07000										$0
DIV. 08000	**OPENINGS**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 08000										$0
DIV. 09000	**FINISHES**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 09000										$0
DIV. 10000	**SPECIALTIES**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 10000										$0
DIV. 11000	**EQUIPMENT**										
	Prefabricated Chemical Building	1	EA	$11,250.00	$15,000.00	$0.00	$75,000.00	$0.00	$101,250.00	$101,250	
	Chemical Tank	1	EA	$450.00	$600.00	$0.00	$3,000.00	$0.00	$4,050.00	$4,050	
	Eye Wash Station	1	EA	$300.00	$400.00	$0.00	$2,000.00	$0.00	$2,700.00	$2,700	
	Chemical Mixing Pump	1	EA	$4,800.00	$6,400.00	$0.00	$32,000.00	$0.00	$43,200.00	$43,200	
	Chemical Metering Pump	1	EA	$750.00	$1,000.00	$0.00	$5,000.00	$0.00	$6,750.00	$6,750	
	Building Selfing	1	EA	$75.00	$100.00	$0.00	$500.00	$0.00	$675.00	$675	
	TOTAL, DIVISION 11000										$158,625
DIV. 12000	**FURNISHINGS**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 12000										$0
DIV. 13000	**SPECIAL CONSTRUCTION**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 13000										$0
DIV. 14000	**CONVEYING EQUIPMENT**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 14000										$0
DIV. 15000	**MECHANICAL**										
	Yard Piping	1	LS	$22,500.00	$16,875.00	$0.00	$11,250.00	$0.00	$50,625.00	$50,625	
	Utility Water Pump	1	LS	$1,875.00	$4,375.00	$0.00	$12,500.00	$0.00	$18,750.00	$18,750	
	TOTAL, DIVISION 15000										$69,375
DIV. 16000	**ELECTRICAL**										
	Electrical Disinfection System	1	LS	$0.00	$0.00	$63,345.00	$0.00	$0.00	$63,345.00	$63,345	
	Electrical Utility Water System	1	LS	$0.00	$0.00	$17,510.00	$0.00	$0.00	$17,510.00	$17,510	
	TOTAL, DIVISION 16000										$80,855
DIV. 17000	**INSTRUMENTATION & CONTROLS**										
	I&C Subcontract	1	LS	$0.00	$0.00	$32,342.00	$0.00	$0.00	$32,342.00	$32,342	
	TOTAL, DIVISION 17000										$32,342
	Subtotal Unit Cost										**$388,000**
	Mobilization and Demobilization (7.5%)										$29,100
	Contingency (20%)										$77,600
	Estimated Construction Subtotal										**$494,700**
	Engineering and Construction Observation (25%)										$123,675
	Administration and Legal (5%)										$24,735
	Estimated Total Project Cost										**$643,110**

The cost estimate herein is based on our perception of current conditions at the project location.This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Mountain Waterworks has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Mountain Waterworks cannot and does not warrant or guarantee that bids or actual construction costs will not vary from the costs presented herein.

PROJECT : Troy Facility Plan Update

JOB # : 170.0020

LOCATION : Troy, Idaho

ELEMENT : TF-3 Slow Rate Land Application

LOCATION FACTOR: 1

DATE : 9/30/2023

BY : ZC

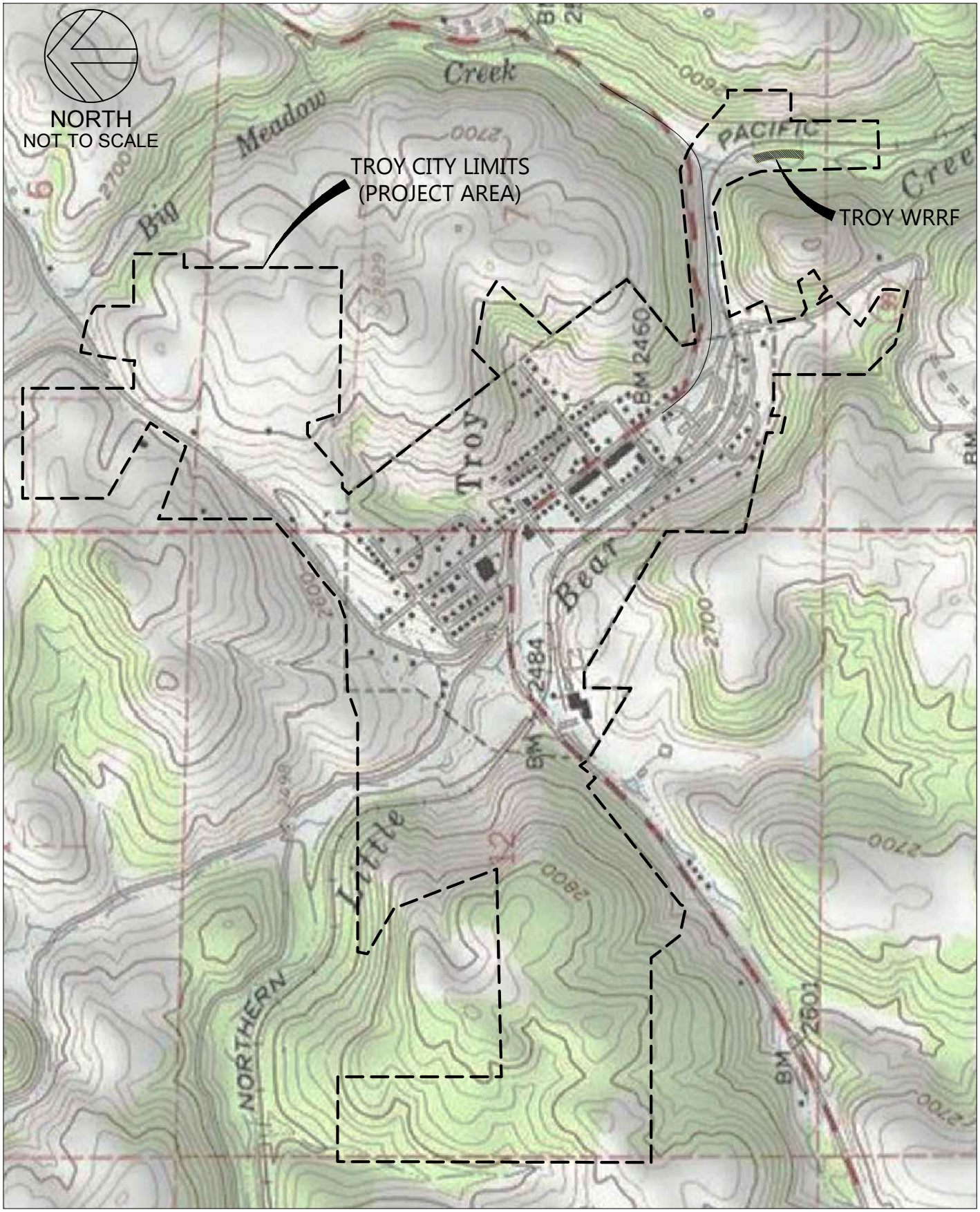
REVIEWED BY: SH

SPEC. NO.	DESCRIPTION	QUAN	UNIT	MATERIAL	LABOR	SUB	EQUIP	OTHER	UNIT COST	SUBTOTAL	TOTAL
DIV. 02000	**SITE WORK**										
	Clearing & Grubbing/ Removal of Obstructions	1	LS	$0.00	$25,000.00	$0.00	$25,000.00	$0.00	$50,000.00	$50,000	
	Storage Lagoon Cut	69,951	CY	$0.00	$5.46	$0.00	$5.46	$0.94	$11.86	$829,655	
	Storage Lagoon Fill	44,888	CY	$0.00	$5.46	$0.00	$5.46	$1.50	$12.42	$557,509	
	Lagoon Liner Bedding Sand	2,156	CY	$27.69	$4.70	$0.00	$3.29	$0.00	$35.67	$76,916	
	Monitoring Wells	3	EA	$5,000.00	$5,000.00	$25,000.00	$0.00	$0.00	$35,000.00	$105,000	
	Access Road	3,300	LF	$8.43	$12.87	$0.00	$12.12	$9.87	$43.30	$142,901	
	Tree Row Preperation & Planting	1	LS	$30,000.00	$15,000.00	$5,000.00	$0.00	$0.00	$50,000.00	$50,000	
	Dust Control & Testing	1	LS	$0.00	$0.00	$0.00	$0.00	$25,000.00	$25,000.00	$25,000	
	TOTAL, DIVISION 02000										$1,836,981
DIV. 03000	**CONCRETE**										
	Precast Concrete Wet Well @ WRRF	1	EA	$15,000.00	$5,250.00	$0.00	$2,250.00	$0.00	$22,500.00	$22,500	
	Precast Concrete Wet Well @ Land Application Site	1	EA	$12,500.00	$4,375.00	$0.00	$1,875.00	$0.00	$18,750.00	$18,750	
	Precast Flow Meter Vault Structure	1	EA	$3,500.00	$1,225.00	$0.00	$525.00	$0.00	$5,250.00	$5,250	
	Reinforced Concrete Pipe - Size 36"	250	LF	$150.00	$75.00	$0.00	$30.00	$0.00	$255.00	$63,750	
	TOTAL, DIVISION 03000										$110,250
DIV. 04000	**MASONRY**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 04000										$0
DIV. 05000	**METALS**										
	Fencing	200	LF	$0.00	$0.00	$25.00	$0.00	$0.00	$25.00	$5,000	
	TOTAL, DIVISION 05000										$5,000
DIV. 06000	**WOOD, PLASTICS, COMPOSITES**										
	HDPE Lagoon Liner (60 Mil)	202520	SF	$0.00	$0.00	$1.40	$0.00	$0.00	$1.40	$283,528	
	Non - Woven Geotextile (8 oz)	202520	SF	$0.00	$0.00	$0.50	$0.00	$0.00	$0.50	$101,260	
	Lagoon Liner Vent System	1	LS	$0.00	$0.00	$35,000.00	$0.00	$0.00	$35,000.00	$35,000	
	Seepage Testing	1	LS	$0.00	$0.00	$0.00	$0.00	$20,000.00	$20,000.00	$20,000	
	TOTAL, DIVISION 06000										$439,788
DIV. 07000	**THERMAL AND MOISTURE PROTECTION**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 07000										$0
DIV. 08000	**OPENINGS**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 08000										$0
DIV. 09000	**FINISHES**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 09000										$0
DIV. 10000	**SPECIALTIES**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 10000										$0
DIV. 11000	**EQUIPMENT**										
	WRRF Pump Package	2	EA	$0.00	$6,250.00	$0.00	$50,000.00	$0.00	$56,250.00	$112,500	
	Land Application Pump Package	1	EA	$0.00	$10,625.00	$0.00	$85,000.00	$0.00	$95,625.00	$95,625	
	Flow Meter	1	EA	$0.00	$750.00	$0.00	$2,500.00	$0.00	$3,250.00	$3,250	
	TOTAL, DIVISION 11000										$208,125
DIV. 12000	**FURNISHINGS**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 12000										$0
DIV. 13000	**SPECIAL CONSTRUCTION**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 13000										$0
DIV. 14000	**CONVEYING EQUIPMENT**										
	Not Used	0	LS	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0	
	TOTAL, DIVISION 14000										$0
DIV. 15000	**MECHANICAL**										
	Yard Piping @ WRRF Wet Well	1	LS	$12,500.00	$9,375.00	$0.00	$6,250.00	$0.00	$28,125.00	$28,125	
	Yard Piping @ Land Application Wet Well	1	LS	$15,000.00	$11,250.00	$0.00	$7,500.00	$0.00	$33,750.00	$33,750	
	4" Force Main	3300	LF	$15.91	$21.10	$0.00	$10.89	$0.00	$47.90	$158,078	
	6" Land Application Distribution Main	7000	LF	$19.93	$15.97	$0.00	$7.46	$0.00	$43.35	$303,482	
	Land Application Irrigtaion Piping	1	LS	$130,128.29	$70,773.33	$0.00	$25,119.33	$0.00	$226,020.96	$226,021	
	Land Application Valving (Check & Isolation)	12	EA	$1,052.76	$789.57	$0.00	$368.47	$0.00	$2,210.80	$26,530	
	TOTAL, DIVISION 15000										$775,985
DIV. 16000	**ELECTRICAL**										
	Electrical WRRF Wet Well	1	LS	$0.00	$0.00	$63,139.00	$0.00	$0.00	$63,139.00	$63,139	
	Electrical Land Application Site	1	LS	$0.00	$0.00	$160,165.00	$0.00	$0.00	$160,165.00	$160,165	
	Electrical Service Drop	1	LS	$0.00	$0.00	$0.00	$0.00	$35,000.00	$35,000.00	$35,000	
	TOTAL, DIVISION 16000										$258,304
DIV. 17000	**INSTRUMENTATION & CONTROLS**										
	I & C Subcontract	1	LS	$0.00	$0.00	$89,321.60	$0.00	$0.00	$89,321.60	$89,322	
	TOTAL, DIVISION 17000										$89,322
	Subtotal Unit Cost										**$3,724,000**
	Mobilization and Demobilization (7.5%)										$279,300
	Contingency (20%)										$744,800
	Estimated Construction Subtotal										**$4,748,100**
	Engineering and Construction Observation (25%)										$1,187,025
	Administration and Legal (5%)										$237,405
	Estimated Total Project Cost										**$6,172,530**

The cost estimate herein is based on our perception of current conditions at the project location.This estimate reflects our professional opinion of accurate costs at this time and is subject to change as the project design matures. Mountain Waterworks has no control over variances in the cost of labor, materials, equipment, services provided by others, contractor's methods of determining prices, competitive bidding or market conditions, practices or bidding strategies. Mountain Waterworks cannot and does not warrant or guarantee that bids or actual construction costs will not vary from the costs presented herein.

Appendix N

Topographic Map of Project Boundary



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Mountain WATERWORKS
ENGINEERING AND ENVIRONMENTAL SOLUTIONS
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BOISE, IDAHO 83702
208.780.3990
IDAHO OFFICES
BOISE · LEWISTON · COEUR D'ALENE

CITY OF TROY

PROJECT BOUNDARY

PROJECT NO.: 170.0010.01

SHEET NO.

Appendix O

NRCS Soil Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Latah County, Idaho

March 7, 2017

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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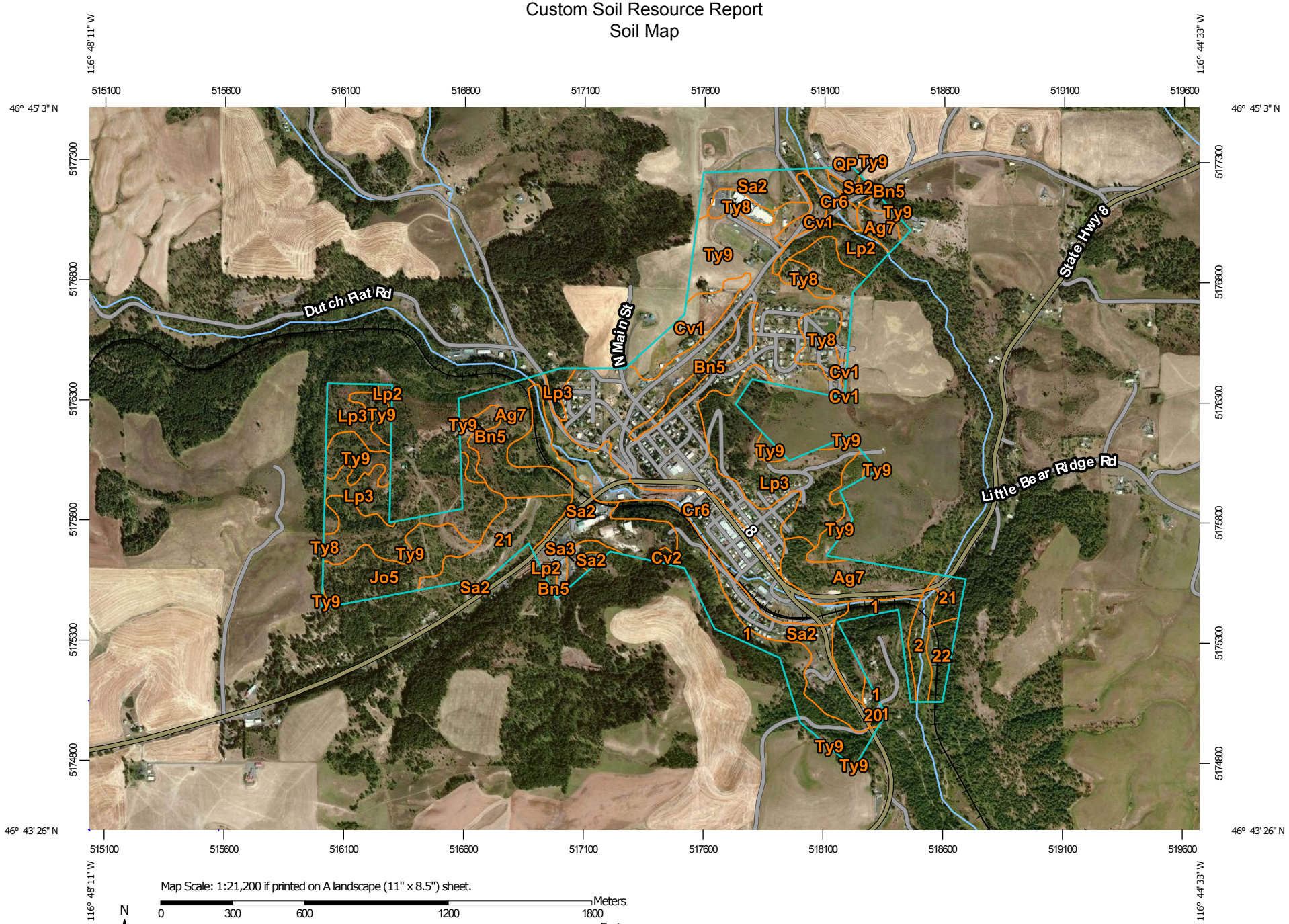
Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

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MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Latah County, Idaho
Survey Area Data: Version 4, Sep 7, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 3, 2010—Jul 5, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Latah County, Idaho (ID057)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
1	Agatha ashy silt loam, 35 to 65 percent slopes	50.9	7.6%
2	Aquic Xerofluvents, 0 to 3 percent slopes	8.2	1.2%
20	Klickson ashy silt loam, 25 to 35 percent slopes	2.5	0.4%
21	Klickson cobbly ashy loam, 35 to 65 percent slopes	29.2	4.4%
22	Klickson-Bluesprin complex, 35 to 65 percent slopes	7.2	1.1%
Ag7	Agatha-Cavendish complex, dry, 20 to 65 percent slopes	55.8	8.4%
Bn5	Sinkler-Santa complex, dry, 20 to 35 percent slopes	17.9	2.7%
Cr6	Crumarine ashy silt loam, 0 to 8 percent slopes	55.0	8.2%
Cv1	Cavendish, dry-Cavendish-Santa complex, 5 to 30 percent slopes	24.2	3.6%
Cv2	Agatha-Cavendish complex, 20 to 50 percent slopes	1.2	0.2%
Jo5	Joel silt loam, moist, 7 to 25 percent slopes	26.4	4.0%
Lp2	Longpen-Agatha-Carlinton complex, 5 to 35 percent slopes	12.8	1.9%
Lp3	Cavendish-Agatha-Sinkler complex, dry, 10 to 40 percent slopes	69.8	10.4%
QP	Pits, quarry	1.7	0.3%
Sa2	Santa ashy silt loam, 8 to 15 percent slopes	76.6	11.5%
Sa3	Santa-Sinkler complex, 20 to 40 percent slopes	3.9	0.6%
Ty8	Taney ashy silt loam, moist, 2 to 8 percent slopes	19.9	3.0%
Ty9	Taney ashy silt loam, moist, 8 to 25 percent slopes	205.6	30.7%
Totals for Area of Interest		**668.8**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas

shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Latah County, Idaho

1—Agatha ashy silt loam, 35 to 65 percent slopes

Map Unit Setting

National map unit symbol: 2ph5r
Elevation: 1,700 to 3,170 feet
Mean annual precipitation: 25 to 33 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Agatha and similar soils: 75 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Agatha

Setting

Landform: Canyons
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess and volcanic ash over colluvium over bedrock derived from basalt

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 4 inches: ashy silt loam
AB - 4 to 11 inches: gravelly ashy silt loam
Bt1 - 11 to 24 inches: very cobbly silt loam
Bt2 - 24 to 33 inches: very cobbly silty clay loam
BC - 33 to 44 inches: very cobbly silty clay loam
R - 44 to 60 inches: bedrock

Properties and qualities

Slope: 35 to 65 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Other vegetative classification: grand fir/ninebark (CN506)
Hydric soil rating: No

2—Aquic Xerofluvents, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2ph5s
Elevation: 1,000 to 2,800 feet
Mean annual precipitation: 14 to 28 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 110 to 150 days
Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season

Map Unit Composition

Aquic xerofluvents and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Aquic Xerofluvents

Setting

Landform: Flood plains, stream terraces
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

A - 0 to 7 inches: gravelly loam
C - 7 to 60 inches: stratified sand to very cobbly sandy loam

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water storage in profile: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Ecological site: DRY MEADOW (R009XY019ID)
Hydric soil rating: No

Minor Components

Aquents

Percent of map unit: 10 percent
Landform: Flood plains
Down-slope shape: Concave

Across-slope shape: Linear
Ecological site: MEADOW (R009XY018ID)
Hydric soil rating: Yes

20—Klickson ashy silt loam, 25 to 35 percent slopes

Map Unit Setting

National map unit symbol: 2ph6c
Elevation: 1,620 to 2,930 feet
Mean annual precipitation: 23 to 31 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Klickson and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Klickson

Setting

Landform: Canyons
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess and volcanic ash over colluvium derived from basalt

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 16 inches: ashy silt loam
Bt1 - 16 to 27 inches: cobbly loam
Bt2 - 27 to 61 inches: very gravelly loam

Properties and qualities

Slope: 25 to 35 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Other vegetative classification: Douglas-fir/ninebark (CN260)
Hydric soil rating: No

21—Klickson cobbly ashy loam, 35 to 65 percent slopes

Map Unit Setting

National map unit symbol: 2ph6d
Elevation: 1,160 to 2,890 feet
Mean annual precipitation: 21 to 29 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Klickson and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Klickson

Setting

Landform: Canyons
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess and volcanic ash over colluvium derived from basalt

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 12 inches: cobbly ashy loam
Bt - 12 to 61 inches: very gravelly loam

Properties and qualities

Slope: 35 to 65 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Other vegetative classification: Douglas-fir/ninebark (CN260)
Hydric soil rating: No

22—Klickson-Bluesprin complex, 35 to 65 percent slopes

Map Unit Setting

National map unit symbol: 2ph6f
Elevation: 1,200 to 2,880 feet
Mean annual precipitation: 21 to 31 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Klickson and similar soils: 55 percent
Bluesprin and similar soils: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Klickson

Setting

Landform: Canyons
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loess and volcanic ash over colluvium derived from basalt

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 12 inches: cobbly ashy loam
Bt - 12 to 61 inches: very gravelly loam

Properties and qualities

Slope: 35 to 65 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Other vegetative classification: Douglas-fir/ninebark (CN260)
Hydric soil rating: No

Description of Bluesprin

Setting

Landform: Canyons
Down-slope shape: Convex
Across-slope shape: Convex

Parent material: Loess over colluvium over bedrock derived from basalt and/or andesite

Typical profile

A - 0 to 11 inches: gravelly silt loam
Bt - 11 to 24 inches: very gravelly silty clay loam
R - 24 to 60 inches: bedrock

Properties and qualities

Slope: 35 to 65 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: SOUTH SLOPE LOAMY 16-22 - Provisional (R009XY004ID)
Hydric soil rating: No

Ag7—Agatha-Cavendish complex, dry, 20 to 65 percent slopes

Map Unit Setting

National map unit symbol: 2kr4n
Elevation: 2,380 to 3,170 feet
Mean annual precipitation: 27 to 33 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Agatha, dry, and similar soils: 60 percent
Cavendish, dry, and similar soils: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Agatha, Dry

Setting

Landform: Canyons
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess and volcanic ash over colluvium over bedrock derived from basalt

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 4 inches: ashy silt loam
AB - 4 to 11 inches: gravelly ashy silt loam
Bt1 - 11 to 24 inches: very cobbly silt loam
Bt2 - 24 to 33 inches: very cobbly silty clay loam
BC - 33 to 44 inches: very cobbly silty clay loam
R - 44 to 60 inches: bedrock

Properties and qualities

Slope: 20 to 65 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Other vegetative classification: Douglas-fir/ninebark (CN260)
Hydric soil rating: No

Description of Cavendish, Dry

Setting

Landform: Canyon walls
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loess over residuum weathered from basalt

Typical profile

A - 0 to 8 inches: ashy silt loam
Bt1 - 8 to 30 inches: silt loam
2Bt2 - 30 to 43 inches: gravelly silt loam
2Cr - 43 to 60 inches: bedrock

Properties and qualities

Slope: 20 to 65 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C

Other vegetative classification: Douglas-fir/ninebark (CN260)
Hydric soil rating: No

Bn5—Sinkler-Santa complex, dry, 20 to 35 percent slopes

Map Unit Setting

National map unit symbol: 2kr4l
Elevation: 2,210 to 3,540 feet
Mean annual precipitation: 25 to 39 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Sinkler, dry, and similar soils: 50 percent
Santa, dry, and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sinkler, Dry

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex, linear
Parent material: Loess and volcanic ash over silty alluvium

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 6 inches: ashy silt loam
Bw - 6 to 12 inches: ashy silt loam
EBt - 12 to 28 inches: silt loam
Btb - 28 to 51 inches: silt loam
Btxb - 51 to 60 inches: silty clay loam

Properties and qualities

Slope: 20 to 35 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C

Other vegetative classification: Douglas-fir/ninebark (CN260)
Hydric soil rating: No

Description of Santa, Dry

Setting
Landform: Interfluves, hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex, concave
Across-slope shape: Linear, convex
Parent material: Volcanic ash over loess

Typical profile
Ap - 0 to 8 inches: ashy silt loam
Bw - 8 to 19 inches: silt loam
E - 19 to 29 inches: silt loam
Btxb1 - 29 to 38 inches: silt loam
Btxb2 - 38 to 60 inches: silt loam

Properties and qualities
Slope: 20 to 35 percent
Depth to restrictive feature: 24 to 39 inches to fragipan
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 8 to 22 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.7 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C/D
Other vegetative classification: Douglas-fir/ninebark (CN260)
Hydric soil rating: No

Cr6—Crumarine ashy silt loam, 0 to 8 percent slopes

Map Unit Setting
National map unit symbol: 2mtvh
Elevation: 2,430 to 3,050 feet
Mean annual precipitation: 25 to 39 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 130 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Crumarine and similar soils: 85 percent
Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crumarine

Setting

Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

A - 0 to 7 inches: ashy silt loam
Bw - 7 to 24 inches: loam
BC - 24 to 47 inches: loam
C - 47 to 60 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 4 to 26 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water storage in profile: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C/D
Ecological site: DRY MEADOW (R009XY019ID)
Hydric soil rating: No

Minor Components

Porrett

Percent of map unit: 10 percent
Landform: Flood plains, terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: MEADOW (R009XY018ID)
Hydric soil rating: Yes

Aquandic endoaquepts

Percent of map unit: 5 percent
Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: MEADOW (R009XY018ID)
Hydric soil rating: Yes

Cv1—Cavendish, dry-Cavendish-Santa complex, 5 to 30 percent slopes

Map Unit Setting

National map unit symbol: 1ly2f
Elevation: 2,500 to 3,250 feet
Mean annual precipitation: 27 to 35 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Cavendish, dry, and similar soils: 40 percent
Santa and similar soils: 20 percent
Cavendish and similar soils: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cavendish, Dry

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over residuum weathered from basalt

Typical profile

A - 0 to 8 inches: ashy silt loam
Bt1 - 8 to 30 inches: silt loam
2Bt2 - 30 to 43 inches: gravelly silt loam
2Cr - 43 to 60 inches: bedrock

Properties and qualities

Slope: 5 to 30 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Other vegetative classification: Douglas-fir/ninebark (CN260)
Hydric soil rating: No

Description of Santa

Setting

Landform: Interfluves, hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex, concave
Across-slope shape: Linear, convex
Parent material: Volcanic ash over loess

Typical profile

Ap - 0 to 8 inches: ashy silt loam
Bw - 8 to 19 inches: silt loam
E - 19 to 29 inches: silt loam
Btxb1 - 29 to 38 inches: silt loam
Btxb2 - 38 to 60 inches: silt loam

Properties and qualities

Slope: 5 to 30 percent
Depth to restrictive feature: 24 to 39 inches to fragipan
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 8 to 22 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C/D
Other vegetative classification: grand fir/ninebark (CN506)
Hydric soil rating: No

Description of Cavendish

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over residuum weathered from basalt

Typical profile

A - 0 to 8 inches: ashy silt loam
Bt1 - 8 to 30 inches: silt loam
2Bt2 - 30 to 43 inches: gravelly silt loam
2Cr - 43 to 60 inches: bedrock

Properties and qualities

Slope: 5 to 30 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Other vegetative classification: grand fir/ninebark (CN506)
Hydric soil rating: No

Cv2—Agatha-Cavendish complex, 20 to 50 percent slopes

Map Unit Setting

National map unit symbol: 1tbkk
Elevation: 2,500 to 4,020 feet
Mean annual precipitation: 25 to 37 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Agatha and similar soils: 35 percent
Cavendish and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Agatha

Setting

Landform: Canyons
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess and volcanic ash over colluvium over bedrock derived from basalt

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 4 inches: ashy silt loam
AB - 4 to 11 inches: gravelly ashy silt loam
Bt1 - 11 to 24 inches: very cobbly silt loam
Bt2 - 24 to 33 inches: very cobbly silty clay loam
BC - 33 to 44 inches: very cobbly silty clay loam
R - 44 to 60 inches: bedrock

Properties and qualities

Slope: 20 to 50 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Natural drainage class: Well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Other vegetative classification: grand fir/ninebark (CN506)
Hydric soil rating: No

Description of Cavendish

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over residuum weathered from basalt

Typical profile

A - 0 to 8 inches: ashy silt loam
Bt1 - 8 to 30 inches: silt loam
2Bt2 - 30 to 43 inches: gravelly silt loam
2Cr - 43 to 60 inches: bedrock

Properties and qualities

Slope: 20 to 50 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Other vegetative classification: grand fir/ninebark (CN506)
Hydric soil rating: No

Jo5—Joel silt loam, moist, 7 to 25 percent slopes

Map Unit Setting

National map unit symbol: pn2m
Elevation: 2,480 to 3,500 feet
Mean annual precipitation: 25 to 37 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 130 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Joel, moist, and similar soils: 80 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Joel, Moist

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 16 inches: silt loam
BA - 16 to 27 inches: silt loam
B/E - 27 to 40 inches: silt loam
Btb - 40 to 61 inches: silty clay loam

Properties and qualities

Slope: 7 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Other vegetative classification: Douglas-fir/ninebark (CN260)
Hydric soil rating: No

Lp2—Longpen-Agatha-Carlinton complex, 5 to 35 percent slopes

Map Unit Setting

National map unit symbol: pmxm
Elevation: 2,010 to 3,170 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Longpen and similar soils: 45 percent
Agatha and similar soils: 20 percent
Carlinton and similar soils: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Longpen

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess and volcanic ash over colluvium derived from basalt

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A1 - 2 to 6 inches: ashy silt loam
A2 - 6 to 9 inches: ashy silt loam
Bt - 9 to 49 inches: silt loam
2Btb - 49 to 60 inches: silty clay loam

Properties and qualities

Slope: 5 to 35 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very high (about 12.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Other vegetative classification: grand fir/ninebark (CN506)
Hydric soil rating: No

Description of Agatha

Setting

Landform: Canyons
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess and volcanic ash over colluvium over bedrock derived from basalt

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 4 inches: ashy silt loam
AB - 4 to 11 inches: gravelly ashy silt loam
Bt1 - 11 to 24 inches: very cobbly silt loam
Bt2 - 24 to 33 inches: very cobbly silty clay loam
BC - 33 to 44 inches: very cobbly silty clay loam
R - 44 to 60 inches: bedrock

Properties and qualities

Slope: 5 to 35 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Other vegetative classification: grand fir/ninebark (CN506)
Hydric soil rating: No

Description of Carlinton

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear, convex
Parent material: Volcanic ash over loess

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 8 inches: ashy silt loam
Bw - 8 to 19 inches: silt loam
B/E - 19 to 31 inches: silt loam
E/B - 31 to 39 inches: silt loam
Btxb - 39 to 60 inches: silty clay loam

Properties and qualities

Slope: 5 to 35 percent

Depth to restrictive feature: 31 to 46 inches to fragipan
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 8 to 26 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Other vegetative classification: grand fir/ninebark (CN506)
Hydric soil rating: No

Lp3—Cavendish-Agatha-Sinkler complex, dry, 10 to 40 percent slopes

Map Unit Setting
National map unit symbol: 2kr4k
Elevation: 2,230 to 2,970 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition
Cavendish, dry, and similar soils: 40 percent
Agatha, dry, and similar soils: 35 percent
Sinkler, dry, and similar soils: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cavendish, Dry

Setting
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over residuum weathered from basalt

Typical profile
A - 0 to 8 inches: ashy silt loam
Bt1 - 8 to 30 inches: silt loam
2Bt2 - 30 to 43 inches: gravelly silt loam
2Cr - 43 to 60 inches: bedrock

Properties and qualities
Slope: 10 to 35 percent

Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 8.1 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Other vegetative classification: Douglas-fir/ninebark (CN260)
Hydric soil rating: No

Description of Agatha, Dry

Setting
Landform: Canyons
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loess and volcanic ash over colluvium over bedrock derived from basalt

Typical profile
Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 4 inches: ashy silt loam
AB - 4 to 11 inches: gravelly ashy silt loam
Bt1 - 11 to 24 inches: very cobbly silt loam
Bt2 - 24 to 33 inches: very cobbly silty clay loam
BC - 33 to 44 inches: very cobbly silty clay loam
R - 44 to 60 inches: bedrock

Properties and qualities
Slope: 20 to 40 percent
Depth to restrictive feature: 40 to 60 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.7 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Other vegetative classification: Douglas-fir/ninebark (CN260)
Hydric soil rating: No

Description of Sinkler, Dry

Setting
Landform: Hills

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex, linear
Parent material: Loess and volcanic ash over silty alluvium

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 6 inches: ashy silt loam
Bw - 6 to 12 inches: ashy silt loam
EBt - 12 to 28 inches: silt loam
Btb - 28 to 51 inches: silt loam
Btxb - 51 to 60 inches: silty clay loam

Properties and qualities

Slope: 10 to 35 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Other vegetative classification: Douglas-fir/ninebark (CN260)
Hydric soil rating: No

QP—Pits, quarry

Map Unit Composition

Pits, quarry: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pits, Quarry

Typical profile

R - 0 to 60 inches: bedrock

Properties and qualities

Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: Unranked

Sa2—Santa ashy silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2v71y
Elevation: 2,510 to 3,200 feet
Mean annual precipitation: 25 to 37 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 105 to 120 days
Farmland classification: Farmland of statewide importance, if drained

Map Unit Composition

Santa and similar soils: 80 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Santa

Setting

Landform: Interfluves, hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex, concave
Across-slope shape: Linear, convex
Parent material: Mixed volcanic ash and loess

Typical profile

Ap - 0 to 8 inches: ashy silt loam
Bw - 8 to 19 inches: silt loam
E - 19 to 29 inches: silt loam
Btxb1 - 29 to 38 inches: silt loam
Btxb2 - 38 to 59 inches: silt loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 24 to 39 inches to fragipan
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 8 to 22 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C/D
Other vegetative classification: grand fir/ninebark (CN506)
Hydric soil rating: No

Sa3—Santa-Sinkler complex, 20 to 40 percent slopes

Map Unit Setting

National map unit symbol: 1hktr
Elevation: 2,230 to 3,400 feet
Mean annual precipitation: 25 to 37 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

Santa and similar soils: 40 percent
Sinkler and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Santa

Setting

Landform: Interfluves, hillslopes
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex, concave
Across-slope shape: Linear, convex
Parent material: Volcanic ash over loess

Typical profile

Ap - 0 to 8 inches: ashy silt loam
Bw - 8 to 19 inches: silt loam
E - 19 to 29 inches: silt loam
Btxb1 - 29 to 38 inches: silt loam
Btxb2 - 38 to 60 inches: silt loam

Properties and qualities

Slope: 20 to 40 percent
Depth to restrictive feature: 24 to 39 inches to fragipan
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 8 to 22 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C/D
Other vegetative classification: grand fir/ninebark (CN506)
Hydric soil rating: No

Description of Sinkler

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex, linear
Parent material: Loess and volcanic ash over silty alluvium

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 6 inches: ashy silt loam
Bw - 6 to 12 inches: ashy silt loam
EBt - 12 to 28 inches: silt loam
Btb - 28 to 51 inches: silt loam
Btxb - 51 to 60 inches: silty clay loam

Properties and qualities

Slope: 20 to 40 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Other vegetative classification: grand fir/ninebark (CN506)
Hydric soil rating: No

Ty8—Taney ashy silt loam, moist, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 1ly2j
Elevation: 2,510 to 3,350 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 130 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Taney, moist, and similar soils: 80 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Taney, Moist

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear, convex
Parent material: Volcanic ash over loess

Typical profile

A - 0 to 10 inches: ashy silt loam
Bt - 10 to 30 inches: silt loam
E - 30 to 35 inches: silt loam
Btxb - 35 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 20 to 46 inches to fragipan
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Other vegetative classification: Douglas-fir/ninebark (CN260)
Hydric soil rating: No

Ty9—Taney ashy silt loam, moist, 8 to 25 percent slopes

Map Unit Setting

National map unit symbol: pnh8
Elevation: 1,880 to 3,500 feet
Mean annual precipitation: 25 to 37 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 95 to 130 days
Farmland classification: Farmland of statewide importance, if drained

Map Unit Composition

Taney, moist, and similar soils: 75 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Taney, Moist

Setting

Landform: Hillslopes

Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Concave
Across-slope shape: Linear, convex
Parent material: Volcanic ash over loess

Typical profile

A - 0 to 10 inches: ashy silt loam
Bt - 10 to 30 inches: silt loam
E - 30 to 35 inches: silt loam
Btxb - 35 to 60 inches: silty clay loam

Properties and qualities

Slope: 8 to 25 percent
Depth to restrictive feature: 20 to 46 inches to fragipan
Natural drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Other vegetative classification: Douglas-fir/ninebark (CN260)
Hydric soil rating: No

Soil Information for All Uses

Suitabilities and Limitations for Use

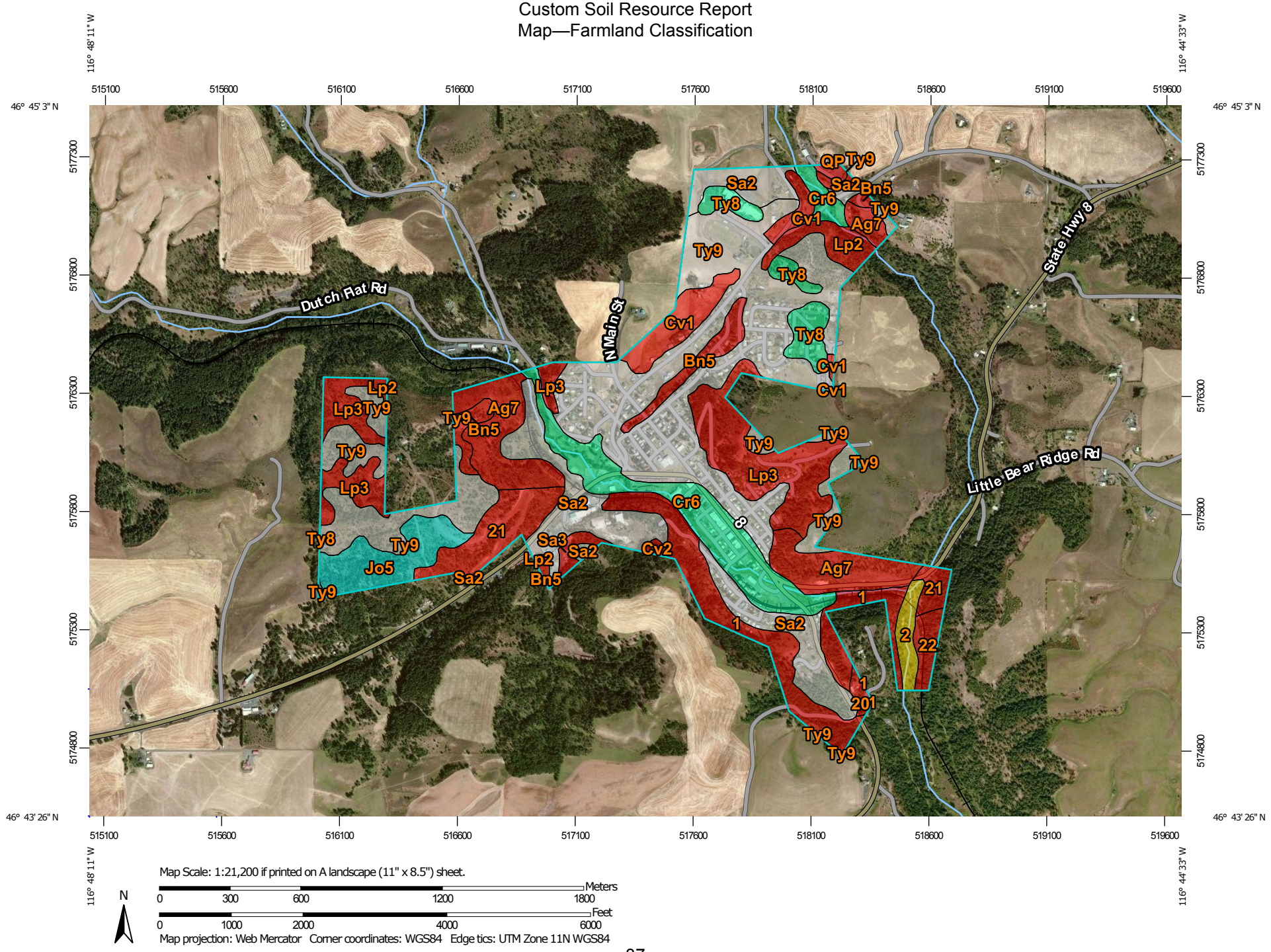
The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Land Classifications

Land Classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Farmland Classification

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.



Map Scale: 1:21,200 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 300 600 1200 1800

Feet
0 1000 2000 4000 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Points

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Water Features

MAP INFORMATION

Streams and Canals

Transportation


Rails


Interstate Highways


US Routes

Major Roads

Local Roads

Background


Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Latah County, Idaho
Survey Area Data: Version 4, Sep 7, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 3, 2010—Jul 5, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Farmland Classification

Farmland Classification— Summary by Map Unit — Latah County, Idaho (ID057)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
1	Agatha ashy silt loam, 35 to 65 percent slopes	Not prime farmland	50.9	7.6%
2	Aquic Xerofluvents, 0 to 3 percent slopes	Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	8.2	1.2%
20	Klickson ashy silt loam, 25 to 35 percent slopes	Not prime farmland	2.5	0.4%
21	Klickson cobbly ashy loam, 35 to 65 percent slopes	Not prime farmland	29.2	4.4%
22	Klickson-Bluesprin complex, 35 to 65 percent slopes	Not prime farmland	7.2	1.1%
Ag7	Agatha-Cavendish complex, dry, 20 to 65 percent slopes	Not prime farmland	55.8	8.4%
Bn5	Sinkler-Santa complex, dry, 20 to 35 percent slopes	Not prime farmland	17.9	2.7%
Cr6	Crumarine ashy silt loam, 0 to 8 percent slopes	Prime farmland if drained	55.0	8.2%
Cv1	Cavendish, dry-Cavendish-Santa complex, 5 to 30 percent slopes	Not prime farmland	24.2	3.6%
Cv2	Agatha-Cavendish complex, 20 to 50 percent slopes	Not prime farmland	1.2	0.2%
Jo5	Joel silt loam, moist, 7 to 25 percent slopes	Farmland of statewide importance	26.4	4.0%
Lp2	Longpen-Agatha-Carlinton complex, 5 to 35 percent slopes	Not prime farmland	12.8	1.9%
Lp3	Cavendish-Agatha-Sinkler complex, dry, 10 to 40 percent slopes	Not prime farmland	69.8	10.4%
QP	Pits, quarry	Not prime farmland	1.7	0.3%
Sa2	Santa ashy silt loam, 8 to 15 percent slopes	Farmland of statewide importance, if drained	76.6	11.5%
Sa3	Santa-Sinkler complex, 20 to 40 percent slopes	Not prime farmland	3.9	0.6%

Farmland Classification— Summary by Map Unit — Latah County, Idaho (ID057)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Ty8	Taney ashy silt loam, moist, 2 to 8 percent slopes	Prime farmland if drained	19.9	3.0%
Ty9	Taney ashy silt loam, moist, 8 to 25 percent slopes	Farmland of statewide importance, if drained	205.6	30.7%
Totals for Area of Interest			**668.8**	**100.0%**

Rating Options—Farmland Classification

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Appendix P

Well Drillers' Report

USE TYPEWRITER OR BALL POINT PEN

POSTED

State of Idaho
Department of Water Administration

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Administration within 30 days after the completion or abandonment of the well.

RECEIVED SEP 25 1923 Department of Water Administration

1. WELL OWNER

Name City of Troy

Address

Owner's Permit No. 86-73-N-27

2. NATURE OF WORK

☑ New well ☐ Deepened ☐ Replacement

☐ Abandoned (describe method of abandoning)

3. PROPOSED USE

☐ Domestic ☐ Irrigation ☐ Test

☑ Municipal ☐ Industrial ☐ Stock

4. METHOD DRILLED

☐ Cable ☑ Rotory ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Diameter of hole 10 & 8 inches Total depth 250 feet

Casing schedule: ☑ Steel & PLASTIC ☐ Concrete

Thickness	Diameter	From	To
.250 inches	10 inches	+ 1 feet	20 feet
.250 inches	8 inches	+1 feet	250 feet
____ inches	____ inches	____ feet	____ feet
____ inches	____ inches	____ feet	____ feet
____ inches	____ inches	____ feet	____ feet

Was a packer or seal used? ☑ Yes ☐ No

Perforated? ☑ Yes ☐ No ☑ Drill

How perforated? ☐ Factory ☐ Knife ☐ Torch

Size of perforation 3/16 inches by ____ inches holes

Number		From	To
19,280	perforations	44 feet	250 feet
____	perforations	____ feet	____ feet
____	perforations	____ feet	____ feet

Well screen installed? ☐ Yes ☑ No

Manufacturer's name

Type Model No.

Diameter ___ Slot size ___ Set from ____ feet to ____ feet

Diameter ___ Slot size ___ Set from ____ feet to ____ feet

Gravel packed? ☐ Yes ☑ No Size of gravel

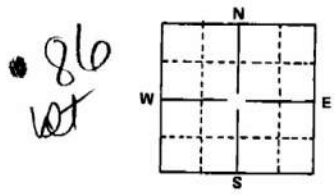
Placed from feet to feet

Surface seal? ☑ Yes ☐ No To what depth 40 feet

Material used in seal ☑ Cement grout ☐ Puddling clay

6. LOCATION OF WELL

Sketch map location must agree with written location.



County LATAH

¼ ¼ Sec. 6, T. 39 N., R. 3 W.

Gov. Lot 6

7. WATER LEVEL

Static water level 48 feet below land surface

Flowing? ☐ Yes ☐ No G.P.M. flow

Temperature ° F. Quality

Artesian closed-in pressure p.s.i.

Controlled by ☐ Valve ☐ Cap ☐ Plug

8. WELL TEST DATA

☐ Pump ☐ Bailer ☐ Other

Discharge G.P.M.	Draw Down	Hours Pumped
150	AIR TEST	

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
10	0	15	CLAY		✓
8	15	40	BASALT		✓
8	40	43	SAND - LARGE		✓
8	43	44	TAN CLAY		✓
8	44	63	BROWN CLAY		✓
8	63	76	CLAY / BASALT	✓	
8	76	78	BASALT		✓
8	78	87	CLAY/BASALT		✓
8	87	207	VERY HARD BASALT		✓
8	207	209	SAND - FINE	✓	
8	209	212	BROWN CLAY		✓
8	212	250	HARD BROWN CLAY		✓

10.

Work started 8-17-23 finished 8-27-23

11. DRILLER'S CERTIFICATION

This well was drilled under my supervision and this report is true to the best of my knowledge.

Adcock Drilling 115
Driller's or Firm's Name Number

Lewiston
Address

Ted Albright 9-15-23
Signed By Date

USE ADDITIONAL SHEETS IF NECESSARY

FORWARD THE WHITE, BLUE, AND PINK COPIES TO THE DEPARTMENT

Form 238-7
8/90

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

RECEIVED MAR 24 1993
Department of Water Resources

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

ENT'D

1. WELL OWNER

Name City of Troy

Address P.O. Box 460 Troy, ID 83871-0460

Drilling Permit No. 86-92-N-67-000

Water Right Permit No. 86-07317

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Well diameter increase
☐ Abandoned (describe abandonment procedures such as materials, plug depths, etc. in lithologic log)

3. PROPOSED USE

☐ Domestic ☐ Irrigation ☐ Test ☒ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

4. METHOD DRILLED

☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.25 inches	10 inches +	5 feet	515 feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

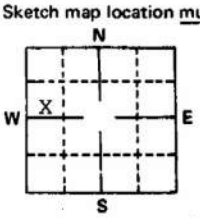
Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☒ Yes ☐ No
Perforated? ☒ Yes ☐ No
How perforated? ☐ Factory ☐ Knife ☒ Torch ☐ Gun
Size of perforation 1/4 inches by 6 inches

Number		From	To
40	perforations	495 feet	515 feet
_____	perforations	_____ feet	_____ feet
_____	perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ___ Slot size ___ Set from _____ feet to _____ feet
Diameter ___ Slot size ___ Set from _____ feet to _____ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 75 Material used in seal: ☐ Cement grout
☒ Bentonite ☐ Puddling clay ☐ _____
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing
☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld
☐ Cemented between strata
Describe access port _____

6. LOCATION OF WELL

Sketch map location must agree with written location.



Subdivision Name _____
Duthie City Park
Lot No. _____ Block No. _____

County Latah

SW ¼ NW ¼ Sec. 7, T. 39 N ☒ S ☐ R. 3 E ☐ W ☒

7. WATER LEVEL

Static water level 60 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow 125+
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature _____ °F. Quality _____
Describe artesian or temperature zones below.

8. WELL TEST DATA

☒ Pump ☐ Bailer ☐ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
170	447	20

9. LITHOLOGIC LOG

104721

Bore Diam.	Depth From	Depth To	Material	Water Yes	Water No
16"	0	5	Top soil brown		
16"	5	30	Clay/some gravels brown		
16"	30	58	Clay red		
12"	58	118	Basalt w/clay seams	X	
12"	118	156	Basalt black and red medium	X	
12"	156	175	Clay red and brown		
12"	175	320	Basalt red and black		
12"	320	493	Basalt black and red hard		
12"	493	515	Fractured basalt	X	
			Mechanical formation packer installed at 75'		

RECEIVED
FEB 26 1993
NORTHERN REGION
IDWR

FILMED
1993

10.

Work started 12-14-92 finished 1-27-93

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Ponderosa Drilling Firm No. 228

Address E. 6010 Broadway Date 2-18-93
Spokane, WA 99212

Signed by (Firm Official) W. Scott Barratt
(W. Scott Barratt)

and

(Operator) Marty Rugo
(Marty Rugo)

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Corrected 12-26-07

Form 238-7
6/02

IDAHO DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

Office Use Only
Well ID No. _____
Inspected by _____
Twp____ Rge____ Sec____
____1/4 ____1/4 ____1/4
Lat: : : Long: : :

1. WELL TAG NO. D D00 51986
DRILLING PERMIT NO. -- 846982
Water Right or Injection Well No. --

ENTERED

2. OWNER
Name CITY OF TROY
Address PO BOX 595 **CORRECTED REPORT**
City TROY State ID Zip 83871

3. LOCATION OF WELL by legal description:
You must provide address or Lot, Blk, Sub. or Directions to well.
Twp. 39 North ☒ or South ☐
Rge. 03 East ☐ or West ☒
Sec. 7 SE 1/4 (10 acres) SW 1/4 (40 acres) NW 1/4 (160 acres)
Gov't Lot -- County LATAH
Lat: : : Long: : :
Address of Well Site HWY 8 5 MI E OF CITY LIMITS
City TROY
(Give at least name of road + Distance to Road or Landmark)
Lt. -- Blk. -- Sub. Name --

4. USE:
☐ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☒ Other Test

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other

6. DRILL METHOD:
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other

7. SEALING PROCEDURES

Seal Material	From	To	Weight / Volume		Seal Placement Method
BENTONITE	0	-18	350	350	TOP POUR

Was drive shoe used? ☒ Y ☐ N Shoe Depth(s) -18
Was drive shoe seal tested? ☒ Y ☐ N How? AIR

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6"	+2	18	.250	Steel	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe N/A Length of Tailpipe N/A
Packer ☐ Y ☒ N Type N/A

9. PERFORATIONS/SCREENS PACKER TYPE
Perforation Method SAW
Screen Type & Method of Installation N/A

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. FILTER PACK

Filter Material	From	To	Weight/Volume	Placement Method
N/A				

11. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
2 ft. below ground Artesian pressure -- lb.
Depth flow encountered -- ft. Describe access port or control devices: --
TOP OF CASING

12. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
50+			1.5

Water Temp. 55 Bottom hole temp. _____
Water Quality test or comments: GOOD
Depth first Water Encounter 505

13. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
10	0	7	DIRT, BOULDERS		X
10	7	95	HARD BASALT		X
6	95	120	CLAY		X
6	120	133	SOFT BASALT		X
6	133	205	CLAY		X
6	205	224	MED BASALT		X
6	224	243	RED / GRAY SOFT BASALT		X
6	243	258	BLACK BASALT		X
6	258	275	SOFT RED / GRAY BASALT		X
6	275	240	SOFT & HARD GRAY BASALT		X
6	240	451	SOFT GRAY SHALE		X
6	451	505	MED HARD BASALT		X
6	505	510	SOFT BASALT	X	

RECEIVED
NOV 28 2007
IDWR/North
RECEIVED
DEC 27 2007
IDWR/North
RETURNED
12/18/07

Completed Depth 510 (Measurable)
Date: Started 5-31-07 Completed 5-31-07

14. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.
Company Name TWO U DRILLING, LLC Firm No. 125
Principal Driller TU Date 11-19-07
and
Driller or Operator II _____ Date _____
Operator I WU Date 11-19-07
Principal Driller and Rig Operator *Required.*
Operator I must have signature of Driller/Operator II.

39N 3W 7

FORWARD COPY TO WATER RESOURCES

11-19-07

Dr. Dale R. Ralston, P.E., P.G.
Consultant in Hydrology
821 Indian Hills Drive
Moscow, Idaho 83843

EVALUATION OF POTENTIAL WELL SITES

FOR

TROY, IDAHO

March, 1987

INTRODUCTION

The purpose of this report is to provide information to guide the location of a new municipal water well for the City of Troy, Idaho. The city needs an additional 150 to 200 gallons per minute (gpm) to augment the pumpage from the existing well and the pipeline to the reservoir on Moscow Mountain.

The analysis of alternative well sites is based upon an evaluation of the geology in the area, a geophysical survey to determine the thickness of basalts in three different locations near Troy, an evaluation of drillers logs for wells drilled in and around Troy, and a general knowledge of ground water occurrence, movement and well yields from basalt systems.

HYDROGEOLOGY

The City of Troy is located near the margin of the Columbia River Basalts as they lap up upon the granitic rocks that make-up the Moscow Mountain Complex (figure 1). Extensive clay deposits are often found near the margins of the basalts. Basalt, clay and granite make-up the geologic framework of the Troy area. The contact between the basalt and the granite is shown on figure 1.

The water yielding characteristics of the different rock types that occur in the Troy area are well understood. A number of very successful municipal wells have been located in the Columbia River Basalts. The most productive well in the immediate area is a Moscow City well at 2,500 gpm and a University of Idaho well at approximately 2,000 gpm. The existing City of Troy well #2 produces about 150 gpm from basalt and sand. Well yields from granites generally are several orders of magnitude

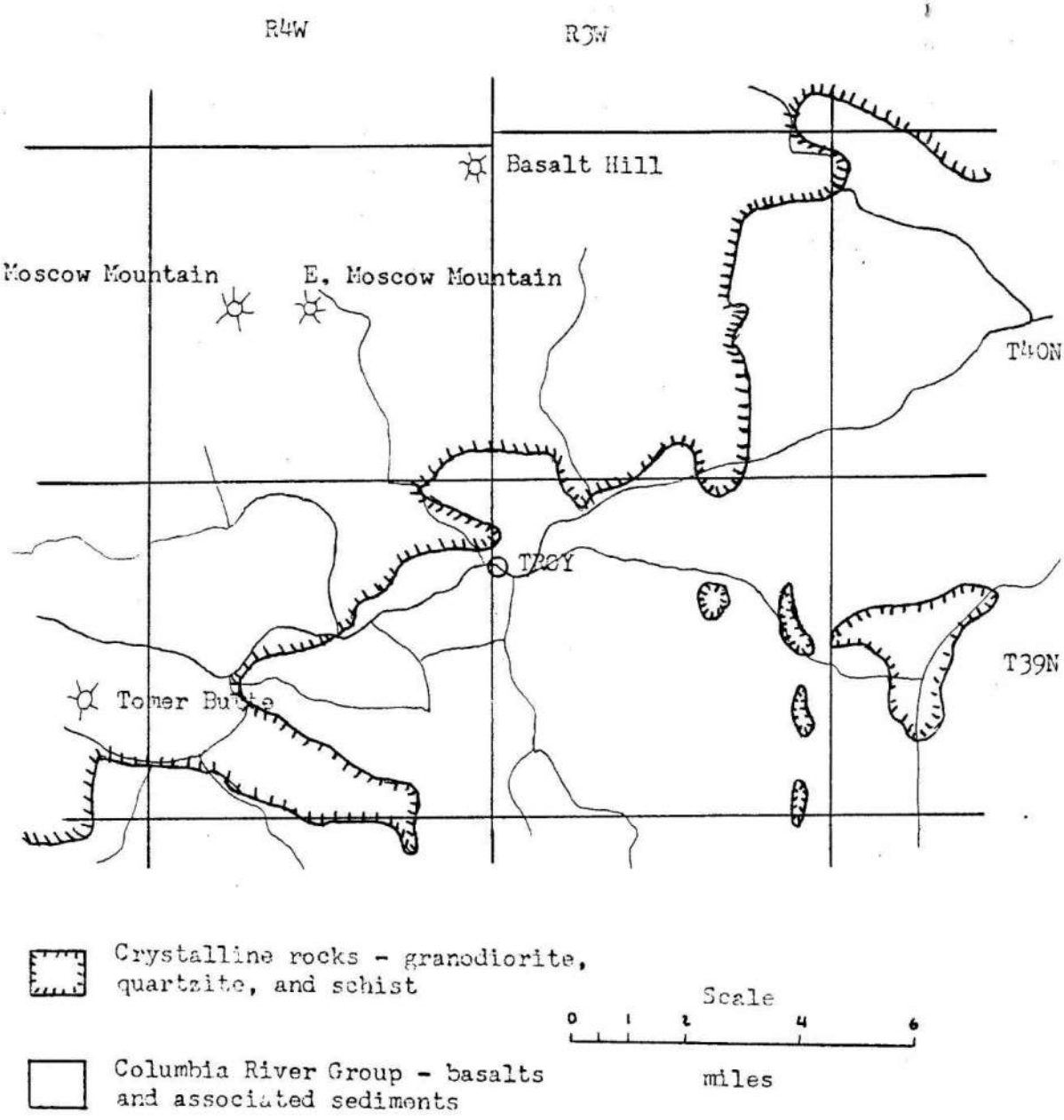


Figure 1. Geologic Map of the Troy Area (after Tullis, 1944).

lower than from basalt. Most domestic wells in granite yield less than 3 gpm. A few more productive wells in granite have been developed for subdivisions and yield as much as 50 gpm. Wells constructed into clays along the margin of the Columbia River Basalts are generally considered failures. Well yields typically are less than 2 gpm and produce water that remains cloudy for a long period of time. Based on this information, the logical target for well development for the City of Troy is basalt of the Columbia River Group. This suggests then that a new city well should be located within that area shown on figure 1 as underlain by basalt.

The Columbia River Basalts present in the Troy area originated from vents located near the area where the states of Oregon, Washington, and Idaho join. The basalt flowed into the area and covered an ancestral topography composed of granitic rocks. Thus the thickness of the basalts near the granite contact vary based upon ancestral topography. It is important when siting a new basalt well that the drilling site be one where a considerable thickness of basalt is present. A geophysical survey was run in the Troy area to evaluate the thickness of basalts at three potential well sites.

An earth resistivity method was applied to estimate the thickness of the basalts. The technique is well established in the literature and has been used at a number of sites throughout the Pacific Northwest. The work was done by a University of Idaho geophysical team led by Dr. Kenneth Sprenke, Assistant Professor of Geophysics at the University of Idaho. Geophysical sounding sites are shown on figure 2. These are potential well sites as identified by Jack Hammond based on access to existing piping systems and land availability. The results of the geophysical survey suggest that the basalt is approxiamtely 450 feet thick under site A and greater than

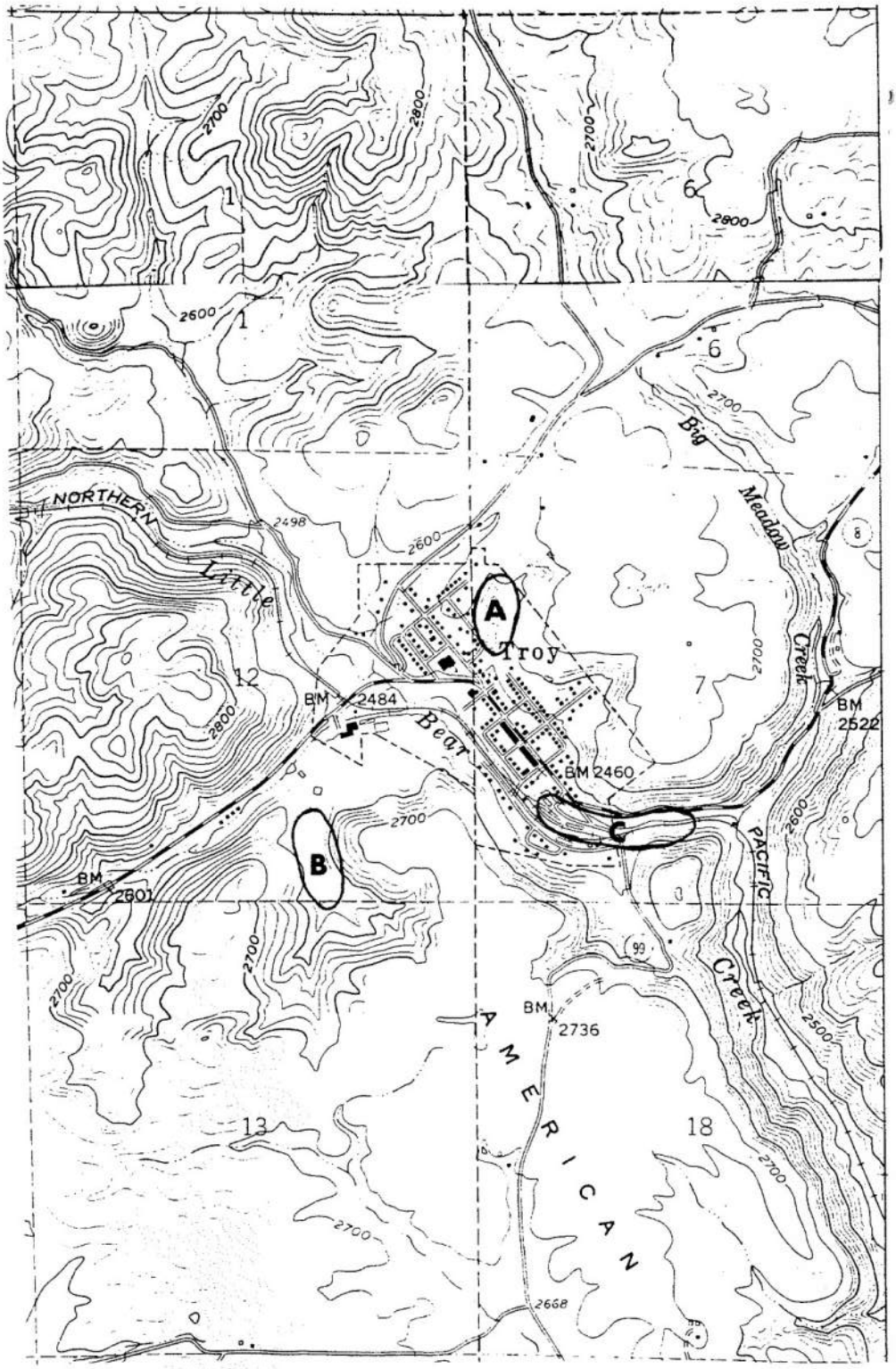


Figure 2. Potential Well Construction and Geophysical Study Sites.

600 feet thick under sites B and C. The 600-foot maximum depth is the limitation of the depth of sounding available using the geophysical tool configuration applied to the site. Interpretation of the geophysical responses is based upon the different electrical resistivity characteristics of basalt, clay and granite, and is both quantitative and qualitative. As such, the survey results should be used as a guide rather than an exact predictive technique. However, the geophysical survey suggests that significant thicknesses of basalt exist at all three of the potential drilling sites.

EXISTING WELL DATA

Data from existing water wells provide an important source of information for construction of a new city well for Troy. Information on individual wells in the area is presented in table 1. Well locations are shown on figure 3. Most of the wells obtain water primarily from basalts. The log of the City of Troy well #2 indicates that water was obtained from basalt and sand at depths of about 63 to 76 and 207 to 209 feet. This is the most productive well in the area. All of the other wells were constructed for domestic purposes and thus yield small quantities of water. They do, however, suggest that there are a number of productive zones within the basalt in the immediate vicinity of the City of Troy.

EVALUATION OF WELL POTENTIAL

The three potential well sites shown on figure 2 (sites A, B and C) all have sufficient thicknesses of basalt to have high potential for well development. Existing wells are not close enough or deep enough with

Table 1. Summary of Well Data Near Troy, Idaho

Well Number	Listed Owner	Location	Depth (feet)	Depth to Water (feet)	Yield (gallons per min)	Aquifer	Summary of Log (feet)
1	Stosveck	39N/4W 12 NW-NE	79	20	10	Granite	0- 20 Soil 20- 79 Granite
2	McGahan	39N/4W 12 SE-NW	129	18	not given	Basalt	0- 9 Soil 9-122 Basalt Water at 112-115 and 126-127
3	Begoine	39N/4W 12 SE-NW	109	60	40	Basalt	0- 9 Soil 9-109 Basalt Water at 98-109
4	Carlson	39N/4W 13 NW-NW	115	42	8	Clay	0- 18 Clay 18- 96 Basalt 96-107 Clay 107-115 Clay Water at 96-109
5	Schumacker	39N/4W 13 SE-SE	217	37	25	Basalt and sand	0- 64 Clay 64- 78 Clay and basalt 78-205 Basalt 205-212 Sand 212-217 Clay Water at 180-186 and 205-212
6	Gash	39N/3W 6 NE-SW	201	60	11	Granite	0- 10 Clay 10- 68 Basalt 68-201 Granite Water at 180-201
7	Troy #2	39N/3W Gov. Lot #6	250	48	150	Basalt and sand	0- 15 Clay 15- 40 Basalt 40- 63 Sand and clay 63- 87 Basalt and clay 87-207 Basalt 207-209 Sand 209-250 Clay Water at 63-76 and 207-209
8	Troy #1	39N/3W Gov. Lot #6	400	62	25	Basalt	0- 17 Soil 17-112 Basalt 112-124 Clay 124-155 Basalt 155-265 Clay 265-335 Basalt 335-339 Clay 339-370 Basalt 370-400 Clay Water at 150-155 and 265-305
9	Winlinger	39N/3W 6 SW-SW	107	35	18	Basalt	0- 9 Clay 9- 87 Clay and basalt 87-107 Basalt Water at 87-107
10	Johnson	39N/3W 7 NE-SE	260	160	40	Basalt	0- 96 Clay 96-260 Basalt Water at 98-260
11	Dimmick	39N/3W 7 SE-SW	25	8	Unknown	Unknown	Hand dug about 60 years ago
12	Sanquist	39N/3W 18 NE-NW	@150	Unknown	Unknown	Unknown	No log available
13	Turner	39N/3W 18 SW-NW	@165	Unknown	@30	Unknown	No log available
14	Johnston	39N/3W 18 SE-SW	46	5	30	Basalt	0- 28 Clay 28- 46 Basalt Water at 35-41

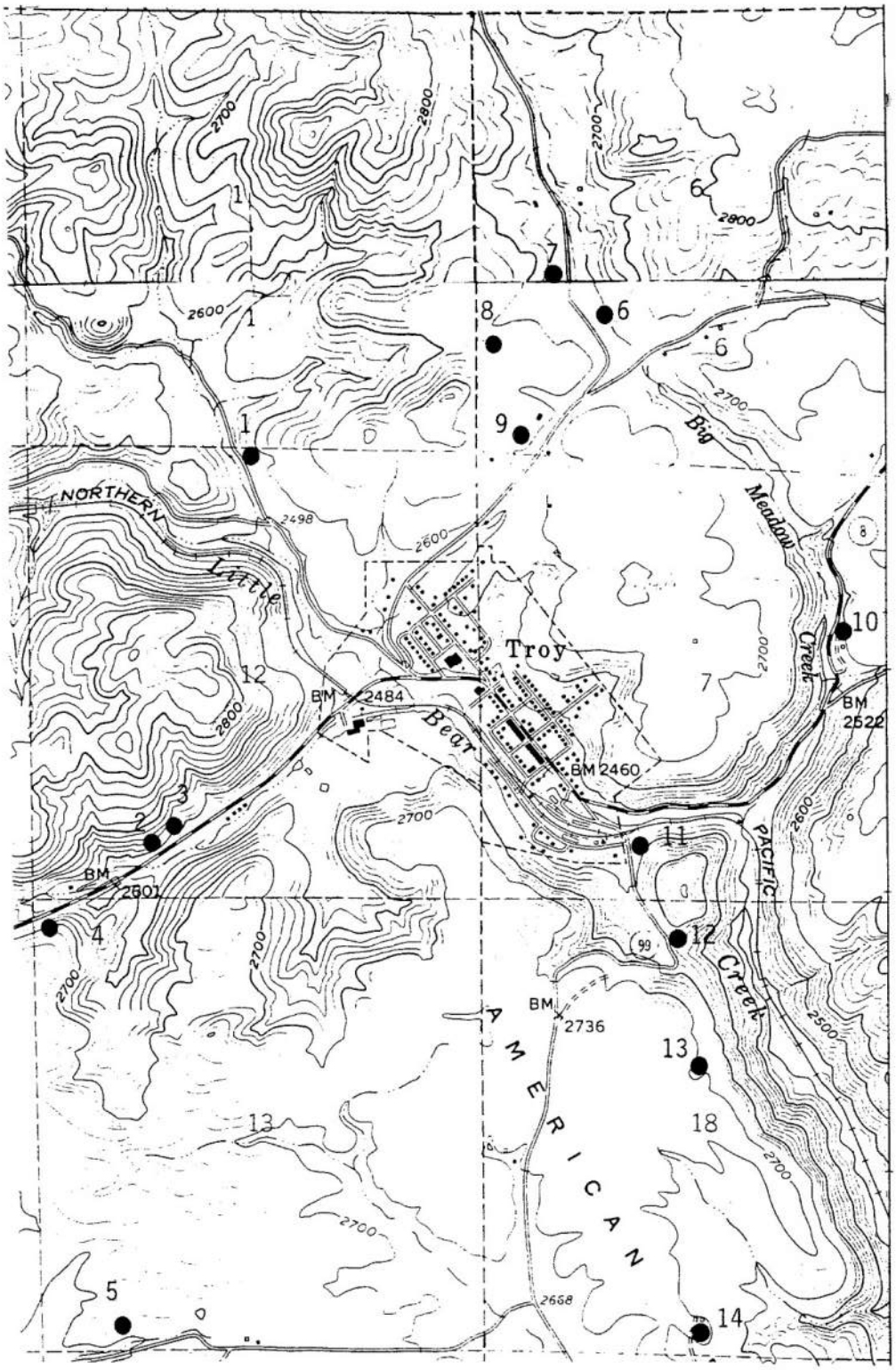


Figure 3. Location of Wells in the Vicinity of Troy, Idaho.

respect to the three target sites to provide a definitive basis for selecting a preferred well site.

The criteria for selection of a preferred well site include the following: 1) the thickness of basalt, 2) the depth to water in a completed well, 3) proximity to the existing water distribution system and 4) land ownership. The first two factors are evaluated in this report with respect to the three sites. Sites B and C have greater basalt thicknesses based on the results of the geophysical survey. Site C should have about 100 feet less depth to water than either site A or site B based on land surface elevation. A deep well (greater than 300 feet) might flow at land surface at site C. The land surface elevation difference might also translate to less required well depth at site C than A or B. Questions with respect to proximity to the water distribution network and land ownership must be posed and answered by city officials.

CONCLUSIONS

Potential well sites A, B and C all have sufficient thicknesses of basalt to be viable well sites for the new Troy City Well. Sites B and C are preferred because of geophysical indications of greater basalt thicknesses. Site C is preferred over site B because of land surface elevation. The lower elevation in the valley would result in the water level being nearer land surface (possibly flowing) and possibly less well depth.

The basalt underlying sites A, B and C is untested with respect to well development. Therefore, considerable uncertainty remains with respect to the potential for the development of the desired yield. Construction of a well at site C (first choice) or site B (second choice) should optimize the chances of successful well development.

REFERENCES

Sylvester, K.A., 1974, Ground Water in the Troy Area, Latah County, Idaho: Directed Study, University of Idaho, 37 p.

Tullis, E.L., 1944, Contributions to the Geology of Latah County, Idaho: Geological Society of America Bulletin, vol. 55, p. 131-164.

Appendix Q

USPWS IPaC Trust Report

IPaC **U.S. Fish & Wildlife Service**

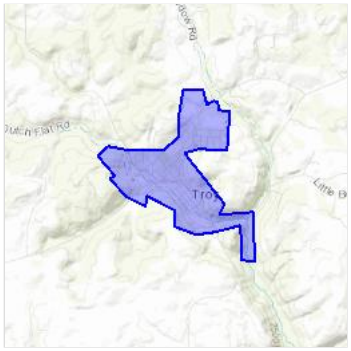
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Latah County, Idaho



Local office

Idaho Fish And Wildlife Office

(208) 378-5243
(208) 378-5262

1387 South Vinnell Way, Suite 368
Boise, ID 83709-1657

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.

The following species are potentially affected by activities in this location:

Flowering Plants

NAME	STATUS
Spalding's Catchfly Silene spaldingii No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/3681	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see maps of where birders and the general public have sighted birds in and around your project area, visit E-bird tools such as the E-bird data mapping tool (search for the name of a bird on your list to see specific locations where that bird has been reported to occur within your project area over a certain timeframe) and the E-bird Explore Data Tool (perform a query to see a list of all birds sighted in your county or region and within a certain timeframe). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Bald Eagle *Haliaeetus leucocephalus** This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Black Swift *Cypseloides niger** This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/8878	Breeds Jun 15 to Sep 10
Brewer's Sparrow *Spizella breweri** This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9291	Breeds May 15 to Aug 10
Clark's Grebe *Aechmophorus clarkii** This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jan 1 to Dec 31
Golden Eagle *Aquila chrysaetos** This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/1680	Breeds Dec 1 to Aug 31
Lesser Yellowlegs *Tringa flavipes** This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Lewis's Woodpecker *Melanerpes lewis** This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9408	Breeds Apr 20 to Sep 30
Long-billed Curlew *Numenius americanus** This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/5511	Breeds Apr 1 to Jul 31
Marbled Godwit *Limosa fedoa** This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9481	Breeds elsewhere
Olive-sided Flycatcher *Contopus cooperi** This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31

Sage Thrasher Oreoscoptes montanus — Breeds Apr 15 to Aug 10
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9433

White Headed Woodpecker Picoides albolarvatus — Breeds May 1 to Aug 15
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9411

Willet Tringa semipalmata — Breeds Apr 20 to Aug 5
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Williamson's Sapsucker Sphyrapicus thyroideus — Breeds May 1 to Jul 31
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/8832

Willow Flycatcher Empidonax traillii — Breeds May 20 to Aug 31
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/3482

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in your project's counties during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the counties of your project area. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

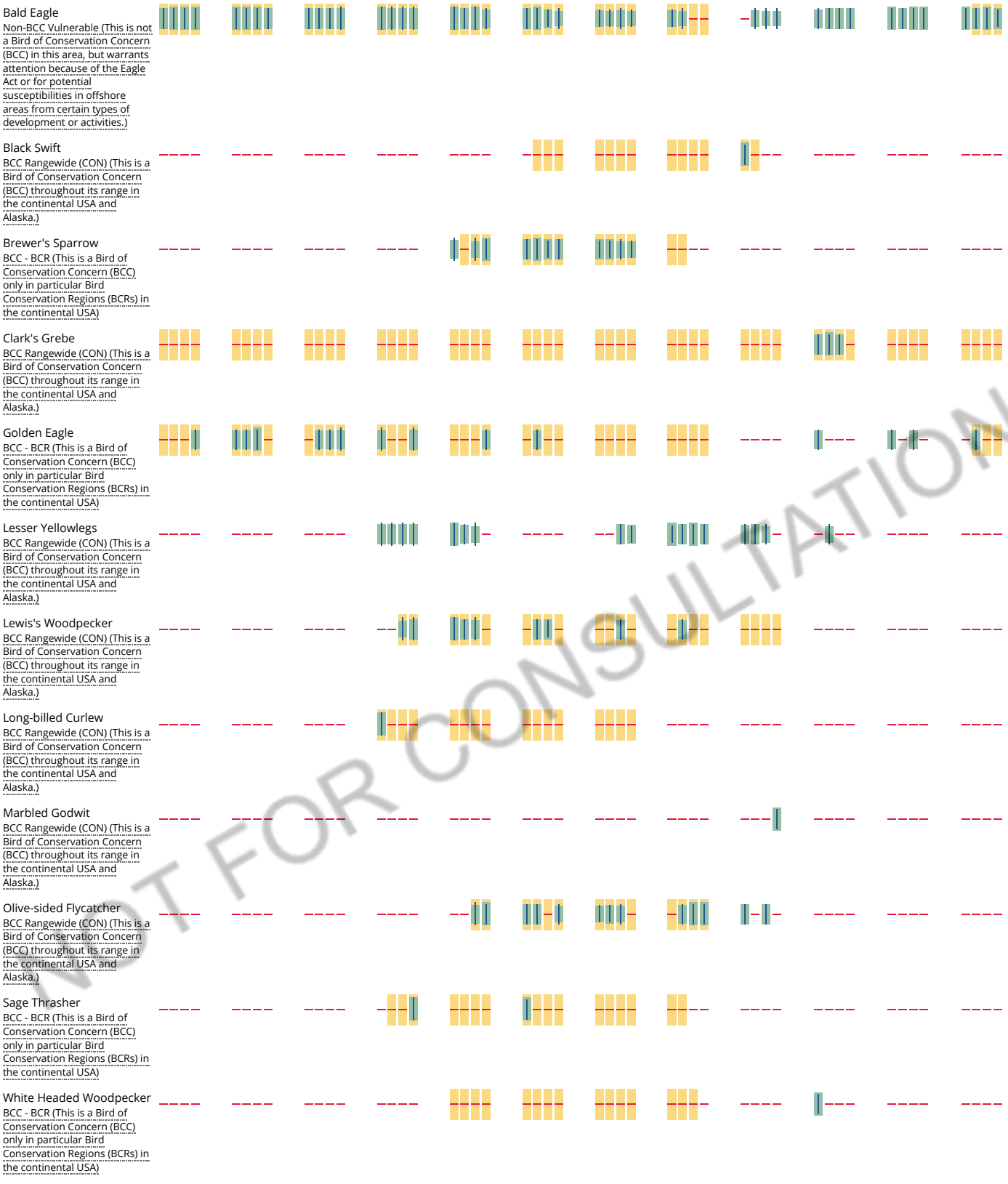
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information.

probability of presence ■ breeding season ■ survey effort | no data

SPECIES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC



Willow Flycatcher
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the counties which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the E-bird Explore Data Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird entry on your migratory bird species list indicates a breeding season, it is probable that the bird breeds in your project's counties at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the BGEPA should such impacts occur.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

This location overlaps the following wetlands:

FRESHWATER FORESTED/SHRUB WETLAND
PSS1A

FRESHWATER POND
PUBHx

RIVERINE
R3UBH

A full description for each wetland code can be found at the National Wetlands Inventory website: https://ecos.fws.gov/ipac/wetlands/decoder

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

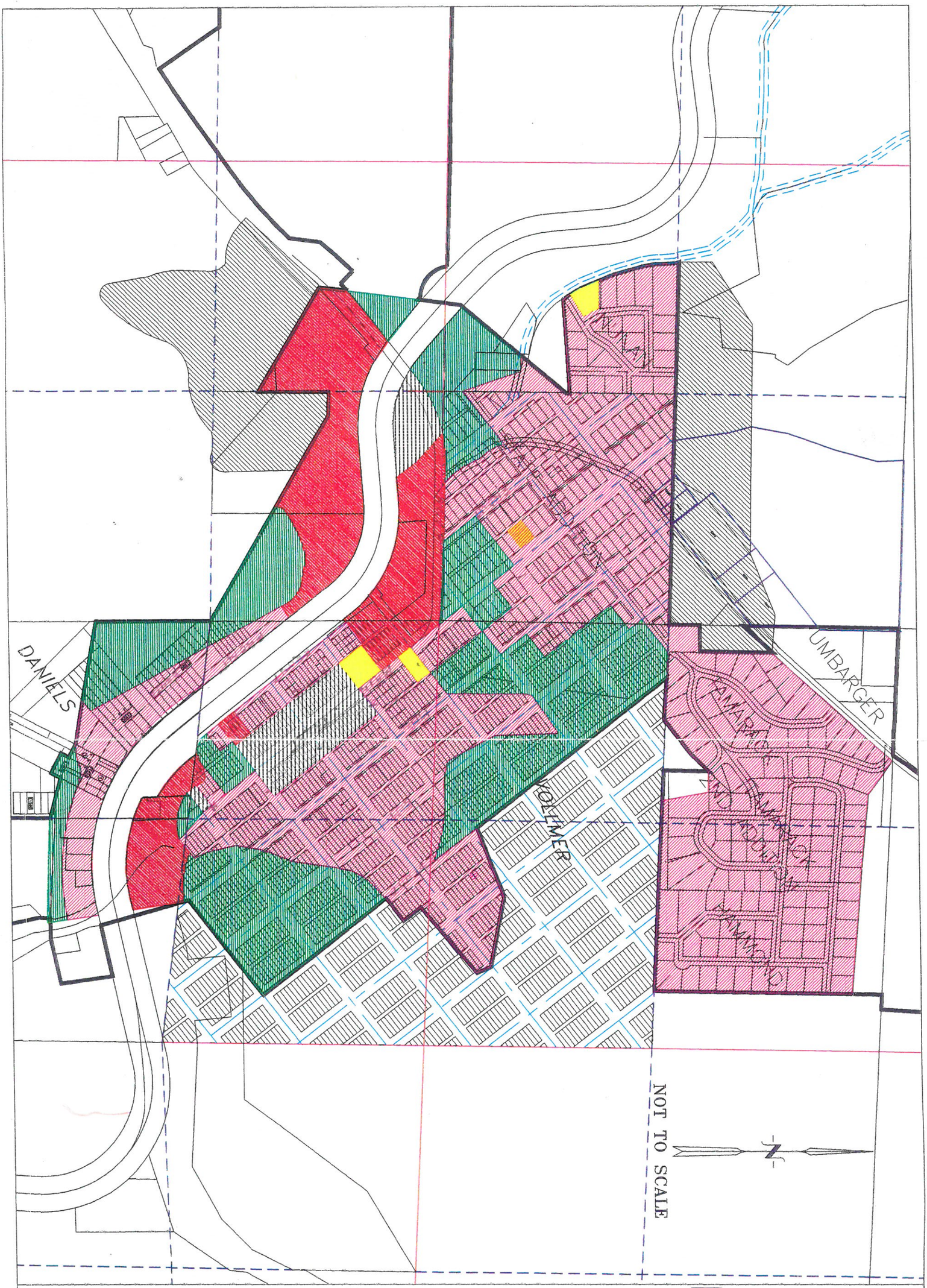
Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Appendix R

City of Troy Zoning Map



LAND USE PLAN
CITY OF TROY
EXISTING ZONING MAP

date: (Summer 1972)

COMMERCIAL–MOTOR BUSINESS

INDUSTRY

MULTI–FAMILY RESIDENTIAL

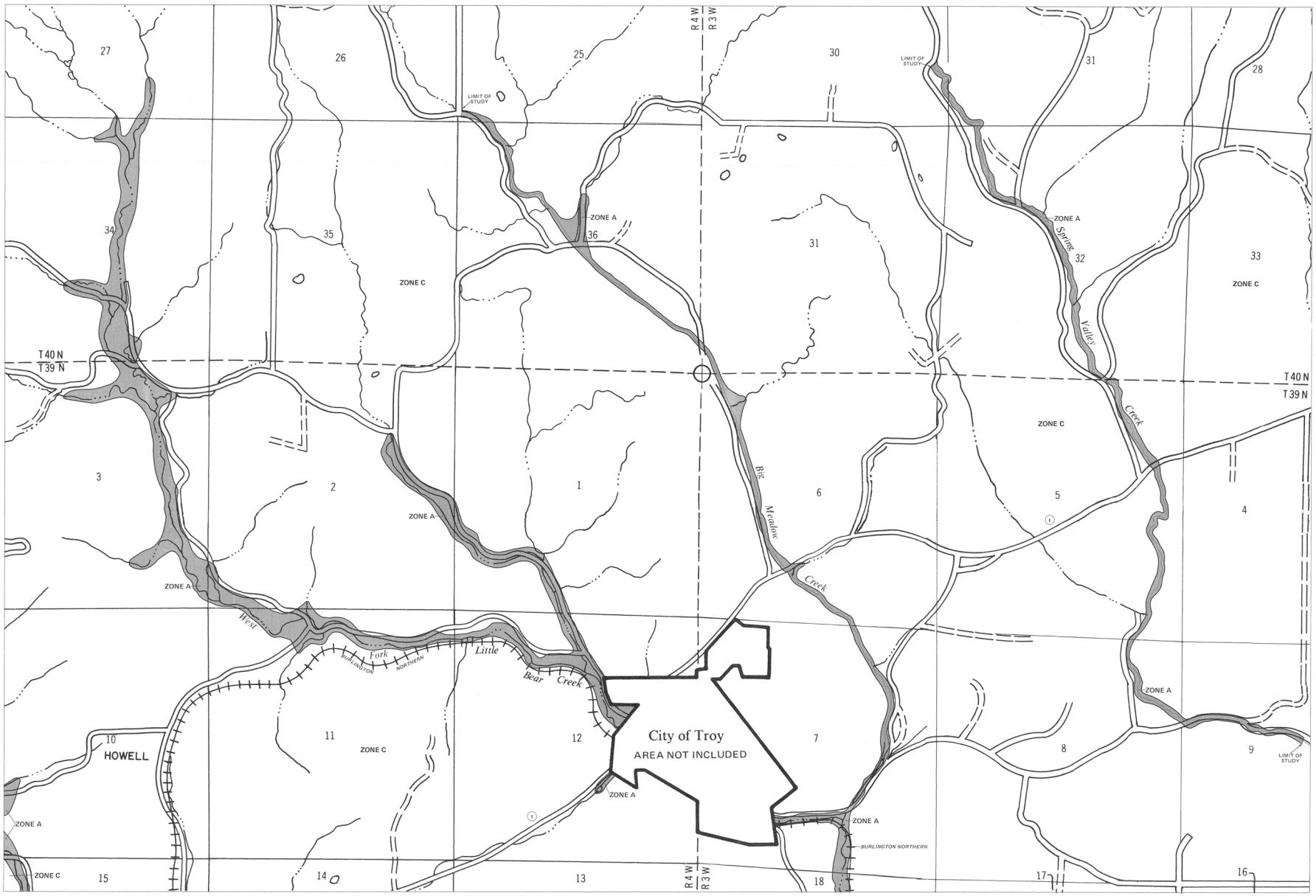
PARK–OPEN SPACE

RESIDENTIAL

VACANT

Appendix S

FEMA Flood Insurance Rate Map



ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FT. NGVD)	DESCRIPTION OF LOCATION
RM14*	2460.1	U.S. Coast and Geodetic Survey bronze disk stamped E 345 1952 located approximately at Troy, at the south corner of Main and 6th Streets, in the north corner of a city park, in the top of the north side of a concrete base for a large wooden flag pole, 61 feet southwest of the centerline of Main Street, 46 feet southeast of the centerline of 6th Street.
RM15*	2483.8	U.S. Coast and Geodetic Survey bronze disk stamped G 345 1952 located approximately 0.5 mile northwest along State Highway 9 from the bank building at Troy, set vertically in the approximate center of the southwest face of the northwest pillar supporting the Burlington Northern Railroad overpass.

*LOCATED IN AREA NOT INCLUDED

KEY TO M

500-Year Flood Boundary

100-Year Flood Boundary

Zone Designations* With Date of Identification e.g., 12/2/74

100-Year Flood Boundary

500-Year Flood Boundary

Base Flood Elevation Line With Elevation In Feet**

Base Flood Elevation in Feet Where Uniform Within Zone**

Elevation Reference Mark

River Mile

**Referenced to the National Geodeti

*EXPLANATION OF ZON

ZONE	EXPL
A	Areas of 100-year flood; flood hazard factors not de
A0	Areas of 100-year shallo are between one (1) and t of inundation are shown, are determined.
AH	Areas of 100-year shallo are between one (1) and elevations are shown, bu are determined.
A1-A30	Areas of 100-year flood; flood hazard factors deter
A99	Areas of 100-year flood protection system under elevations and flood haza
B	Areas between limits of t year flood; or certain area ing with average depths les the contributing drainage mile; or areas protected by (Medium shading)
C	Areas of minimal flooding.
D	Areas of undetermined, b
V	Areas of 100-year coastal action); base flood elevati not determined.
V1-V30	Areas of 100-year coastal action); base flood elevatio determined.

NOTES TO US

Certain areas not in the special flood h may be protected by flood control stru

This map is for flood insurance purpo sarily show all areas subject to floo all planimetric features outside special

For adjoining map panels, see separat Panels.

INITIAL IDENTIFI NOVEMBER 8,

FLOOD HAZARD BOUNDAR JUNE 28, 19

FLOOD INSURANCE RATE AUGUST 15,

FLOOD INSURANCE RATE

Refer to the FLOOD INSURANCE RA shown on this map to determine wh structures in the zones where elevation lished.

To determine if flood insurance is a contact your insurance agent, or call t Program, at (800) 638-6620, or (800)

APPROXIMATE

1000 0

NATIONAL FLOO

FIRM

FLOOD INSU

LATAH CO

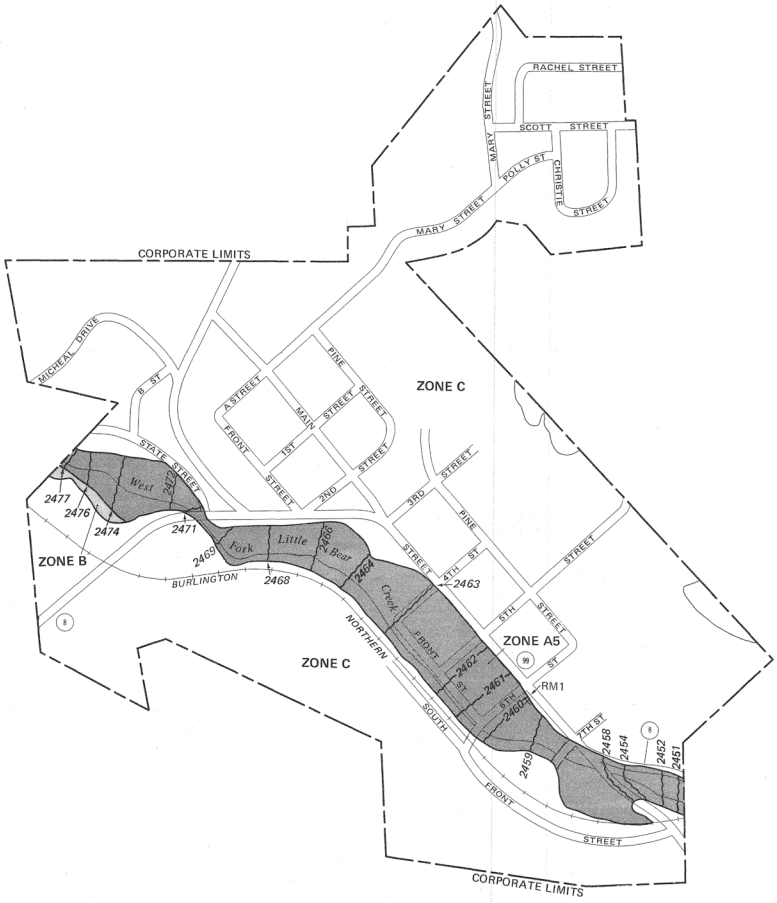
(UNINCORPOR

PANEL 265 O

(SEE MAP INDEX F

COMMUNI

U.S. DEPARTM AND URBAN D FEDERAL INSUR



ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FT. NGVD)	DESCRIPTION OF LOCATION
RM1	2460.1	U.S. Coast and Geodetic Survey bronze disk set on top of a concrete base for a large wooden flag pole, 61 feet southwest of the centerline of Main Street, 46 feet southeast of the centerline of 6th Street.

100-Year Flood Boundary ——— ZONE B

Zone Designations* With Date of Identification e.g., 12/2/74 — ZONE A1 DATE / ZONE A5 DATE

100-Year Flood Boundary ——— ZONE B

500-Year Flood Boundary ———

Base Flood Elevation Line With Elevation In Feet** ——— 513

Base Flood Elevation in Feet Where Uniform Within Zone** (EL 987)

Elevation Reference Mark RM7 ×

River Mile • M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

*EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for flood insurance purposes only; it does not necessarily show all areas subject to flooding in the community or all planimetric features outside special flood hazard areas.

INITIAL IDENTIFICATION:
MAY 10, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS:
DECEMBER 26, 1975

FLOOD INSURANCE RATE MAP EFFECTIVE:
DECEMBER 18, 1979

FLOOD INSURANCE RATE MAP REVISIONS:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620, or (800) 424-8872.

APPROXIMATE SCALE
500 0 500 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CITY OF
TROY, IDAHO
LATAH COUNTY

ONLY PANEL PRINTED

COMMUNITY-PANEL NUMBER
160091 0001 B

EFFECTIVE DATE:
DECEMBER 18, 1979

Appendix T

USTWS Wetlands Map

U.S. Fish and Wildlife Service
National Wetlands Inventory

Wetlands_Troy

January 19, 2018

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Appendix U

Air Quality Map

Idaho Air Quality Planning Areas