



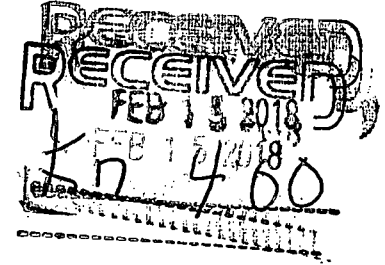
205 Executive Court
Little Rock, Arkansas 72205
Telephone (501) 664-1552
Fax (501) 664-8579
www.cristengineers.com

Stewart W. Noland
Leslie B. Price
Matthew D. Dunn
Craig A. Johnson

February 15, 2018

VIA PERSONAL COURIER

Ms. Bailey Taylor
Enforcement Analyst – Water Division
Arkansas Department of Environmental Quality
5301 Northshore Drive
North Little Rock, AR 72118-5317



RE: City of Walnut Ridge, Arkansas
CAO LIS 17-040: AR0046566, AFIN 38-00040
Progress Report 01

Dear Ms. Taylor:

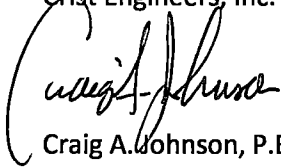
The following components are a brief synopsis of progress regarding the CAO.

Item No.	Date	Description
1	9/6/17 Ongoing	Treatment Operational Testing in accordance with Table 2-2 of the CAP
2	12/27/17	Execution of Owner-Engineer Agreement to conduct WWAC, PER and ER for improvements
3	1/15/18	Submission of PER and WWAC Pre-Application Report to the State of Arkansas Water/Wastewater Advisory Committee
4	1/31/18	Walnut Ridge council approved sales tax referendum to fund up to \$5 million that will be on the ballot for May 22 vote
5	2/9/18	WWAC Committee letter approved the PER and recommended funding from ANRC, USDA, and AEDC
6	Ongoing	PER and ER development for USDA-RD Funding

A courtesy copy of the PER and WWAC application is included for your records. Should you need any further supplemental information regarding the progress descriptions above, please don't hesitate to give me a call.

Ms. Bailey Taylor
City of Walnut Ridge, Arkansas
CAO LIS 17-040: AR0046566, AFIN 38-00040
Progress Report 01
Page 2 of 2

Sincerely,
Crist Engineers, Inc.

A handwritten signature in black ink, appearing to read "Craig A. Johnson". The signature is written in a cursive style with a large initial "C".

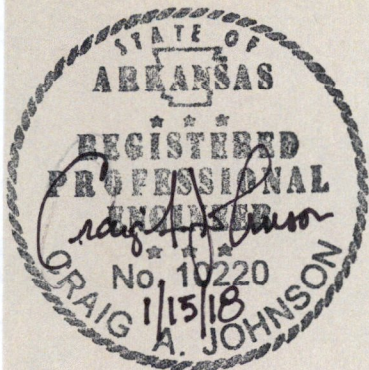
Craig A. Johnson, P.E.
Associate

Enclosures: PER for Wastewater System Improvements, January 2018

Cc: Jon Kopp
City Water Works Manager



CITY OF WALNUT RIDGE, ARKANSAS
for the CITY WATER WORKS



PRELIMINARY ENGINEERING REPORT WASTEWATER SYSTEM IMPROVEMENTS JANUARY 2018



CRIST ENGINEERS, INC.
205 EXECUTIVE COURT
LITTLE ROCK, ARKANSAS
501.664.1552
CRISTENGINEERS.COM





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Stewart W. Noland
Leslie B. Price
Matthew D. Dunn
Craig A. Johnson

January 15, 2018

Mr. Dave Fenter, WWAC Chairman
Arkansas Natural Resources Commission
101 Capitol Avenue, Suite 350
Little Rock, Arkansas 72201

RE: Wastewater Treatment Plant Improvements
City Water Works
Walnut Ridge, Arkansas
Crist Engineers Job File No. 1618

Dear Mr. Fenter:

On behalf of the City Water Works for Walnut Ridge, Arkansas, please accept the original and six (6) copies of the above referenced report for the WWAC committee's consideration.

Please contact me should you have any questions concerning the report.

Sincerely,
Crist Engineers, Inc.

A handwritten signature in black ink that reads "Craig A. Johnson, P.E." in a cursive style.

Craig A. Johnson, P.E.
Associate

cc: Mr. Jonathan Kopp, General Manager
216 Southwest Fourth Street, Walnut Ridge, AR 72476

WASTEWATER PRE-APPLICATION
COVER PAGE

WWAC ID #:

1. Applicant / Owner:	City of Walnut Ridge	2. CDBG Grantee:	City of Walnut Ridge
Representative & Title:	Charles Snapp, Mayor	Representative & Title:	Charles Snapp, Mayor
Address:	300 W. Main	Address:	300 W. Main
City & Zip Code:	Walnut Ridge, AR 72476	City & Zip Code:	Walnut Ridge, AR 72476
County:	Lawrence	County:	Lawrence
Phone:	(870) 886-6638	Phone:	(870) 886-6638
FAX:	(870) 886-6147	FAX:	(870) 886-6147
E-Mail Address:	wrcityhall@att.net	E-Mail Address:	wrcityhall@att.net
3. Engineering Firm:	Crist Engineers, Inc.	4. Application Type: (Mark all that apply) <input type="checkbox"/> LMI Service Hookups <input type="checkbox"/> New Collection System or Extension <input type="checkbox"/> Rehab Existing Collection System <input type="checkbox"/> New Treatment Plant <input checked="" type="checkbox"/> Rehab Existing Treatment Plant <input type="checkbox"/> Other _____	
Project Engineer:	Craig Johnson, P.E.		
Address:	205 Executive Court		
City & Zip Code:	Little Rock, AR 72205		
Phone:	(501) 664-1552		
FAX:	(501) 664-8579		
E-Mail Address:	cjohnson@cristengineers.com		

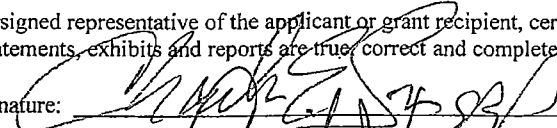
5. Number of Existing Customers:	2807	Number of New Customers:	N.A.	Projected Number of Customers:	N.A.
6. Arkansas Senate District	20	Arkansas House District	60	U. S. House District	1

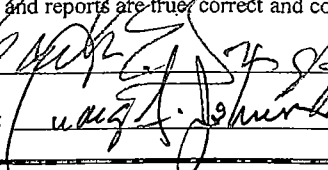
7. Provide a brief description of the project: The proposed project, the Walnut Ridge Wastewater Improvements Project, includes decommissioning of the existing Biolac® biological treatment system and components, and installing an extended aeration, activated sludge field-erected treatment system. The project also includes construction of a new Administration Building, a new Blower Building, containing new blowers, and a Chemical Feed Room, a new bar screen structure with splitter box, new and modified yard piping, a new 8.45-mile 14" PVC outfall line to the Black River and effluent pump station (containing 4 new pumps), and modifications to the existing chlorine contact basin/dechlorination basin/effluent weir. Other work on the existing treatment site includes decommissioning of the existing blower building and Headworks/Administration Building and minor site work.

8. Indicate the Agencies and Dollar Amounts you plan to use for this project:

\$ _____	Community Development Block Grant Program
\$ _____	Arkansas Natural Resources Commission
\$ _____	Community Resource Group
\$ 6,000,000	USDA, Rural Development
\$ _____	Other Funding Source: _____
\$ 6,000,000	Total Funds Requested

9. I, the undersigned representative of the applicant or grant recipient, certify that the information contained herein and the attached statements, exhibits and reports are true, correct and complete to the best of my knowledge and belief.

Applicant's Signature:  Date: 1-18-2018

Application Preparer's Signature:  Date: 1-15-2018

Application for Federal Assistance SF-424

Version 02

*** 1. Type of Submission:**

- Preapplication
- Application
- Changed/Corrected Application

*** 2. Type of Application:**

- New
- Continuation
- Revision

* If Revision, select appropriate letter(s):

* Other (Specify)

*** 3. Date Received:**

Completed by Grants.gov upon submission.

4. Applicant Identifier:

5a. Federal Entity Identifier:

*** 5b. Federal Award Identifier:**

State Use Only:

6. Date Received by State:

7. State Application Identifier:

8. APPLICANT INFORMATION:

* a. Legal Name:

* b. Employer/Taxpayer Identification Number (EIN/TIN):

* c. Organizational DUNS:

d. Address:

* Street1:

Street2:

* City:

County:

* State:

Province:

* Country:

* Zip / Postal Code:

e. Organizational Unit:

Department Name:

Division Name:

f. Name and contact information of person to be contacted on matters involving this application:

Prefix:

* First Name:

Middle Name:

* Last Name:

Suffix:

Title:

Organizational Affiliation:

* Telephone Number:

Fax Number:

* Email:

Application for Federal Assistance SF-424

Version 02

9. Type of Applicant 1: Select Applicant Type:

City or Township Government

Type of Applicant 2: Select Applicant Type:

Type of Applicant 3: Select Applicant Type:

* Other (specify):

*** 10. Name of Federal Agency:**

United States Environmental Protection Agency

11. Catalog of Federal Domestic Assistance Number:

66.203 or 66.418

CFDA Title:

Environmental Finance Center Grants or Construction Grants for WWTW

*** 12. Funding Opportunity Number:**

* Title:

13. Competition Identification Number:

Title:

14. Areas Affected by Project (Cities, Counties, States, etc.):

City of Walnut Ridge, Lawrence County, Arkansas

*** 15. Descriptive Title of Applicant's Project:**

Walnut Ridge Wastewater Improvements Project

Attach supporting documents as specified in agency instructions.

Application for Federal Assistance SF-424

Version 02

16. Congressional Districts Of:

* a. Applicant

* b. Program/Project

Attach an additional list of Program/Project Congressional Districts if needed.

17. Proposed Project:

* a. Start Date:

* b. End Date:

18. Estimated Funding (\$):

* a. Federal	<input type="text" value="\$6,000,000.00"/>
* b. Applicant	<input type="text"/>
* c. State	<input type="text"/>
* d. Local	<input type="text"/>
* e. Other	<input type="text"/>
* f. Program Income	<input type="text"/>
* g. TOTAL	<input type="text" value="\$6,000,000.00"/>

* 19. Is Application Subject to Review By State Under Executive Order 12372 Process?

- a. This application was made available to the State under the Executive Order 12372 Process for review on
- b. Program is subject to E.O. 12372 but has not been selected by the State for review.
- c. Program is not covered by E.O. 12372.

* 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes", provide explanation.)

Yes No

21. *By signing this application, I certify (1) to the statements contained in the list of certifications** and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)

** I AGREE

** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.

Authorized Representative:

Prefix: * First Name:

Middle Name:

* Last Name:

Suffix:

* Title:

* Telephone Number: Fax Number:

* Email:

* Signature of Authorized Representative:  * Date Signed:

Application for Federal Assistance SF-424

Version 02

*** Applicant Federal Debt Delinquency Explanation**

The following field should contain an explanation if the Applicant organization is delinquent on any Federal Debt. Maximum number of characters that can be entered is 4,000. Try and avoid extra spaces and carriage returns to maximize the availability of space.

[Empty text input area for Applicant Federal Debt Delinquency Explanation]



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- Appendix B: Detailed Cost Estimates
- Appendix C: Design Criteria and Design Information
- Appendix D: Maps and Exhibits

PRELIMINARY ENGINEERING REPORT: WASTEWATER



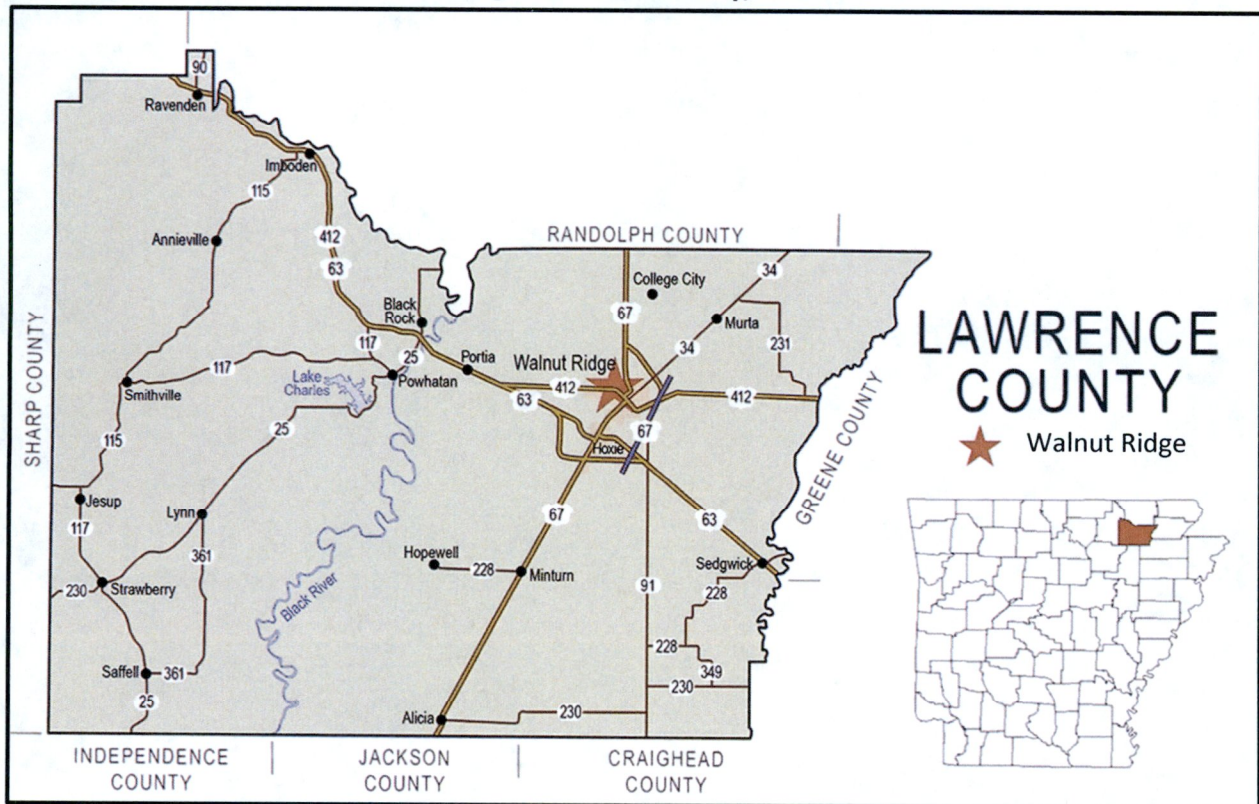
WALNUT RIDGE, ARKANSAS

I. EXISTING CONDITIONS

A. Project Name, Location, and Area Map

The City of Walnut Ridge is located in northeast Lawrence County, where the city lies between the Black River to the west and the Cache River to the east. The proposed project, the Walnut Ridge Wastewater Improvements Project ('the project') for work at the wastewater treatment plant (WWTP), includes decommissioning the existing aerated Biolac® biological treatment system and components, and installing an extended aeration treatment system while maintaining other plant processes such as the chlorine contact/dechlorination basin. Further description of the work for the proposed project is included in later sections of this report. A location map of the City of Walnut Ridge in Lawrence County, Arkansas is shown in **Figure 1.0**.

Figure 1.0: Location Map of Walnut Ridge, Lawrence County, Arkansas



B. Need for Project

The proposed project includes improvements and repairs to the existing wastewater treatment plant, and decommissioning of the current biological treatment train to be replaced by an extended aeration, activated sludge plant.

Historically, inhibition of nitrification has been an issue at the WWTP due to the presence of quaternary ammonium compounds ("Quats") and the inability to sustain biomass during wet weather events, with the latter being more prevalent. Wet weather treatment and compliance has been an inherent problem over the past 15 years. The increase in flow during the rain events removes total suspended solids (TSS) containing biochemical oxygen demand in the biomass, causing a degradation of the effluent quality by exceeding dissolved oxygen (DO), total residual chlorine (TRC), total suspended solids (TSS), 5-day carbonaceous biological oxygen demand (CBOD₅), and ammonia nitrogen permit limits. From January 1, 2013 through January 31, 2017, discharge effluent exceeded the TSS limit 8 times, CBOD₅ 6 times, and ammonium nitrogen 27 times.

The increase in the WWTP influent flow during wet weather occurrences reduces biomass solids and the solids retention time, whereby limiting the nitrification process of the ammonia nitrogen. This degradation of the WWTP effluent quality further exacerbates toxicity non-compliance of the receiving stream Village Creek. In summary, the existing treatment plant is not capable of consistently meeting effluent limitation requirements. If wastewater treatment plant improvements are not made, the NPDES discharge permit parameters will not be reliably met. Although permit violation suggests degradation of water quality in the receiving stream, no specific health problems related to the effluent has been reported to date.

The existing treatment facility was commissioned in 1994. Many components of the facility have reached their useful life and consideration for a thorough rehabilitation effort has been deemed necessary to continue reliable treatment and correct the violations noted in the Consent Administration Order (CAO) issued by the Arkansas Department of Environmental Quality (ADEQ). As part of the project, an evaluation was conducted for an alternative discharge location, since the current receiving stream has a 100-percent critical dilution of the WWTP effluent requiring both lethal and sublethal permit limits for whole effluent toxicity testing. In addition, preliminary project planning includes the identification of funding alternatives for the proposed capital improvements by submitting a Water/Wastewater Advisory Committee (WWAC) application administered by the Arkansas Natural Resources Commission (ANRC).

The City of Walnut Ridge understands the necessity for compliance in accordance with National Pollutant Discharge Elimination System (NPDES) permit requirements and is currently operating under a Corrective Action Plan (CAP), dated August 2017, addressing current discharge deficiencies.

C. Existing Collection System

The Walnut Ridge City Water Works is a component unit of the City of Walnut Ridge, Arkansas. The City Water Works provides water and sewer services to the citizens of Walnut Ridge, and the recently incorporated College City area.

The initial Walnut Ridge collection system was constructed in the 1940's, with additions continually being made. The system currently consists of approximately 17,801 feet of forcemain, approximately 164,500 feet of gravity pipe, and approximately 531 manholes. A majority of the gravity sewer lines are 6-inch or 8-inch diameter, with the remaining gravity sewer lines being 10-inch, 12-inch, and 15-inch in diameter. Approximately 20-percent of the collection system is 40-years old or older, with the majority being either 6-inch or 8-inch pipe. Early materials of construction included vitrified clay and concrete pipes with brick masonry manholes; while ductile iron and plastic pipe were included as later construction materials. A map of the collection system is included in **Appendix D** of this report. The Walnut Ridge wastewater collection system can be subdivided into five (5) basins, each containing gravity sewers, forcemains, manholes, and pump stations.

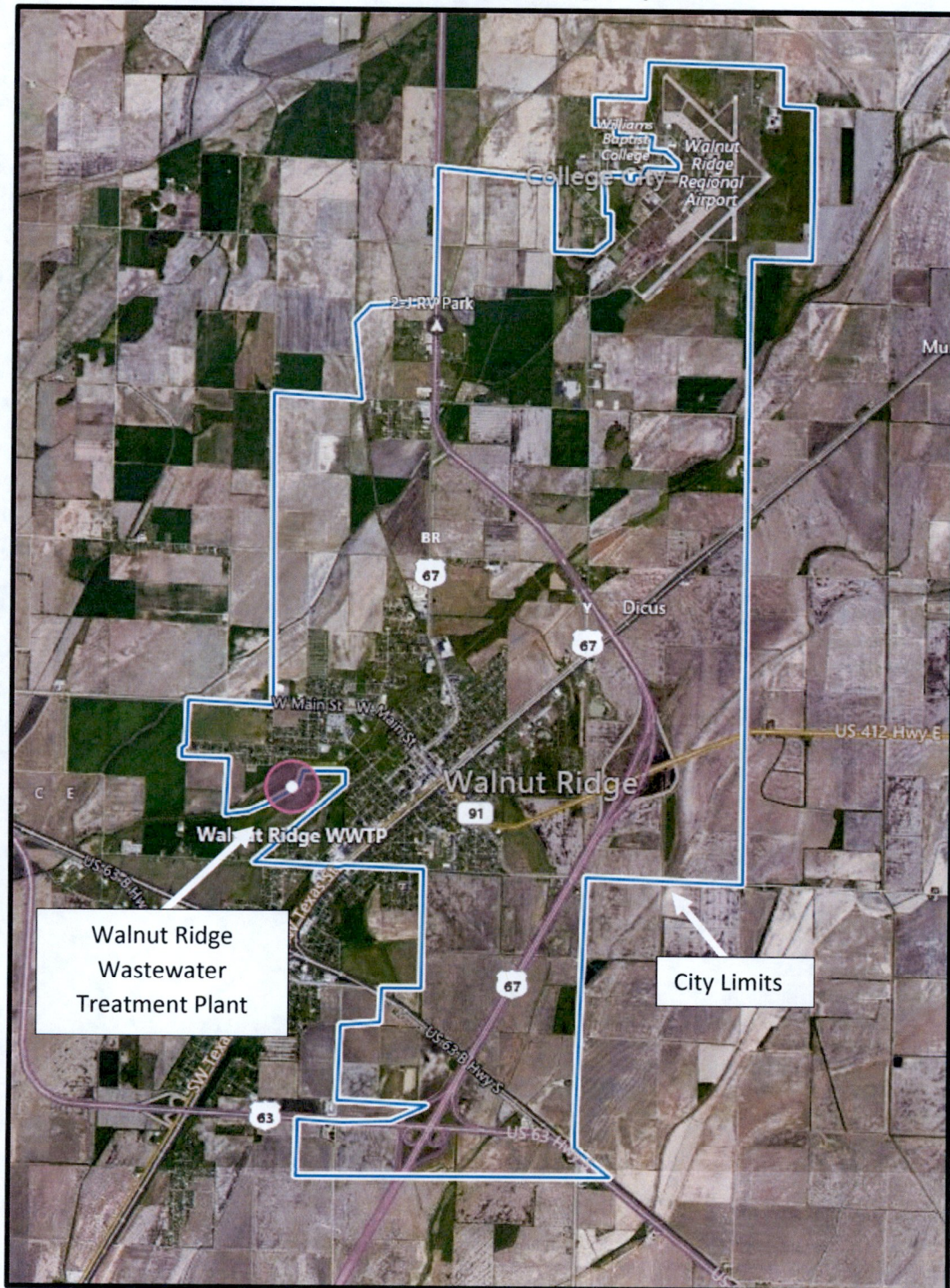
Walnut Ridge collection system contains 23 pump stations ranging from 180 gallons-per-minute (gpm) vacuum prime-type pump stations to 1-½" grinder pump stations. Oak Street, Village Creek, and Frit Pump Stations contain two Smith & Loveless brand, 180 gpm pumps. Oak Street and Village Creek Pump Stations are vacuum primed, above-ground stations. The Frit Pump Station is an older below-ground station. Midway Road, Hope Street, Wal-Mart, Highway 412, School, Bowling Alley, Skil Drive, Brushed Road, Teel Road, Luther Bridges Road, Ray Martin, Highway 34, State Street, and Burris Road Pump Stations are all Smith & Loveless brand, above-ground, "dog-house" type pump stations, each with two 80 gpm vacuum assist pumps, which range in age from 2001 to 2012. Farm Service and North Ridge Pump Stations each contain two 1-½" grinder pumps. The North Ridge Pump Station grinder pump is a 2014 model. The Farm Service Pump Station grinder pumps were installed in the late 1980's. Skil Pump Station is a Smith & Loveless brand, below-ground station with two 80 gpm pumps that were installed in 1980. Poplar Street is a Smith & Loveless brand, above-ground pump station with two 100 gpm pumps that were installed in 1985. The 4th Street Pump Station is a small station with a single 3-inch grinder pump installed. Robin Lane Pump Station is a Smith & Loveless brand, below-ground, station with two 80 gpm pumps. **Table 1.0** below is a summary of the components of the existing Walnut Ridge collection system.

Table 1.0: Collection System Components Summary

Sub Basin	Manholes (MH)	Gravity						Force				
		Unknown	6"	8"	10"	12"	15"	4"	6"	8"	10"	12"
1	99	3,490	1,440	15,218	5,272	2,635	0	0	0	3,791	1,924	0
2	77	6,276	10,009	8,657	0	0	0	0	1,900	0	0	0
3	108	2,302	17,261	7,252	5,200	0	0	2,402	1,227	519	0	0
4	123	6,220	7,266	23,620	734	2,540	0	0	0	0	0	0
5	116	1,606	9,712	18,712	3,142	1,050	2,699	0	0	519	0	0
Not in Basin	8	272	0	1,808	0	79	0	2,030	0	0	2,129	1,360
Total	531	20,166	45,687	75,267	14,348	63,04	2,699	4,432	3,128	4,829	4,053	1,360
Total MH = 531		Total Gravity = 164,472 feet; 31.1 miles						Total Force Main = 17,801; 3.4 miles				
Total Pump Stations = 23 (above-ground: 17, below-ground: 3, grinder stations: 3)												

The wastewater treatment plant (WWTP) is located approximately 1-mile west of the town center, at the end of W Oak Street. The current WWTP was constructed in 1994, replacing a single cell oxidation pond which was abandoned. The existing treatment plant consists of a bar screen, a biological treatment system that includes nutrient removal and aeration, clarification, chlorination/dechlorination, and post-aeration, before discharging into Village Creek. Village Creek flows to the White River, through the Arkansas River and ultimately to the Mississippi River. **Figure 2.0** provides a general location of the WWTP in relation to the City of Walnut Ridge (city limits shown as a bold green/white line).

Figure 2.0: General WWTP Location and Walnut Ridge City Limits



Currently, influent flow enters the plant via a 12-inch forcemain and solids are removed by a bar screen located at the headworks building. Wastewater then flows through a 24-inch influent line to the influent flow splitter box at the head of the biological treatment system. The flow is then split as wastewater travels via two 16-inch lines into the Biolac® biological treatment system. The Biolac® system is an activated sludge process using extended aeration and retention of biological

solids. The in-ground earthen basin, with a gunite apron that extends 1-foot below water level, has a moving aeration chain system for mixing and oxygen transfer. The aeration system is a stationary fine-bubble aeration system designed to supply 4 cubic-feet-per-minute (CFM) of air per 1,000 cubic feet of aeration basin volume (where stationary fine bubble aeration systems typically require 8 to 10 CFM of air per 1,000 cubic feet of aeration basin volume). The aeration/mixing system is supplied by with three (3), 50 horsepower (HP) blowers, located in the blower building, rated at 1,232 CFM at 5.4 pounds per square inch, gauge (psig). The Biolac® basin is followed by integral Biolac EZClear® secondary clarifiers with v-notched effluent weirs. The clarifier effluent flows through a 24-inch pipe to the disinfection basin. The disinfection basin consists of three chambers, with the middle chamber acting as the baffle area, therefore the total travel length is approximately 108-feet. The design volume of the chlorine basin is 50,150 gallons with a chlorine contact time (CT) of 18.8 minutes for peak day flow, and a CT time of 60 minutes for average day flow. The chlorine contact basin is followed by post-aeration, and dechlorination with sodium thiosulfate. The treated wastewater effluent then discharges over a 90-degree V-notch weir to a 24-inch effluent line discharging at the permitted Village Creek outfall. The existing treatment plant is designed for an average influent flow rate of 1.19 Million Gallons per Day (MGD). The plant has a Generac® emergency generator installed inside the blower building. Currently, the site has an on-site sludge storage pond that is periodically cleaned-out and the solids are hauled away for disposal to a landfill. This hauling and disposal of the generated sludge is contracted on an as-needed basis. **Figure 3.0** shows a large-scale schematic of the existing treatment train.

The Airport Industrial Park wastewater collection system was originally constructed to serve a military flight training base and included a mechanical treatment plant. The mechanical plant was abandoned in 1970, and a pump station and forcemain was installed to convey wastewater to the single cell oxidation pond (known as the Airport Industrial Park plant) located south-west of the airport, near the intersection of Industrial Park Road and Miller Drive. With the construction of the Biolac® system, the airport lagoon system was decommissioned and wastewater from this area was pumped to the new plant site. However, the collection system in this area continues to serve industrial customers, the college, and residences.

Figure 3.0: Large Scale Schematic of Existing WWTP (With Aerial Image)



D. National Pollutant Discharge Elimination System (NPDES)

The WWTP is authorized to discharge wastewater under the National Pollutant Discharge Elimination System (NPDES) and the Arkansas Water and Air Pollution Control Act through Permit Number AR 0046566 (CAO LIS 17-040, AFIN 38-00040). The current permit was effective on July 1, 2016 and expires June 30, 2021. **Table 2.0** outlines NPDES Effluent Limitations and Monitoring Requirements for typical parameters of the permit.

Table 2.0: NPDES Effluent Limitations and Monitoring Requirements, Walnut Ridge WWTP

Effluent Characteristics	Discharge Limitations			Monitoring Requirements		
	Mass (lbs/day), <i>unless otherwise specified</i>	Concentration (mg/l) <i>unless otherwise specified</i>		Frequency	Sample Type	
	Monthly Avg.	Monthly Avg.	7-Day Avg.			
Flow	N/A	Report, MGD	Report, MGD (Daily Maximum)	five/week	totalizing meter	
Overflows	Monthly Total SSOs (occurrences/month)			See Comments ¹		
Overflow Volume	Monthly Total Volume of SSOs (gallons/month)			See Comments ¹		
Carbonaceous Biochemical Oxygen Demand (CBOD5)	99.2	10.0	15.0	three/week	composite	
Total Suspended Solids (TSS)	148.9	15.0	22.5	three/week	composite	
Ammonia Nitrogen (NH3-N)						
	(May-Oct)	39.7	4.0	6.0	three/week	composite
	(Nov-Apr)	59.5	6.0	9.0	three/week	composite
Dissolved Oxygen (DO)						
	(May-Oct)	N/A	5.0 (Inst. Min.)		three/week	grab
	(Nov-Apr)	N/A	6.0 (Inst. Min.)		three/week	grab
Fecal Coliform Bacteria (FCB)						
	(Apr-Sept)	N/A	200	400	three/week	grab
	(Oct-Mar)	N/A	1000	2000	three/week	grab
Total Residual Chlorine (TRC) ²	N/A	0.011 mg/l (Inst. Max.)		three/week ²	grab ³	
Total Phosphorus (TP)	report	report	report	once/quarter	grab	
Nitrate + Nitrite Nitrogen (NO3 + NO2-N)	report	report	report	once/quarter	grab	
Total Recoverable Mercury	report	report	report	once/month	grab	
pH	N/A	Min. 6.0 s.u.	Max. 9.0 s.u.	two/month	grab	
Comments:						
¹ See Condition No. 5 of Part II (SSO Condition). If there are no overflows during the entire month, report, "zero" ("0").						
² TRC must be measured using any approved test method established in 40 CFR 136 capable of meeting a detection level of 0.033 mg/l or lower. If TRC is not detected at the required detection level (i.e., lab result is "ND"), report "zero" ("0") on the Discharge Monitoring Report (DMR). Report the concentration if TRC is detected and measured in the sample.						
³ TRC shall be measured within fifteen (15) minutes of sampling.						

Under Environmental Protection Agency regulations, if a treatment works has a flow greater than or equal to 1.0 MGD or has (or is required to have) a pretreatment program, or is otherwise required by the permitting authority to provide the data, then the utility is to provide effluent testing data, for the listed pollutants, to the regulatory agency for further review. At a minimum, effluent testing data is to be based on at least three pollutant scans and must be no more than four and one-half years old. **Table 3.0** shows the Whole Effluent Toxicity (WET) limit for lethal and sub-lethal endpoints and the Daily Average Lethality and 7-Day Minimum Lethality (7-Day NOEC) of the renewed NPDES discharge permit for the Walnut Ridge WWTP.

Table 3.0: NPDES Effluent Limitations and Monitoring Requirements, Walnut Ridge WWTP (Continued from Table 2.0).

Effluent Characteristics	Discharge Limitations			Monitoring Requirements	
	Mass (lbs/day, unless otherwise specified)	Concentration (mg/l, unless otherwise specified)		Frequency	Sample Type
	Monthly Avg.	Monthly Avg.	7-Day Avg.		
Whole Effluent Toxicity (22414) ^{4,5} (7-day NOEC) ⁴ 22414 <i>Ceriodaphnia dubia</i> & <i>Pimephales promelas</i>	N/A	Not < 100%		once/quarter	24-hr comp
Chronic Sub-Lethality Wet Limit ^{5,6} (51714) <i>Pimephales promelas</i>	N/A	Not < 80%		once/quarter	24-hr comp
Chronic Sub-Lethality <i>Ceriodaphnia dubia</i>	N/A	report (%)		once/quarter	24-hr comp
<i>Pimephales promelas</i> (Chronic) ^{4,5,6} Pass/Fail Lethality (7-day NOEC) TLP6C Pass/Fail Growth (7-day NOEC) TGP6C Survival (7-day NOEC) TOP6C Coefficient of Variation (Growth) TQP6C Growth (7-day NOEC) TPP6C		7-Day Average Report (Pass=0/Fail=1) Report (Pass=0/Fail=1) Report % Report % Report %		once/quarter once/quarter once/quarter once/quarter once/quarter	24-hr comp 24-hr comp 24-hr comp 24-hr comp 24-hr comp
<i>Ceriodaphnia dubia</i> (Chronic) ^{4,5,6} Pass/Fail Lethality (7-day NOEC) TLP3B Pass/Fail production (7-day NOEC) TGP3B Survival (7-day NOEC) TOP3B Coefficient of Variation (Reproduction) TQP3B Reproduction (7-day NOEC) TPP3B		7-Day Average Report (Pass=0/Fail=1) Report (Pass=0/Fail=1) Report % Report % Report %		once/quarter once/quarter once/quarter once/quarter	24-hr comp 24-hr comp 24-hr comp 24-hr comp

Comments:

⁴See Condition No. 10 of Part II (WET Testing Condition).

⁵Whole Effluent Toxicity limit is for lethal endpoints. The Daily Average Lethality and 7-Day Minimum Lethality (7-day NOEC) value shall not be less than 100% effluent. The Daily Average Lethality (7-Day NOEC) value is defined as the greatest effluent concentration, which does not elicit lethality that is statistically different from the control (0% effluent) at the 95% confident level.

⁶Whole Effluent Toxicity limit is for *P. promelas* sub-lethal endpoints. The Daily Average Sub-Lethality and 7-Day Minimum Sub-Lethality (7-Day NOEC) value shall not be less than 80% effluent. The Daily Average Sub-Lethality (7-Day NOEC) value is defined as the greatest effluent concentration, which does not elicit sub-lethality that is statistically different from the control (0% effluent) at the 95% confident level.

Definitions:

LOEC (Lowest Observed Effect Concentration) – The lowest concentration of an effluent or toxicant that results in adverse effects on the test organisms (where the values for the observed endpoints are statistically different from the control).

NOEC (No Observed Effect Concentration) – Is the highest tested concentration of an effluent or toxicant at which no adverse effects are observed on the aquatic test organisms at a specific time of observation.

The WET test is utilized to measure the acute (lethal) and chronic (sub-lethal) effect of effluent on biology in the receiving stream. The test utilizes a series of effluent dilutions (critical dilution) for a measurement of biological survival for vertebrates (fathead minnow) and invertebrate species (water flea). The dilution series is based on flow of the receiving stream, 7Q10, which is the lowest flow in seven consecutive days in a 10-year period. WET testing failure results of the Walnut Ridge WWTP effluent, from 2011 through 2016, are shown in **Table 4.0** below.

Table 4.0: WET Testing Failures 2011 to 2016

Parameter	Result
Vertebrate Lethal Failures, <100%	1
Vertebrate Sublethal Failures, <80%	5
Invertebrate Lethal Failures	3
Invertebrate Sublethal Failures	13

There were two (2) successive 100-percent survival rates for both vertebrate and invertebrate lethal and sublethal tests in July and August 2016. Furthermore, the WWTP Ammonia-Nitrogen Testing failed in 2016 as well. These results are in **Table 5.0** below. After implementing new caustic dosages in July 2016, there was a noticeable reduction in all Ammonia-Nitrogen values.

Table 5.0: Ammonia-Nitrogen Testing Failures 2016

Parameter	Result
30-Day Ammonia-Nitrogen Failures	8
7-Day Ammonia-Nitrogen Failures	8
Ammonia-Nitrogen Loading Failures	5
Invertebrate Sublethal Failures	13

As discussed in previous sections of this report, testing results of the WWTP flow showed the presence of Quaternary Ammonium Compounds (Quats). These are positively charged polyatomic ions that are strongly cationic and attach to inorganic and organic surfaces. The strong positive charge of the Quats attaches to negatively charged bacteria and causes membrane leakage and bacteria death, which means destruction of the biomass in a biological treatment plant. Quats compounds can also be used to produce products that reduce plant growth, used at ornamental greenhouses. With exceptionally strong bases, Quat cations degrade. These compound salts are used as disinfectants, surfactants, fabric softeners, and antistatic agents (e.g. in shampoos). Furthermore, Quats can be used for the development of cationic detergents and disinfectants, which are used to remove organic material. Common sources include hospitals, restaurants, and nursing homes where strong disinfectants or sanitizing agents are commonly used. Quats are deactivated by anionic detergents (including common soaps) and as disinfectants, perform best in "soft" water.

Due to the plant effluent consistently failing to meet permit requirements, the Arkansas Department of Environmental Quality (ADEQ) negotiated the terms of a Consent Administrative Order (CAO), dated May 25, 2017 and effective on July 10, 2017, with the City of Walnut Ridge to address the plant efficiency and failures. The CAO proposed was due also to a pattern of non-compliance on similar permit parameters related to previous CAO's administered in 1995, 2000, 2003, 2007, and 2010. Per the Order and Agreement of the CAO, the City of Walnut Ridge agreed to pay a reduced voluntary civil penalty of \$7,200, submit to ADEQ a CAP, provide progress reports as required, and submit to ADEQ a SSES. The approved CAP, milestone schedule, and final compliance were issued a final date June 1, 2020.

Since the agreement was reached for the propose CAO, the City Water Works are to initiate a study by a registered, licensed engineer to perform an evaluation of the wastewater treatment system and the citywide sanitary sewer system. The scope of the project includes compiling wastewater treatment alternatives, including alternative discharge locations.

E. Present Flows and Wastewater Characteristics

Wastewater flow data was obtained from Walnut Ridge utilizing the discharge monthly reports (DMR's). Historical average day flow rate data for 2012 to 2016 is given in **Table 6.0**. The average monthly flow rates vary from 0.37 mgd in 2016 to 1.07 mgd in 2015. The average daily flow rate and the maximum daily flow rate for the 5-year period of 2012 to 2016 is 0.59 mgd and 3.95 mgd, respectfully.

Table 6.0: Historical Average Day Flow Rates (mgd), 2012 - 2015

Month	2012	2013	2014	2015	2016
January	0.58	0.79	0.56	0.59	0.52
February	0.51	0.70	0.52	0.63	0.44
March	0.93	0.56	0.72	0.82	0.88
April	0.50	0.67	0.27	0.78	0.72
May	0.49	0.78	0.67	0.93	0.70
June	0.57	0.52	0.68	0.46	0.45
July	0.50	0.43	0.40	0.51	0.42
August	0.38	0.74	0.40	0.47	1.02
September	0.47	0.39	0.43	0.39	0.52
October	0.43	0.48	0.48	0.44	0.37
November	0.40	0.40	0.40	1.07	0.44
December	0.54	0.92	0.51	0.88	0.57
Average	0.53	0.62	0.50	0.66	0.59

Historical flow rate data, from **Table 6.0**, was used to estimate peaking factors for maximum month and maximum day, as given in **Table 7.0** below.

Table 7.0: Historical Flow Rates and Resulting Peaking Factors

Flow Rate Category	Rate, mgd	Peaking Factor
Average Day	0.59	1.00
Maximum Month	1.07	1.81
Maximum Day	3.95	6.70

Based on historical average day flow rates, presented in Table 6.0, and the yearly historical population for the City of Walnut Ridge, an average wastewater flow rate per capita per day (gpcd) can be calculated for years 2012 to 2016. The estimated yearly population, the average day WWTP flow rate, and the calculated average day wastewater flow rate per capita per day is presented in Table 8.0.

Table 8.0: Per Capita Average Day Wastewater Flow Rates

Year	Estimated Population	Average Day WW Flow Rate	
		mgd	gpcd
2012	4812	0.53	110
2013	4773	0.62	130
2014	4734	0.50	106
2015	4704	0.66	140
2016	4674	0.59	126
Average of Rates		0.59	122

1.0 Infiltration/Inflow

For purposes of estimating a wastewater collection system's infiltration/inflow condition, the Environmental Protection Agency (EPA) has determined that the average for dry weather flows is 120 gpcd. This includes domestic wastewater flow, infiltration, and nominal industrial and commercial flows. The EPA indicates this average dry weather flow should be used as an indicator to determine the limit of non-excessive infiltration. If the average daily flow per capita (excluding major industrial and commercial flows greater than 50,000 gpd each) is less than 120 gpcd (measured during periods of high groundwater), the amount of infiltration is considered non-excessive.

In 1990, an infiltration/inflow study was conducted on the Walnut Ridge collection system. In summary, the study concluded that the Walnut Ridge collection system is not subject to excessive infiltration or inflow.

The current collection system still generally performs well except during periods of wet weather. It is therefore assumed that the Walnut Ridge system follows a typical municipal wastewater flow rate pattern in that as seasonal precipitation increases, wastewater flow rates increase. Comparing the historical daily flow rate data to the yearly historical population data, the average, minimum, and maximum flow per capita per day, for 2013 through 2016, is as follows in Table 9.0.

Table 9.0: Average, Minimum, and Maximum Flow per Capita per Day, 2013-2016

Flow Rate Parameter	Year			
	2013	2014	2015	2016
Average, gpcd	129	129	141	126
Minimum, gpcd	30	54	2	40
Maximum, gpcd	827	624	804	794

The city's problems with inflow and infiltration are primarily limited to the southeast portion of the city, south of Main Street and east of Front Street. The City of Walnut Ridge currently does not specifically measure infiltration and inflow; therefore I/I can only be estimated from wastewater influent flow records and customer base records.

Excessive infiltration and inflow into the sanitary sewer system can potentially cause overflows at manholes and other locations which are considered unpermitted discharges. To assess the potential of infiltration and inflow, the ADEQ's sanitary sewer overflow (SSO) database was analyzed from December 2001 through October 2017. **Table 10.0** provides the history of the SSO's frequency by year. There were no recorded SSO's during 2016 and 2017.

Table 10.0: History of Walnut Ridge Reported SSOs

Year	SSO Occurences
2001	2
2002	None Recorded
2003	None Recorded
2004	None Recorded
2005	None Recorded
2006	4
2007	1
2008	None Recorded
2009	3
2010	None Recorded
2011	7
2012	3
2013	5
2014	2
2015	4
2016	None Recorded
2017*	None Recorded
Total	31
<i>*No record for entire year</i>	

2.0 Present Wastewater Characteristics

Wastewater characterization data was obtained from historical Discharge Monthly Reports (DMR's), which were used to evaluate wastewater loading and effluent parameters at the wastewater treatment plant (WWTP). The data capture was from 2012 through 2015. The historical DMR data includes permit and sample criteria as established by the ADEQ issued NPDES permit. **Table 11.0** provides a summary of the analyzed data from 2012 through 2015.

Table 11.0: Historical Effluent Characteristics, 2012-2015

Effluent Characterization	2012 through 2015 Effluent Characterization		
	<i>Avg.</i>	<i>Min.</i>	<i>Max.</i>
Flow, Avg. Day (MGD)	0.58	0.27	1.05
Flow, Max. Day (MGD)	1.84	0.28	3.95
CBOD5, Mass (lbs/day)	15.99	2.30	37.20
CBOD5, 7-Day (mg/L)	4.91	2.40	11.00
CBOD5, Max. Mo. (mg/L)	3.44	2.00	7.00
TSS, Mass (lbs/day)	36.06	2.50	135.20
TSS, 7-Day (mg/L)	10.40	4.00	41.70
TSS, Max. Mo. (mg/L)	6.50	0.60	14.00
pH Min.	6.99	0.14	7.70
pH Max.	7.80	7.00	8.41
May-October			
NH3-N, Mass (lbs/day)	8.06	0.30	62.10
NH3-N, 7-Day (mg/L)	3.75	0.20	19.50
NH3-N, Max. Mo. (mg/L)	1.91	0.15	13.40
DO, (mg/L)	6.48	5.10	7.90
November-April			
NH3-N, Mass (lbs/day)	12.71	0.41	101.70
NH3-N, 7-Day (mg/L)	3.65	0.10	20.50
NH3-N, Max. Mo. (mg/L)	2.38	0.09	17.30
DO, (mg/L)	8.04	6.50	9.40
April-September			
Fecal Coliform (FCB), Mo. Avg.	26.68	3.00	121.00
Fecal Coliform (FCB), 7-Day Avg.	187.16	4.00	935.00
October-March			
Fecal Coliform (FCB), Mo. Avg.	21.54	2.00	85.00
Fecal Coliform (FCB), 7-Day Avg.	240.90	4.00	1865.00
Total Residual Chlorine (mg/L)	0.08	0.01	0.10

3.0 Quantity and Characteristics of Industrial and Other Major Wastewater Contributors

Walnut Ridge has three major highways and two major railroads running through the city, as well as an airport, the Walnut Ridge Regional Airport, which is capable of handling large air craft. Walnut Ridge has a large agricultural industry which includes rice, soybeans, wheat, and corn. Williams Baptist College is located next to the airport and the Walnut Ridge industrial park. Lawrence Memorial Hospital provides emergency and

comprehensive healthcare services to the city. Industries such as Frit Industries, Morgan Buildings and Spas, and Douglas/Quikut all provide jobs for the area. Other businesses and industries provide a relatively diverse commercial and industrial base for Walnut Ridge, with a wide range of goods and services represented.

The Walnut Ridge Industrial park is located adjacent to the Walnut Ridge Airport. The 2,200-acre industrial park is served by water, wastewater, natural gas, electricity, communications, railroad, and the airport.

F. Financial Information

1.0 Walnut Ridge Sewer Department Financials

The City Water Works provides water and sewer services to its customers from a system owned distribution network. All activities of the City Water Works are considered business type activities. The accounts of the City Water Works are organized on the basis of a proprietary fund type specifically an enterprise fund. The activities of this fund are accounted for with a separate set of self-balancing accounts that comprise assets, liabilities, net assets, revenues, and expenses.

The City of Walnut Ridge has three types of sewer customer classifications: Residential, Commercial, and Industrial. Walnut Ridge City Water Works currently serves a total of 2,807 sewer customers where there are 2,450 Residential sewer customers, 334 Commercial sewer customers, and 23 Industrial sewer customers.

The Walnut Ridge City Council passed an updated sewer rate ordinance in November 2016 that defined a sewer rate increase of \$1.80 per 1,000 gallons. Monthly sewer usage is estimated by the monthly water usage via water meters. The ordinance also defines the minimum monthly charge (or 'minimum bill') for each customer classification. The minimum monthly sewer bill, which is the same for all three customer classes, is \$4.40 per 1,000 gallons with a 1,000-gallon minimum. The current sewer bill for 4,000 gallons is \$17.60.

The minimum monthly water bill is \$10.25 per 1,000 gallons with a 1,000-gallon minimum. Additional fees that are charged to customers include the following, in **Table 12.0**.

Table 12.0: Additional Monthly Fees

Description of Additional Monthly Fee	Additional Monthly Fee
Trash Pick-Up	\$12.00
Fire Protection	\$5.00
Mosquito Spraying	\$1.50
Health Department Fee	\$0.30
Taxes (on Water, Trash, and Spray)	10%

Currently, Lawrence County Regional Water is the only wholesale water customer of the City Water Works, with a flat rate of \$3.50 per 1,000-gallons. The current average use for this wholesale water customer is approximately 140,000 gallons per month which supplies about 40 customers. The Walnut Ridge City Water Works does not currently have any wholesale wastewater customers.

2.0 Financial Status of Existing System

The City Water Works Audited Financial Statements for years ending June 30, 2014, June 30, 2015, June 30, 2016, and June 30, 2017, as well as 2018 budgetary information is included in the Appendices of this report. A summarized accounting of the financial statements for the Walnut Ridge Water and Sewer Works is shown in **Table 13.0** below. The City Water Works sewer system operation and maintenance expenses are not anticipated to change much as a consequence of this project. There are no new customers being added to the system as part of this project.

Table 13.0: Summary of Walnut Ridge City Water Works Financial Information

Account	2014	2015	2016	2017	2018 (Budget)
<i>Water Revenue</i>	\$ 766,246	\$ 754,262	\$ 779,504	\$ 884,861	\$ 945,000
<i>Sewer Revenue</i>	\$ 497,225	\$ 474,497	\$ 525,895	\$ 515,028	\$ 545,000
<i>Late Payment Charges</i>	\$ 25,623	\$ 31,397	\$ 30,746	\$ 35,496	\$ 36,000
<i>Misc. Income</i>	\$ 19,519	\$ 13,605	\$ 13,043	\$ 24,550	\$ 20,000
Total Operating Revenue	\$ 1,308,613	\$ 1,273,761	\$ 1,349,188	\$ 1,459,935	\$ 1,546,000
Total Operating Expense	\$ 1,332,380	\$ 1,363,302	\$ 1,364,185	\$ 1,382,835	\$ 1,497,250
TOTAL OPERATING INCOME (LOSS)	(\$ 23,767)	(\$ 89,541)	(\$ 14,997)	\$ 77,100	\$ 48,750
<i>Total Non-Operating Revenues (Expenses)</i>	<i>(\$ 42,672)</i>	<i>(\$ 40,518)</i>	<i>(\$ 40,921)</i>	<i>(\$ 35,148)</i>	<i>N/A</i>
TOTAL CHANGE IN NET	(\$ 66,439)	(\$ 130,059)	(\$ 55,918)	(\$ 41,952)	N/A
TOTAL NET	\$ 3,327,034	\$ 3,196,975	\$ 3,141,057	\$ 3,183,009	N/A

Operating revenues and expenses generally result from providing services and producing and delivering goods in connection with a proprietary fund's principle ongoing operations. The principle operating revenues of the enterprise funds include the cost of sales and services, administrative expenses, and depreciation on capital assets. All revenues and expenses not meeting these definitions are reported as non-operating revenues and expenses.

Descriptions and information regarding Capital Assets, Long-Term Debt, Bond Requirements, and Monthly Rates are included in the financial statements included in the Appendices.

II. OTHER INFORMATION FOR LINE WORK OR EXTENSION WORK

The City of Walnut Ridge Improvements Project described herein does not include the installation of any additional line work or extension work. Not Applicable.

III. FUTURE CONDITIONS

A. Past and Projected Population

An important component of any planning effort is the projection of future population. Anticipated population growth will influence the future needs for utility capacities, especially that of collection lines, pumping facilities, and treatment facilities.

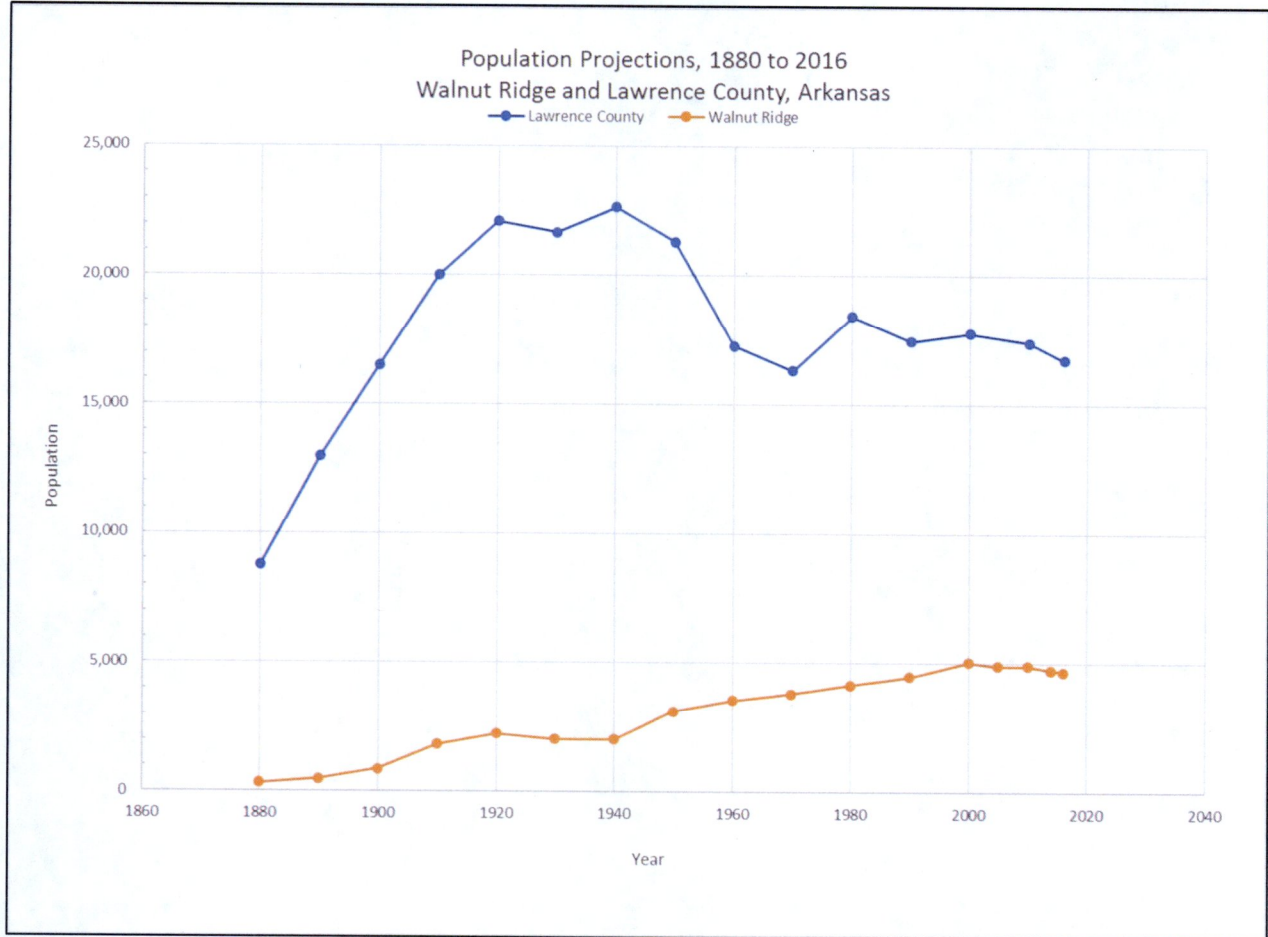
Historical population data for Lawrence County and the City of Walnut Ridge, from 1880 to 2016, is provided in **Table 14.0** and the following graph **Figure 4.0**. The population of the City of Walnut Ridge increased from 301 people in 1880 to 4,674 people in 2016. The UALR State Data Center does not provide projected population estimates for cities.

Table 14.0: Historical Population Data, U.S. Census Bureau

Census Year	U.S. Census Data (Population)	
	Lawrence County	Walnut Ridge
1880	8782	301
1890	12984	457
1900	16491	845
1910	20001	1798
1920	22098	2226
1930	21663	2007
1940	22651	2013
1950	21303	3106
1960	17267	3547
1970	16320	3800
1980	18447	4152
1990	17457	4472
2000	17774	5034
2005	---	4903
2010	17415	4890
2014	---	4734
2016*	16735	4674

** 2016 population data, estimated U.S. Decennial Census Data*

Figure 4.0: Historical Population Graph, U.S. Census Bureau



As can be noted, the population of Walnut Ridge peaked in 2000 at 5,034 people. Since 2000, the population of Walnut Ridge has slowly declined with a negative population growth rate (from 2000 to 2016) of -0.15 percent per year. From 1880 to 2000, the population of Walnut Ridge increased by approximately 4,733 people, with an average growth rate of 3.07 percent per year. The largest increase in population in Walnut Ridge occurred from 1900 to 1910, with an approximate yearly growth rate of 11.28 percent per year, growing an additional 953 people in 10 years. However, since 2005, population patterns indicate a slow decline, -0.50 percent per year, and perhaps a stabilizing of the decreasing population. The projected population, further discussed below, indicates a steady increase in population for the 20-year planning period. Based on trend analysis of historical populations, the 2037 projected population of Walnut Ridge is 6,691 people, or approximate of 2,000 additional people. This projection is based on average growth rate of 1.78 percent per year. The calculated 20-year population estimate is presented in **Table 15.0**, in 5-year increments, for a 20-year planning period of 2017 to 2037.

Table 15.0: 20-year Population Forecast by 5-year Increments, Walnut Ridge

Year	Projected Population
2017	4757
2022	5181
2027	5642
2032	6144
2037	6691

In 2014, the City of Walnut Ridge contracted with Urban Planning Associates, Inc. to develop a Comprehensive Plan for the future growth and development of the Walnut Ridge area. The plan serves as an official policy statement of the City of Walnut Ridge for directing orderly growth and development within its city limits and planning area. The Walnut Ridge Planning Commission directed the preparation of the plan during a process which included careful study of the area. Areas of analysis include Walnut Ridge's history, demographics and projected population, topography, utility capacity, transportation systems, existing infrastructure, and surrounding land use. The plan is to guide the decisions of the Planning Commission and the City Council during a 25-year planning period.

The plan points out that Walnut Ridge's historic growth rates suggest a return to population growth. According to the plan, Walnut Ridge's historical growth rate data from 1970 onward indicates the population could reach 5,552 people by 2030. Projections calculated from Lawrence County population projections from the University of Arkansas-Little Rock Institute for Economic Advancement shows the population declining to 4,735 in 2030. The plan further uses three population growth scenarios to predict future growth. The first scenario is based on linear extrapolation of trends over the last 30-years, yielding 5,552 people by 2030. The second scenario, provided by data based on UALR projections for Lawrence County, yield a population of 4,735 people by 2030. A third scenario assumes a one-percent annual growth rate to yield 5,967 people by 2030.

The three scenarios presented in the Comprehensive Plan, as well as the projections calculated for this report, show a range of growth possibilities for the city. It is possible that over the course of the next 20 years that Walnut Ridge could experience population change resembling any of the three presented scenarios and the calculated projection. Therefore, the population projection presented herein, as calculated and shown in **Table 15.0**, is used to determine future growth for utility needs of the city.

B. Projected Flow Rates

Using the estimated population and the average day wastewater flow rates, as given in Section I of this report, a per capita average day wastewater flow rate of 122 gallons per capita day (gpcd) is calculated. Applying the average rate of 122 gpcd to the projected population, and using the peaking factors developed, yields the projected wastewater flow rates presented in **Table 16.0**.

Table 16.0: Projected Wastewater Flow Rates

Year	Population	Flow Rate (mgd)		
		Average Day	Maximum Month PF = 1.81	Maximum Day PF = 6.70
2017	4757	0.58	1.05	3.89
2022	5181	0.63	1.14	4.23
2027	5642	0.69	1.25	4.61
2032	6144	0.75	1.36	5.02
2037	6691	0.82	1.48	5.47

C. Possible Effluent Limits

Due to the current WWTP's inability to meet NPDES discharge permit limits, an alternative discharge location at the Black River, with less stringent discharge requirements, is considered as part of this planning effort. The effluent would be pumped through 8.45-miles of 14-inch PVC pipe to an outfall location on the Black River near the convergence of the Spring River and the Black River, at the end of the North-South Lawrence County Road 411, or 3.7-miles upstream from the USGS river gauge at the U.S. Hwy. 63 bridge. This outfall alternative is further discussed in Section IV below. The watershed area at the outfall is 7,370-square-miles with a 7Q10 flow of 2,060 cfs, and is in the Delta Ecoregion. ADEQ has stated that the DO water quality standard is 5.0 mg/L year-round for a discharge at this location. Per discussions with ADEQ regarding the possible relocation of the discharge of treated domestic wastewater to the Black River, the preliminary limits are shown in Table 17.0.

Table 17.0: Preliminary Limits for Discharge to the Black River (ADEQ)

Parameter	Monthly Average	Daily Maximum
BOD5 (year-round)	30.0 mg/L	
TSS (year-round)	30.0 mg/L	
DO (year-round)	2.0 mg/L (Instantaneous Minimum)	
Fecal Coliform Bacteria		
	(May-September)	200 col/100 mL
	(October-April)	1,000 col/100 mL
pH (year-round)	6.0 – 9.0 s.u.	
Acute WET Testing Dilution series: 1.3%, 1.7%, 2.3%, 3.0%, 4.0% Critical Dilution: 3.0%	Once/quarter Reporting	

D. Present and Projected Number of Users

Currently, the City of Walnut Ridge has 2,807 sewer customers of which 2,450 are Residential Customers, 334 are Commercial Customers, and 23 are Industrial Customers. There are no new users projected to be added to the customer base with the proposed improvements detailed herein.

IV. DEVELOPMENT AND SCREENING OF ALTERNATIVES

The scope of the proposed project includes compiling wastewater treatment alternatives including alternative discharge locations. An evaluation of the current sewer rate structure with funding alternatives will be considered.

A. Alternatives

The first (**Alternative 1.0**) and second (**Alternative 2.0**) alternatives includes the construction of two (2) new Extended Aeration, Activated Sludge, field erected wastewater treatment units. Each of these alternatives include the common components of constructing a new bar-screen structure with splitter box, a new administration building, a new blower building and new blowers, yard piping additions/modifications, and modifications to the existing chlorination/dechlorination basin. The administration building is proposed to be a 35-foot by 20-foot metal building with an office, restroom, storage room, and electrical room. The proposed blower building is to be a 20-foot by 40-foot metal building with a chemical feed room and an overhead coiling door. The general arrangement of both **Alternative 1.0** and **Alternative 2.0** can be seen on **Exhibit 1** in the Appendices of this report. These two alternatives include keeping the current discharge location at Village Creek. The third alternative (**Alternative 3.0**) is for a partial mix aerated lagoon wastewater treatment plant with discharge to the Black River. The fourth alternative (**Alternative 4.0**) is the "Do Nothing" approach.

For the two (2) alternatives reviewed, the existing influent 12-inch forcemain would be plugged and a live tie-in with new 12-inch ductile iron pipe would be installed to divert the influent wastewater to the new bar screen structure. This live tie-in would take place as one of the final steps of construction of the new treatment process so that the existing wastewater treatment process can remain in service during construction. Both alternatives include the construction of a new bar screen structure which will include an influent chamber area, a single 1/2-inch mechanically-cleaned coarse bar screen, followed by a splitter box. The splitter box proposed is for properly dividing influent flow between the treatment units, by use of adjustable weirs. The splitter box will also have a pipe for full flow diversion from the bar screen and treatment units, if a need for such ever arises. Effluent from the treatment units will flow by a new 24-inch ductile iron pipe that would tie-into the existing 24-inch clarifier effluent pipe of the existing treatment process. The existing chlorine contact/dechlorination basin is adequately designed for a maximum flow of 4.475 MGD, based only on volume and the minimum allowable chlorine contact time of 15-minutes. These preliminary calculations are included in the Appendices of this report. Further detailed calculations will be completed as design of the process progresses. The existing 90-degree V-notch effluent weir may be raised or modified, and is contained within the chlorine contact/dechlorination basin.

The existing 24-inch effluent pipe to Village Creek will be decommissioned and a new 14-inch PVC effluent forcemain and pump station will be installed to pump the wastewater effluent for discharge to the Black River. The proposed effluent pump station will contain four (4) new pumps, two (2) at 1,100 gpm at 100-feet total dynamic head (TDH) and two (2) at 2,400 gpm at 100-feet

TDH, where one (1) of the 2,400 gpm pumps will act as a “stand-by”. The proposed effluent pipeline route, 8.45-miles long, is shown on **Exhibit 2** in the Appendices of this report. The construction cost estimate of the proposed 14-inch effluent forcemain is \$4,310,600. The detailed cost estimate for the forcemain and pump station is included in the Appendices of this report.

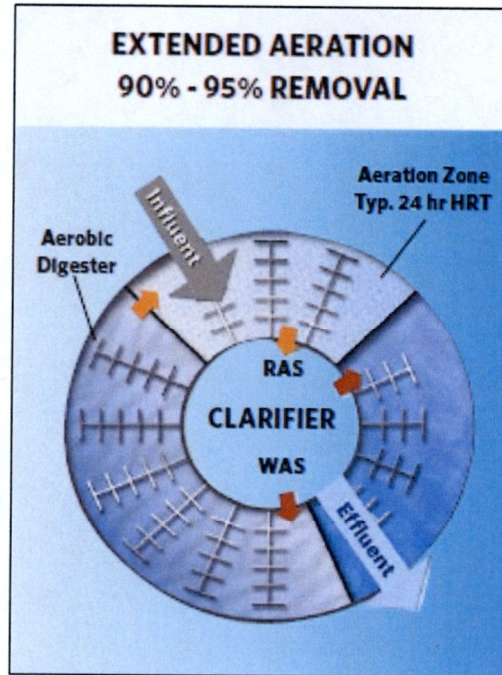
As previously mentioned, each alternative also includes the construction of a new 700-square-foot administration building and a new 800-square-foot blower building. Further treatment site improvements include the decommissioning of the existing Biolac® treatment system, the existing headworks building, the existing blower building, new gravel access roads, concrete sidewalks, and electrical/controls modifications and additions. The following are further descriptions of each of the treatment processes considered for this project.

Alternative 1.0: Field-Erected (FE) Extended Aeration Package Plant by Evoqua (Davco). For this alternative, the proposed new treatment units will bypass the existing Biolac® treatment system, which will be decommissioned at the end of new plant construction. The new field erected WWT units will be extended aeration, activated sludge type treatment units as provided by Evoqua will be constructed in-ground. In a single reactor basin, the system accomplishes aeration and clarification. **Figure 5.0** and **Figure 6.0** show the OMNIPAC SBR System.

Figure 5.0: Davco Field-Erected System Example, 1MG Dual-Path Process



Figure 6.0: Davco Field-Erected General Treatment Schematic



This package plant approach is pre-engineered and factory-built; however, this system will be built in-ground. For this Alternative, there will be two (2) 110-foot diameter units with an average day capacity of 625,000 gallons-per-day (GPD) each, which can operate in parallel and serve as redundancy. These units will be designed with a 3.0 peaking factor, allowing for a total influent flow of 3.75 MGD to be treated. Further information on this system, as well as the design proposal, can be found in the Appendices of this report. The design proposal includes the addition of the digester section of each tank, but the digester is currently not being considered in final design which reduces the cost by about 10-percent. The treatment process aeration will include the installation of three (3) new 100-Hp blowers in the proposed blower building. The blowers included in the preliminary design are centrifugal multistage blowers. The following **Table 18.0** represents the preliminary construction cost estimate for this treatment process with the two outfall alternatives. The details of this preliminary cost estimate is included in the Appendices of this report.

Table 18.0: Alternative 1.0 Construction Cost Estimate

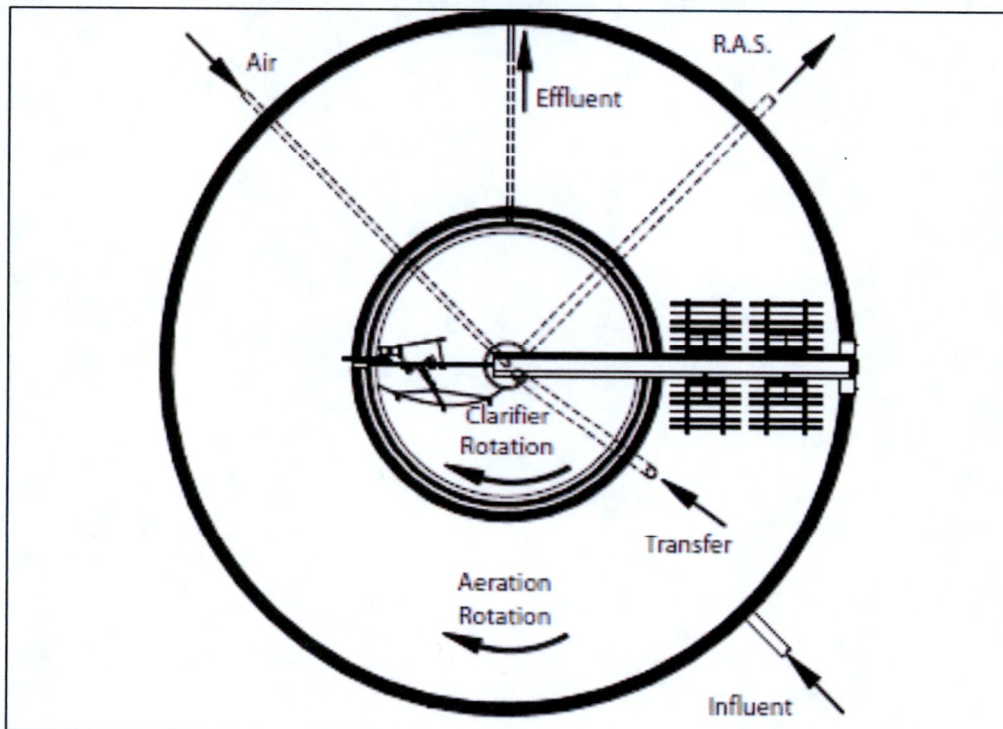
Alternative Description	Preliminary Construction Cost Estimate (2018 \$)
Alt. 1.0: Field-Erected Extended Aeration Package System by Davco, with Discharge to Existing Outfall at Village Creek	\$4.96 M

Alternative 2.0: Field-Erected (FE) CSR Package Plant, Model GR by Schreiber Corporation. For this alternative, the proposed new treatment units will bypass the existing Biolac® treatment system, which will be decommissioned at the end of new plant construction. The new field erected WWT units will be extended aeration, activated sludge continuously sequencing reactor (CSR) type treatment units as provided by Schreiber. The treatment units are Biological Nutrient

Removal (BNR) systems contained in a single basin. It sequences through the three (3) process phases required for BNR – Oxic, Anoxic, and Anaerobic. The three phases do not occur at the same time in the basin but occur sequentially, one after the other, repetitively, over time. During the Oxic phase, the entire basin is Oxic (i.e. aerobic). When the air is turned off, the entire basin becomes anoxic and then ultimately anaerobic. With the CSR system, the diffusers are constantly moving through the water. The contents of the basin are mixed as the rotating bridge moves around the basin. After the anaerobic phase is completed, the air is turned back on and the cycle repeats. This system is designed for complete separation of aeration and mixing and has a 100% aeration turndown capability (which allows low energy mixing without aeration). The Schreiber FlexControls can be programmed for many alternative scenarios, which can be as simple as a DO system with timers or can be an online monitoring of BNR process parameters.

The Model GR basin configuration proposed for this project utilizes the CSR system to provide high-efficiency aeration and separate low energy mixing for activated sludge. The GR unit incorporates aeration and clarification within the same structure to optimize space utilization. **Figure 7.0** shows the Schreiber CSR Model GR typical basin configuration as proposed for this alternative.

Figure 7.0: Schreiber CSR Model GR Typical Basin Configuration



For this Alternative, there will be two (2) 140-foot diameter units with an average day capacity of 1.25 MGD each. The unit will include four (4) dual arm rotating aeration assemblies, two (2) single arm rotating aeration assemblies, three (3) 60-Horsepower blowers with manifold and powder coated enclosure, a D.O. Process Control System, all necessary scraper assemblies, scum removal equipment, effluent weirs, scum baffles and brackets. Further information on this system, as well

as the design proposal, can be found in the Appendices of this report. The following **Table 19.0** represents the preliminary construction cost estimate for this treatment process with the two outfall alternatives. The details of this preliminary cost estimate is included in the Appendices of this report.

Table 19.0: Alternative 2.0 Construction Cost Estimate

Alternative Description	Preliminary Construction Cost Estimate (2018 \$)
Alt. 2.0: Field Erected CSR Package Plant, Model GR by Schreiber, with Discharge to Existing Outfall at Village Creek	\$4.37 M

Alternative 3.0: Partial Mix Aerated Lagoon by Environmental Dynamics International (EDI). For this alternative, the proposed new treatment units will bypass the existing Biolac® treatment system, which will be decommissioned at the end of new plant construction. The Partial Mix (PM) lagoon is an enhanced facultative lagoon process to simultaneously remove BOD and provide solids separation and digestion. The enhancement is achieved by the circulation of the lagoon bulk liquid whereby soluble carbonaceous BOD (cBOD) is introduced to biosolids. Note the difference between this and a Complete Mix lagoon which uses greater airflows to keep all biosolids in suspension so a higher concentration can come in contact with soluble cBOD more efficiently than the PM. PM lagoons are typically several days' detention (generally more than 5 days). Aeration is only provided to maintain oxygen in the liquid portion of the lagoon, and air flow is limited to the process oxygen demand from cBOD removal. Solids settling and digestion is facilitated in the same reactor. Mixing (i.e., solids suspension) via aeration is not a factor in the design so a low-energy system is possible. Typical BOD removal and oxygen demand in the PM lagoon is defined by biological reaction rates as published in US EPA design manual EPA-625-83-015, "Municipal Wastewater Stabilization Ponds." Removals are based on first order kinetics for detention times and temperature of the lagoon. Nitrogen is removed in PM reactors primarily via assimilation by heterotrophic organisms. Very little autotrophic nitrification can be expected on a consistent basis, although nitrification may become established with the combination of a warm climate and long detention time. Alternate provisions must be employed under any circumstance if nitrogen removal is desired. The design for this system involves two basins divided into four (4) separate zones. The first basin is divided into three (3) zones by baffle curtains. The Basin Design Summary Information and the Air/Blower Design Information are shown in **Table 20.0** and **Table 21.0** below.

Table 20.0: Basin Design Summary Information

Parameter	Zone 1	Zone 2	Zone 3	Zone 4
Volume, MG	5.1	5.5	5.1	10.5
Retention Time, Days	4.1	4.4	4.1	8.4
Operating Regime	Partial Mix	Partial Mix	Partial Mix	Partial Mix
Expected Winter Effluent Concentration (BOD5 and TSS), mg/L	149	89	56	25

Table 21.0: Air/Blower Design Information

Parameter	Design
Airflow Requirements, scfm	1898
Design Blower Operating Pressure, psig	5.8
# of Duty Blowers	1
# of Standby Blowers	1
% of Blower Capacity	87
Motor Size, hp	75

Detailed design information from the manufacturer can be found in the Appendices of this report. **Exhibit 3** shows the preliminary layout for this type of system. The submerged lateral aeration system will need to be installed dry with a drained and dredged basin. Effluent flow to the Black River is required with this system, as the treatment capability for this type of system is not adequate for discharge at the existing outfall location on Village Creek. The following **Table 22.0** represents the preliminary construction cost estimate for this treatment process with the outfall at the Black River. The details of all preliminary cost estimates are included in the Appendices of this report.

Table 22.0: Alternative 3.0 Construction Cost Estimate

Alternative Description	Preliminary Construction Cost Estimate (2018 \$)
Alt. 3.0: Partial Mix Aerated Lagoon Plant	\$4.42 M
w/ Discharge to Existing Outfall at Village Creek	\$8.73 M

Alternative 4.0: Do Nothing or Upgrades

The existing wastewater treatment plant effluent currently does not consistently meet the ADEQ NPDES Permit Requirements for discharge to Village Creek. If alternative wastewater treatment facilities are not provided, discharge from the existing treatment facility can be expected to continue to violate permit requirements.

Other than an inability to meet the discharge permit requirements, the no action alternative would have no other noticeable environmental impacts on the facility planning area. However, if Walnut Ridge continues to not meet its wastewater permit requirements, ADEQ could impose fines and other restrictions on the City Water Works. Such actions would have a significant adverse economic impact on the facility planning area. Furthermore, the existing treatment train process has reached its useful life and improvements or upgrades to the existing system are uneconomical and not justified, as the treatment capacity and capability cannot be improved by any such modifications. The no action alternative is therefore undesirable from a water quality and, perhaps, an economic perspective, and is therefore eliminated from further consideration. Furthermore, due to the inability to upgrade the existing treatment system, improvements considerations are therefore eliminated from further consideration as well.

B. Regionalization

The Walnut Ridge City Water Works (and Sewer Department) is the largest wastewater system within 10-miles of the City of Walnut Ridge, regionalization is not applicable.

C. Sludge Treatment and Disposal

The existing sludge handling and disposal is to pay for it to be hauled away after removal from the WWTP site sludge lagoon. This is expected to be the continued practice, unless the City Water Works decides to look into other options. From a regulatory perspective, the options available for ultimate disposal of municipal sewage sludge are limited. All practical sludge disposal options currently available generally involve either land application (including treatment and reuse options), surface disposal (including landfills), and incineration. Currently, there are no plans to modify the current process. Currently, waste sludge is removed from the Biolac® secondary clarifiers by air-lift pumping and is conveyed to a sludge lagoon. Because the sludge is not routinely wasted from the current treatment process, there is little information available concerning sludge production at the Walnut Ridge WWTP from which to base any production estimates. Although cost-effective on an interim basis, this practice does not provide for ultimate disposal of the accumulating sludge. When the lagoon approaches capacity, it will be necessary to remove the sludge from the lagoon for ultimate disposal. With this facility, method of land application is usually accomplished on a competitive-bid contract basis.

D. Alternative Conveyance Systems

Not Applicable.

E. Environmental Impact of Project

The environmental, and perhaps economic, impacts of the no action alternative are not acceptable. Implementation of the no action alternative would result in violations of the Arkansas water quality standards and the NPDES permit requirements. The no action alternative is therefore eliminated from further consideration, because any alternative must, at a minimum, be able to meet permit requirements.

The proposed project for wastewater treatment would not have an impact on the site of the facility, as this project occurs on the existing wastewater treatment site owned by the City of Walnut Ridge. However, the construction of a new outfall will certainly have environmental impacts. As part of preparing the Environmental Report for the proposed project, project information will be sent to numerous resource and regulatory agencies to identify any environmental impacts.

Except for the construction of a possible new outfall forcemain, which would intersect floodplain areas, none of the proposed project features will be located in a 100-year floodplain. The proposed project therefore should have no significant impact on floodplains.

According to historic information provided by resource and regulatory agencies, there are no critical habitats, national or state parks or forests, fish and wildlife refuges, national natural landmarks, or wild and scenic rivers in the project planning area. There are, however, floodplains, wetlands, and prime farmland located within the City planning area. Almost all of the land surrounding the corporate limits of Walnut Ridge is either wetland or prime farmland. The White Oak Slough, which is located to the east of Walnut Ridge, is a nearby recognized wetlands area. Other than minor impacts, the project should have no significant impact on wetlands. Historic information further provides that there are no listed, proposed, or candidate threatened or endangered species present in the planning area. Also, it was historically reported that there are no known threatened or endangered species in the planning area. The Arkansas Game and Fish Commission historically determined that the project should have an insignificant adverse impact upon non-endangered fish and wildlife resources.

Walnut Ridge is located among four different state parks: Old Davidsonville, Lake Charles, Lake Frierson, and Crowley's Ridge. All are located within 20 miles of the city.

F. Collection System

Not Applicable. No proposed collection system expansion work is part of the proposed project.

V. COST EFFECTIVE ANALYSIS

A. Capital Costs

The following cost estimate in **Table 23.0** is a summary of the proposed project, the Walnut Ridge Improvements Project, **Alternative 2.0.A**, and is presented in 2017 dollars. The detailed cost estimates are included in the Appendices of this report.

Table 23.0: Cost Estimate Summary

Estimated Item Description	Estimated Cost
Construction Improvements (Treatment)	\$4,366,900
Engineering, Legal, Environmental, and Administration (20%)	\$873,000
Subtotal	\$5,239,900
Interest During Construction	\$144,000
Total Estimated Cost	\$5,370,900

The cost estimate information shown includes costs for construction, engineering, and contingencies as well as the assumption that funding will be by the United States Department of Agriculture – Rural Development Division for 40-years at an interest rate of 2.50-percent. With

an estimate of \$5,370,000, the loan information included herein is rounded up to a total loan of \$6,000,000 for conservative projection information. Once actual funding is obtained these projections will be modified to account for actual final cost estimates of design. For a loan of \$6,000,000, the annual payment estimate is approximately \$240,000. A 10-percent annual reserve amount is added to the projected annual payment amount, or approximately \$24,000. Based on a USDA-RD loan of \$6,000,000 at 2.5-percent over 40-years, with a 10-percent reserve fund, the estimated annual debt service is approximately \$263,000. Further funding may be provided by the passing of a sales tax, to be put forth for voting in 2018. At this time there are no additional funds from other sources, sales taxes or otherwise, projected to be used for this project and therefore funding assumptions included in this report are assumed to be 100-percent financed by a USDA-RD loan or similar financing loan mechanism.

B. Operation, Maintenance, and Replacement Costs

The proceeds from established rates or sales tax will be used for the purpose of operating and maintaining the Walnut Ridge wastewater system. Rates for water and wastewater utilities were recently increased in October 2016. The raise in 2016 was to offset the rising cost of labor and equipment expenses, as the utility reportedly lost \$33,775.05 in 2015. As part of the funding acquisition process, a review of the existing wastewater rates may again be examined to ensure there is adequate funding for operation, maintenance, and replacement costs, as well as adequate funding for other necessary costs. Operation, maintenance, and replacement costs for the proposed project improvements are therefore subject to the established, and possibly increased, sewer rates.

The Walnut Ridge City Water Works operates and maintains the water and wastewater utility systems for the city. The department operation expenses from 2014 through 2017 are shown on the statements included in the Appendices of this report. The proposed project is not expected to significantly change the Operation and Maintenance Costs associated with treatment and collection of wastewater from the Walnut Ridge system.

VI. SELECTED ALTERNATIVE

A. Selected Alternative

The proposed project is described in Section IV of this report, titled as **Alternative 2.0.A.**

B. Land and Easements

Improvements at the wastewater treatment plant will occur on land already owned by the City of Walnut Ridge. Any required or new utility right-of-way easements and lands will be obtained by the City of Walnut Ridge, working in concert with the Walnut Ridge City Water Works, the City Engineer, landowners, the City Attorney, and any other necessary individuals. Each easement will be properly recorded at the County Courthouse.

C. Staffing Requirements

No additional staff to the present Walnut Ridge City Water Works department are anticipated as a consequence of the proposed project and improvements.

D. COE Permits

Permits may be required during construction of the new outfall forcemain.

E. Other Significant Issues

If required, the Environmental Report will address direct and indirect impacts on any land use, floodplains, wetlands or other important resources, endangered species, historical and archeological properties, water quality, coastal resources, and socio-economic/environmental justice factors as they relate to the selected alternative.

1.0 Needs of Project Area

The Walnut Ridge planning area is adequately served by the existing parks and recreational facilities, educational, airport, industrial park, and medical facilities. The railroad and highway transportation systems appear adequate for the area.

The planning area is served by water, wastewater, electric, natural gas, and communications utilities. With the exception of the wastewater system, the other utilities have adequate capacity and capability to serve the area.

With the exception of the need to upgrade and improve the wastewater system, there are no known deficiencies in the planning area public services.

2.0 Social and Economic Conditions

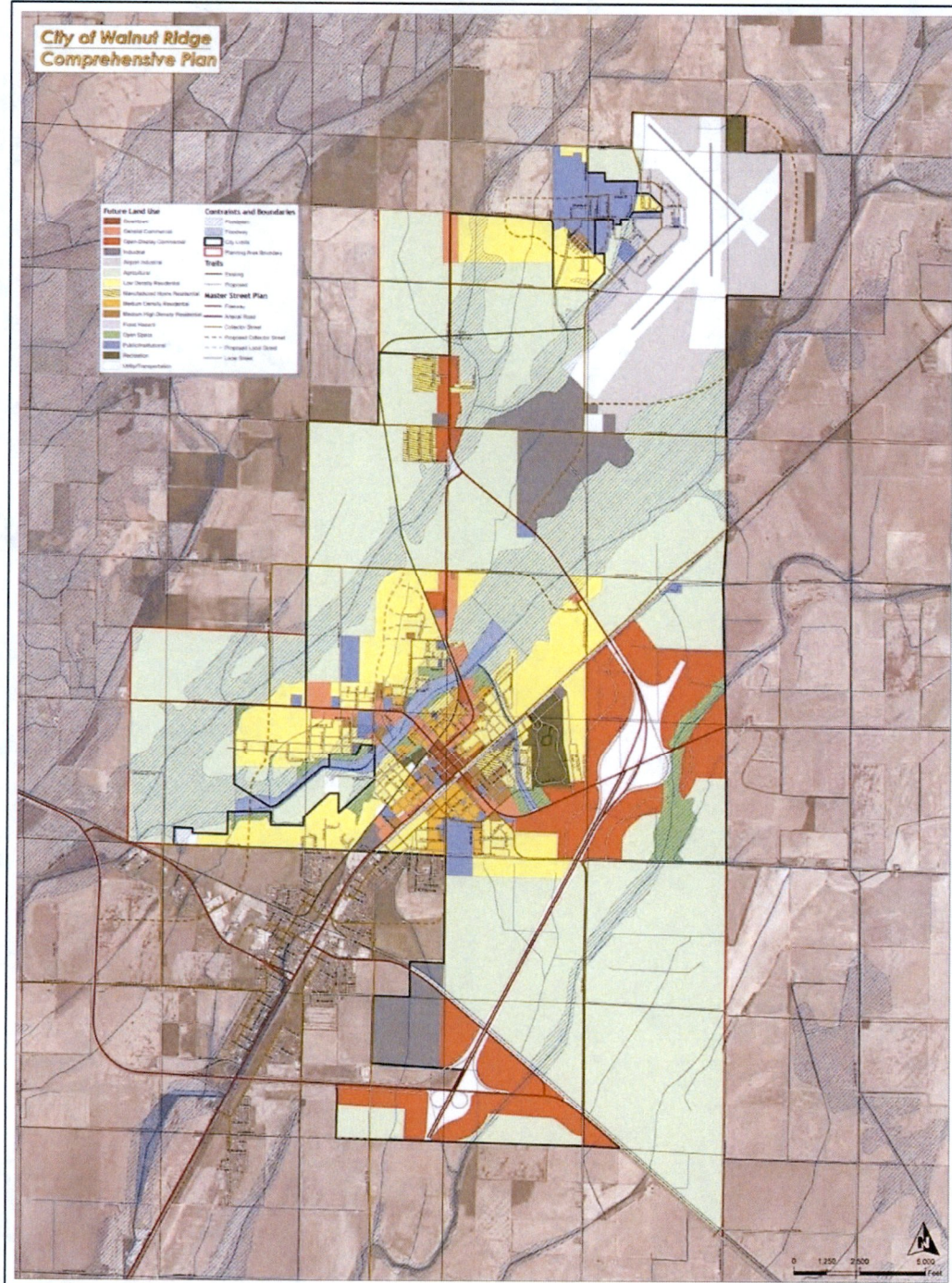
Median household income in Walnut Ridge in 2016 was \$40,957, compared to the State of Arkansas median household income in 2016 of \$44,334. Approximately 40-percent of the number of households in Walnut Ridge in 2016 had a median household income range of \$10,000 to \$40,000. The median per capita income in Walnut Ridge in 2016 was \$19,754, compared to the State of Arkansas median per capita income in 2016 of \$24,264. Residents with income below the poverty level in 2016 was 24.0-percent, compared to that of the State of Arkansas in 2016 of 23.3%. The unemployment rate of Walnut Ridge in 2015 was 5.4-percent, compared to the State of Arkansas in 2015 at 4.8-percent.

The most common industries in Walnut Ridge, in order of the greatest percentage, are health care, educational services, machinery, construction, accommodation and food services, food and beverage stores, and professional, scientific, and technical services.

3.0 The Planning Area

The Walnut Ridge Planning Area Boundary map, created with the 2014 Comprehensive Plan commissioned by Walnut Ridge, is shown as **Figure 8.0** below. The Planning Area Map was prepared in accordance with statutes found in the Arkansas Codes, Annotated §14-56-413. A copy of the planning boundary map is on file with the City Clerk and the Lawrence County Recorder.

Figure 8.0: Walnut Ridge 2014 Comprehensive Plan Planning Area Boundary Map



The Planning Area Boundary depicted includes those lands within the territorial jurisdiction of Walnut Ridge for which it may prepare plans, ordinances, and regulations. This area extends beyond the city limits to include those areas most likely to become a part of the city within a period of twenty-five years. The City of Walnut Ridge will, in accordance with A.C.A. §14-56-422, file the plans, ordinances, and regulations as they pertain to the territory beyond the corporate limits with the county recorder of Lawrence County.

F. Construction Obstacles

No construction obstacles are anticipated.

G. Sludge Management

It is anticipated that sludge management will continue in the same fashion as currently exists, as described in Section IV.C above. A specific sludge management plan may be further detailed during the design and construction phases of the proposed project, if deemed necessary.

H. Annual O&M Budget

Copies of the City Water Works operation and maintenance budgets are included in the Appendices of this report. Additional operation and maintenance requirements or expenses are not expected with the implementation of the proposed project and improvements.

I. Capital Funding Plan

See information presented in Division V, Section B of this report. All loan information and calculations are based on a loan of 100-percent of the project amount.

J. Sewer Rate Information

Data based on 11 months, December 2016 to October 2017, show that the City of Walnut Ridge monthly sewer revenue is \$40,483. The average monthly bill is \$17.85.

1.0 Minimum Sewer Bill

The minimum sewer bill is discussed in previous sections of this report.

2.0 Charge for 4,000 Gallons

See information presented in Section I, Part F of this report.

3.0 Other Fees

See information presented in Sections I through VI, herein.

4.0 Copy of Present User Charge Rate Schedule(s)

See the Appendices of this report for the financial audit statements, which include the user charge rates for the audited year.

K. Design Criteria

Preliminary design criteria for the proposed project are included in the Appendices of this report.

L. Implementation Schedule

The following table, **Table 24.0**, is an approximate of the project timetable, assuming the project is funded by the USDA-RD program.

Table 24.0: Project Implementation Schedule

Project Tasks	Estimated Duration, Months
Pre-Contract/Contract, includes: Resolution of Intent & Signatory Authority; Negotiate and Procure Professional Services; Regulatory Review and Approval.	3 to 5
WWAC Report and Reviews, includes: Prepare and Submit WWAC Report; Receive WWAC Comment Letter.	2 to 4
Draft Reports, Ordinances, and Reviews, includes: Prepare and Submit Draft Engineering Report (ER); Prepare and Submit Draft Environmental Information Document (EID); Submit Draft Rate and Sewer Use Ordinance (if Required); Regulatory Review and Comment.	6 to 12
Public Hearings and Reports, includes: Advertise for and Conduct Public Meeting; Revise PER and EID as Required; Advertise for and Conduct Public Hearing; Submit Final Engineering Report; Submit Final EID with Public Participation Documents; Regulatory Review and Approvals	3 to 6
Preparation and Approval of Plans, Specifications, and Ordinances, includes: Submit Draft Drawings and Specifications; Submit Draft Project Performance Work Plan; Regulatory Review and Comment; Submit Enacted Ordinances; Submit Final Drawings and Specifications; Submit Final Project Performance Plan; Regulatory Approvals.	12 to 18
Bidding/Pre-Construction, includes: Negotiate Engineering Agreement for Construction; Regulatory Review and Approval; Update Application as Required; Bond Ordinance; Bond Purchase Agreement; Loan Closing; Regulatory Reviews and Approvals.	6 to 12
Construction (1-year) and Post-Construction (1-year Project Performance).	24

APPENDIX A

FINANCIAL AUDIT STATEMENTS AND USER RATE CHARGE



CRIST JOB NO.
1618



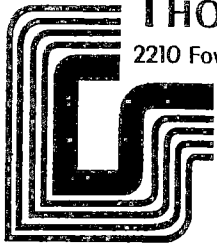
PRELIMINARY ENGINEERING REPORT
WASTEWATER IMPROVEMENTS
JANUARY 2018

Walnut Ridge Water & Sewer Works
(A Component Unit of the City of Walnut Ridge, Arkansas)
Audited Financial Statements

For the Years Ended June 30, 2015 and 2014

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THOMAS, SPEIGHT & NOBLE

2210 FOWLER AVENUE, JONESBORO, AR 72401 (870) 932-5858

A PROFESSIONAL ASSOCIATION OF CERTIFIED PUBLIC ACCOUNTANTS
MEMBER OF THE PRIVATE COMPANIES PRACTICE SECTION OF THE AMERICAN INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS

INDEPENDENT AUDITORS' REPORT

To the Board of Commissioners
Walnut Ridge Water & Sewer Works

Report on the Financial Statements

We have audited the accompanying financial statements of Walnut Ridge Water & Sewer Works as of and for the year ended June 30, 2015 and 2014, and the related notes to the financial statements, which collectively comprise Walnut Ridge Water & Sewer Works basic financial statements as listed in the table of contents.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express opinions on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

Opinions

In our opinion, the financial statements referred to above present fairly, in all material respects, the respective financial position of Walnut Ridge Water & Sewer Works as of June 30, 2015 and 2014, and the respective changes in financial position and cash flows thereof for the years then ended in accordance with accounting principles generally accepted in the United States of America.

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Other Matters

Required Supplementary Information

Management has omitted the management's discussion and analysis that accounting principles generally accepted in the United States of America require to be presented to supplement the basic financial statements. Such missing information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. Our opinion on the basic financial statements is not affected by this missing information.

Other Reporting Required by *Government Auditing Standards*

In accordance with *Government Auditing Standards*, we have also issued our report dated April 28, 2016, on our consideration of Walnut Ridge Water & Sewer Works internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements and other matters. The purpose of that report is to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering Walnut Ridge Water & Sewer Works internal control over financial reporting and compliance.

Thomas, Speight & Noble, CPAs

Thomas, Speight & Noble, CPAs
Jonesboro, Arkansas
April 28, 2016

Walnut Ridge Water and Sewer Works
Statements of Net Position
June 30, 2015 and 2014

	2015	2014
<u>ASSETS</u>		
CURRENT ASSETS		
Cash and cash equivalents - unrestricted	\$ 17,214	\$ 30,672
Customer accounts receivable	138,932	119,030
Accrued interest receivable	286	286
Prepaid insurance	10,525	12,385
Materials inventory (at cost)	42,653	38,130
Total current assets	209,610	200,503
NON-CURRENT ASSETS		
Cash and cash equivalents - restricted for debt service	306,837	296,319
Restricted investments	125,754	125,031
Capital assets		
Capital assets, net of accumulated depreciation	4,038,485	4,194,001
Total non-current assets	4,471,076	4,615,351
TOTAL ASSETS	\$ 4,680,686	\$ 4,815,854
<u>LIABILITIES AND NET POSITION</u>		
CURRENT LIABILITIES		
Accounts payable	\$ 59,837	\$ 64,101
Sales tax payable	6,484	6,484
Accrued and withheld payroll taxes	3,951	3,717
Accrued wages	2,148	2,111
Accrued retirement	19,424	18,970
Accrued compensated absences	26,715	6,168
Customer deposits	108,879	108,659
Accrued interest	1,177	1,227
Current portion of long-term debt	28,390	27,313
Due to other governments	69,014	63,988
Total current liabilities	326,019	302,738
LONG-TERM DEBT, net of current maturities	1,157,692	1,186,082
TOTAL LIABILITIES	1,483,711	1,488,820
NET POSITION		
Net investment in capital assets	2,825,422	2,980,606
Restricted for debt service	2,279	2,427
Unrestricted	369,274	344,001
Total net position	3,196,975	3,327,034
TOTAL LIABILITIES AND NET POSITION	\$ 4,680,686	\$ 4,815,854

The accompanying notes are an integral part of these financial statements.

Walnut Ridge Water and Sewer Works
Statements of Revenues, Expenses and Changes in Net Position
For the Years Ended June 30, 2015 and 2014

	2015	2014
OPERATING REVENUES		
Water revenue	\$ 754,262	\$ 766,246
Sewer revenue	474,497	497,225
Late payment charges	31,397	25,623
Miscellaneous income	13,605	19,519
Total operating revenue	1,273,761	1,308,613
OPERATING EXPENSES		
Purchased water	539,620	514,029
Salaries, wages & benefits	342,560	300,442
Payroll taxes	19,463	22,347
Depreciation & amortization	162,535	161,061
Utilities	106,258	79,317
Maintenance materials & contractual services	74,470	131,585
Insurance	11,956	19,805
Office expense	25,373	33,484
Lab fees	39,184	33,895
Bad debts	9,283	14,713
Professional fees	16,495	14,977
Other expense	16,105	6,725
Total operating expenses	1,363,302	1,332,380
OPERATING INCOME (LOSS)	(89,541)	(23,767)
NON-OPERATING REVENUES (EXPENSES)		
Interest income	1,880	1,094
Interest expense	(42,398)	(43,766)
Nonoperating revenues (expenses)	(40,518)	(42,672)
CHANGE IN NET POSITION	(130,059)	(66,439)
NET POSITION AT BEGINNING OF YEAR	3,327,034	3,393,473
NET POSITION AT END OF YEAR	\$ 3,196,975	\$ 3,327,034

The accompanying notes are an integral part of these financial statements.

Walnut Ridge Water and Sewer Works
Statements of Cash Flows
For the Years Ended June 30, 2015 and 2014

	2015	2014
Cash flows from operating activities:		
Cash receipts from customers	\$ 1,253,859	\$ 1,319,731
Cash payments to suppliers for goods and services	(838,942)	(869,585)
Cash payments to employees	(342,523)	(317,109)
Net cash provided by (used in) operating activities	72,394	133,037
Cash flows from capital and related financing activities:		
Principal payments on long-term debt	(27,313)	(26,297)
Interest payments on long-term debt	(42,398)	(45,628)
Purchases of capital assets	(7,000)	(22,556)
Net cash provided by (used in) financing activities	(76,711)	(94,481)
Cash flows from investing activities:		
Purchase of investments	(723)	(720)
Interest received	1,880	1,094
Net cash provided by (used in) investing activities	1,157	374
Cash flows from non-capital financing activities:		
Customer meter deposits (net)	220	3,648
Net cash provided by (used in) non-capital financing activities	220	3,648
NET INCREASE (DECREASE) IN CASH AND RESTRICTED CASH	(2,940)	42,578
CASH AND CASH EQUIVALENTS - BEGINNING OF YEAR	326,991	284,413
CASH AND CASH EQUIVALENTS - END OF YEAR	\$ 324,051	\$ 326,991
RECONCILIATION OF OPERATING INCOME TO NET CASH PROVIDED BY OPERATING ACTIVITIES		
Operating income (loss)	\$ (89,541)	\$ (23,767)
Adjustments to reconcile operating income (loss) to net cash provided by operating activities:		
Depreciation and amortization	162,535	161,061
(Increase)/Decrease In:		
Customer accounts receivable	(19,902)	7,424
Materials inventories	(4,523)	(989)
Prepaid insurance	1,860	6,038
Increase/(Decrease) In:		
Accounts payable and accrued expenses	16,719	(25,804)
Customer deposits	220	3,648
Due to other governments	5,026	5,426
NET CASH PROVIDED BY (USED IN) OPERATING ACTIVITIES	\$ 72,394	\$ 133,037

The accompanying notes are an integral part of these financial statements.

Walnut Ridge Water & Sewer Works
Notes to Financial Statements
June 30, 2015 and 2014

NOTE 1: ORGANIZATION AND SUMMARY OF SIGNIFICANT ACCOUNT POLICIES

Organization

The Walnut Ridge Water and Sewer Works (the Department) is a department of the City of Walnut Ridge, Arkansas. These financial statements present the financial position, results of operations and cash flows of the department and are not intended to present that of the City of Walnut Ridge or any of its other activities.

The Department provides water and waste water treatment services to its citizens from a system owned distribution network. All activities of the Department are considered business type activities. The accounts of the Walnut Ridge Water & Sewer Works are organized on the basis of a proprietary fund type specifically an enterprise fund. The activities of this fund are accounted for with a separate set of self-balancing accounts that comprise assets, liabilities, net assets, revenues, and expenses. Enterprise funds account for the activities (i) that are financed with debt that is secured solely by a pledge of net revenues from fees and charges of the activity; (ii) that are required by laws or regulations that the activity's costs of providing services, including capital costs (such as depreciation or debt service), be recovered with fees and charges, rather than with taxes or similar revenues; or (iii) that the pricing policies of the activity establish fees and charges designed to recover its costs, including capital costs (such as depreciation or debt service).

The basis of accounting determines when transactions and economic events are reflected in financial statements, and measurement focus identifies which transactions and events should be recorded. Enterprise Funds use the accrual basis of accounting to record the flow of all economic resources (measurement focus). This basis of accounting and measurement focus emphasizes the measurement of net income similar to the approach used by commercial enterprises, revenues are recorded when earned and expenses are recorded when incurred. Net position is segregated into invested in capital assets, restricted, and unrestricted components.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect certain reported amounts and disclosures. Accordingly, actual results could differ from those estimates.

Cash and Cash Equivalents

For the purpose of the statements of cash flows, the Department considers all highly liquid investments with an original maturity of three months or less to be cash equivalents.

Customer Accounts Receivable

Walnut Ridge Water & Sewer Works uses the direct write-off method for accounting for bad debt. Water charges receivables as shown in the balance sheets are stated at net realizable value. The use of this method is not materially different from the values reported under the allowance method.

Materials Inventory

Inventory, consisting of supplies and materials, is stated at the lower of cost or market using the first-in first-out method.

Restricted assets

Restricted assets consists of investments used to satisfy debt covenants, meter deposits held in trust, and funds set aside for renewal and replacement.

Walnut Ridge Water & Sewer Works

Notes to Financial Statements

June 30, 2015 and 2014

NOTE 1: ORGANIZATION AND SUMMARY OF SIGNIFICANT ACCOUNT POLICIES (Continued)

Capital Assets

The cost of additions and major replacements of retired units of property are capitalized. Walnut Ridge Water and Sewer Works defines capital assets as assets with an initial, individual cost of more than \$500 and an estimated useful life in excess of two years. The cost and accumulated depreciation of property sold or retired is deducted from capital assets and any profit or loss resulting from the disposal is credited or charged in the non-operating section of the statements of revenues, expenses, and changes in net position. The cost of current repairs, maintenance, and minor replacements is charged to expense when incurred.

Depreciation of capital assets is charged as an expense against operations. Depreciation rates have been applied on a straight-line basis, with estimated useful lives as follows:

Water & Sewer Systems	10-50 Years
Buildings	20-30 Years
Equipment	5-7 Years
Vehicles	3-5 Years

Operating Revenues and Expenses

Operating revenues and expenses generally result from providing services and producing and delivering goods in connection with a proprietary fund's principal ongoing operations. The principal operating revenues of the enterprise funds are charges to customers for sales and services. Operating expenses for enterprise funds include the cost of sales and services, administrative expenses, and depreciation on capital assets. All revenues and expenses not meeting these definitions are reported as non-operating revenues and expenses.

Net Position

Net position comprises the various net earnings from operating income, non-operating revenues and expenses, and capital contributions. Net position is classified in the following three components:

Net investment in capital assets – This component of net position consists of capital assets, net of accumulated depreciation and reduced by the outstanding balances of any bonds, mortgages, notes or other borrowings that are attributable to the acquisition, construction or improvement of those assets. If there are significant unspent related debt proceeds at year-end, the portion of the debt attributable to the unspent proceeds is not included in the calculation of invested in capital assets, net of related debt. Rather, that portion of the debt is included in the same net position component as the unspent proceeds.

Restricted for debt service– This component of net position consists of constraints imposed by creditors (such as through debt covenants), grantors, contributors, or laws or regulations of other governments or constraints imposed by law through constitutional provisions or enabling legislation. When an expense is incurred for purposes for which there are both restricted and unrestricted net position available, it is Walnut Ridge Water & Sewer's policy to apply those expenses to restricted net position to the extent such are available and then to unrestricted net position.

Unrestricted– This component of net position consists of net assets that do not meet the definition of "restricted" or "invested in capital assets, net of related debt."

Budgets and Budgetary Accounting

Prior to the beginning of the new fiscal year, the Board of Commissioners adopt an annual budget for Walnut Ridge Water & Sewer Works. The budget is adopted under a basis consistent with GAAP, except that depreciation, certain capital expenses, and non-operating income and expense items are not considered. All annual appropriations lapse at year-end.

Walnut Ridge Water & Sewer Works
Notes to Financial Statements
June 30, 2015 and 2014

NOTE 2: CAPITAL ASSETS

As summary of changes in property, plant, and equipment for the years ended June 30, 2015 and 2014 are as follows:

	<u>Balance</u> <u>6/30/2014</u>	<u>Additions</u>	<u>Deletions</u>	<u>Balance</u> <u>6/30/2015</u>
Capital assets not being depreciated:				
Land	\$ 95,778	\$ -	\$ -	\$ 95,778
Construction in process	-			-
Total capital assets not being depreciated	<u>95,778</u>	<u>-</u>	<u>-</u>	<u>95,778</u>
Other capital assets				
Buildings	37,257	-		37,257
Distribution system	7,724,209	-	-	7,724,209
Equipment	292,486	7,000	-	299,486
Total other assets at historical cost	<u>8,053,952</u>	<u>7,000</u>	<u>-</u>	<u>8,060,952</u>
Less accumulated depreciation for:				
Buildings	(37,006)		-	(37,006)
Distribution system	(3,657,546)	(152,299)	-	(3,809,845)
Equipment	(261,177)	(10,217)	-	(271,394)
Total accumulated depreciation	<u>(3,955,729)</u>	<u>(162,516)</u>	<u>-</u>	<u>(4,118,245)</u>
Total capital assets, being depreciated, net	<u>4,098,223</u>	<u>(155,516)</u>	<u>-</u>	<u>3,942,707</u>
Total capital assets, net	<u>\$ 4,194,001</u>	<u>\$ (155,516)</u>	<u>\$ -</u>	<u>\$ 4,038,485</u>

Walnut Ridge Water & Sewer Works
Notes to Financial Statements
June 30, 2015 and 2014

NOTE 2: CAPITAL ASSETS (Continued)

	<u>Balance</u> <u>6/30/2013</u>	<u>Additions</u>	<u>Deletions</u>	<u>Balance</u> <u>6/30/2014</u>
Capital assets not being depreciated:				
Land	\$ 95,777	\$ -	\$ -	\$ 95,777
Construction in process	-			-
Total capital assets not being depreciated	<u>95,777</u>	<u>-</u>	<u>-</u>	<u>95,777</u>
Other capital assets				
Buildings	37,257	-		37,257
Distribution system	7,724,209	-	-	7,724,209
Equipment	287,698	20,771	(15,983)	292,486
Total other assets at historical cost	<u>8,049,164</u>	<u>20,771</u>	<u>(15,983)</u>	<u>8,053,952</u>
Less accumulated depreciation for:				
Buildings	(37,006)		-	(37,006)
Distribution system	(3,504,423)	(153,123)	-	(3,657,545)
Equipment	(269,220)	(7,939)	15,983	(261,176)
Total accumulated depreciation	<u>(3,810,649)</u>	<u>(161,062)</u>	<u>15,983</u>	<u>(3,955,728)</u>
Total capital assets, being depreciated, net	<u>4,238,516</u>	<u>(140,291)</u>	<u>0</u>	<u>4,098,224</u>
Total capital assets, net	<u>\$ 4,334,293</u>	<u>\$ (140,291)</u>	<u>\$ 0</u>	<u>\$ 4,194,001</u>

NOTE 3: CUSTODIAL CREDIT RISK OF BANK DEPOSITS AND INVESTMENTS

Custodial credit risk is the risk that in the event of a bank failure, Walnut Ridge Water & Sewer Works deposits may not be returned to it. Walnut Ridge Water & Sewer Works deposit policy for custodial risk is compliant with bond requirements. At year end June 30, 2014, Walnut Ridge Water & Sewer Works had bank deposits in the amount of \$458,366. Due to the dollar amounts of cash deposits and investments, and the limits of the Federal Deposit Insurance Corporation (FDIC), Walnut Ridge Water & Sewer Works is required to secure additional monies by pledging securities held by the pledging financial institution's trust department or agent at year end June 30, 2014. At year end June 30, 2015, Walnut Ridge Water & Sewer Works had bank deposits in the amount of \$448,987. There were no unsecured funds at year end June 30, 2015

Walnut Ridge Water & Sewer Works
Notes to Financial Statements
June 30, 2015 and 2014

NOTE 4: RETIREMENT PLAN

The entity provides pension benefits for all of its full-time employees through the Employees Retirement Plan of the City Water Works of Walnut Ridge, Arkansas (the "Plan"). The Plan is a single-employer defined contribution plan and is administered by the Walnut Ridge Water & Sewer Works. The Plan is authorized and may be amended by the entity's City Council.

In a defined contribution plan, the benefits depend solely on amounts contributed to the plan, plus investment earnings. Employees are eligible to participate after a one-year exclusionary period. The entity contributes 8% of the employee's base salary each month. The entity's contributions for each employee (and interest allocated to the employee's account) are vested 20% annually for each year of participation. The matching contribution amount accrued for the 12 months ended June 30, 2015 and 2014 was \$17,334 and \$18,970 respectively.

NOTE 5: COMPENSATED ABSENCES

Vested or accumulated vacation, sick leave, and compensatory time are recorded as an expense and liability as the benefits accrue to employees, and are included as accrued compensated absences on the statements of financial position.

NOTE 6: LONG-TERM DEBT

	2015	2014
Regions Bank, note payable of \$412,371, interest rate of 4.5%; principle and interest payable monthly beginning July 1, 2003; principle & interest payment of \$2,278; matures December 1, 2029	\$ 283,567	\$ 297,665
2012 Debt Reserve Bond issue – USDA, 3.250%, \$823,000; principal and interest payable monthly beginning July 30, 2011; principle & interest payment of \$3,111; matures April 27, 2049	787,386	798,924
2012 Debt Reserve Bond issue - USDA, 3.250% \$120,000: principle and interest payable monthly beginning July 30, 2011; principle & interest payment of \$454; matures April 27, 2049	115,129	116,806
	\$ 1,186,082	\$ 1,213,395

All bonds are secured by revenues and water system of Walnut Ridge Water & Sewer Works.

Walnut Ridge Water & Sewer Works
Notes to Financial Statements
June 30, 2015 and 2014

NOTE 6: LONG-TERM DEBT (Continued)

Maturities and analysis of long-term debt changes to Walnut Ridge Water & Sewer Works long-term debt are as follows:

	2015	2014
Total long-term debt at beginning of year	\$ 1,213,395	\$ 1,239,692
Additonal borrowings	-	-
Note payable retirements	(27,313)	(26,297)
Total long-term debt at the end of the year, net	1,186,082	1,213,395
Less current portion	(28,390)	(27,313)
Non-current portion	\$ 1,157,692	\$ 1,186,082

Maturities of long-term debt at June 30, 2015 are as follows:

	Principal	Interest	Total
2016	\$ 28,390	\$ 41,726	\$ 70,116
2017	29,511	40,605	70,116
2018	30,677	39,439	70,116
2019	31,891	38,225	70,116
2020	33,155	36,961	70,116
Thereafter	1,032,458	528,607	1,561,065
	\$ 1,186,082	\$ 725,563	\$ 1,911,645

Interest expense was \$42,398 for year ended June 30, 2015 and \$43,766 for year ended June 30, 2014.

NOTE 7: BOND REQUIREMENTS

Walnut Ridge Water & Sewer Works must maintain certain requirements after receiving bonds from the United States Department of Agriculture (USDA). The bonds require that funds be established as described below.

The USDA issued the 3.25% 92 01 and 92 02 Debt Service Reserve & Short Lived Asset Reserve in the amount of \$787,388 and \$115,129 on July 30, 2011. Walnut Ridge Water & Sewer Works is required to deposit a sum equal to the installment of the principal and interest due on the next monthly installment payment plus the sum of \$358 into the Debt Reserve Fund.

These funds with deposits in excess of the amounts insured by FDIC must be secured by bonds or other direct or fully guaranteed obligations of the United States of America.

NOTE 8: RISK MANAGEMENT AND LITIGATION

Walnut Ridge Water & Sewer Works is exposed to various risks of loss to torts, thefts of, damage to, and destruction of assets, errors and omissions, injuries to employees, and natural disasters. Expenditures and claims are recognized when it is probable that a loss has occurred and the amount of the loss can be reasonably estimated. In determining claims, events that might create claims, but for which none have been reported, are considered.

Walnut Ridge Water & Sewer Works
Notes to Financial Statements
June 30, 2015 and 2014

NOTE 9: MONTHLY WATER RATES

Walnut Ridge Water & Sewer Works shall be determined by meter measurements. The consumption per month will be charged \$5.90/1,000 gallons of water with a 1,000 gallon minimum per the rate increase in January 2014. Sewer charges are \$3.50/1,000 gallons with a 1,000 gallon minimum, with next 1,000 gallons \$3.50 thereafter all over 2,000 gallons at \$4.40 per 1,000 per the rate increase in 2003.

NOTE 10: SUBSEQUENT EVENTS

Management has evaluated subsequent events through April 28, 2016, the date on which the financial statements were available to be issued.



THOMAS, SPEIGHT & NOBLE

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A PROFESSIONAL ASSOCIATION OF CERTIFIED PUBLIC ACCOUNTANTS
MEMBER OF THE PRIVATE COMPANIES PRACTICE SECTION OF THE AMERICAN INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS

INDEPENDENT AUDITOR'S REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING AND ON COMPLIANCE AND OTHER MATTERS BASED ON AN AUDIT OF FINANCIAL STATEMENTS PERFORMED IN ACCORDANCE WITH *GOVERNMENT AUDITING STANDARDS*

To the Board of Commissioners
Walnut Ridge Water & Sewer Works
Pocahontas, Arkansas

We have audited, in accordance with the auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States, the financial statements of Walnut Ridge Water & Sewer Works as of and for the years ended June 30, 2015 and 2014, and the related notes to the financial statements as listed in the table of contents and have issued our report thereon dated April 28, 2016.

In planning and performing our audit of the financial statements, we considered Walnut Ridge Water & Sewer Works internal control over financial reporting (internal control) to determine the audit procedures that are appropriate in the circumstances for the purpose of expressing our opinions on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of Walnut Ridge Water & Sewer Works internal control. Accordingly, we do not express an opinion on the effectiveness of the Walnut Ridge Water & Sewer Works internal control.

Our consideration of internal control was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control that might be material weaknesses or, significant deficiencies and therefore, material weaknesses or significant deficiencies may exist that were not identified. However, as discussed below, we identified a certain deficiency in internal control that we consider to be a material weakness.

A *deficiency in internal control* exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, misstatements on a timely basis. A *material weakness* is a deficiency, or a combination of deficiencies, in internal control, such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected on a timely basis. A *significant deficiency* is a deficiency, or a combination of deficiencies, in internal control that is less severe than a material weakness, yet important enough to merit attention by those charged with governance. We consider the following deficiency to be a material weakness.

2015-1 To ensure proper safeguarding of assets, financial accounting duties relating to initiating, receipting, depositing, disbursing, and recording transactions should be distributed among appropriate employees. Walnut Ridge Water & Sewer Works management did not segregate these duties to sufficiently reduce the risks of fraud and error and properly safeguard assets, because of limited resources. We recommend that the financial accounting duties be segregated among employees to the extent possible.

Compliance and Other Matters

As part of obtaining reasonable assurance about whether the Walnut Ridge Water & Sewer Works financial statements are free from material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements, noncompliance with which could have a direct and material effect on the determination of financial statement amounts. However, providing an opinion on compliance with those provisions was not an objective of our audit, and accordingly, we do not express such an opinion. The results of our tests disclosed no instances of noncompliance or other matters that are required to be reported under *Government Auditing Standards*.

Purpose of this Report

The purpose of this report is solely to describe the scope of our testing of internal control and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the entity's internal control or on compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the entity's internal control and compliance. Accordingly, this communication is not suitable for any other purpose.

Thomas, Speight & Noble, CPAs

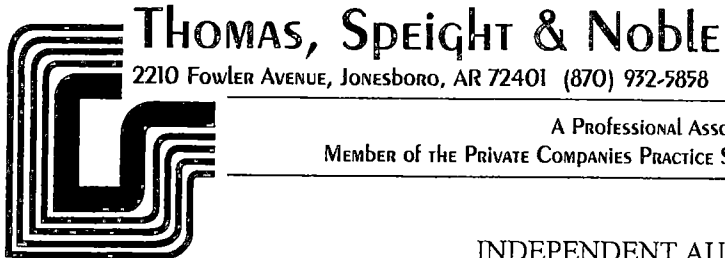
Thomas, Speight & Noble, CPAs
Jonesboro, Arkansas
April 28, 2016

Walnut Ridge Water & Sewer Works
(A Component Unit of the City of Walnut Ridge, Arkansas)
Audited Financial Statements

For the Years Ended June 30, 2016 and 2015

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A PROFESSIONAL ASSOCIATION OF CERTIFIED PUBLIC ACCOUNTANTS
MEMBER OF THE PRIVATE COMPANIES PRACTICE SECTION OF THE AMERICAN INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS

INDEPENDENT AUDITORS' REPORT

To the Board of Commissioners
Walnut Ridge Water & Sewer Works

Report on the Financial Statements

We have audited the accompanying financial statements of Walnut Ridge Water & Sewer Works as of and for the year ended June 30, 2016 and 2015, and the related notes to the financial statements, which collectively comprise Walnut Ridge Water & Sewer Works basic financial statements, as listed in the table of contents.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express opinions on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

Opinions

In our opinion, the financial statements referred to above present fairly, in all material respects, the respective financial position of Walnut Ridge Water & Sewer Works as of June 30, 2016 and 2015, and the respective changes in financial position and cash flows thereof for the years then ended in accordance with accounting principles generally accepted in the United States of America.

Other Matters

Required Supplementary Information

Management has omitted the management's discussion and analysis that accounting principles generally accepted in the United States of America require to be presented to supplement the basic financial statements. Such missing information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. Our opinion on the basic financial statements is not affected by this missing information.

Other Reporting Required by Government Auditing Standards

In accordance with *Government Auditing Standards*, we have also issued our report dated August 22, 2016, on our consideration of Walnut Ridge Water & Sewer Works internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements and other matters. The purpose of that report is to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering Walnut Ridge Water & Sewer Works internal control over financial reporting and compliance.

Thomas, Speight & Noble, CPAs

Thomas, Speight & Noble, CPAs
Jonesboro, Arkansas
August 22, 2016

Walnut Ridge Water and Sewer Works
Statements of Net Position
June 30, 2016 and 2015

	<u>Water</u>	<u>Sewer</u>	<u>Total</u>	<u>2015</u>
	2016	2016		
<u>ASSETS</u>				
CURRENT ASSETS				
Cash and cash equivalents - unrestricted	\$ 2,248	\$ 2,248	\$ 4,496	\$ 17,214
Customer accounts receivable	73,066	73,065	146,131	138,932
Accrued interest receivable	194	194	388	286
Prepaid insurance	5,263	5,262	10,525	10,525
Materials inventory (at cost)	17,634	17,634	35,268	42,653
Total current assets	98,405	98,403	196,808	209,610
NON-CURRENT ASSETS				
Cash and cash equivalents - restricted	125,007	177,270	302,277	306,837
Certificates of deposit - restricted	77,688	77,688	155,376	125,754
Capital assets				
Capital assets, net of accumulated depreciation	988,747	2,889,194	3,877,941	4,038,485
Total non-current assets	1,191,443	3,144,152	4,335,595	4,471,076
TOTAL ASSETS	\$ 1,289,848	\$ 3,242,555	\$ 4,532,403	\$ 4,680,686
<u>LIABILITIES AND NET POSITION</u>				
CURRENT LIABILITIES				
Accounts payable	49,620	\$ 110	\$ 49,730	\$ 59,837
Sales tax payable	4,216	4,215	8,431	6,484
Accrued and withheld payroll taxes	2,539	2,539	5,078	3,951
Accrued wages	1,074	1,074	2,148	2,148
Accrued retirement	8,036	8,038	16,074	19,424
Accrued compensated absences	3,723	3,722	7,445	26,715
Current portion of long-term debt	14,755	14,754	29,509	28,390
Due to other governments	17,093	17,092	34,185	69,014
Total current liabilities	101,056	51,544	152,600	215,963
LONG-TERM DEBT, net of current maturities	564,092	564,091	1,128,183	1,157,692
LIABILITIES PAYABLE FROM RESTRICTED ASSETS				
Customer deposits	105,173	4,214	109,387	108,879
Accrued interest	588	588	1,176	1,177
Total liabilities payable from restricted assets	105,761	4,802	110,563	110,056
TOTAL LIABILITIES	770,909	620,437	1,391,346	1,483,711
NET POSITION				
Net investment in capital assets	409,900	2,310,349	2,720,249	2,825,422
Restricted for debt service	101,924	101,925	203,849	186,220
Unrestricted	7,115	209,845	216,959	185,333
Total net position	518,939	2,622,118	3,141,057	3,196,975
TOTAL LIABILITIES AND NET POSITION	\$ 1,289,848	\$ 3,242,555	\$ 4,532,403	\$ 4,680,686

The accompanying notes are an integral part of these financial statements.

Walnut Ridge Water and Sewer Works
Statements of Revenues, Expenses and Changes in Net Position
For the Years Ended June 30, 2016 and 2015

	Water 2016	Sewer 2016	Total	2015
OPERATING REVENUES				
Water revenue	\$ 779,504	\$ -	\$ 779,504	\$ 754,262
Sewer revenue	-	525,895	525,895	474,497
Late payment charges	15,373	15,373	30,746	31,397
Miscellaneous income	6,522	6,521	13,043	13,605
Total operating revenue	<u>801,399</u>	<u>547,789</u>	<u>1,349,188</u>	<u>1,273,761</u>
OPERATING EXPENSES				
Purchased water	579,442	-	579,442	539,620
Salaries, wages & benefits	143,711	143,711	287,422	342,560
Payroll taxes	9,782	9,782	19,564	19,463
Depreciation	48,180	112,973	161,153	162,535
Utilities	16,474	100,075	116,549	106,258
Maintenance materials & contractual services	45,340	59,682	105,022	74,470
Insurance	4,509	4,508	9,017	11,956
Office expense	13,322	13,322	26,644	25,373
Lab fees	-	33,267	33,267	39,184
Bad debts	5,190	5,190	10,380	9,283
Professional fees	5,828	5,828	11,656	16,495
Other expense	2,035	2,034	4,069	16,105
Total operating expenses	<u>873,813</u>	<u>490,372</u>	<u>1,364,185</u>	<u>1,363,302</u>
OPERATING INCOME (LOSS)	(72,414)	57,417	(14,997)	(89,541)
NON-OPERATING REVENUES (EXPENSES)				
Interest income	224	224	448	1,880
Interest expense	<u>(20,685)</u>	<u>(20,684)</u>	<u>(41,369)</u>	<u>(42,398)</u>
Nonoperating revenues (expenses)	<u>(20,461)</u>	<u>(20,460)</u>	<u>(40,921)</u>	<u>(40,518)</u>
CHANGE IN NET POSITION	(92,875)	36,957	(55,918)	(130,059)
NET POSITION AT BEGINNING OF YEAR	611,814	2,585,161	3,196,975	3,327,034
NET POSITION AT END OF YEAR	<u>\$ 518,939</u>	<u>\$ 2,622,118</u>	<u>\$ 3,141,057</u>	<u>\$ 3,196,975</u>

The accompanying notes are an integral part of these financial statements.

Walnut Ridge Water and Sewer Works
Statements of Cash Flows
For the Years Ended June 30, 2016 and 2015

	2016	2015
Cash flows from operating activities:		
Cash receipts from customers	\$ 1,341,989	\$ 1,253,859
Cash payments to suppliers for goods and services	(931,650)	(838,942)
Cash payments to employees	(328,481)	(342,523)
Net cash provided by (used in) operating activities	81,858	72,394
Cash flows from capital and related financing activities:		
Principal payments on long-term debt	(28,390)	(27,313)
Interest payments on long-term debt	(41,369)	(42,398)
Purchases of capital assets	(609)	(7,000)
Net cash provided by (used in) financing activities	(70,368)	(76,711)
Cash flows from investing activities:		
Purchase of investments	(29,622)	(723)
Interest received	347	1,880
Net cash provided by (used in) investing activities	(29,275)	1,157
Cash flows from non-capital financing activities:		
Customer meter deposits (net)	507	220
Net cash provided by (used in) non-capital financing activities	507	220
NET INCREASE (DECREASE) IN CASH AND CASH EQUIVALENTS	(17,278)	(2,940)
CASH AND CASH EQUIVALENTS - BEGINNING OF YEAR	324,051	326,991
CASH AND CASH EQUIVALENTS - END OF YEAR	\$ 306,773	\$ 324,051
RECONCILIATION OF OPERATING INCOME TO NET CASH PROVIDED BY OPERATING ACTIVITIES		
Operating income (loss)	\$ (14,997)	\$ (89,541)
Adjustments to reconcile operating income (loss) to net cash provided by operating activities:		
Depreciation	161,153	162,535
(Increase)/Decrease In:		
Customer accounts receivable	(7,199)	(19,902)
Materials inventory	7,385	(4,523)
Prepaid insurance	-	1,860
Increase/(Decrease) In:		
Accounts payable and accrued expenses	(29,655)	16,939
Due to other governments	(34,829)	5,026
NET CASH PROVIDED BY (USED IN) OPERATING ACTIVITIES	\$ 81,858	\$ 72,394

The accompanying notes are an integral part of these financial statements.

Walnut Ridge Water & Sewer Works
Notes to Financial Statements
June 30, 2016 and 2015

NOTE 1: ORGANIZATION AND SUMMARY OF SIGNIFICANT ACCOUNT POLICIES

Organization

The Walnut Ridge Water and Sewer Works (the Department) is a department of the City of Walnut Ridge, Arkansas. These financial statements present the financial position, results of operations and cash flows of the Department and are not intended to present that of the City of Walnut Ridge or any of its other activities.

The Department provides water and waste water treatment services to its citizens from a system owned distribution network. All activities of the Department are considered business type activities. The accounts of the Walnut Ridge Water & Sewer Works are organized on the basis of a proprietary fund type specifically an enterprise fund. The activities of this fund are accounted for with a separate set of self-balancing accounts that comprise assets, liabilities, net assets, revenues, and expenses. Enterprise funds account for the activities (i) that are financed with debt that is secured solely by a pledge of net revenues from fees and charges of the activity; (ii) that are required by laws or regulations that the activity's costs of providing services, including capital costs (such as depreciation or debt service), be recovered with fees and charges, rather than with taxes or similar revenues; or (iii) that the pricing policies of the activity establish fees and charges designed to recover its costs, including capital costs (such as depreciation or debt service).

The basis of accounting determines when transactions and economic events are reflected in financial statements, and measurement focus identifies which transactions and events should be recorded. Enterprise Funds use the accrual basis of accounting to record the flow of all economic resources (measurement focus). This basis of accounting and measurement focus emphasizes the measurement of net income similar to the approach used by commercial enterprises, revenues are recorded when earned and expenses are recorded when incurred. Net position is segregated into invested in capital assets, restricted, and unrestricted components.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect certain reported amounts and disclosures. Accordingly, actual results could differ from those estimates.

Cash and Cash Equivalents

For the purpose of the statements of cash flows, the Department considers all highly liquid investments with an original maturity of three months or less to be cash equivalents.

Customer Accounts Receivable

Walnut Ridge Water & Sewer Works uses the direct write-off method for accounting for bad debt. Water charges receivables as shown in the statements of net position are stated at net realizable value. The use of this method is not materially different from the values reported under the allowance method.

Materials Inventory

Inventory, consisting of supplies and materials, is stated at the lower of cost or market using the first-in first-out method.

Restricted assets

Restricted assets consists of investments used to satisfy debt covenants, meter deposits held in trust, and funds set aside for renewal and replacement.

Walnut Ridge Water & Sewer Works
Notes to Financial Statements
June 30, 2016 and 2015

NOTE 1: ORGANIZATION AND SUMMARY OF SIGNIFICANT ACCOUNT POLICIES
(Continued)

Capital Assets

The cost of additions and major replacements of retired units of property are capitalized. Walnut Ridge Water and Sewer Works defines capital assets as assets with an initial, individual cost of more than \$500 and an estimated useful life in excess of two years. The cost and accumulated depreciation of property sold or retired is deducted from capital assets and any profit or loss resulting from the disposal is credited or charged in the non-operating section of the statements of revenues, expenses, and changes in net position. The cost of current repairs, maintenance, and minor replacements is charged to expense when incurred.

Depreciation of capital assets is charged as an expense against operations. Depreciation rates have been applied on a straight-line basis, with estimated useful lives as follows:

Water & Sewer Systems	10-50 Years
Buildings	20-30 Years
Equipment	5-7 Years
Vehicles	3-5 Years

Operating Revenues and Expenses

Operating revenues and expenses generally result from providing services and producing and delivering goods in connection with a proprietary fund's principal ongoing operations. The principal operating revenues of the enterprise funds are charges to customers for sales and services. Operating expenses for enterprise funds include the cost of sales and services, administrative expenses, and depreciation on capital assets. All revenues and expenses not meeting these definitions are reported as non-operating revenues and expenses.

Net Position

Net position comprises the various net earnings from operating income, non-operating revenues and expenses, and capital contributions. Net position is classified in the following three components:

Net investment in capital assets – This component of net position consists of capital assets, net of accumulated depreciation and reduced by the outstanding balances of any bonds, mortgages, notes or other borrowings that are attributable to the acquisition, construction or improvement of those assets. If there are significant unspent related debt proceeds at year-end, the portion of the debt attributable to the unspent proceeds is not included in the calculation of invested in capital assets, net of related debt. Rather, that portion of the debt is included in the same net position component as the unspent proceeds.

Restricted for debt service– This component of net position consists of constraints imposed by creditors (such as through debt covenants), grantors, contributors, or laws or regulations of other governments or constraints imposed by law through constitutional provisions or enabling legislation. When an expense is incurred for purposes for which there are both restricted and unrestricted net position available, it is Walnut Ridge Water & Sewer's policy to apply those expenses to restricted net position to the extent such are available and then to unrestricted net position.

Unrestricted– This component of net position consists of net assets that do not meet the definition of "restricted" or "invested in capital assets, net of related debt."

Walnut Ridge Water & Sewer Works
Notes to Financial Statements
June 30, 2016 and 2015

NOTE 1: ORGANIZATION AND SUMMARY OF SIGNIFICANT ACCOUNT POLICIES
(Continued)

Budgets and Budgetary Accounting

Prior to the beginning of the new fiscal year, the Board of Commissioners adopt an annual budget for Walnut Ridge Water & Sewer Works. The budget is adopted under a basis consistent with GAAP, except that depreciation, certain capital expenses, and non-operating income and expense items are not considered. All annual appropriations lapse at year-end.

NOTE 2: CAPITAL ASSETS

As summary of changes in property, plant, and equipment for the years ended June 30, 2016 and 2015 are as follows:

	<u>Balance</u> <u>6/30/2015</u>	<u>Additions</u>	<u>Deletions</u>	<u>Balance</u> <u>6/30/2016</u>
Capital assets not being depreciated:				
Land	\$ 95,778	\$ -	\$ -	\$ 95,778
Construction in process	-	-	-	-
Total capital assets not being depreciated	<u>95,778</u>	<u>-</u>	<u>-</u>	<u>95,778</u>
Other capital assets				
Buildings	37,257	-	-	37,257
Distribution system	7,724,209	609	-	7,724,818
Equipment	299,486	-	-	299,486
Total other assets at historical cost	<u>8,060,952</u>	<u>609</u>	<u>-</u>	<u>8,061,561</u>
Less accumulated depreciation for:				
Buildings	(37,006)	-	-	(37,006)
Distribution system	(3,809,845)	(152,057)	-	(3,961,902)
Equipment	(271,394)	(9,096)	-	(280,490)
Total accumulated depreciation	<u>(4,118,245)</u>	<u>(161,153)</u>	<u>-</u>	<u>(4,279,398)</u>
Total capital assets, being depreciated, net	<u>3,942,707</u>	<u>(160,544)</u>	<u>-</u>	<u>3,782,163</u>
Total capital assets, net	<u>\$ 4,038,485</u>	<u>\$ (160,544)</u>	<u>\$ -</u>	<u>\$ 3,877,941</u>

Walnut Ridge Water & Sewer Works
Notes to Financial Statements
June 30, 2016 and 2015

NOTE 2: CAPITAL ASSETS (Continued)

	<u>Balance</u> <u>6/30/2014</u>	<u>Additions</u>	<u>Deletions</u>	<u>Balance</u> <u>6/30/2015</u>
Capital assets not being depreciated:				
Land	\$ 95,778	\$ -	\$ -	\$ 95,778
Construction in process	-			-
Total capital assets not being depreciated	<u>95,778</u>	<u>-</u>	<u>-</u>	<u>95,778</u>
Other capital assets				
Buildings	37,257	-		37,257
Distribution system	7,724,209	-		7,724,209
Equipment	292,486	7,000		299,486
Total other assets at historical cost	<u>8,053,952</u>	<u>7,000</u>	<u>-</u>	<u>8,060,952</u>
Less accumulated depreciation for:				
Buildings	(37,006)		-	(37,006)
Distribution system	(3,657,546)	(152,299)	-	(3,809,845)
Equipment	(261,177)	(10,217)	-	(271,394)
Total accumulated depreciation	<u>(3,955,729)</u>	<u>(162,516)</u>	<u>-</u>	<u>(4,118,245)</u>
Total capital assets, being depreciated, net	<u>4,098,223</u>	<u>(155,516)</u>	<u>-</u>	<u>3,942,707</u>
Total capital assets, net	<u>\$ 4,194,001</u>	<u>\$ (155,516)</u>	<u>\$ -</u>	<u>\$ 4,038,485</u>

NOTE 3: CUSTODIAL CREDIT RISK OF BANK DEPOSITS AND INVESTMENTS

Custodial credit risk is the risk that in the event of a bank failure, Walnut Ridge Water & Sewer Works deposits may not be returned to it. Walnut Ridge Water & Sewer Works deposit policy for custodial risk is compliant with bond requirements. At year end June 30, 2015, Walnut Ridge Water & Sewer Works had bank deposits in the amount of \$448,987. Due to the dollar amounts of cash deposits and investments, and the limits of the Federal Deposit Insurance Corporation (FDIC), Walnut Ridge Water & Sewer Works is required to secure additional monies by pledging securities held by the pledging financial institution's trust department or agent at year end June 30, 2015. At year end June 30, 2016, Walnut Ridge Water & Sewer Works had bank deposits in the amount of \$477,953. At June 30, 2016, there were pledged securities in the amount of \$425,613 held on the Department's behalf. The amount of unsecured cash deposits as of June 30, 2016, was \$52,340.

Walnut Ridge Water & Sewer Works
Notes to Financial Statements
June 30, 2016 and 2015

NOTE 4: RETIREMENT PLAN

The entity provides pension benefits for all of its full-time employees through the Employees Retirement Plan of the City Water Works of Walnut Ridge, Arkansas (the "Plan"). The Plan is a single-employer defined contribution plan and is administered by the Walnut Ridge Water & Sewer Works. The Plan is authorized and may be amended by the entity's City Council.

In a defined contribution plan, the benefits depend solely on amounts contributed to the plan, plus investment earnings. Employees are eligible to participate after a one-year exclusionary period. The entity contributes 8% of the employee's base salary each month. The entity's contributions for each employee (and interest allocated to the employee's account) are vested 20% annually for each year of participation. The matching contribution amount accrued for the 12 months ended June 30, 2016 and 2015 was \$16,072 and \$17,334 respectively.

NOTE 5: COMPENSATED ABSENCES

Vested or accumulated vacation, sick leave, and compensatory time are recorded as an expense and liability as the benefits accrue to employees, and are included as accrued compensated absences on the statements of financial position.

NOTE 6: LONG-TERM DEBT

	2016	2015
Regions Bank, note payable of \$412,371, interest rate of 4.5%; principle and interest payable monthly beginning July 1, 2003; principle & interest payment of \$2,278; matures December 1, 2029	\$ 268,827	\$ 283,567
2012 Debt Reserve Bond issue – USDA, 3.250%, \$823,000; principal and interest payable monthly beginning July 30, 2011; principle & interest payment of \$3,111; matures April 27, 2049	775,470	787,386
2012 Debt Reserve Bond issue - USDA, 3.250% \$120,000; principle and interest payable monthly beginning July 30, 2011; principle & interest payment of \$454; matures April 27, 2049	113,395	115,129
	\$ 1,157,692	\$ 1,186,082

All bonds are secured by revenues and water system of Walnut Ridge Water & Sewer Works.

Walnut Ridge Water & Sewer Works
Notes to Financial Statements
June 30, 2016 and 2015

NOTE 6: LONG-TERM DEBT (Continued)

Maturities and analysis of long-term debt changes to Walnut Ridge Water & Sewer Works long-term debt are as follows:

	<u>2016</u>	<u>2015</u>
Total long-term debt at beginning of year	\$ 1,186,082	\$ 1,213,395
Additional borrowings	-	-
Note payable retirements	(28,390)	(27,313)
Total long-term debt at the end of the year, net	<u>1,157,692</u>	<u>1,186,082</u>
Less current portion	<u>(29,509)</u>	<u>(28,390)</u>
Non-current portion	<u>\$ 1,128,183</u>	<u>\$ 1,157,692</u>

Maturities of long-term debt at June 30, 2016 are as follows:

	<u>Principal</u>	<u>Interest</u>	<u>Total</u>
2017	\$ 29,509	\$ 40,607	\$ 70,116
2018	30,677	39,439	70,116
2019	31,891	38,225	70,116
2020	33,155	36,961	70,116
2021	34,468	35,648	70,116
Thereafter	997,992	492,959	1,490,951
	<u>\$ 1,157,692</u>	<u>\$ 683,839</u>	<u>\$ 1,841,531</u>

Interest expense was \$41,369 for year ended June 30, 2016 and \$42,398 for year ended June 30, 2015.

NOTE 7: BOND REQUIREMENTS

Walnut Ridge Water & Sewer Works must maintain certain requirements after receiving bonds from the United States Department of Agriculture (USDA). The bonds require that funds be established as described below.

The USDA issued the 3.25% 92 01 and 92 02 Debt Service Reserve & Short Lived Asset Reserve in the amount of \$787,388 and \$115,129 on July 30, 2011. Walnut Ridge Water & Sewer Works is required to deposit a sum equal to the installment of the principal and interest due on the next monthly installment payment plus the sum of \$358 into the Debt Reserve Fund.

These funds with deposits in excess of the amounts insured by FDIC must be secured by bonds or other direct or fully guaranteed obligations of the United States of America.

NOTE 8: RISK MANAGEMENT AND LITIGATION

Walnut Ridge Water & Sewer Works is exposed to various risks of loss to torts, thefts of, damage to, and destruction of assets, errors and omissions, injuries to employees, and natural disasters. Expenditures and claims are recognized when it is probable that a loss has occurred and the amount of the loss can be reasonably estimated. In determining claims, events that might create claims, but for which none have been reported, are considered.

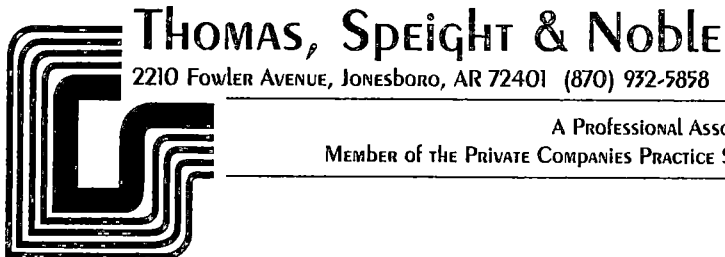
Walnut Ridge Water & Sewer Works
Notes to Financial Statements
June 30, 2016 and 2015

NOTE 9: MONTHLY WATER RATES

Walnut Ridge Water & Sewer Works shall be determined by meter measurements. The consumption per month will be charged \$5.90/1,000 gallons of water with a 1,000 gallon minimum per the rate increase in January 2014. Sewer charges are \$3.50/1,000 gallons with a 1,000 gallon minimum, with next 1,000 gallons \$3.50 thereafter all over 2,000 gallons at \$4.40 per 1,000 per the rate increase in 2003.

NOTE 10: SUBSEQUENT EVENTS

Management has evaluated subsequent events through August 22, 2016, the date on which the financial statements were available to be issued.



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A PROFESSIONAL ASSOCIATION OF CERTIFIED PUBLIC ACCOUNTANTS

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INDEPENDENT AUDITOR'S REPORT ON INTERNAL CONTROL OVER FINANCIAL
REPORTING AND ON COMPLIANCE AND OTHER MATTERS BASED ON AN AUDIT OF
FINANCIAL STATEMENTS PERFORMED IN ACCORDANCE WITH *GOVERNMENT*
AUDITING STANDARDS

To the Board of Commissioners
Walnut Ridge Water & Sewer Works
Pocahontas, Arkansas

We have audited, in accordance with the auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States, the financial statements of the business-type activities of the Walnut Ridge Water and Sewer Works, as of and for the year ended June 30, 2016, and the related notes to the financial statements, which collectively comprise the Walnut Ridge Water and Sewer Works' basic financial statements and have issued our report thereon dated August 22, 2016.

Internal Control over Financial Reporting

In planning and performing our audit of the financial statements, we considered the Walnut Ridge Water and Sewer Works' internal control over financial reporting (internal control) to determine the audit procedures that are appropriate in the circumstances for the purpose of expressing our opinions on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of the Walnut Ridge Water and Sewer Works' internal control. Accordingly, we do not express an opinion on the effectiveness of the Walnut Ridge Water and Sewer Works' internal control.

A *deficiency in internal control* exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, misstatements on a timely basis. A *material weakness* is a deficiency, or a combination of deficiencies, in internal control such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected on a timely basis. A *significant deficiency* is a deficiency, or a combination of deficiencies, in internal control that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

Our consideration of internal control was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control that might be material weaknesses or significant deficiencies and therefore, material weaknesses or significant deficiencies may exist that were not identified. However, as discussed below, we identified a certain deficiency in internal control that we consider to be a material weakness.

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2016-1 To ensure proper safeguarding of assets, financial accounting duties relating to initiating, receipting, depositing, disbursing, and recording transactions should be distributed among appropriate employees. Walnut Ridge Water and Sewer Works' management did not segregate these duties to sufficiently reduce the risks of fraud and error and properly safeguard assets, because of limited resources. We recommend the financial accounting duties be segregated among employees to the extent possible.

Management has responded and indicated that financial accounting duties relating to initiating, receipting, depositing, disbursing, and recording transactions will be segregated to the extent possible with current staffing levels.

Compliance and Other Matters

As part of obtaining reasonable assurance about whether the Walnut Ridge Water and Sewer Works' financial statements are free from material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements, noncompliance with which could have a direct and material effect on the determination of financial statement amounts. However, providing an opinion on compliance with those provisions was not an objective of our audit, and accordingly, we do not express such an opinion. The results of our tests disclosed no instances of noncompliance or other matters that are required to be reported under *Government Auditing Standards*.

Purpose of this Report

The purpose of this report is solely to describe the scope of our testing of internal control and compliance and the results of that testing, and not to provide an opinion on the effectiveness of the entity's internal control or on compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the entity's internal control and compliance. Accordingly, this communication is not suitable for any other purpose.

Thomas, Speight & Noble, CPAs

Thomas, Speight & Noble, CPAs
Jonesboro, Arkansas
August 22, 2016

Walnut Ridge Water & Sewer Works
(A Component Unit of the City of Walnut Ridge, Arkansas)

Audited Financial Statements

For the Years Ended June 30, 2017 and 2016

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A PROFESSIONAL ASSOCIATION OF CERTIFIED PUBLIC ACCOUNTANTS

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INDEPENDENT AUDITORS' REPORT

To the Board of Commissioners
Walnut Ridge Water & Sewer Works

Report on the Financial Statements

We have audited the accompanying financial statements of Walnut Ridge Water & Sewer Works, a component unit of the City of Walnut Ridge, Arkansas, as of and for the year ended June 30, 2017 and 2016, and the related notes to the financial statements, which collectively comprise Walnut Ridge Water & Sewer Works basic financial statements as listed in the table of contents.

Management's Responsibility for the Financial Statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with accounting principles generally accepted in the United States of America; this includes the design, implementation, and maintenance of internal control relevant to the preparation and fair presentation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors' Responsibility

Our responsibility is to express opinions on these financial statements based on our audit. We conducted our audit in accordance with auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards*, issued by the Comptroller General of the United States. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. Accordingly, we express no such opinion. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of significant accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinions.

Opinions

In our opinion, the financial statements referred to above present fairly, in all material respects, the respective financial position of Walnut Ridge Water & Sewer Works as of June 30, 2017 and 2016, and the respective changes in financial position and cash flows thereof for the year then ended in accordance with accounting principles generally accepted in the United States of America.

Emphasis of Matter

As discussed in Note 1, the financial statements present only the Walnut Ridge Water & Sewer Works and are not intended to present fairly the financial position of the City of Walnut Ridge, Arkansas, and the results of its operations and cash flows in conformity with accounting principles generally accepted in the United States of America.

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Other Matters

Required Supplementary Information

Management has omitted the management's discussion and analysis that accounting principles generally accepted in the United States of America require to be presented to supplement the basic financial statements. Such missing information, although not a part of the basic financial statements, is required by the Governmental Accounting Standards Board who considers it to be an essential part of financial reporting for placing the basic financial statements in an appropriate operational, economic, or historical context. Our opinion on the basic financial statements is not affected by this missing information.

Other Reporting Required by Government Auditing Standards

In accordance with *Government Auditing Standards*, we have also issued our report dated September 15, 2017, on our consideration of Walnut Ridge Water & Sewer Works internal control over financial reporting and on our tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements and other matters. The purpose of that report is to describe the scope of our testing of internal control over financial reporting and compliance and the results of that testing, and not to provide an opinion on internal control over financial reporting or on compliance. That report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering Walnut Ridge Water & Sewer Works internal control over financial reporting and compliance.

Thomas, Speight & Noble, CPAs

Thomas, Speight & Noble, CPAs
Jonesboro, Arkansas
September 15, 2017

Walnut Ridge Water and Sewer Works
(A Component Unit of the City of Walnut Ridge, Arkansas)
Statements of Net Position
June 30, 2017 and 2016

	Water 2017	Sewer 2017	Total	2016
ASSETS				
CURRENT ASSETS				
Cash and cash equivalents - unrestricted	\$ 39,471	\$ 39,471	\$ 78,942	\$ 4,496
Customer accounts receivable	72,087	72,087	144,174	146,131
Accrued interest receivable	1,499	1,499	2,998	388
Prepaid insurance	5,263	5,263	10,526	10,525
Materials inventory (at cost)	20,345	20,345	40,690	35,268
Total current assets	<u>138,665</u>	<u>138,665</u>	<u>277,330</u>	<u>196,808</u>
NON-CURRENT ASSETS				
Cash and cash equivalents - restricted	160,087	194,730	354,817	302,277
Certificates of deposit - restricted	77,689	77,689	155,378	155,376
Capital assets				
Capital assets, net of accumulated depreciation	940,532	2,847,620	3,788,152	3,877,941
Total non-current assets	<u>1,178,308</u>	<u>3,120,039</u>	<u>4,298,347</u>	<u>4,335,595</u>
TOTAL ASSETS	<u>\$ 1,316,973</u>	<u>\$ 3,258,704</u>	<u>\$ 4,575,677</u>	<u>\$ 4,532,403</u>
LIABILITIES AND NET POSITION				
CURRENT LIABILITIES				
Accounts payable	\$ 50,789	\$ 111	\$ 50,900	\$ 49,730
Sales tax payable	4,822	4,822	9,644	8,431
Accrued and withheld payroll taxes	2,494	2,494	4,988	5,078
Accrued wages	1,314	1,314	2,628	2,148
Accrued retirement	9,598	9,598	19,196	16,074
Accrued compensated absences	4,111	4,111	8,222	7,445
Current portion of long-term debt	15,643	15,643	31,286	29,509
Due to other governments	18,789	18,789	37,578	34,185
Total current liabilities	<u>107,560</u>	<u>56,882</u>	<u>164,442</u>	<u>152,600</u>
LONG-TERM DEBT, net of current maturities	<u>553,110</u>	<u>553,110</u>	<u>1,106,220</u>	<u>1,128,183</u>
LIABILITIES PAYABLE FROM RESTRICTED ASSETS				
Customer deposits	120,692	136	120,828	109,387
Accrued interest	589	589	1,178	1,176
Total liabilities payable from restricted assets	<u>121,281</u>	<u>725</u>	<u>122,006</u>	<u>110,563</u>
TOTAL LIABILITIES	<u>781,951</u>	<u>610,717</u>	<u>1,392,668</u>	<u>1,391,346</u>
NET POSITION				
Net investment in capital assets	371,779	2,278,867	2,650,646	2,720,249
Restricted for debt service	38,806	194,005	232,811	203,849
Unrestricted	124,437	175,115	299,552	216,959
Total net position	<u>535,022</u>	<u>2,647,987</u>	<u>3,183,009</u>	<u>3,141,057</u>
TOTAL LIABILITIES AND NET POSITION	<u>\$ 1,316,973</u>	<u>\$ 3,258,704</u>	<u>\$ 4,575,677</u>	<u>\$ 4,532,403</u>

The accompanying notes are an integral part of these financial statements.

Walnut Ridge Water and Sewer Works
(A Component Unit of the City of Walnut Ridge, Arkansas)
Statements of Revenues, Expenses and Changes in Net Position
For the Years Ended June 30, 2017 and 2016

	Water 2017	Sewer 2017	Total	2016
OPERATING REVENUES				
Water revenue	\$ 884,861	\$ -	\$ 884,861	\$ 779,504
Sewer revenue	-	515,028	515,028	525,895
Late payment charges	17,748	17,748	35,496	30,746
Miscellaneous income	12,275	12,275	24,550	13,043
Total operating revenue	<u>914,884</u>	<u>545,051</u>	<u>1,459,935</u>	<u>1,349,188</u>
OPERATING EXPENSES				
Purchased water	557,079	-	557,079	579,442
Salaries, wages & benefits	149,192	149,192	298,384	287,422
Payroll taxes	10,735	10,735	21,470	19,564
Depreciation	49,418	113,803	163,221	161,153
Utilities	27,185	90,559	117,744	116,549
Maintenance materials & contractual services	42,658	58,223	100,881	105,022
Insurance	3,747	3,747	7,494	9,017
Office expense	14,336	14,336	28,672	26,644
Lab fees	-	34,135	34,135	33,267
Bad debts	6,006	6,006	12,012	10,380
Professional fees	12,418	12,418	24,836	11,656
Other expense	8,454	8,454	16,907	4,069
Total operating expenses	<u>881,228</u>	<u>501,607</u>	<u>1,382,835</u>	<u>1,364,185</u>
OPERATING INCOME (LOSS)	33,656	43,444	77,100	(14,997)
NON-OPERATING REVENUES (EXPENSES)				
Interest income	173	173	346	448
Interest expense	(17,747)	(17,747)	(35,494)	(41,369)
Non-operating revenues (expenses)	<u>(17,574)</u>	<u>(17,574)</u>	<u>(35,148)</u>	<u>(40,921)</u>
CHANGE IN NET POSITION	16,083	25,869	41,952	(55,918)
NET POSITION AT BEGINNING OF YEAR	518,939	2,622,118	3,141,057	3,196,975
NET POSITION AT END OF YEAR	<u>\$ 535,022</u>	<u>\$ 2,647,987</u>	<u>\$ 3,183,009</u>	<u>\$ 3,141,057</u>

The accompanying notes are an integral part of these financial statements.

Walnut Ridge Water and Sewer Works
(A Component Unit of the City of Walnut Ridge, Arkansas)
Statements of Cash Flows
For the Years Ended June 30, 2017 and 2016

	2017	2016
Cash flows from operating activities:		
Cash receipts from customers	\$ 1,461,892	\$ 1,341,989
Cash payments to suppliers for goods and services	(897,728)	(931,650)
Cash payments to employees	(319,854)	(328,481)
Net cash provided by (used in) operating activities	244,310	81,858
Cash flows from capital and related financing activities:		
Principal payments on long-term debt	(20,186)	(28,390)
Interest payments on long-term debt	(35,494)	(41,369)
Purchases of capital assets	(73,432)	(609)
Net cash provided by (used in) financing activities	(129,112)	(70,368)
Cash flows from investing activities:		
Purchase of investments	-	(29,622)
Interest received	346	347
Net cash provided by (used in) investing activities	346	(29,275)
Cash flows from non-capital financing activities:		
Customer meter deposits (net)	11,441	507
Net cash provided by (used in) non-capital financing activities	11,441	507
NET INCREASE (DECREASE) IN CASH AND CASH EQUIVALENTS	126,986	(17,278)
CASH AND CASH EQUIVALENTS - BEGINNING OF YEAR	306,773	324,051
CASH AND CASH EQUIVALENTS - END OF YEAR	\$ 433,759	\$ 306,773
RECONCILIATION OF OPERATING INCOME TO NET CASH PROVIDED BY OPERATING ACTIVITIES		
Operating income (loss)	\$ 77,100	\$ (14,997)
Adjustments to reconcile operating income (loss) to net cash provided by operating activities:		
Depreciation	163,221	161,153
(Increase)/Decrease In:		
Customer accounts receivable	1,957	(7,199)
Accrued interest receivable	(2,610)	-
Materials inventory	(5,422)	7,385
Increase/(Decrease) In:		
Accounts payable	1,170	(10,107)
Sales tax payable	1,213	1,947
Accrued and withheld payroll taxes	(90)	1,127
Accrued wages	480	-
Accrued retirement	3,122	(3,350)
Accrued compensated absences	777	(19,272)
Due to other governments	3,393	(34,829)
NET CASH PROVIDED BY (USED IN) OPERATING ACTIVITIES	\$ 244,310	\$ 81,858

The accompanying notes are an integral part of these financial statements.

Walnut Ridge Water & Sewer Works
(A Component Unit of the City of Walnut Ridge, Arkansas)
Notes to Financial Statements
June 30, 2017 and 2016

NOTE 1: ORGANIZATION AND SUMMARY OF SIGNIFICANT ACCOUNT POLICIES

Organization

The Walnut Ridge Water & Sewer Works (the Department) is a component unit of the City of Walnut Ridge, Arkansas. These financial statements present the financial position, results of operations and cash flows of the Department and are not intended to present that of the City of Walnut Ridge or any of its other activities.

The Department provides water and waste water treatment services to its citizens from a system owned distribution network. All activities of the Department are considered business type activities. The accounts of the Walnut Ridge Water & Sewer Works are organized on the basis of a proprietary fund type specifically an enterprise fund. The activities of this fund are accounted for with a separate set of self-balancing accounts that comprise assets, liabilities, net assets, revenues, and expenses. Enterprise funds account for the activities (i) that are financed with debt that is secured solely by a pledge of net revenues from fees and charges of the activity; (ii) that are required by laws or regulations that the activity's costs of providing services, including capital costs (such as depreciation or debt service), be recovered with fees and charges, rather than with taxes or similar revenues; or (iii) that the pricing policies of the activity establish fees and charges designed to recover its costs, including capital costs (such as depreciation or debt service).

The basis of accounting determines when transactions and economic events are reflected in financial statements, and measurement focus identifies which transactions and events should be recorded. Enterprise Funds use the accrual basis of accounting to record the flow of all economic resources (measurement focus). This basis of accounting and measurement focus emphasizes the measurement of net income similar to the approach used by commercial enterprises, revenues are recorded when earned and expenses are recorded when incurred. Net position is segregated into invested in capital assets, restricted, and unrestricted components.

Use of Estimates

The preparation of financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect certain reported amounts and disclosures. Accordingly, actual results could differ from those estimates.

Cash and Cash Equivalents

For the purpose of the statements of cash flows, the Department considers all highly liquid investments with an original maturity of three months or less to be cash equivalents.

Customer Accounts Receivable

Walnut Ridge Water & Sewer Works uses the direct write-off method for accounting for bad debt. Water charges receivables as shown in the statements of net position are stated at net realizable value. The use of this method is not materially different from the values reported under the allowance method.

Materials Inventory

Inventory, consisting of supplies and materials, is stated at the lower of cost or market using the first-in first-out method.

Restricted assets

Restricted assets consist of cash and investments used to satisfy debt covenants, meter deposits held in trust, and funds set aside for retirement, and renewal and replacement.

Capital Assets

The cost of additions and major replacements of retired units of property are capitalized. Walnut Ridge Water and Sewer Works defines capital assets as assets with an initial, individual cost of more than \$500 and an estimated useful life in excess of two years. The cost and accumulated depreciation of property sold or retired is deducted from capital assets and any profit or loss resulting from the disposal is credited or charged in the non-operating section of the statements of revenues, expenses, and changes in net position. The cost of current repairs, maintenance, and minor replacements is charged to expense when incurred.

Walnut Ridge Water & Sewer Works
(A Component Unit of the City of Walnut Ridge, Arkansas)
Notes to Financial Statements
June 30, 2017 and 2016

NOTE 1: ORGANIZATION AND SUMMARY OF SIGNIFICANT ACCOUNT POLICIES (Continued)

Depreciation of capital assets is charged as an expense against operations. Depreciation rates have been applied on a straight-line basis, with estimated useful lives as follows:

Distribution System	10-50 Years
Buildings	20-30 Years
Equipment	3-7 Years

Operating Revenues and Expenses

Operating revenues and expenses generally result from providing services and producing and delivering goods in connection with a proprietary fund's principal ongoing operations. The principal operating revenues of the enterprise funds are charges to customers for sales and services. Operating expenses for enterprise funds include the cost of sales and services, administrative expenses, and depreciation on capital assets. All revenues and expenses not meeting these definitions are reported as non-operating revenues and expenses.

Net Position

Net position comprises the various net earnings from operating income, non-operating revenues and expenses, and capital contributions. Net position is classified in the following three components:

Net investment in capital assets – This component of net position consists of capital assets, net of accumulated depreciation and reduced by the outstanding balances of any bonds, mortgages, notes or other borrowings that are attributable to the acquisition, construction or improvement of those assets. If there are significant unspent related debt proceeds at year-end, the portion of the debt attributable to the unspent proceeds is not included in the calculation of net investment in capital assets. Rather, that portion of the debt is included in the same net position component as the unspent proceeds.

Restricted for debt service– This component of net position consists of constraints imposed by creditors (such as through debt covenants), grantors, contributors, or laws or regulations of other governments or constraints imposed by law through constitutional provisions or enabling legislation. When an expense is incurred for purposes for which there are both restricted and unrestricted net position available, it is Walnut Ridge Water & Sewer's policy to apply those expenses to restricted net position to the extent such are available and then to unrestricted net position.

Unrestricted– This component of net position consists of net assets that do not meet the definition of "restricted" or "net investment in capital assets."

Budgets and Budgetary Accounting

Prior to the beginning of the new fiscal year, the Board of Commissioners adopt an annual budget for Walnut Ridge Water & Sewer Works. The budget is adopted under a basis consistent with GAAP, except that depreciation, certain capital expenses, and non-operating income and expense items are not considered. All annual appropriations lapse at year-end.

Walnut Ridge Water & Sewer Works
(A Component Unit of the City of Walnut Ridge, Arkansas)
Notes to Financial Statements
June 30, 2017 and 2016

NOTE 2: CAPITAL ASSETS

As summary of changes in property, plant, and equipment for the years ended June 30, 2017 and 2016 are as follows:

	<u>Balance</u> <u>6/30/2016</u>	<u>Additions</u>	<u>Deletions</u>	<u>Balance</u> <u>6/30/2017</u>
Capital assets not being depreciated:				
Land	\$ 95,778	\$ -	\$ -	\$ 95,778
Construction in process	-			-
Total capital assets not being depreciated	<u>95,778</u>	<u>-</u>	<u>-</u>	<u>95,778</u>
Other capital assets				
Buildings	37,257	-		37,257
Distribution system	7,724,818	-		7,724,818
Equipment	299,486	73,432	-	372,918
Total other assets at historical cost	<u>8,061,561</u>	<u>73,432</u>	<u>-</u>	<u>8,134,993</u>
Less accumulated depreciation for:				
Buildings	(37,006)		-	(37,006)
Distribution system	(3,961,902)	(151,113)	-	(4,113,015)
Equipment	(280,490)	(12,108)	-	(292,598)
Total accumulated depreciation	<u>(4,279,398)</u>	<u>(163,221)</u>	<u>-</u>	<u>(4,442,619)</u>
Total capital assets, being depreciated, net	<u>3,782,163</u>	<u>(89,789)</u>	<u>-</u>	<u>3,692,374</u>
Total capital assets, net	<u>\$ 3,877,941</u>	<u>\$ (89,789)</u>	<u>\$ -</u>	<u>\$ 3,788,152</u>

Walnut Ridge Water & Sewer Works
(A Component Unit of the City of Walnut Ridge, Arkansas)
Notes to Financial Statements
June 30, 2017 and 2016

NOTE 2: CAPITAL ASSETS (Continued)

	<u>Balance</u> <u>6/30/2015</u>	<u>Additions</u>	<u>Deletions</u>	<u>Balance</u> <u>6/30/2016</u>
Capital assets not being depreciated:				
Land	\$ 95,778	\$ -	\$ -	\$ 95,778
Construction in process	-			-
Total capital assets not being depreciated	<u>95,778</u>	<u>-</u>	<u>-</u>	<u>95,778</u>
Other capital assets				
Buildings	37,257	-		37,257
Distribution system	7,724,209	609	-	7,724,818
Equipment	299,486	-	-	299,486
Total other assets at historical cost	<u>8,060,952</u>	<u>609</u>	<u>-</u>	<u>8,061,561</u>
Less accumulated depreciation for:				
Buildings	(37,006)		-	(37,006)
Distribution system	(3,809,845)	(152,057)	-	(3,961,902)
Equipment	(271,394)	(9,096)	-	(280,490)
Total accumulated depreciation	<u>(4,118,245)</u>	<u>(161,153)</u>	<u>-</u>	<u>(4,279,398)</u>
Total capital assets, being depreciated, net	<u>3,942,707</u>	<u>(160,544)</u>	<u>-</u>	<u>3,782,163</u>
Total capital assets, net	<u>\$ 4,038,485</u>	<u>\$ (160,544)</u>	<u>\$ -</u>	<u>\$ 3,877,941</u>

NOTE 3: CASH AND CERTIFICATES OF DEPOSIT - RESTRICTED

Cash and cash equivalents – restricted and certificates of deposit – restricted consist of reserves restricted by long-term debt covenants and customer deposits. The long-term debt covenants require minimum reserves for bond payments and a depreciation fund (see Note 7).

	<u>2017</u>	<u>2016</u>
Debt service reserves	\$ 232,813	\$ 203,849
Customer deposits	187,553	138,224
Depreciation and replacement	18,770	61,591
Retirement	71,059	53,989
	<u>\$ 510,195</u>	<u>\$ 457,653</u>

Walnut Ridge Water & Sewer Works
(A Component Unit of the City of Walnut Ridge, Arkansas)
Notes to Financial Statements
June 30, 2017 and 2016

NOTE 4: CUSTODIAL CREDIT RISK OF BANK DEPOSITS AND INVESTMENTS

Custodial credit risk is the risk that in the event of a bank failure, Walnut Ridge Water & Sewer Works deposits may not be returned to it. Walnut Ridge Water & Sewer Works deposit policy for custodial risk is compliant with bond requirements. At year end June 30, 2017 and 2016, Walnut Ridge Water & Sewer Works had bank deposits in the amount of \$605,147 and \$448,987, respectively. Due to the dollar amounts of cash deposits and investments, and the limits of the Federal Deposit Insurance Corporation (FDIC), Walnut Ridge Water & Sewer Works was required to secure additional monies by pledging securities held by the pledging financial institution's trust department or agent at year end June 30, 2017. At June 30, 2017, there were pledged securities in the amount of \$332,264. The amount of unsecured cash deposits as of June 30, 2017 was \$8,208.

NOTE 5: RETIREMENT PLAN

The entity provides pension benefits for all of its full-time employees through the Employees Retirement Plan of the City Water Works of Walnut Ridge, Arkansas (the "Plan"). The Plan is a single-employer defined contribution plan and is administered by the Walnut Ridge Water & Sewer Works. The Plan is authorized and may be amended by the entity's City Council.

In a defined contribution plan, the benefits depend solely on amounts contributed to the plan, plus investment earnings. Employees are eligible to participate after a one-year exclusionary period. The entity contributes 8% of the employee's base salary each month. The entity's contributions for each employee (and interest allocated to the employee's account) are vested 20% annually for each year of participation. The matching contribution amount accrued for the 12 months ended June 30, 2017 and 2016 was \$19,196 and \$16,072 respectively.

NOTE 6: COMPENSATED ABSENCES

Vested or accumulated vacation, sick leave, and compensatory time are recorded as an expense and liability as the benefits accrue to employees, and are included as accrued compensated absences on the statements of net position.

NOTE 7: BOND REQUIREMENTS

Walnut Ridge Water & Sewer Works must maintain certain requirements after receiving bonds from the United States Department of Agriculture (USDA). The bonds require that funds be established as described below.

The USDA issued the 3.25% 92 01 and 92 02 Debt Service Reserve & Short Lived Asset Reserve in the amount of \$787,388 and \$115,129 on July 30, 2011. Walnut Ridge Water & Sewer Works is required to deposit a sum equal to the installment of the principal and interest due on the next monthly installment payment plus the sum of \$358 into the Debt Reserve Fund.

These funds with deposits in excess of the amounts insured by FDIC must be secured by bonds or other direct or fully guaranteed obligations of the United States of America.

Walnut Ridge Water & Sewer Works
(A Component Unit of the City of Walnut Ridge, Arkansas)
Notes to Financial Statements
June 30, 2017 and 2016

NOTE 8: LONG-TERM DEBT

	2017	2016
Integrity First Bank, note payable of \$266,008, interest rate of 4.00%; principal and interest payable monthly beginning April 28, 2017; principal & interest payment of \$2,346; matures December 1, 2029	\$ 262,738	\$ 268,827
2012 Debt Reserve Bond issue – USDA, 3.250%, \$823,000; principal and interest payable monthly beginning July 30, 2011; principal & interest payment of \$3,111; matures April 27, 2049	763,160	775,470
2012 Debt Reserve Bond issue - USDA, 3.250% \$120,000: principal and interest payable monthly beginning July 30, 2011; principal & interest payment of \$454; matures April 27, 2049	111,608	113,395
	\$ 1,137,506	\$ 1,157,692

All bonds are secured by revenues and water system of Walnut Ridge Water & Sewer Works.

Maturities and analysis of long-term debt changes to Walnut Ridge Water & Sewer Works long-term debt are as follows:

	2017	2016
Total long-term debt at beginning of year	\$ 1,157,692	\$ 1,186,082
Note payable retirements	(20,186)	(28,390)
Total long-term debt at the end of the year, net	1,137,506	1,157,692
Less current portion	(31,286)	(29,509)
Non-current portion	\$ 1,106,220	\$ 1,128,183

Walnut Ridge Water & Sewer Works
(A Component Unit of the City of Walnut Ridge, Arkansas)
Notes to Financial Statements
June 30, 2017 and 2016

NOTE 8: LONG-TERM DEBT (Continued)

Maturities of long-term debt at June 30, 2017 are as follows:

	<u>Principal</u>	<u>Interest</u>	<u>Total</u>
2018	\$ 31,286	\$ 38,407	\$ 69,693
2019	32,448	37,286	69,734
2020	33,630	36,104	69,734
2021	34,903	34,831	69,734
2022	36,271	33,463	69,734
Thereafter	968,968	454,487	1,423,455
	<u>\$ 1,137,506</u>	<u>\$ 634,578</u>	<u>\$ 1,772,084</u>

Interest expense was \$35,494 for year ended June 30, 2017 and \$41,369 for year ended June 30, 2016.

NOTE 9: RISK MANAGEMENT AND LITIGATION

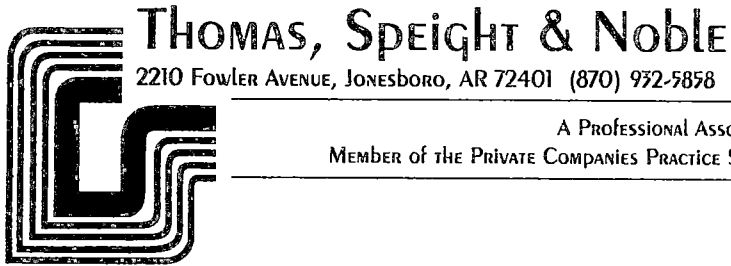
Walnut Ridge Water & Sewer Works is exposed to various risks of loss to torts, thefts of, damage to, and destruction of assets, errors and omissions, injuries to employees, and natural disasters. Expenditures and claims are recognized when it is probable that a loss has occurred and the amount of the loss can be reasonably estimated. In determining claims, events that might create claims, but for which none have been reported, are considered.

NOTE 10: MONTHLY WATER RATES

Walnut Ridge Water & Sewer Works shall be determined by meter measurements. The consumption per month will be charged \$5.90/1,000 gallons of water with a 1,000-gallon minimum per the rate increase in November 2016. Sewer charges are \$4.40/1,000 gallons with a 1,000-gallon minimum per the rate increase in November 2016.

NOTE 11: SUBSEQUENT EVENTS

Management has evaluated subsequent events through September 15, 2017, the date on which the financial statements were available to be issued.



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A PROFESSIONAL ASSOCIATION OF CERTIFIED PUBLIC ACCOUNTANTS

MEMBER OF THE PRIVATE COMPANIES PRACTICE SECTION OF THE AMERICAN INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS

INDEPENDENT AUDITORS' REPORT ON INTERNAL CONTROL OVER FINANCIAL REPORTING AND ON COMPLIANCE AND OTHER MATTERS BASED ON AN AUDIT OF FINANCIAL STATEMENTS PERFORMED IN ACCORDANCE WITH *GOVERNMENT AUDITING STANDARDS*

To the Board of Commissioners
Walnut Ridge Water & Sewer Works
Walnut Ridge, Arkansas

We have audited, in accordance with the auditing standards generally accepted in the United States of America and the standards applicable to financial audits contained in *Government Auditing Standards* issued by the Comptroller General of the United States, the financial statements of the business-type activities of the Walnut Ridge Water & Sewer Works, as of and for the year ended June 30, 2017, and the related notes to the financial statements, which collectively comprise the Walnut Ridge Water & Sewer Works' basic financial statements and have issued our report thereon dated September 15, 2017.

Internal Control over Financial Reporting

In planning and performing our audit of the financial statements of Walnut Ridge Water & Sewer Works as of and for the year ended 2017, in accordance with auditing standards generally accepted in the United States of America, we considered Walnut Ridge Water & Sewer Works' internal control over financial reporting (internal control) as a basis for designing audit procedures that are appropriate in the circumstances for the purpose of expressing our opinions on the financial statements, but not for the purpose of expressing an opinion on the effectiveness of Walnut Ridge Water & Sewer Works' internal control. Accordingly, we do not express an opinion on the effectiveness of Walnut Ridge Water & Sewer Works' internal control.

A *deficiency in internal control* exists when the design or operation of a control does not allow management or employees, in the normal course of performing their assigned functions, to prevent, or detect and correct, misstatements on a timely basis. A *material weakness* is a deficiency, or a combination of deficiencies in internal control, such that there is a reasonable possibility that a material misstatement of the entity's financial statements will not be prevented, or detected and corrected, on a timely basis. A *significant deficiency* is a deficiency, or a combination of deficiencies, in internal control that is less severe than a material weakness, yet important enough to merit attention by those charged with governance.

Our consideration of internal control was for the limited purpose described in the first paragraph of this section and was not designed to identify all deficiencies in internal control that might be material weaknesses or significant deficiencies and therefore material weaknesses or significant deficiencies may exist that were not identified. However, as discussed below, we did identify a certain deficiency in internal control described below, that we consider to be a material weakness.

2017-1 To ensure proper safeguarding of assets, financial accounting duties relating to initiating, receipting, depositing, disbursing, and recording transactions should be distributed among appropriate employees. Walnut Ridge Water & Sewer Works' management did not segregate these duties to sufficiently reduce the risks of fraud and error and properly safeguard assets, because of limited resources. We recommend the financial accounting duties be segregated among employees to the extent possible.

Management has responded and indicated that financial accounting duties relating to initiating, receipting, depositing, disbursing, and recording transactions will be segregated to the extent possible with current staffing levels.

Compliance and Other Matters

As part of obtaining reasonable assurance about whether the Walnut Ridge Water & Sewer Works' financial statements are free from material misstatement, we performed tests of its compliance with certain provisions of laws, regulations, contracts, and grant agreements, noncompliance with which could have a direct and material effect on the determination of financial statement amounts. However, providing an opinion on compliance with those provisions was not objective of our audit, and accordingly, we do not express such an opinion. The results of our tests disclosed no instances of noncompliance that are required to be reported under *Government Auditing Standards*.

2210 FOWLER AVENUE
PO Box 17167
JONESBORO, AR 72403-6721
870-932-5858
Fax 870-932-2030

420 WEST WALNUT
PO Box 205
Blytheville, AR 72316
870-762-5831
Fax 870-762-5833

1400 WEST KEISER
PO Box 644
OSCEOLA, AR 72570
870-563-2638
Fax 870-563-3794

915 TOWNSEND DRIVE
PO Box 700
POCAHONTAS, AR 72455
870-892-2575
Fax 870-892-2576

Walnut Ridge Water & Sewer Works' Response to Findings

Management's response to the findings identified in our audit is described above. Management's response was not subjected to the auditing procedures applied in the audit of the financial statements and, accordingly, we express no opinion on it.

Purpose of this Report

The purpose of this report is solely to describe the scope of our testing of internal control and compliance and the results of that testing, and not to provide an opinion on the effective of the entity's internal control or on compliance. This report is an integral part of an audit performed in accordance with *Government Auditing Standards* in considering the entity's internal control and compliance. Accordingly, this communication is not suitable for any other purpose.

Thomas, Speight & Noble, CPAs

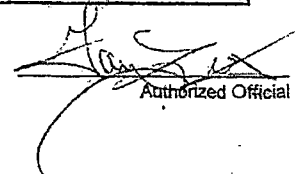
Thomas, Speight & Noble, CPAs

Jonesboro, Arkansas

September 15, 2017

USDA Rural Development Statement of Income and Expense					
Walnut Ridge Water and Sewer		Walnut Ridge, AR			
Fiscal Year End			7/1/16-6/30/17	7/1/17-6/30-18	
		Prior Year Actual	Recent Year Budget	Recent Year Actual	Proposed Budget
Operating Income					
1	Water Revenue			884,861.00	945000
2	Sewer Revenue			515,028.00	545000
3	Penalty Income			35,496.00	36000
4	Misc. Incom			24,550.00	20000
5	Interest			346.00	300
6					
9					
10	Total Income	\$ -	\$ -	\$ 1,460,281.00	\$ 1,546,300.00
Operating Expenses					
11	Purchased Water			557,079.00	600,000.00
12	Salaries Wages and Benefits			298,384.00	310,000.00
13	Payroll Taxes			21,470.00	21,750.00
14	Depreciation			163,221.00	158,000.00
15	Utilities			117,744.00	118,000.00
16	Maintenance materials & Contractual Services			100,881.00	100,000.00
17	Insurance			7,494.00	7,500.00
18	Office Expense			28,672.00	30,000.00
19	Lab Fees			34,135.00	47,000.00
20	Bad Debt			12,012.00	15,000.00
21	Professional Services			24,836.00	75,000.00
22	Other Expense			16,907.00	15,000.00
23					
24					
25					
26					
27	Total Expenses	\$ -	\$ -	\$ 1,382,835.00	\$ 1,497,250.00
28	Net Operating Income (Loss)	\$ -	\$ -	\$ 77,446.00	\$ 49,050.00
Debt Service					
29	USDA Bond			42,780.00	42,780.00
30	Regions Bank Bond			27,576.00	26,954.00
31					
32					
33					
34					
35	Total Debt Service	\$ -	\$ -	\$ 70,356.00	\$ 69,734.00
Transfers to Reserves					
36	Debt Service Reserve \$312 and \$46 monthly			4,296.00	4,296.00
37	Short Lived Asset Reserve			13,333.00	13,333.00
38					
39					
40					
41	Total Reserves	\$ -	\$ -	\$ 17,629.00	\$ 17,629.00
Other Income (Loans, Grants, Transfers from Reserves)					
42	Depreciation ADDED Back	\$ -	\$ -	\$ 163,221.00	\$ 158,000.00
43					
44					
45					
46	Total Non-Operating Income	\$ -	\$ -	\$ 163,221.00	\$ 158,000.00
Capital Improvements					
47					
48					
49					
50					
51	Total Capital Improvements	\$ -	\$ -	\$ -	\$ -
52	Income/Loss	\$ -	\$ -	\$ 152,682.00	\$ 119,687.00
53	Beginning Cash	\$ -	\$ -	\$ -	\$ 152,682.00
54	Ending Cash	\$ -	\$ -	\$ 152,682.00	\$ 272,369.00

USDA Rural Development				
Statement of Income and Expense				
Walnut Ridge Water and Sewer		Walnut Ridge, AR		
Fiscal Year End			7/1/15-6/30/16	7/1/16-6/30-17
	Prior Year Actual	Recent Year Budget	Recent Year Actual	Proposed Budget
Operating Income				
1	Water Revenue		764,943.00	895,000.00
2	Sewer Revenue		472,792.00	500,000.00
3	Misc. Income		7,853.00	12,000.00
4	Penalty Income		30,746.00	33,000.00
5	Interest		388.00	500.00
6	Charge Offs		514.00	525.00
9				
10	Total Income	\$ -	\$ -	\$1,277,236.00
Operating Expenses				
11	NEAPWA		577,346.00	525,000.00
12	Office personnel/expenses and Management		148,431.00	139,500.00
13	Chemicals & Materials		52,192.00	55,000.00
14	Insurance-Group and Company		53,456.00	57,000.00
15	Labor & Contracted Services		145,148.00	155,000.00
16	Depreciation Expense		130,000.00	129,550.00
17	Truck/Digger & Water/Sewer Expense		34,355.00	35,000.00
18	Utilities and Telephone		122,389.00	125,000.00
19	Lab and Permit		38,644.00	40,000.00
20	Bad Debt		10,887.00	12,500.00
21	Employee Retirement		22,060.00	23,000.00
22	Taxes		39,263.00	35,000.00
23	Sludge Disposal		-	50,000.00
24				
25				
26				
27	Total Expenses	\$ -	\$ -	\$1,374,171.00
28	Net Operating Income (Loss)	\$ -	\$ -	\$ (96,935.00)
Debt Service				
29	USDA Bond		42,780.00	42,780.00
30	Regions Bank Bond		27,576.00	27,576.00
31				
32				
33				
34				
35	Total Debt Service	\$ -	\$ -	\$ 70,356.00
Transfers to Reserves				
36	Debt Service Reserve \$312 and \$46 monthly		4,296.00	4,296.00
37	Short Lived Asset Reserve		13,333.00	13,333.00
38				
39				
40				
41	Total Reserves	\$ -	\$ -	\$ 17,629.00
Other Income (Loans, Grants, Transfers from Reserves)				
42	Depreciation ADDED Back	\$ -	\$ -	\$ 130,000.00
43				
44				
45				
46	Total Non-Operating Income	\$ -	\$ -	\$ 130,000.00
Capital Improvements				
47				
48				
49				
50				
51	Total Capital Improvements	\$ -	\$ -	\$ -
52	Income/Loss	\$ -	\$ -	\$ (54,920.00)
53	Beginning Cash	\$ -	\$ -	\$ (54,920.00)
54	Ending Cash	\$ -	\$ -	\$ (54,920.00)


Authorized Official

APPENDIX B

DETAILED COST ESTIMATES



CRIST JOB No.
1618



PRELIMINARY ENGINEERING REPORT
WASTEWATER IMPROVEMENTS
JANUARY 2018

Crist Engineers, Inc.
Walnut Ridge Wastewater Treatment Improvements
Preliminary Cost Summary
January 2018

Crist Project No. 1618

Alternative Description: Alternative 1.0 Field-Erected SBR Package Plant by Evoqua (Davco)

Item No.	Description	Total Quantity	Unit	Unit Cost	Total Cost
1	New 1/2" Bar Screen, Structure, and Splitter Box	1	LS	\$ 300,000	\$ 300,000
2	Field-Erected SBR Package Plant by Evoqua	2	EA	\$ 1,559,250	\$ 3,118,500
3	Blowers (100HP)	3	EA	\$ 80,000	\$ 240,000
4	35' x 20' Administration Building	700	SF	\$ 80	\$ 56,000
5	40' x 20' Blower Building w/ Overhead Door	800	SF	\$ 80	\$ 64,000
6	Modifications to Existing Chlorine Contact Basin	1	LS	\$ 15,000	\$ 15,000
7	Yard Piping (24" (1155LF), 12" (500LF), Air Piping)	1	LS	\$ 176,000	\$ 176,000
8	Site Work	1	LS	\$ 40,000	\$ 40,000
9	Electrical/Mechanical/Plumbing	1	LS	\$ 115,000	\$ 115,000
10	6' Chain Link Fence	1600	LF	\$ 25	\$ 40,000
11	Decommissioning of Existing Units	1	LS	\$ 25,000	\$ 25,000
12	Miscellaneous & Incidental Work	1	LS	\$ 79,400	\$ 79,400
13	Storm Water, Pollution Prev. Plan & Silt Control	1	LS	\$ 19,800	\$ 19,800
14	Trench and Excavation Safety	1	LS	\$ 39,700	\$ 39,700
15	Mobilization/Demobilization (5%)	1	LS	\$ 209,500	\$ 209,500
16	Contingency (10%)	1	LS	\$ 419,000	\$ 419,000
Total					\$ 4,956,900

Alternative Description: Alternative 2.0 Field-Erected CSR Model GR Package Plant by Schreiber Corp.

Item No.	Description	Total Quantity	Unit	Unit Cost	Total Cost
1	New 1/2" Bar Screen, Structure, and Splitter Box	1	LS	\$ 300,000	\$ 300,000
2	Field-Erected CSR Model GR Package Plant by Schreiber	2	EA	\$ 1,050,000	\$ 2,100,000
3	Structural Concrete Basin for Treatment Units & Dirt Work	1300	CY	\$ 600	\$ 780,000
3	35' x 20' Administration Building	700	SF	\$ 80	\$ 56,000
4	40' x 20' Blower Building w/ Overhead Door	800	SF	\$ 80	\$ 64,000
5	Modifications to Existing Chlorine Contact Basin	1	LS	\$ 15,000	\$ 15,000
6	Yard Piping (24" (1155LF), 12" (500LF), Air Piping)	1	LS	\$ 176,000	\$ 176,000
7	Site Work	1	LS	\$ 35,000	\$ 35,000
8	Electrical/Mechanical/Plumbing	1	LS	\$ 100,000	\$ 100,000
9	6' Chain Link Fence	1600	LF	\$ 25	\$ 40,000
10	Decommissioning of Existing Units	1	LS	\$ 25,000	\$ 25,000
11	Miscellaneous & Incidental Work	1	LS	\$ 69,800	\$ 69,800
12	Storm Water, Pollution Prev. Plan & Silt Control	1	LS	\$ 17,500	\$ 17,500
13	Trench and Excavation Safety	1	LS	\$ 34,900	\$ 34,900
14	Mobilization/Demobilization (5%)	1	LS	\$ 184,600	\$ 184,600
15	Contingency (10%)	1	LS	\$ 369,100	\$ 369,100
Total					\$ 4,366,900

Crist Engineers, Inc.
Walnut Ridge Wastewater Treatment Improvements
Preliminary Cost Summary
January 2018

Crist Project No. 1618

Alternative Description: Partial Mix Aerated Lagoon by EDI

Date: January 2018

Item No.	Description	Total Quantity	Unit	Unit Cost	Total Cost
1	New 1/2" Bar Screen, Structure, and Splitter Box	1	LS	\$ 300,000	\$ 300,000
2	Partial Mix Aerated Lagoon	1	EA	\$ 400,000	\$ 400,000
3	Dirt Work (Excavation, Fill, Haul, Disposal)	130000	CY	\$ 20	\$ 2,600,000
3	35' x 20' Administration Building	700	SF	\$ 80	\$ 56,000
4	40' x 20' Blower Building w/ Overhead Door	800	SF	\$ 80	\$ 64,000
5	Modifications to Existing Chlorine Contact Basin	1	LS	\$ 15,000	\$ 15,000
6	Yard Piping (24" (1000LF), Air Piping)	1	LS	\$ 120,000	\$ 120,000
7	Site Work	1	LS	\$ 36,000	\$ 36,000
8	Electrical/Mechanical/Plumbing	1	LS	\$ 26,000	\$ 26,000
9	6' Chain Link Fence	3600	LF	\$ 25	\$ 90,000
10	Decommissioning of Existing Units	1	LS	\$ 25,000	\$ 25,000
11	Miscellaneous & Incidental Work	1	LS	\$ 71,100	\$ 71,100
12	Storm Water, Pollution Prev. Plan & Silt Control	1	LS	\$ 17,800	\$ 17,800
13	Trench and Excavation Safety	1	LS	\$ 35,600	\$ 35,600
14	Mobilization/Demobilization (5%)	1	LS	\$ 186,600	\$ 186,600
15	Contingency (10%)	1	LS	\$ 373,200	\$ 373,200
Total					\$ 4,416,300

Alternative Description: Forcemain to Black River

Item No.	Description	Total Quantity	Unit	Unit Cost	Total Cost
1	14" SDR 21 PVC Forcemain, Open Cut	44616	LF	\$ 60	\$ 2,676,960
2	2" Vacuum/Air Release Valve Assembly	2	EA	\$ 4,000	\$ 8,000
3	14" Isolation Valve	2	EA	\$ 2,600	\$ 5,200
4	Package Pump Station (4 Pumps)	1	LS	\$ 384,000	\$ 384,000
5	Pavement Repair	290	LF	\$ 110	\$ 31,900
6	18" Steel Encasement Pipe, Hwy. 412 Bore	100	LF	\$ 200	\$ 20,000
7	Creek Crossing	2	EA	\$ 15,000	\$ 30,000
8	Granular Bedding Material	4500	TON	\$ 30	\$ 135,000
9	Forcemain Route Clearing	1	LS	\$ 80,000	\$ 80,000
10	Forcemain Location Signs	45	EA	\$ 35	\$ 1,575
11	Seeding, Sodding, & Final Cleanup	1	LS	\$ 32,000	\$ 32,000
12	Acceptance Testing	44616	LF	\$ 2.50	\$ 111,540
13	Miscellaneous & Incidental Work	1	LS	\$ 63,100	\$ 63,100
14	Storm Water, Pollution Prev. Plan & Silt Control	1	LS	\$ 15,800	\$ 15,800
15	Trench and Excavation Safety	1	LS	\$ 26,800	\$ 26,800
16	Permanent Easement Acquisition	1	LS	\$ 178,000	\$ 178,000
17	Mobilization/Demobilization (5%)	1	LS	\$ 170,200	\$ 170,200
18	Contingency (10%)	1	LS	\$ 340,500	\$ 340,500
Total					\$ 4,310,575

SELECTED ALTERNATIVE: Alternative 2.0.A: Field-Erected CSR Model GR Package Plant by Schreiber Corp., to Existing Village Creek Outfall

Construction Improvements (Treatment)	\$4,366,900.00
Engineering, Legal, Environmental, and Administration (20%)	\$873,000.00
Subtotal	\$5,239,900.00
Intrest During Construction	\$131,000.00
Total Estimated Cost	\$5,370,900.00

APPENDIX C

DESIGN CRITERIA AND DESIGN INFORMATION



CRIST JOB NO.
1618



PRELIMINARY ENGINEERING REPORT
WASTEWATER IMPROVEMENTS
JANUARY 2018

ALTERNATIVE 1.0

FIELD-ERECTED EXTENDED AERATION PACKAGE PLANT BY EVOQUA (DAVCO)



CRIST JOB NO.
1618



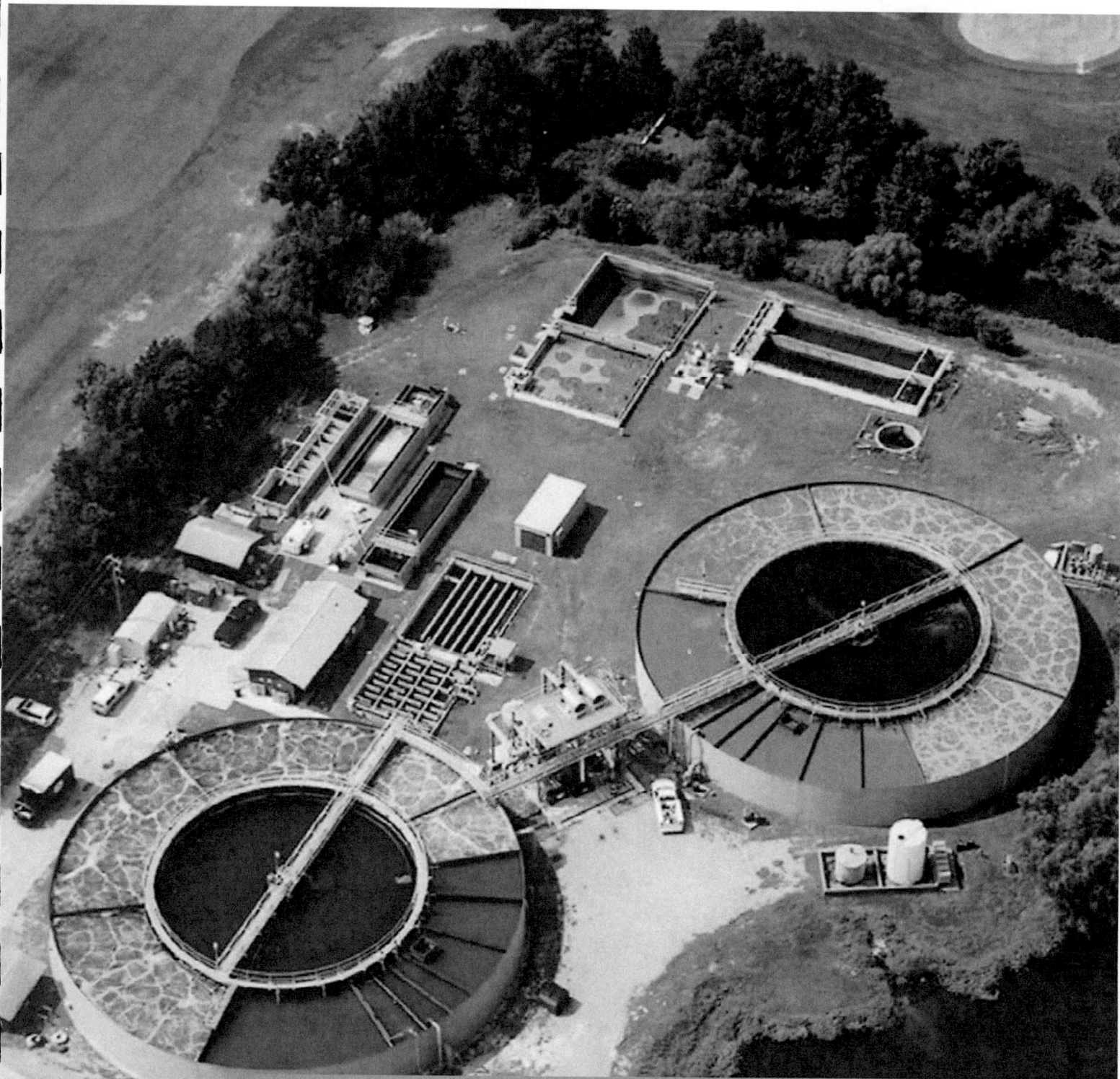
PRELIMINARY ENGINEERING REPORT
WASTEWATER IMPROVEMENTS
JANUARY 2018



eVOQUA
WATER TECHNOLOGIES



**DAVCO™ FIELD-ERECTED
WASTEWATER TREATMENT SYSTEMS**



DAVCO™ FIELD-ERECTED TREATMENT PLANTS

Evoqua, through its DAVCO™ product line, is an industry leader in the manufacture and installation of field-erected biological treatment plants for the reduction of biochemical oxygen demand, total suspended solids, total nitrogen, and phosphorus. Municipalities and industrial clients can reduce their overall capital expenditure and have a shorter concept-to-completion timeline. Capacities range from 0.1 MGD to 5.0 MGD with full turnkey construction, retrofit, rehab, or replacement services available.



Turnkey Wastewater Treatment Solution in less than six months.

CONCEPT TO COMPLETION THE COMPREHENSIVE TREATMENT SOLUTION

DAVCO™ field-erected treatment plants are ideal for the reduction of biochemical oxygen demand, total suspended solids, total nitrogen, and phosphorus. Evoqua's DAVCO product and service teams have worked with municipalities, developers and engineers for more than 50 years to deliver turnkey projects and solutions in as fast as six months.

DAVCO field-erected treatment plants offer optimum application flexibility relative to physical size, flow rates, treatment levels, and site requirements. Treatment capacities range from 0.1 to 5.0 million gallons per day (mgd) and are available in a variety of configurations, including activated sludge processes, sequencing batch reactors, and oxidation ditch configurations. Treatment plant material options include carbon steel, galvanized steel, stainless steel, concrete, or any combination of these materials.

Overall capital, maintenance, and operating costs can be reduced with a shorter concept-to-completion timeline. Full turnkey, retrofit or upgrade solutions are also available.

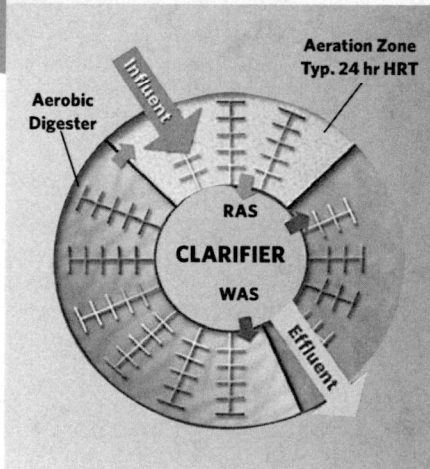
KEY FEATURES

- Over 50 years of experience and biological process expertise
- Engineering to Start-up: Single-source responsibility
- Equipment engineering and quality manufacturing
- Short on-site completion timelines with full technical support
- Retrofit and Rehab of existing equipment available (regardless and manufacturer)

APPLICATIONS:

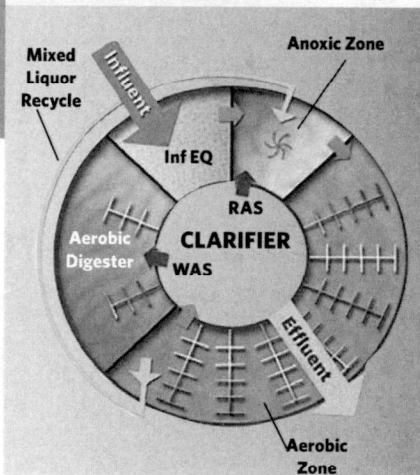
- Municipal Wastewater
- Industrial Wastewater
- Commercial or Home Developers
- Reuse and Reclamation
- Biological Nutrient Removal (BNR)
- BOD/COD/TSS/Reduction

**EXTENDED AERATION
90% - 95% REMOVAL**



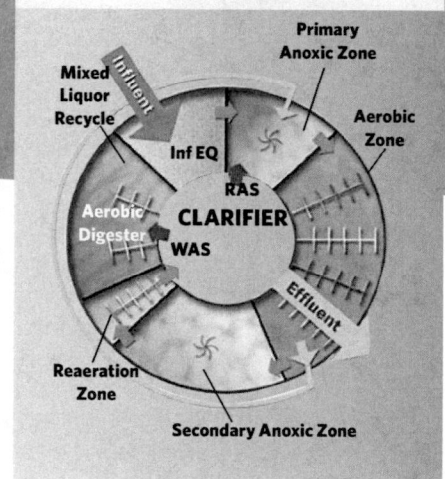
- BOD/TSS
- NH3 < 1 mg/L
- TP (Chemically)

**BIOLOGICAL NUTRIENT REMOVAL
2 STAGE**



- BOD/TSS
- TN < 8 mg/L
- TP (Chemically)

**BIOLOGICAL NUTRIENT REMOVAL
4 STAGE**



- BOD/TSS
- TN < 3 mg/L
- TP (Chemically)

EFFICIENCY & ECONOMY IN A SINGLE PACKAGE

DAVCO™ field-erected treatment plants integrate the industry's most advanced treatment processes into a cost effective package solution. The result is a highly flexible and efficient treatment facility that can be operational in weeks, instead of months.

Evoqua's biological treatment process experts are always available to guide process selection and to assist with technical support in all phases of application refinement, process design, and specification development.

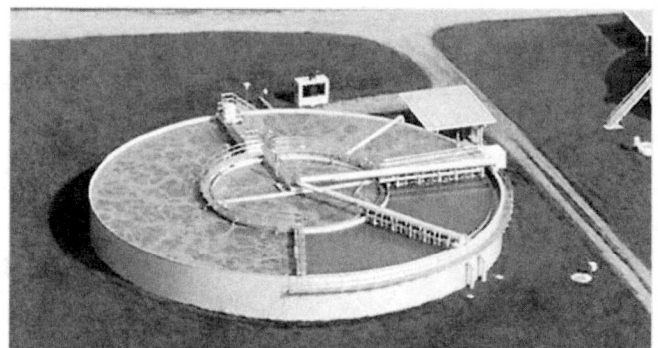
One of the unique innovative Evoqua processes is the dual path, providing complete process redundancy meeting EPA Class I, II, or III reliability standards in a single DAVCO™ field-erected treatment plant tank. In reuse applications, and other instances where process redundancy is required, the innovative and reliable dual path design offers significant savings in both capital cost and land utilization, while achieving even strict biological nutrient removal.

Evoqua treatment processes utilizing a DAVCO treatment plant design are guaranteed to meet or exceed all Federal, State, and Local government requirements. Evoqua has more than two decades of experience in the design of biological nutrient removal processes, meeting stringent effluent requirements.

EFFLUENT PARAMETERS

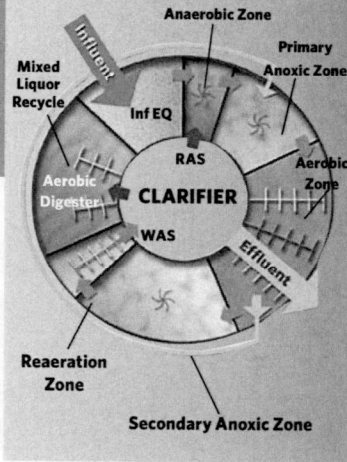
For flows from 0.1 to 5.0 mgd (Before Filtration)

- Biological Oxygen Demand BOD < 10 mg/L
- Total Suspended Solids TSS < 10 mg/L
- Ammonia NH3 < 1 mg/L
- Total Nitrogen TN < 3 mg/L
- Total Phosphorus TP < 1 mg/L



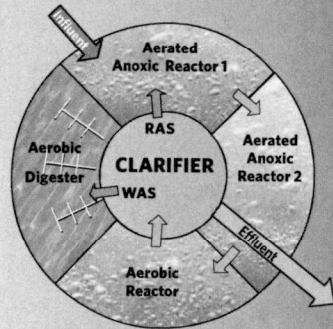
Dual Path Process 1 MGD installation in North Carolina

BIOLOGICAL NUTRIENT REMOVAL 5 STAGE



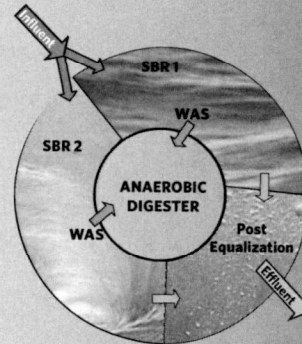
- BOD/TSS
- TN < 3 mg/L
- TP < 1 mg/L (Biologically)

AERATED ANOXIC



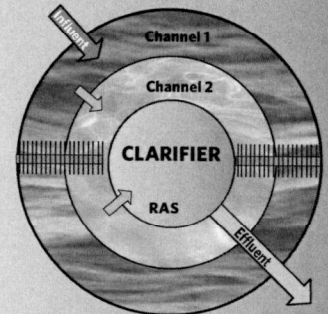
- BOD/TSS
- TN < 6 mg/L
- TP (Chemically)

OMNIPAC® SBR PACKAGE PLANTS



- BOD/TSS
- TN < 3 mg/L
- TP (Chemically)

ORBAL® SYSTEMS



- BOD/TSS
- TN < 6 mg/L
- TN < 4 mg/L with MLSS recycle
- TP (Chemically)

DAVCO™ field-erected treatment plants provide a cost-effective long-life solution to treatment plant construction. This package plant approach is considerably less capital intensive than form-built, concrete basin type treatment plants due to the weather-related delays and labor-intensive conditions associated with built-in-place approaches.

The field-erected plants are simpler and faster to install because they require less physical space, less yard piping and electrical conduit, less maintenance, and significantly less site preparation.

\$

Field-Erected Plants

\$

Site-Built Concrete Plants

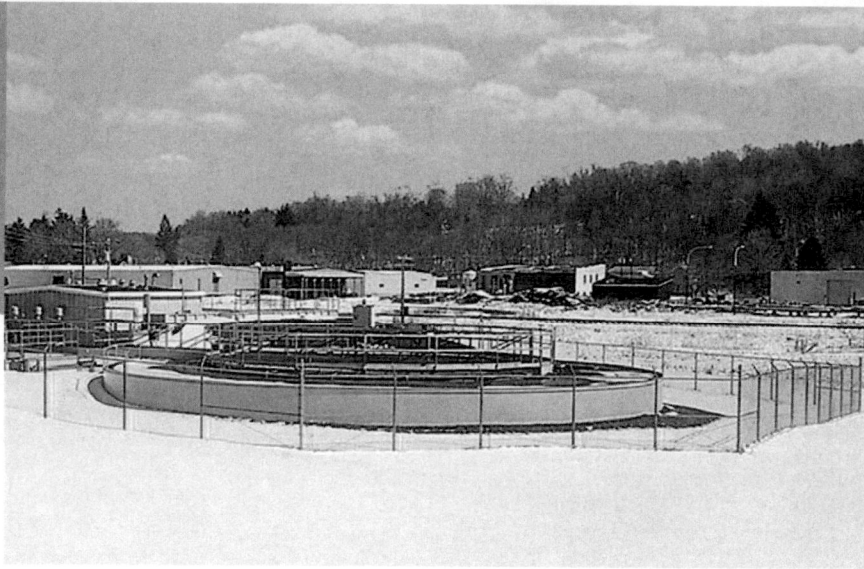
Both the capital costs and life-cycle costs of Field-Erected Treatment Plants are only a fraction of these same costs in site-built concrete plants.



Biological Nutrient Removal Process 1 MGD Installation in Alabama

OTHER PROCESSES OFFERED

- Orbal® Multichannel Oxidation Ditch
- VLR® Looped Reactor Process
- OMNIPAC® Sequencing Batch Reactors (SBR)
- Tow-Bro® Clarifiers
- Membrane Bio Reactors (MBR)
- Envirex® Rotating Biological Contactors (RBC)



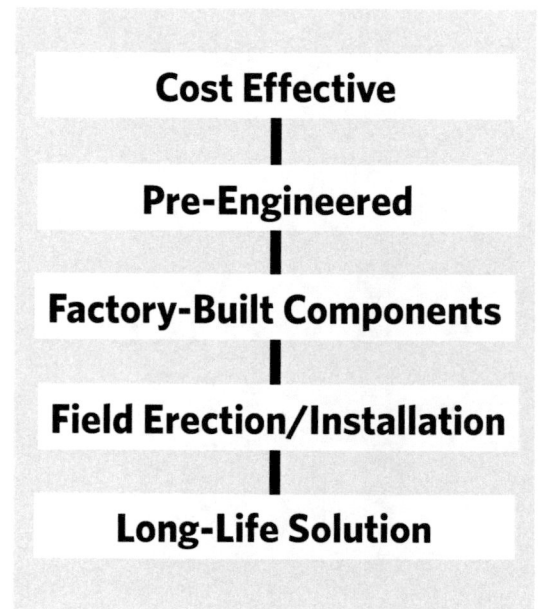
Field-erected plants installed in cold-climate conditions may be partially or fully buried to utilize the earth as insulation conserving the latent heat of the incoming raw sewage and to prevent freezing.

COST-EFFECTIVE, LONG-LIFE TREATMENT SOLUTION

Evoqua's DAVCO™ product and service team is the industry's most experienced, relative to the field-erected treatment plant assembly methods, procedures, and quick start-up techniques. Over the years, the Evoqua installation team has earned an enviable reputation for its quality on-site workmanship, and its reliability in meeting strict schedule and budget parameters. With the use of the Evoqua installation team, sole-source responsibility is assured.

In addition, DAVCO field-erected treatment plants save money in many ways - both initially and over time, eliminating the need for multiple tankage, separate clarification systems and sludge recycle systems. Engineering and construction costs are dramatically reduced by the use of pre-engineered components and the precision factory fabrication of individual assemblies.

Davco field-erected plants have proven their long-life functionality and durability over decades and in all types of climatic extremes. They provide an immediate solution that outlasts other options which often cost many times more and take far longer to construct.

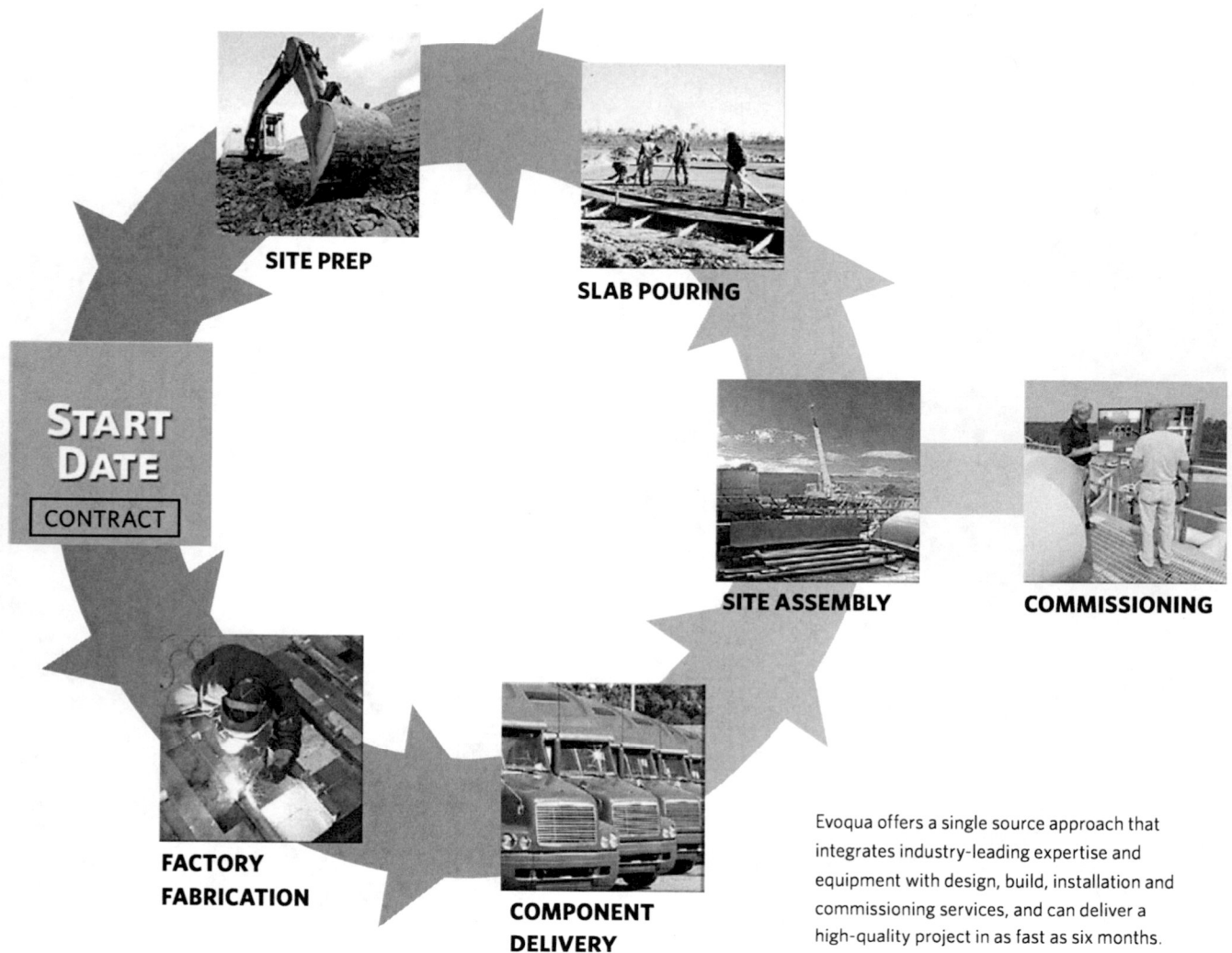


Evoqua's single source approach integrates experience with equipment design, steel fabrication, field installation/construction, and commissioning services.

THE DAVCO™ FIELD-ERECTED TREATMENT PLANT CYCLE

Contract-to-completion timelines for site-built concrete treatment plants can be exceedingly long often ranging from months to years. In contrast, DAVCO™ field-erected treatment plants are pre-engineered and factory built in our Thomasville, GA fabrication facility. The components and internal piping assemblies in these field-erected plants benefit from the machine shop atmosphere of factory construction, and provide a major advantage with short on-site installation time.

DAVCO field-erected treatment plant components are trucked to the site and installed on a concrete base slab (typically the site is prepared and excavated as necessary and the slab poured while the system is manufactured). The field installation primarily involves assembling and welding the components, then cleaning and coating the entire system.

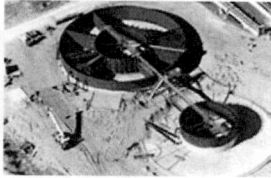


Evoqua offers a single source approach that integrates industry-leading expertise and equipment with design, build, installation and commissioning services, and can deliver a high-quality project in as fast as six months.

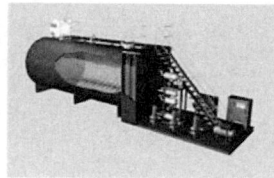
DAVCO™ PRODUCTS AND SERVICES

FAST, TURNKEY, OEM SOLUTIONS FOR FILTRATION, SCREW PUMPS, AND FIELD ERECTED WASTEWATER TREATMENT PLANTS

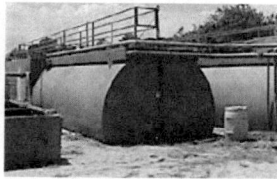
BIOLOGICAL TREATMENT



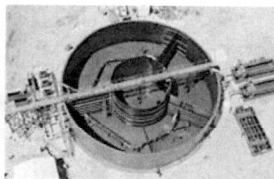
DAVCO™ Field Erected Treatment Plants



X-Press™ MBR Systems



Package Plants



OMNIPAC® SBR Field Erected Package Plant

CLARIFICATION

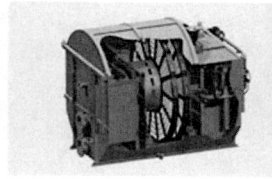


Modular & Field Erected Clarifiers

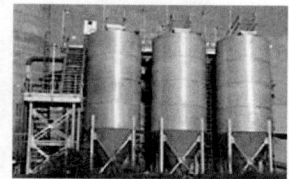


Internalift® and Externalift™ Screw Pumps

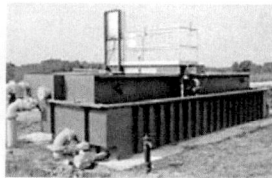
TERTIARY FILTRATION



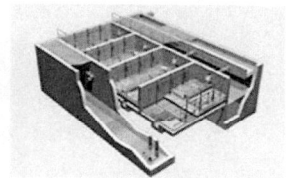
Forty-X™ Disc Filters



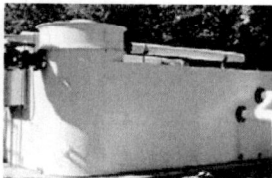
Continuous Backwash Filters



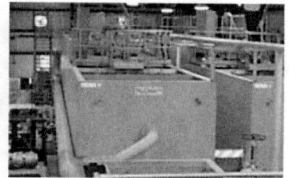
Gravisand® Traveling Bridge Filters



Hydro-Clear® Sand Filters



Deep-Bed Sand Filters



NxClear® Denitrification Filters

ABOUT THE DAVCO PRODUCT LINE

Evoqua, through its Davco product line is an industry leader in the manufacture and installation of water and wastewater treatment equipment and systems including field erected biological treatment plants, screw pumps, filtration equipment and clarifier rehabilitation. Davco products and services are supported by experienced project teams that have been working with municipalities, developers and engineers for more than 50 years to deliver turnkey treatment projects and solutions. Evoqua offers a single source approach that integrates industry-leading expertise and equipment with design, build, installation and commissioning services, and can deliver a high quality project in as fast as six months.

PROJECT CAPABILITIES

- Applications & Design Engineering
- Equipment Manufacturing
- Project Management
- Field Erection & Installation
- Turnkey Project Solutions
- Performance Warranties
- Commissioning



1828 Metcalf Ave., Thomasville, GA 31792

+1 (800) 841-1550 (toll-free) +1 (229) 226-5733 (toll) www.evoqua.com/davco

DAVCO™
an EVOQUA brand

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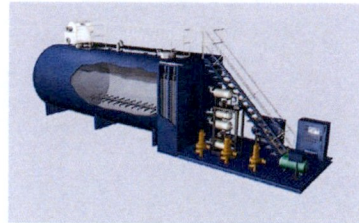
DAVCO PRODUCTS AND SERVICES

FAST, TURNKEY, OEM SOLUTIONS FOR FILTRATION, SCREW PUMPS, AND FIELD ERECTED WASTEWATER TREATMENT PLANTS

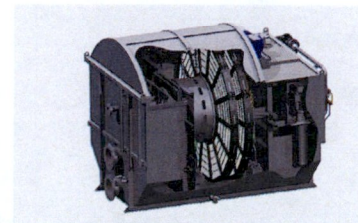
BIOLOGICAL TREATMENT



DAVCO™ Field Erected Treatment Plants



X-Press™ MBR Systems



Forty-X™ Disc Filters



Continuous Backwash Filters



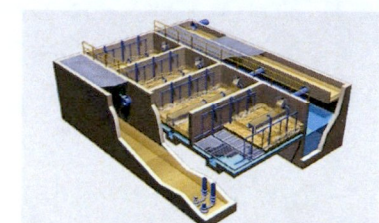
Package Plants



OMNIPAC® SBR Field Erected Package Plant

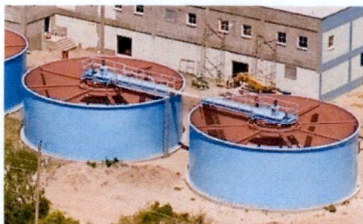


Gravisand® Traveling Bridge Filters



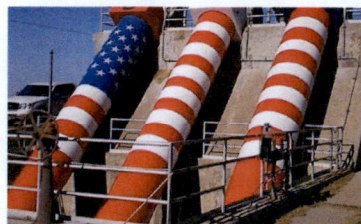
Hydro-Clear® Sand Filters

CLARIFICATION

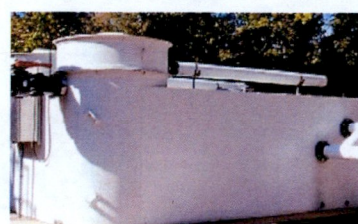


Modular & Field Erected Clarifiers

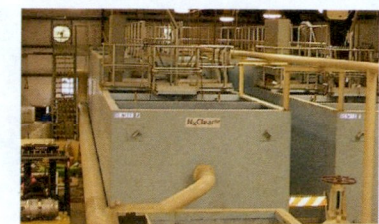
SCREW PUMPS



Internalift® and Externalift™ Screw Pumps



Deep-Bed Sand Filters



NxClear® Denitrification Filters

DAVCO PRODUCTS AND SERVICES

FAST, TURNKEY, OEM SOLUTIONS FOR FILTRATION, SCREW PUMPS, AND FIELD ERECTED WASTEWATER TREATMENT PLANTS

RETROFIT, REHAB, & REPLACEMENT SERVICES

When demand increases, regulations change, and plant equipment reaches its useful life, Evoqua Water Technologies responds. The Davco product offering includes retrofit, rehab, and replacement parts, equipment, and services for water and wastewater filtration, separation, clarification, aeration, biological treatment, and screw pumps. Our application experts and complete database of OEM (Original Equipment Manufacturer) drawings provides for faster, more cost effective, and responsive project execution.



Increase performance of existing wastewater treatment equipment and field erected plants



Inspect, repair or replace screw pumps



Upgrade or convert sand filtration to Forty-X™ Disc Filters

PROJECT CAPABILITIES

- Applications & Design Engineering
- Treatability & Pilot Testing
- Equipment Manufacturing
- Project Management
- Field Erection & Installation
- Turnkey Project Solutions
- Performance Warranties
- Commissioning

ABOUT THE DAVCO PRODUCT LINE

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EVOQUA

BUDGET PROPOSAL

EVOQUA WATER TECHNOLOGIES LLC
1828 METCALF AVE
THOMASVILLE, GA 31792

TELEPHONE 229-227-8706
FACSIMILE 229-228-0312

TO Chad Cooley (ETEC) CC Jimmy Speigner P#180008-A0

CELL 501-690-3721 TEL 501-978-1025

FROM Mike Bennett DATE 10-10-2017 PAGE 1 OF 4

SUBJECT Walnut Ridge, AR WWTP
(1,250,000 GPD)

MESSAGE

Budget price to manufacture, deliver, unload, field erect, field paint, and start-up two (2) mirror image 625,000 GPD above ground extended aeration ring steel Davco™ field erected WWTP's is \$ Rep to advise dollars.

Note: The scope of supply and pricing is based on EVOQUA's standard equipment selection, standard terms of sale and warranty terms. Any variations from these standards may affect this budgetary proposal. Additionally, please note that this budgetary proposal is for review and informational purposes only and does not constitute an offer for acceptance.

Items included in above pricing for each WWTP:

Hydrostatic steel inner & outer tank walls for each plant
Two (2) hydrostatic steel bulkheads with center kick-braces for each plant
304SS influent box with a 304SS manual clean bar screen and drying deck for each plant
Plant air distribution system with 304SS diffuser drop-pipes for each plant
Fine bubble flexible membrane diffusers for aeration zone in each plant
Coarse bubble diffusers for aerobic sludge digester zone in each plant
Clarifier effluent launderer and scum baffle for each plant
Clarifier scum control system for each plant
Clarifier sludge collector mechanism with ½ HP chain & sprocket drive for each plant
RAS/WAS system with sludge airlift and 304SS splitter box for each plant
4" Digester supernatant return airlift for each plant
Main access bridge with aluminum handrails, toeplates and bar grating for each plant
Equipment access walkways with aluminum handrails, toeplates and bar grating for each plant
One (1) access stairway w/intermediate landing, aluminum handrails and stair treads
Interconnecting bridge between plants with aluminum handrails, toeplates and bar grating
Plant clarifier controls in a NEMA 4X 304SS UL stamped enclosure for each plant
3 mils DFT epoxy primer & 6 mils DFT epoxy topcoat inside & out of each plant

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EVOQUA

BUDGET PROPOSAL

EVOQUA WATER TECHNOLOGIES LLC
1828 METCALF AVE
THOMASVILLE, GA 31792

TELEPHONE 229-227-8706
FACSIMILE 229-228-0312

Items not included in above pricing for WWTP:

Sitework with concrete slabs and clarifier grout
Raw sewage influent pump station with force main to each WWTP
WWTP final effluent outfall line
Interconnecting yard piping and valves
Plant blowers & blower controls
Piping from plant blowers to each WWTP air header connection
Mechanical screen and grit removal system
Comminutor
Odor control system
Disinfection equipment (UV or Chlorination)
Main electrical distribution panel
Standby power generator with automatic transfer switch
Main power line from power pole to main electrical distribution panel
Power lines from main electrical distribution panel to each WWTP panel
Plant & area lighting
On plant field run electrical conduit and wiring
3 phase electrical disconnect switches
Mechanical sludge dewatering with chemical feed
Sludge drying beds
Operation's building
Roads, site fencing and holding ponds
Landscaping with trees, shrubs, & grass seeding
State permitting
Performance and payment bond
Contractor's markup
Taxes of any kind

EVOQUA WATER TECHNOLOGIES LLC

**Walnut Ridge, AR WWTP
DAVCO BIOLOGICAL TREATMENT SYSTEMS
PRELIMINARY DESIGN SUMMARY
October 10, 2017**

Rev No: 0
Prep By: Mike Bennett
Proposal #: 180008-A0D1

I. DESIGN BASIS: **Sizing represents one of two equal-sized plants operated in parallel.*

Total Design Flow: 1.250 MGD Peaking Factor: 3.0 Total Peak Flow: 3.750 MGD
Design Flow/FETP (Q): 0.625 MGD Peak Flow/FETP: 1.875 MGD

	Influent	
	Conc. (mg/L)	Load/FETP (lbs/day)
BOD	250	1,303
TSS	250	1,303
NH3-N	30	156
TKN	40	209
NO3-N	--	--
TP	7	36

	Secondary Clarifier Effluent	
	Conc. (mg/L)	Expected (mg/L)
CBOD	10.0	< 10.0 *
TSS	15.0	< 15.0 *
NH3-N	4.0	< 4.0
TN		not req'd
NO3-N		not req'd
TP		not req'd

* Chemical addition and/or filtration may be required.

Maximum Wastewater Temperature: 20 °C 68 °F
Minimum Wastewater Temperature: 10 °C 50 °F
Site Elevation: 269 ft. MSL

Use NO3 or TN for design? None

II. PROCESS ASSUMPTIONS & VARIABLES:

Influent VSS Fraction: 80% Design DO Conc: 2.0 mg/L Max Water Level (Bio): 15.000 ft
Design MLSS: 3,500 mg/L RAS Rate, %Q: 50% Freeboard (Bio): 1.500 ft
% MLVSS: 75%
Design MLVSS: 2,625 mg/L
Biosolids Yield Factor: 0.65 lbsVSS/lbsBOD
Recommended Clarifier Hydraulic Loading: 1,000 gpd/ft² (at Peak flow)

III. PROCESS DESIGN PARAMETERS:

Aeration Basin 282.5 °

Number of Aeration Basins:	1	Aerobic Volume per Basin:	630,657 gallons
Total Aerobic Volume:	630,657 gallons	AOR:	2,588 lbs. O ₂ /day
Aerobic SRT:	17.0 days	SOR:	7,620 lbs. O ₂ /day*
Aerobic HRT:	24.2 hours @ Q	Air Flow Required:	1,207 SCFM*
BOD Loading:	15.5 lbs BOD/1000cf/day	Aeration Diffuser Type:	Fine Bubble
Aerobic F/M:	0.094 lbs BOD/lbs MLVSS	*Diffuser supplier to confirm SOR/SCFM values at final design	

Secondary Clarifier

Clarifier Diameter:	51.50 feet	Surface Overflow Rate:	300 gpd/ft ² (avg)
Sludge Production:	1,043 lbs/day		900 gpd/ft ² (peak)
Clarifier Surface Area:	2,083.1 ft ²	Solids Loading Rate:	13 lb/day/ft ² (avg)
Total Clarifier Volume:	192,102 gallons		39 lb/day/ft ² (peak)

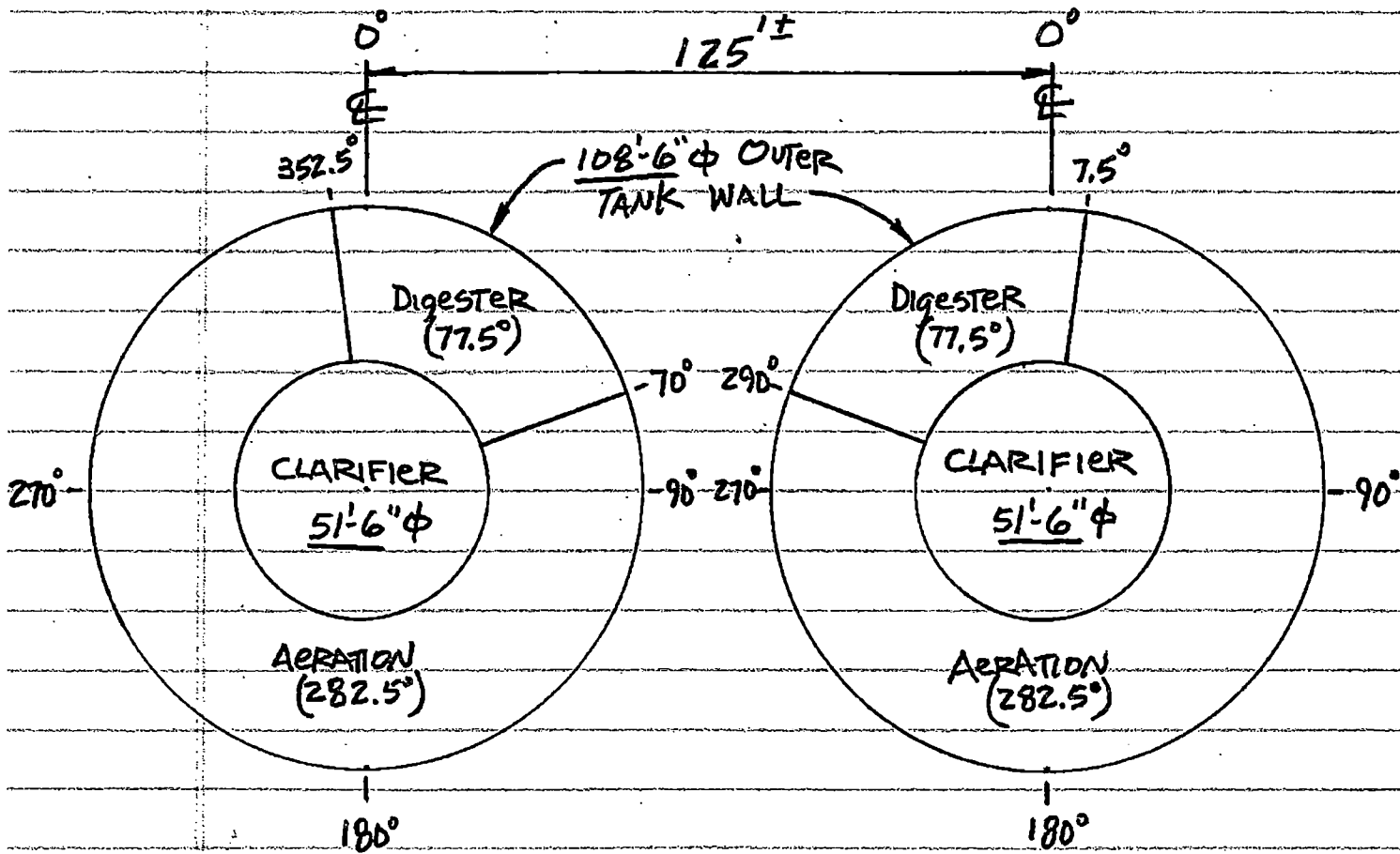
Aerobic Digester 77.5 °

Number of Digester Basins:	1	Digester Volume per Basin:	173,012 gallons
Digester Volume:	173,012 gallons	Air Flow Required:	694 SCFM*
Digester SRT:	30.1 days	*Assumes 30 SCFM/1000 cuft & coarse bubble	

Tank Sizing & Air Flow

Plant O.W. Diameter:	108.50 feet	Total SCFM Required*:	1,901 SCFM	Per Plant
Plant I.W. Diameter:	51.50 feet	*Excluding Airlifts	59 SCFM	Per Plant
Bulkhead Length:	28.50 feet	Total SCFM w/ Airlifts	1,960 SCFM	Per Plant
Total Bio Process (no EQ) Volume:	0.631 MG			

WALNUT Ridge, AR WWTP
(Duplex MIRROR IMAGE 625,000 GPD FETP's)



PLANT HEIGHT: 16'-6" w/18" Freeboard

Shada Tanner

From: Chad Cooley <ccooley@etec-sales.com>
Sent: Thursday, October 12, 2017 4:49 PM
To: Craig Johnson
Subject: Walnut Ridge, AR - WWTP
Attachments: Walnut Ridge, AR WWTP - Evoqua FETP - Budget Proposal.pdf; E18-26577 Walnut Ridge WWTP Blower Scope.pdf; GM 090S_DN-250_P__A_SE___GB-005917_revB.pdf; Continental Budget Proposal Walnut Ridge AR WWTP.pdf; TDS US MODEL 77.pdf

Craig –

God afternoon. Please find attached a budget proposal from Evoqua Water Technologies to provide two (2) parallel Davco Field Erected Treatment Plants (FETP's) for the referenced project, per your request. Note the proposal includes a detailed scope of supply, design summary and a sketch of the proposed layout. Please also note the following options to this configuration:

- These plants can be installed below grade, if desired, but will require additional structural support for the exterior walls. We can have Davco evaluate this, but it will likely result in a slight increase to the budget prices listed below.
- The digesters can be eliminated, if you prefer to use existing facilities for this purpose. Such elimination will lower the budget prices below by about 10%.

I have also attached blower proposals from both Aerzen (PD) and Continental (Multi-Stage), to give you a couple of blower options for the project. The budget prices for all of the equipment described therein is listed below.

Budget Pricing:

- Two (2) parallel 625,000 gpd FETP from Davco: **\$2,250,000**
- Three (3) 125-HP PD blowers from Aerzen: **\$ 300,000**
- Three (3) 100-HP M-S blowers from Continental: **\$ 200,000**

The budget price for a Davco FETP with Aerzen blowers is **\$2,550,000**.

The budget price for a Davco FETP with Continental blowers is **\$2,450,000**.

Please review the attached proposal at your convenience. If you have any questions, or require additional information, please do not hesitate to contact me. We appreciate your continued interest in ETEC and the manufacturers we represent.

Thanks,

Chad B. Cooley, P.E.
Vice President
Environmental Technical Sales, Inc.
900 S. Shackelford, Suite 300
Little Rock, AR 72211
Phone: (501) 978-1025 Fax: (501) 978-1026
Cell: (501) 690-3721
<http://etec-sales.com/>
E-mail: ccooley@etec-sales.com

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ALTERNATIVE 2.0

FIELD-ERECTED CSR
PACKAGE PLANT,
MODEL GR BY
SCHREIBER
CORPORATION



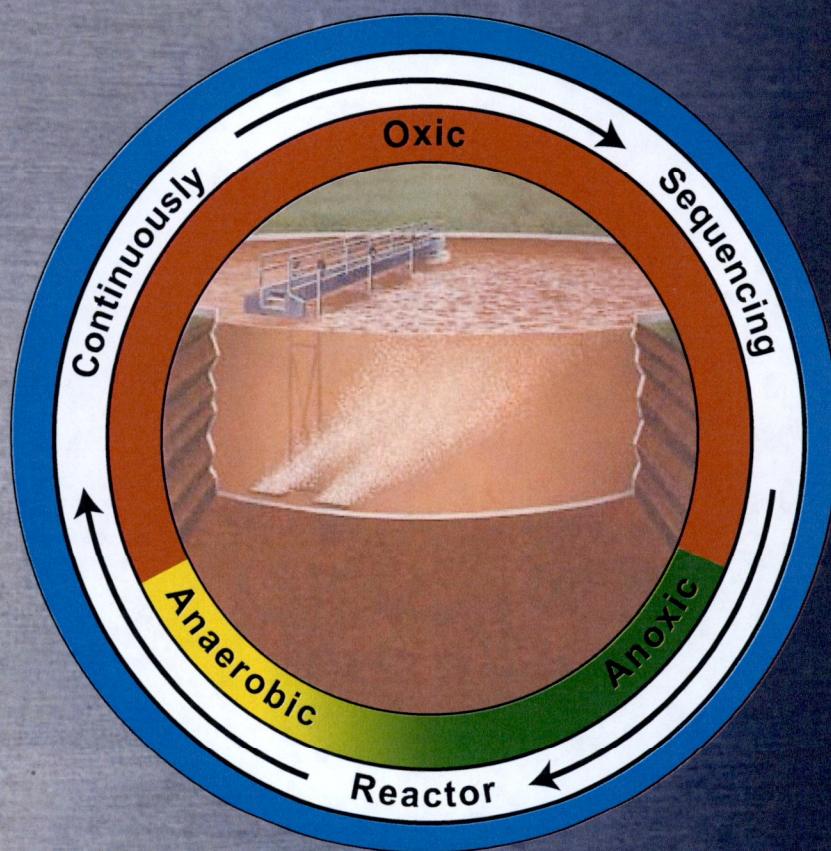
CRIST JOB NO.
1618



PRELIMINARY ENGINEERING REPORT
WASTEWATER IMPROVEMENTS
JANUARY 2018

SCHREIBER CSR

CONTINUOUSLY SEQUENCING REACTOR



A Biological Nutrient Removal (BNR) system utilizing continuous flow in a single basin.



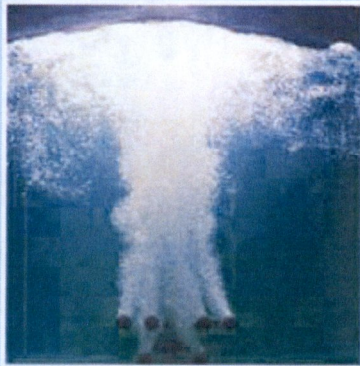
The Schreiber Continuously Sequencing Reactor, or CSR, is a Biological Nutrient Removal (BNR) system contained in a *Single Basin*. It sequences through the 3 process phases required for BNR – Oxidic, Anoxic and Anaerobic – in one basin. The 3 phases do not occur at the same time in the basin. They occur sequentially – one after the other, repetitively, over time. During the Oxidic phase, the entire basin is Oxidic (i.e. aerobic). When the air is turned off, the entire basin becomes anoxic and then ultimately anaerobic. After the anaerobic phase is completed, the air is turned back on and the cycle repeats –over and over - i.e. a Continuously Sequencing Reactor.

For the CSR, the secret to this “phase sequence-ability” lies in its unique design for *complete separation of aeration and mixing*. It has a *100% aeration turndown capability!* This important feature allows the aeration to be turned completely off while the CSR applies its low energy mixing without aeration. Through the use of Schreiber FlexControls, the CSR process can be advanced to meet the most stringent of requirements for today and the future.

HIGH OXYGEN TRANSFER

High Oxygen Transfer depends on maximizing air bubble surface area and contact time. Conventional diffused air systems mix via air lift pumping, which produces vertical circulating currents that are detrimental to Oxygen transfer since they actually reduce contact time. With CSR, since the diffusers are constantly moving through the water, there is minimum coalescence of the small bubbles (coalescence decreases total bubble surface area). Consequently, optimum surface area is maintained and the rise rate of the air bubbles provide maximum contact time. The resulting CSR oxygenation efficiency amounts to over 4.65 lbs. O₂ / hr per wire horsepower. Compared to 2.5 to 3.5 lbs. O₂/hr per wire horsepower for conventional diffused and mechanical aeration systems, the efficiency of the CSR results in savings of 35% to 50%.

CONVENTIONAL DIFFUSED AIR



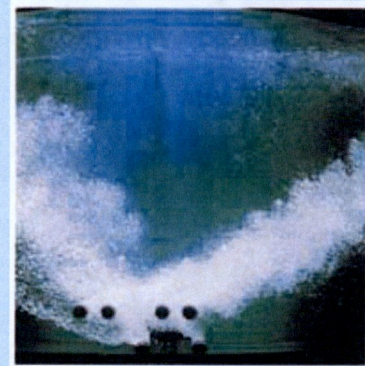
Stationary diffusers alone create a vertical updraft of water, increasing bubble rise rate, reducing contact time, and leading to a coalescence of bubbles that reduces available O₂ surface area for low oxygen transfer.

ROTATING DIFFUSERS ONLY



The CSR utilizes rotating diffusers that distribute small air bubbles in a uniform pattern, leading to well dispersed free-rising bubbles that maximize contact time and yield high oxygen transfer.

ROTATING & STATIONARY DIFFUSERS



By moving the water horizontally over stationary diffusers, the CSR's rotating diffusers eliminate the updraft problem created by stationary diffusers alone. The combination of rotating and stationary diffusers can greatly increase aeration capacity for higher basin loadings.

LOWER ENERGY COSTS FOR MIXING

The contents of the basin are mixed as the rotating bridge moves around the basin. Retrievable diffuser support components, and diffuser units suspended from the bridge, provide the driving force for complete mixing. Close proximity of these components to the tank bottom provides localized scouring to maintain suspension of solids. As a result, the power requirement for mixing is 2.5 to 3.5 HP/MG.

ADVANCING LEVELS OF PROCESS CONTROL

The Schreiber *FlexControl* process control system can be as simple as a DO system with timers or as sophisticated as online monitoring of BNR process parameters. As the name Schreiber *FlexControl* implies, the Schreiber process control system is very flexible, yet simple to operate.

DESIGN FLEXIBILITY

Schreiber aeration systems are suitable for aeration designs ranging from basic secondary treatment to advanced nutrient removal processes such as MLE, VIP, etc.



COUNTER CURRENT[®]
AERATION

Model GR

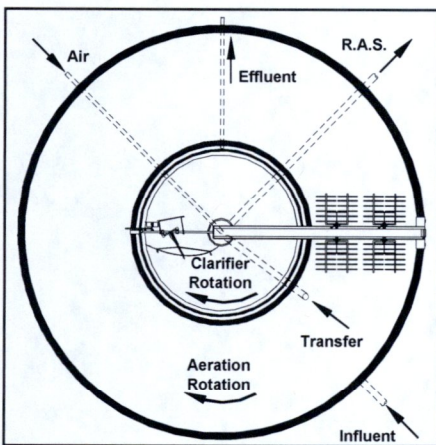
Aeration/clarification in a
single basin suitable for ADFs
up to 1.5 MGD.



Model GR Aeration

Schreiber's Model GR basin configuration utilizes Schreiber's patented *Counter Current Aeration* system, which provides high efficiency aeration and **separate** low energy mixing for activated sludge. Designed for smaller flows, the GR unit incorporates aeration and clarification within the same structure for optimum space utilization. A single GR aeration / clarification basin is capable of handling average daily flows to 1.5 MGD.

The GR model utilizes a circular tank with an aeration diameter up to 168' with typical sidewater depths from 10'-20'. Circular structures provide the most economical construction - minimum concrete and excavation with maximum basin volumes. A concentric internal wall is built within the aeration tank to form the clarifier structure. Helical scraper assemblies are suspended from a lightweight beam arm that rotates within the clarifier section of the basin. Independent from the clarifier arm, flexible membrane diffusers are suspended just inches above the basin floor, within the aeration ring, from a peripherally driven rotating aeration bridge. The continuous rotation of the bridge in the aeration ring provides constant mixing (separate from aeration) with minimal energy consumption. The movement of the diffusers through the water enhances fine bubble aeration, achieving high oxygen transfer efficiency. The design of Schreiber's diffusers permits 100% turndown of aeration while maintaining complete mixing.



- Features:**
- Maximum process flexibility
 - Separation of aeration from mixing
 - Hot-dip galvanized for corrosion protection
 - Minimal heat loss and aerosol release
 - Low life-cycle costs
 - Retrievable membrane diffusers
 - Low mixing costs
 - High oxygen transfer

COUNTER CURRENT AERATION Model GR - **SReactor**

With *Counter Current Aeration*, the air to the diffusers may be turned off as the aeration bridge continues to mix the contents of the basin. In a single basin, a continuous sequence of oxic, anoxic, and anaerobic phases can be achieved as a result of the ability to turn air on and off to the diffusers while the continuously rotating aeration bridge maintains the organics in suspension. It is by this advanced concept that the GR unit becomes a **Continuously Sequencing Reactor (CSR)** for biological nutrient removal, Schreiber's 21st century advancement over the *Sequencing Batch Reactor (SBR)*.

COUNTER CURRENT AERATION Model GR - **SReactor**, incorporating... **SCHREIBERFLEX**
Process Control System

With only the addition of direct monitoring process control equipment, a GR unit operating as a *Continuously Sequencing Reactor (CSR)* can achieve the highest level of biological nutrient removal for nitrogen and phosphorus. *SchreiberFlex* is Schreiber's unique process control system utilizing direct monitoring to meet today's tightest effluent limits.



Technical Solution Calculations
for

Walnut Ridge WWTF
AR
1.250 MGD ADF Facility

Representative
ETEC

September 22, 2017



Walnut Ridge WWTF

Flows Given or Assumed

	Average Flow		Ratio: 2.50	Peak Daily Flow	
	MGD	gpm		MGD	gpm
Design Flow	1.25	868		3.13	2,170
Headworks Flow	1.25	868		3.13	2,170
Equipment					
Bar Screen	1.25	868		3.13	2,170
Fine Screen	--	--		--	--
Washer Compactor	--				
Grit & Grease	--	--		--	--
Aeration GR - AOR	1.25	868		3.13	2,170
Aeration GRO - AOR	--	--		--	--
Digester	--	--		--	--
Clarifier	--	--		--	--
Fuzzy Filter				--	--
RAS		--			
Open Flight		--			
Tube Pump		--			

Notes:

This Technical Solutions Calculation Basis of Design has been prepared exclusively for the convenience of the design engineer. The design parameters used have been obtained from other sources. Schreiber assumes no responsibility for the accuracy of the design parameters.

The design engineer is responsible for the final facility design. Schreiber LLC's sole function is to supply equipment based upon the final facility design.

SCHREIBER[®]

Pure Ingenuity

Summary of Equipment

SCHREIBER CleanScreens

Frontloader Bar Screen

Model :	FR 220	
Number of Units:	1	
Width :	24	inches

SCHREIBER CSR CONTINUOUSLY SEQUENCING REACTOR

GR Aeration System

	Design	
Model :	GR	
Number of Units:	1	
Diameter :	140	feet
SWD :	15.0	feet
Raceway:	139.5	feet
F:M Ratio :	0.07	
MLSS Concentration :	4,000	mg/ L
Hydraulic Detention :	25.45	hours
Biological Loading Rate:	11.76	lb. BOD / 1000 cu. ft.
Linear feet of rotating diffusers:	1,050	feet
Linear feet of stationary diffusers:	0	feet
Concrete Quantity Estimate :	1,267	total cubic yards

Aeration Blowers

Model :	PD 130	
Number of Duty Blowers :	2	
Number of Standby Blowers :	1	
Horsepower (each) :	60	hp
ICFM (each) :	853	ICFM
SCFM (each) :	728	SCFM

Blower / Process Control

Dissolved Oxygen Monitoring	yes
Nitrate Monitoring	0
Ammonia Monitoring	0

GR Clarification

Model :	GR
---------	----



Summary of Equipment

Number of Duty Units:	1	
Number of Standby Units:	0	
Diameter :	65	feet
SWD :	14.0	feet
Surface Settling Rate @ Avg Flow :	377	gpd / sq. ft.
Surface Settling Rate @ Peak Flow :	942	gpd / sq. ft.

SCHREIBER CleanScreens

Frontloader Bar Screen System Calculations

Design Criteria

1. Peak Daily Flow Q = 2,170 gpm or 3.13 MGD
2. Velocity Range in Front of Screen - 2 ft. / sec. to 3 ft. / sec.
3. A 10% Blinding Factor.
4. Design Head Loss of 8 inches at maximum flow
5. Minimum 1' - 6" foot freeboard upstream at maximum flow
6. Calculations are based on using (1) barscreen unit.

Cross-Sectional Area Required (Width x Side Water Depth):

$$1. Q = \frac{\text{Peak Daily Flow}}{(60 \times 7.48)} = \frac{2,170}{(60 \times 7.48)} = 4.84 \text{ cfs}$$

$$2. A = \frac{Q}{V} = \frac{4.84 \text{ cfs}}{\text{Assume } 2.00 \text{ ft/sec}} = 2.42 \text{ sq ft @ Peak Daily Flow}$$

Bar Screen Equipment Sizing and Selection:

1. Number of Duty Units	1 Duty Unit(s)
Number of Standby Units	0 Standby Unit(s)
Width of Screen	2 feet 0 inches
2. Screen Drive Horsepower	0.75 hp each
3. Max. Side Water Depth (Upstream)	2 feet 4 inches
Recommended Minimum Channel Depth	3 feet 10 inches
4. Width of screen bars	0.375 inches
Spacing of bars (center to center)	1.000 inches
Clear opening between bars	0.625 inches

Notes:

If a bypass channel and overflow weir is utilized, the maximum upstream sidewater depth, channel depth, and water level elevations need to be evaluated relative to the weir configuration and resulting head over the weir.

Aeration

Flows

			Design
Average Daily Flow	ADF	MGD	1.25
Peak Flow	PDF	MGD	3.13

Site Conditions

			Design
Wastewater Temperature	T	°C	15
Site Elevation		feet	250
Dissolved Oxygen	DO	mg/L	2.00
Air Temperature		°F	110
Vapor Pressure @ T		psi	1.275
Relative Humidity	RH		80%

BOD

			Design
BOD Influent	BOD _{Inf}	mg/L	200
BOD Effluent		PPD	2,085
BOD Effluent Limit	BOD _{Eff}	mg/L	10
Pounds of Oxygen required per pound BOD		# O ₂ /#BOD	1.5
Assumed Volatile Portion of Solids	%VSS		68%
TSS Influent	TSS _{Inf}	mg/L	200
TSS Effluent	TSS _{Eff}	mg/L	12

Nitrogen

			Design
TKN Influent	TKN _{Inf}	mg/L	31
TKN Effluent	TKN _{Eff}	mg/L	1.5
TKN Removed = Nitrate (NO ₃) Produced	TKN _{Rem}	mg/L	29.5
Influent Nitrates & Nitrites	NO ₃ _{Inf}	mg/L	1.0
Total Nitrogen Influent	TN _{Inf}	mg/L	32.0
Organic N Influent	Org N _{Inf}	mg/L	1.0
Organic N Effluent	Org N _{Eff}	mg/L	1.0
Ammonia Influent	NH ₃ _{Inf}	mg/L	30.0
Ammonia Effluent	NH ₃ _{Eff}	mg/L	0.5
Nitrates Produced by Nitrification	NO ₃ prod by N	mg/L	29.50
Total Nitrates Loading	NO ₃ _{Load}	mg/L	30.50
Nitrates Removed	NO ₃ _{Rem}	mg/L	0.00
Carbon Ratio	BOD:NO ₃ _{Rem}		NA
Nitrates Effluent	NO ₃ _{Eff}	mg/L	30.50
Total Nitrogen Effluent	TN _{Eff}	mg/L	32.00

Reactor Design

Volume & Suspended Solids

			Design
Food:Mass Ratio	F:M		0.070
Mixed Liquor Suspended Solids	MLSS	mg/L	4,000
Mixed Liquor Volatile Suspended Solids	MLVSS	mg/L	2,720
Total Process Volume Required	Vol _(process)	MG	1.31
Pounds of Mixed Liquor Volatile Suspended Solids	#MLVSS	pounds	29,786

Nitrification Kinetics

Design



CONTINUOUSLY SEQUENCING REACTOR

Maximum specific growth rate of Nitrifiers @ 15°C	$\mu_{N, max}$	g NVSS / g NVSS-day	0.45
Nitrifier Yield Coefficient	a_N	g NVSS/ g NH3	0.15
Half-Saturation Coefficient for Nitrogen	K_N	mg/L	0.50
Half-Saturation Coefficient for Oxygen	K_O	mg/L	0.30
Heterotrophs yield coefficient	a	g VSS / g BOD	0.55
Maximum Specific Growth Rate of Nitrifiers @ T	$\mu_{N, max @ T}$	g NVSS / g NVSS-day	0.450
Specific Growth Rate of Nitrifiers	μ_N	g NVSS / g NVSS-day	0.196
Specific Rate of Nitrification	q_N	g NH3 / g NVSS - day	1.304
Fraction of nitrifying organisms	F_N		0.0406
Nitrification Rate	R_N	mg/L NH3 rem / day	144.13
Specific Nitrification Rate, # NH3 / #MLVSS - d	SNR_d	# NH3 / # MLVSS - day	0.0530
Specific Nitrification Rate, # NH3 / #MLVSS - hr @ T	SNR	# NH3 / #MLVSS - hour @ T°C	0.0022

Denitrification Kinetics

			Design
Specific Denitrification Rate per day at 20°C	$SDNR_d$	# NO3/# MLVSS - Day @ 20°C	0.03110
Specific Denitrification Rate per hour @ 20°C	$SDNR @ 20^\circ$	# NO3/# MLVSS - Hour @ 20°C	0.00130
Specific Denitrification Rate per hour @ T°C	$SDNR$	# NO3/# MLVSS - Hour @ T°C	0.00107

Process Phase Times

Oxic Time (Aerobic/Nitrification/"N" time)			Design
BOD Reduction: NH3 Reduction Ratio			8
Specific BOD Reduction Rate @ T°C	$SBRR$	#BOD / #MLVSS-hr	0.018
Time for Total BOD Reduction	T_{TBOD}	hours per day	3.76
Time for Soluble BOD Reduction	T_{SBOD}	hours per day	1.27
Time for Nitrification	T_N	hours per day	4.68
Minimum Oxic (Aerobic) Time Required	T_{omin}	hours per day	4.68
Percent Oxic (Aerobic) Time In CSR	$\%T_{oxic}$		100%
Design Blower Operating Hours per day		hours per day	24.00

Anoxic Time (Denitrification/"DN" Time)

Required Time for Anoxic(Denitrification)	T_{DN}	hours per day	0.00
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Calculate Combination times

Combined Oxic(N) + Anoxic(DN) Reaction Time	$T_{omin+DN}$	hours	4.68
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Air Calculations

Actual Oxygen Required (AOR)			Design
Oxygen required in PPD	$O_2 reqd$	PPD	4,386
Oxygen Recovery via Denitrification		PPD	-
Allowed Oxygen Recovery via DN	$O_2 Rec$	PPD	-
Actual Oxygen Required in PPD	AOR	PPD	4,386

Standard Oxygen Transfer Rate

Saturation Concentration ($C^*_{\infty 20}$)	$C^*_{\infty 20}$	mg/L	10.50
Select Alpha	α		0.70
Aged Diffusers Factor	F		0.99
Theta	Θ		1.024
Standard Pressure	P_s	psia	14.696
Site Pressure	P_b	psia	14.578
Pressure Correction	Ω		0.992
Oxygen Saturation @ 20°C	C^*_{s20}	mg/L	9.09
Oxygen Saturation @ T	C^*_T	mg/L	10.08
Oxygen Saturation Correction	τ		1.11



Beta	β		0.95
Standard Oxygen Transfer Rate lbs/day	SOTR	lbs/day	8,339
Standard Oxygen Transfer Rate lbs/hour	SOR	lbs/hour	347

SOR to AOR Ratio

Calculated SOR/AOR ratio			1.90
Selected SOR/AOR ratio for Design			1.90
SOR from AOR using (SOR:AOR ratio)		# O ₂ /Day	8,339

Process Control

Process Monitoring

			Design
Dissolved Oxygen Monitoring			yes
Nitrate Monitoring			0
Ammonia Monitoring			0

Aeration GR

GR Aeration

GR

			Design
Number of GR Aeration/Clarifier Basins		basins	1
GR Aeration SWD		feet	15.00

CSR Volume and Diameter

Total GR CSR Volume Required (Vol(process) - Vol(DNB))		million gallons	1.31
GR Process Volume per Basin, MG		million gallons	1.31
GR Process Volume per Basin, CF		cubic feet	175,538
GR Aeration Basin Diameter		feet	140.00
GR Channel Width		feet	36.25
Total CSR Volume		million gallons	1.33

Volumetric Loading

GR Volumetric Loading		# BOD /per day/ 1,000 CF	11.76
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Maximum Cycle Times, (MCTs)

Max "Air On" Cycle Time	T _{ONmax}	hours	12.73
Max "Air Off" Cycle Time	T _{OFFcycle}	hours	0.00
Max Cycle Time	T _{CYmax}	hours	12.73

GR Clarifier

GR Clarifier

Clarifier Model			GR
Number of Clarifier Duty Units			1
Underflow Concentration - MLSS			10,000

Minimum Clarifier Surface Area

Minimum Clarifier Diameter		feet	72.08
GR Clarifier Inner Diameter		feet	65.00

Surface Settling Rate

Surface Settling Rate @ Q _{av}		gal/day/sq. ft.	377
Surface Settling Rate @ Q _{pk}		gal/day/sq. ft.	942

Solids Loading Rate

Average RAS Flow		MGD	0.83
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Depth Based on German Standards

h1 (Clean Water Zone)

h1 - Clean Water Zone in feet		feet	1.64
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h2 (Separation/Return Flow Zone)

h2 - Separation Zone in feet		feet	7.29
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h3 (Density flow and storage zone)

h3 - Storage Zone in feet		feet	3.15
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h4 (Thickening and sludge removal zone)

h4 - Thickening and Sludge Removal Zone in feet		feet	3.50
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Clarifier Depth

Clarifier Depth based on German Standards		feet	15.57
Clarifier Depth based on US Standard Design Practices		feet	12
Clarifier Depth = 1 ft less than Aeration Depth		feet	14
Actual Clarifier Depth Desired (SWD) >12'		feet	14

GR Blower Air Requirements

Transfer Efficiency of deepest diffusers

			Design
Height of deepest diffuser off bottom		feet	0.67
Diffuser submergence		feet	14.33
O2 transfer, %/Meter			5.20%
Net Transfer Efficiency			22.71%

Discharge Pressure

Minimum Blower Discharge Pressure		psi	8.08
Blower Design Pressure		psi	9.23

Air required - SCFM, ICFM, Ratio

GR SCFM Required		SCFM	1,457
Site Elevation		feet	250
Inlet Pressure = Pa - Pv*RH		psi	13.558
ICFM Required @ Site Conditions:		ICFM	1,705

Horsepower of Blowers

Operating Horsepower of Blowers		HP	84.98
Design Horsepower of Blowers		HP	95.20

GR Diffusers Required

Diffusers Required

			Design
GR air flow rate thru diffuser		scfm/lf	1.60

Rotating Headers

Rotating diffusers per GR basin		diffusers	420
Linear feet of rotating diffusers per GR basin		linear feet	1050
GR rotating diffuser submergence		feet	14.33

Stationary Headers

Number of stationary diffusers per GR basin		diffusers	0
Linear feet of stationary diffusers per GR basin		linear feet	0
GR stationary diffuser submergence		feet	14.33

Total Diffusers per basin

Total number of diffusers per GR basin		diffusers	420
Total linear feet of diffusers per GR basin		linear feet	1,050

Total Diffusers for System

Total linear feet of rotating diffusers for system		linear feet	1,050
Total linear feet of stationary diffusers for system		linear feet	-
Total linear feet of diffusers for system		linear feet	1,050

Percent GR diffusers that are rotating		percent	100%
Percent GR diffusers that are stationary		percent	0%
GR diffuser loading at design		SCFM/LF	1.39
GR average net transfer, %			22.72%
GR weighted transfer efficiency			5.20%

GR Blower Arrangement

Number of Blowers			Design
Number of operating blowers for rotating diffusers			2
Number of operating blowers for stationary diffusers			0
Number of standby blowers			1
Total number of blowers			3

Blowers for Rotating Headers

Selected rotating blower capacity in SCFM		SCFM	728
Selected rotating blower capacity in ICFM		ICFM	853

Blowers for Stationary Headers

Selected stationary blower capacity in SCFM		SCFM	--
Selected stationary blower capacity in ICFM		ICFM	--

Blower Model

Schreiber blower model designation		Model	PD 130
Motor HP of selected blower model		HP	60.0
Operating BHP of selected blower model		HP	48.5
Includes enclosure(s)			yes
BHP of selected model for aged diffuser			60.0

Diffuser Loading

Actual GR rotating diffuser loading		SCFM/LF	1.39
Actual GR stationary diffuser loading		SCFM/LF	--

GR Aeration/Clarifier Mechanical & Structural

Mechanical Details			Design
Type GR Bridge			Honeycomb
Materials of Construction			Carbon Steel

Motors

Aeration Bridge Drive Motor Horsepower		hp	5.00
Aeration Bridge Drive Operating Horsepower		hp	3.75
Clarifier Beam Drive Motor Horsepower		hp	0.20
Clarifier Beam Drive Operating Horsepower		hp	0.16

Structural/Concrete

Floor Slab Thickness		feet	1.25
GR Freeboard		feet	2.00
GR Wall Height		feet	17.00
GR Aeration Wall Thickness		feet	1.25
GR Clarifier Wall Thickness		feet	1.25
Total Cubic Yards of Concrete		cubic yards	1,267

GR Aeration/Clarifier Options

Optional Epoxy Coated			No
Optional Electric Drill			Yes
Optional Manifold Header			No
Optional Fabricated Skirt			No
Optional Launder Brush			No
Optional Scum Trough			No

Shada Tanner

From: Chad Cooley <ccooley@etec-sales.com>
Sent: Monday, October 16, 2017 8:20 AM
To: Craig Johnson
Subject: RE: Walnut Ridge - WWTP Options - EDI

Yes, sorry, accidentally left "EDI" in subject line. Everything in the emails below is associated with Schreiber.

Thanks,

Chad B. Cooley, P.E.
Vice President
Environmental Technical Sales, Inc.
900 S. Shackleford, Suite 300
Little Rock, AR 72211
Phone: (501) 978-1025 Fax: (501) 978-1026
Cell: (501) 690-3721
<http://etec-sales.com/>
E-mail: ccooley@etec-sales.com

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From: Craig Johnson [<mailto:cjohnson@crisengineers.com>]
Sent: Monday, October 16, 2017 8:18 AM
To: Chad Cooley <ccooley@etec-sales.com>
Subject: RE: Walnut Ridge - WWTP Options - EDI

I want to make sure this proposal is for Schreiber...not EDI?

From: Chad Cooley [<mailto:ccooley@etec-sales.com>]
Sent: Monday, October 16, 2017 8:12 AM
To: Craig Johnson <cjohnson@crisengineers.com>
Subject: RE: Walnut Ridge - WWTP Options - EDI

Craig, just a quick note. Aerzen is Schreiber's standard blower supplier, so this proposal is based on the highest quality blowers available.

Thanks,

Chad B. Cooley, P.E.
Vice President
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From: Chad Cooley
Sent: Monday, October 16, 2017 8:03 AM
To: 'Craig Johnson' <cjohnson@crisengineers.com>
Subject: RE: Walnut Ridge - WWTP Options - EDI

Craig –

Good morning. Please see below the budget pricing associated with the Schreiber design summary I sent September 28, 2017.

Equipment Price For:	Walnut Ridge, AR.
GR Aeration/Clarification - One (1) 140/65 ft diameter GR Aeration/Clarification Unit including four(4) dual arm rotating aeration assemblies, two (2) single arm rotating aeration assemblies, three (3) 60 hp blowers with manifold and powder coated enclosure, a D.O. Process Control System, all necessary scraper assemblies, scum removal equipment, effluent weirs, scum baffles and brackets.	\$
Frontloader Bar Screen - One (1) 24" Frontloader Mechanically Cleaned Bar Screen, with 5/8" openings, 304 stainless steel rack head, 304 stainless steel bar rack, ¾ hp drive motor, galvanized frame support, aluminum cover, and control panel.	\$
TOTAL BUDGET PRICE FOR ALL EQUIPMENT LISTED ABOVE	\$ \$800,000
All pricing is in U.S. Dollars.	
All above pricing includes freight, supervision of installation, field services start-up, and training of personnel.	
All above pricing does not include installation of equipment.	
Budgetary pricing assumes standard materials of construction and electrical components.	

Schreiber often includes their Frontloader bar screen to their proposals. If you do not need this screen, the breakout price for that is about \$50,000. Please review this proposal at your convenience. If you have any questions, or require additional information, please do not hesitate to contact me. We appreciate your continued interest in ETEC and the manufacturers we represent.

Thanks,

Chad B. Cooley, P.E.
Vice President
Environmental Technical Sales, Inc.
900 S. Shackleford, Suite 300

Little Rock, AR 72211
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From: Chad Cooley
Sent: Thursday, September 28, 2017 5:11 PM
To: 'Craig Johnson' <cjohnson@crisengineers.com>
Subject: RE: Walnut Ridge - WWTP Options - EDI

Craig –

Good afternoon. Please find attached a Technical Solution Calculations report from Schreiber Corporation. Note this is basically a set of design calculations and proposed scope of supply for the referenced project. The personnel responsible to send my budget pricing are already at WEFTEC, so it will be a few days before I can get budget pricing. I just wanted to get this scope in your hands so that you could see how Schreiber plans to approach the project.

I have also attached some literature for your use and information. If you have any questions, or require additional information, please do not hesitate to contact me.

Thanks,

Chad B. Cooley, P.E.
Vice President
Environmental Technical Sales, Inc.
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From: Craig Johnson [<mailto:cjohnson@crisengineers.com>]
Sent: Friday, September 15, 2017 10:56 AM
To: Chad Cooley <ccooley@etec-sales.com>
Subject: RE: Walnut Ridge - WWTP Options - EDI

New construction. Here is a site plan of the area. Don't plan on using any existing facilities except chlorination and dichlorination basin at the existing plant.

From: Chad Cooley [<mailto:ccooley@etec-sales.com>]
Sent: Friday, September 15, 2017 9:51 AM

To: Craig Johnson <cjohnson@crisengineers.com>

Subject: Re: Walnut Ridge - WWTP Options - EDI

Are there any existing lagoons/basins that can be used, or will this be all new construction?

Thanks,
Chad Cooley
(501) 690-3721

On Sep 14, 2017, at 9:18 AM, Craig Johnson <cjohnson@crisengineers.com> wrote:

Chad – We are working with Walnut Ridge to evaluate WWTP options. The existing facility is a Biolac unit that has reached its service life and has struggled to maintain permit. The client has an interest to return to lagoon technology. I want to engage EDI in this effort. There are two specific options we are looking at. One is to stay with the existing outfall on Village Creek or construct a new outfall to the Black River. We have room at the existing site to construct lagoons. Outlined below are the discharge parameters for each discharge location. I would like to know EDI thoughts and the application of their technology for both options. I will also be evaluating a mechanical plant option for the existing discharge at Village Creek as well, and we can discuss more on that. Regarding influent parameters, you can assume typical municipal characterization. We are gathering additional data on the influent at this time. I want to target a design flow of 1.25 MGD.

Village Creek Outfall Parameters

CBOD5/TSS/NH3-N/DO (mg/L)
10.0/15.0/4.0/6

Black River Outfall Parameters

BOD5/TSS/DO (mg/L)
30.0/30.0/2.0

Let me know if you have any questions.

Craig A. Johnson, P.E.
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ALTERNATIVE 3.0

PARTIAL MIX
AERATED LAGOON BY
ENVIRONMENTAL
DYNAMICS
INTERNATIONAL (EDI)



CRIST JOB NO.
1618



PRELIMINARY ENGINEERING REPORT
WASTEWATER IMPROVEMENTS
JANUARY 2018

Aerated Lagoon Budgetary Design

Partial Mix Aerated Lagoon for Wastewater Treatment
in
Walnut Ridge, AR

September 27, 2017

Prepared for:

Crist Engineers
Little Rock, AR



All information herein is confidential and to be considered property of EDI

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Lagoon
Solutions



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I. Wastewater Design Basis

The preliminary EDI IDEAL process proposal has been developed based on the following wastewater influent conditions. Customer to confirm design values for final design and warranty criteria.

A. Influent Wastewater Flow

Parameter	Value	Unit
Design Average Flow	1.25	MGD

* Estimated value

B. Influent Wastewater Quality

Parameter		Design Value	Unit
Average BOD ₅	Concentration*	250	mg/L
	Design Load*	2608	lb/d

* Estimated value

C. Site Conditions

Parameter	Value	Unit
Operational Winter Water Temperature*:	0	°C
Relative Humidity (Summer)*:	85	%
Site Elevation (at berm)*	260.0	ft

* Estimated Value

D. Effluent Quality Criteria

Parameter (Monthly Average Concentration)	Design Value	Unit
BOD ₅	30	mg/L
Total Suspended Solids	30	mg/L

II. Total Lagoon Solutions

Whatever your treatment challenge, EDI is committed to provide peace of mind as the single source for your complete lagoon solution. Too often are owners and operators caught in a blame game between multiple suppliers that are bundled together at bid-time to provide lowest overall project cost without consideration for operational and troubleshooting convenience. EDI offers a variety of options that are offered as a complete package for single-source responsibility and optimal convenience. EDI asks you to engage our sales representatives to learn more about how EDI can provide total support from package estimates through ongoing process support and maintenance; or as we call it, *Aeration for Life™*.

A. Superior Lagoon Technology

Advanced Efficiency Suspended Panel Aeration System

EDI is the only aeration provider on the market to take high efficiency panel diffuser technology and apply it to a curvilinear design that allows for ease of membrane maintenance and maximum aeration efficiency. EDI's suspended panel aeration system provides several benefits:

- The innovative suspended panel configured with floating laterals support low flux rate applications for ultra-high oxygen transfer efficiency performances. Custom system designs are made to meet client needs of price and efficiency.
- Internal ballasting of aeration units reduces contractor install time and materials expense.
- Curvilinear panel design allows for quick and easy membrane changes compared to traditional flat panels that often require aeration units to be sent back to the factory.
- Easily configurable to any lagoon footprint.
- Comes with extensive array of membrane options to fit your unique wastewater application, including state of the art PTFE embedded Matrix Plus membranes.

Premium Positive Displacement Blowers

EDI has over 40 years of experience providing aerated lagoon systems. That experience has led to the conclusion that the client can be best served by having a single point of responsibility when it comes to their aerated lagoon process. By providing the line-to-bubble system, EDI can ensure a seamless project with equipment that is integrated for maximum performance. EDI's standard is to offer premium positive displacement blowers because of their low maintenance and high reliability. The high-quality blowers provided by EDI can be configured to continuously run at a set air flow for overall operational simplicity or can be controlled by in-situ sensors for maximum process efficiency.

Integrated Motor Starters and System Controls

Motor starters and system controls are an integral part of any water resource reclamation system. EDI provides an ideal integration of controls and motor starters that ensure equipment longevity and owner satisfaction. Lifespan for blower equipment can be increased when the proper motor starters are used. Control systems can be equipped with upgrades including DO blower control, BioMizer™ lagoon aeration and mixing system, SCADA, and ArcArmor™ technology for the ultimate in operator safety and convenience.

BioInsulate™ Thermal Covers

EDI's modular cover system is comprised of a series of individual thermal panels that are encapsulated in a protective membrane sheath. The panels are available in a number of configurations and can provide insulation values up to R-30. The panel-type insulating cover is superior to other insulating cover options, such as particulate covers, due to their ability to resist environmental conditions (e.g., wind) and disturbance caused by treatment aeration systems.

BioShade™ Algal Prevention Covers

There are several options available on the market for algae control and prevention. EDI's BioShade eliminates the vast portion of ultraviolet light that enters the treatment lagoon and provides algae with the means to achieve photosynthetic growth. No UV, no algae. The BioShade cover is a floating, permeable lagoon cover that allows gas (from facultative lagoons or from aerobic lagoon aeration) to escape while allowing rainwater to pass through – thereby reducing or eliminating pooling on top of the cover.

Baffles

EDI lagoon baffles provide for greater design flexibility by reshaping hydraulic flow in existing or new lagoons. Baffles are a way to address the potential for short-circuiting in a lagoon. They can also be used to create a series of small cells in series, rather than one large complete mix or partial mix basin, to increase the efficiency of the overall treatment process.

B. Additional Support Programs

Complete lagoon solutions from EDI not only simplify the design and provision of lagoon upgrades. They also allow for worry-free communication and coordination, because EDI can provide installation, start-up, and maintenance for your lagoon system.

Aeration Works Installation

EDI Aeration Works™ division was created to give contractors and operators of aeration systems a source for fast, reliable installation and maintenance. The EDI Aeration Works group is made up of experienced installers and field service professionals. Aeration Works personnel are experts at the installation and maintenance of aeration systems with process and operational optimization objectives.

Aeration Works (AW) expert installers are faster and more thorough than someone new to installing in-basin components of EDI aeration systems. AW experts know what tools are needed, how to perform installations quickly, and how to ensure it is done exactly to manufacturer's specifications. Utilizing Aeration Works' expertise for system installation ensures the job is done right.

Benefits of planning for Aeration Works installation include:

- Mechanical warranty against defects and workmanship increases from 2 to 5 years.
- Eliminates inspection requirements for validation of process warranty.
- Project completed more quickly with seamless communication and familiarity between installation crew and manufacturer.
- Decreased contractor administrative duties (inspection scheduling, inventory, subcontractor scheduling, etc.)
- Single-point responsibility should any future issues arise.

Preventative Maintenance Program

For maintenance or preventative maintenance, the Aeration Works group has the experience to evaluate the degree of work needed then properly refurbish a system for maximum long term performance. When construction crews or contractors have already been selected, Aeration Works can also provide supervision to assure the work is done to manufacturer's specification.

A maintenance plan allows facility operators to outsource scheduled maintenance of their aeration systems to EDI Aeration Works group. When this program is chosen as part of a new IDEAL Process sale, the mechanical warranty of the aeration system is extended as long as a service agreement is in place. Aeration Works can inspect any existing aeration or treatment system and a preventative maintenance program can be developed. The benefits of a preventative maintenance plan include:

- Minimizing unscheduled outages
- Easy budgeting with a single annual expense to cover all parts and labor
- Increased energy efficiency and savings
- Decreased operating costs

Infinity Program™

This program incorporates the mechanical warranty and services of the Preventative Maintenance Program but goes one step further by guaranteeing the performance of the aeration system. Under this program, EDI maintains the physical condition of the membranes through preventative maintenance procedures and will periodically measure the performance of the membrane. Aeration Works will replace or adjust the equipment to ensure the aeration system operates within a pre-determined performance envelope.

III. Process Selection Details

The EDI Aerated Lagoon System may be comprised of a single pond or a series of two or more ponds or zones within a single basin. These zones or ponds are characterized as Complete Mix, Partial Mix and Quiescent. Additionally, there are a number of ancillary system components that round out EDI's aerated lagoon processes.

A. Partial Mix Lagoon

The Partial Mix (PM) lagoon is an enhanced facultative lagoon process to simultaneously remove BOD and provide solids separation and digestion. The enhancement is achieved by the circulation of the lagoon bulk liquid whereby soluble cBOD is introduced to biosolids more efficiently than in a purely facultative flow-through lagoon. Note the difference between this and a Complete Mix lagoon which uses greater airflows to keep all biosolids in suspension so a higher concentration can come in contact with soluble cBOD more efficiently than the PM. Screening and grit removal are generally not required for PM lagoon systems, but use of the screening pretreatment can help avoid nuisance floating materials and improve aesthetics.

PM lagoons are typically several days' detention (generally more than 5 days). Aeration is only provided to maintain oxygen in the liquid portion of the lagoon, and air flow is limited to the process oxygen demand from cBOD removal. Solids settling and digestion is facilitated in the same reactor. Mixing (i.e., solids suspension) via aeration is not a factor in the design so a low-energy system is possible. Typical BOD removal and oxygen demand in the PM lagoon is defined by biological reaction rates as published in US EPA design manual EPA-625-83-015, "Municipal Wastewater Stabilization Ponds." Removals are based on first order kinetics for detention times and temperature of the lagoon.

Nitrogen is removed in PM reactors primarily via assimilation by heterotrophic organisms. Very little autotrophic nitrification can be expected on a consistent basis, although nitrification may become established with the combination of a warm climate and long detention time. Alternate provisions must be employed under any circumstance if nitrogen removal is desired.

PM lagoons are generally used as a part of a more robust treatment scheme when used in series with other processes:

- A. Multiple PM reactors in series
- B. CM and PM in series.
- C. IDEAL™ Bioreactor and PM
 - a. Quiescent Zone optional for polishing
 - b. Filtration optional for advanced polishing
- D. PM lagoon for side-stream sludge digestion and storage as part of an advanced lagoon processes
- E. Disinfection

Important Note: It is critical to understand the difference between the mixing (i.e., solids suspension) that occurs in a CM lagoon versus the water circulation that occurs in a PM lagoon. The CM lagoon can achieve a higher level of treatment in a smaller volume due to the efficient

delivery of food to microorganisms. PM lagoons may use less energy but may require greater pond volumes with larger footprints, and are more limited in reaching high levels of treatment.

B. Existing Infrastructure and Construction

EDI does not have information regarding the site that would be used if discharging to the Black River. EDI assumes a large open space available with no restrictions on basin geometry.

Figure 2 shows an example of what the basin layout could be. Two basins assumed, the first split into 3 cells via baffle curtain. The final cell is one aerated zone. Note that the submerged lateral aeration system will need to be installed dry with a drained and dredged basin.

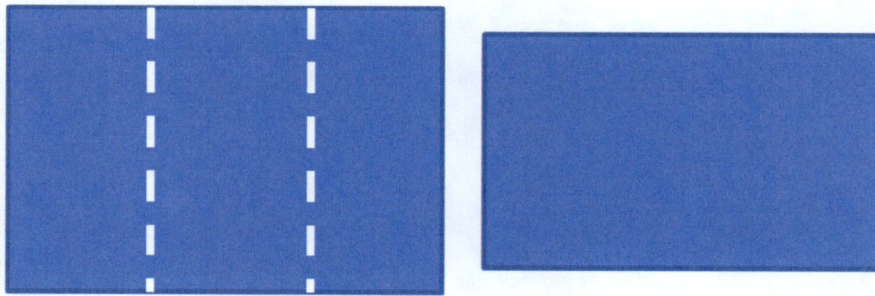


Figure 2. Assumed Layout

IV. Preliminary System Components Selection

A. Checklist and Description:

Four (4) Partial Mix Zones

	YES	Not Required	By Others
A. Premium Positive Displacement Blower Package	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Partial Mix Aeration System, Complete	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. Submerged Laterals and Supports			
b. High-Efficiency Lagoon Panel Technology			
c. Retrievable Assemblies and Diffusers			
d. Purge and Miscellaneous			
C. Process Controls	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. HOA Controls			
D. BioInsulate Thermal Cover	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. BioShade UV Cover	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
F. Lagoon Baffle(s)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
G. Engineering Support	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H. Training and Field Service	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
a. Documentation and IOM Manuals			
b. On Site Start Up Support			
c. On Site Operator Process and Maintenance Training			
I. Mechanical and Process Warranties	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
J. Freight to Site	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
K. Optional Extended Maintenance Contract Available	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Available with EDI Package once sizing determined.

B. Budgetary Cost Estimates*

EDI Partial Mix Lagoon Solution:

\$ 400,000 U.S.D.

Includes In-Basin aeration equipment, blowers, controls, baffles, 2 trips of field service, and freight to site.

*All prices to be reviewed upon confirmation of project scope and hardware specifications.

Optional Modules – To be selected by engineer and/or customer

V. Design Data Summary

Design Influent Conditions

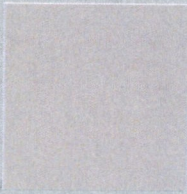
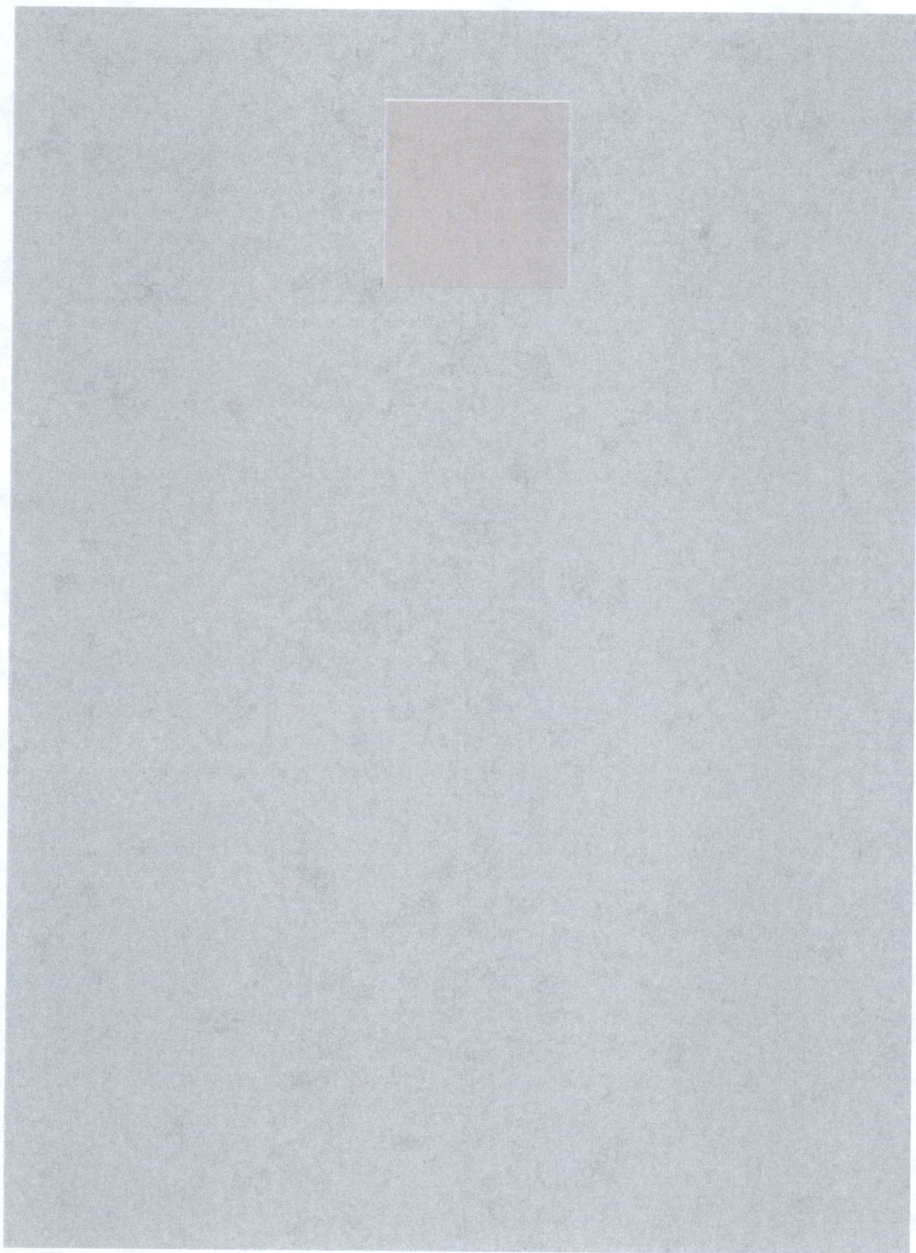
Design Average Flow *	1.25	MGD
BOD5 concentration *	250	mg/L
loading	2608	lb/d
TSS concentration	250	mg/L
loading	2608	lb/d
Min Lagoon Water Temp (Winter)*	0	°C
Max Water Temp (Summer)*	30	°C

Basin Summary Information

	Zone No. 1	Zone No. 2	Zone No. 3	Zone No. 4
Volume, MG	5.1	5.5	5.1	10.5
Retention Time, days	4.1	4.4	4.1	8.4
Operating Regime	Partial Mix	Partial Mix	Partial Mix	Partial Mix
Expected Winter Effluent Concentration, mg/L	149	89	56	25

Air / Blower Information

Airflow Requirement	1898	scfm
Design Blower Operating Pressure	5.8	psig
# of Duty Blowers	1	
# of Standby Blowers	1	
% of Blower Capacity	87%	
Motor Size	75	hp



Environmental Dynamics International

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Walnut Ridge, Arkansas, Crist Job No. 1618
WWTP Chlorine Contact Basin Capacity Calculations Summary

December 11, 2017

Plans from construction of basin (see note 4 on sheet WR-9208) state the following:
"Chlorination Basin has a volume of 50,150 gallons, which will provide detention time of 18.8-minutes at peak flow rate and 60 minutes at average design flow."

Flow Rate (Peak): 3.84 MGD (Design)
Flow Rate (Average): 1.176 MGD (Design)
Water Depth (Peak): 10.21-feet (94.22-feet MSL)

A. Determine Maximum Capacity of Chlorine Contact Basin, based only on Freeboard Depth

Ten State Standards: A minimum contact time of 15 minutes at design peak hourly flow or maximum rate of pumpage shall be provided after thorough mixing. (mixing: turbulent flow or mechanical mixer).

****Per 100-3, Part 102.44: For evaluation of existing chlorine contact tanks, field tracer studies should be done to assure adequate contact time.*

****Total Residual Chlorine limit modified with permit renewal, from 0.1 mg/L to 0.011 mg/L, see 12.A.1 of Fact Sheet in Permit.*

1. Determine Limiting Factors:

- a. Interior Suppressed Weir Elevations: 93.5 FT
Maximum Allowable Head Over 5-foot suppressed weir: 2.5 FT
Maximum Water Depth at Suppressed Weirs = 96 FT
Water Depth in Basin = 96FT – 84FT = 12-feet

- b. Interior Baffle Walls Elevation: 95.5 FT
With 1' Freeboard = 94.5 FT
With 1.5' Freeboard = 94.0 FT
Water Depth in Basin, 1' FB = 94.5FT – 84FT = 10.5-feet
Water Depth in Basin, 1.5' FB = 94.0FT – 84FT = 10.0-feet

- c. V-Notch Weir (90-degrees) at Effluent Elevation: 91.5 FT (bottom), 93.5 FT (top)
Maximum Allowable Head Over 90-Degree V-Notch Weir: 2.0 FT
Maximum Water Depth at V-Notch Weir = 91.5FT + 2.0FT = 93.5FT

2. Determine Maximum Depth:

Since Elevation of 96.0 FT is > Elevation of interior baffle walls of 95.5 FT, Discard depth of 12 FT.
Maximum Elevation at Interior Baffle Walls of 94.5 FT or 94 FT
Maximum Allowable Head over V-notch Weir, Elevation: 93.5 FT

Cannot Discard due to Elevation at V-notch Weir because it can be replaced at a higher elevation. Maximum water depth allowed with current structure = 10.5 feet. Effluent area of contact basin has dechlorination and aeration, do not use for calculations.

Minimum allowable contact time (per 10 State Standards) = 15 minutes

3. Depth of Interior Weir Walls, each end of Baffled Area: 9.5-feet (Elev. 93.5-feet MSL)

Area 1 Dimensions:	Width: 8-feet	Length: 18-feet
Area 2 Dimensions:	Width: 16-feet	Length: 32-feet

4. Determine Maximum Flow Rate:

At 10.5 feet: Area = 5376 CF	Q = 459 CFM (4.95 MGD)
At 10.0 feet: Area = 5120 CF	Q = 437 CFM (4.71 MGD)
At 9.5 feet: Area = 4864 CF	Q = 415 CFM (4.475 MGD)

Conclusion No. 1: Based only on volume and the minimum allowable contact time of 15-minutes, the Maximum Flow Rate Range:

4.475 MGD to 4.95 MGD

- **Consideration of Permit Conditions, not part of these calculations: Total Residual Chlorine = 0.011 mg/L and Fecal Coliform Limit (200#/100ML or 400#/100ML).**

B. Determine Maximum Capacity of Chlorine Contact Basin, based on Actual Contact Time

Ten State Standards: A minimum contact time of 15 minutes at design peak hourly flow or maximum rate of pumpage shall be provided after thorough mixing. (mixing: turbulent flow or mechanical mixer).

***Per 100-3, Part 102.44: For evaluation of existing chlorine contact tanks, field tracer studies should be done to assure adequate contact time.

***Total Residual Chlorine limit modified with permit renewal, from 0.1 mg/L to 0.011 mg/L, see 12.A.1 of Fact Sheet in Permit.

1. Flow Rate for Future Design:

Q1 = 3.0 MGD (4.64 CFS)

Q2 = 3.5 MGD (5.415 CFS)

Q3 = 4.0 MGD (6.19 CFS)

2. Calculate Required Volume for Flow Rates, based on minimum Chlorine Contact Time (15 minutes):

For Q1 (@3.0 MGD): 4176 CF (31,239 Gal)

For Q2 (@3.5 MGD): 4874 CF (36,460 Gal)

For Q3 (@4.0 MGD): 5571 CF (41,674 Gal)

3. Calculate Water Depth at Flow Rates:

**Suppressed 5-foot Weirs at inlet and outlet of baffle area. Water depth will vary depending on the headloss over the two suppressed weirs. Suppressed weir wall (both) depth is 9.5-feet.*

Headloss Q1: H = 0.43-feet Water Depth = 9.93-feet

Headloss Q2: H = 0.47-feet Water Depth = 9.97-feet

Headloss Q3: H = 0.52-feet Water Depth = 10.02-feet

4. Calculate Depth/Width (D/W) for each Flow Rate:

Channel Width1 = 5-feet (Two 5-foot wide channels)

Channel Width2 = 6-feet (One 6-foot wide channel)

Q1 @ 3.0 MGD	Depth = 9.93-feet	D/W @ 5' = 1.986	D/W @ 6' = 1.66
Q2 @ 3.5 MGD	Depth = 9.97-feet	D/W @ 5' = 1.99	D/W @ 6' = 1.66
Q3 @ 4.0 MGD	Depth = 10.02-feet	D/W @ 5' = 2.00	D/W @ 6' = 1.67

D/W Ratio Range: 1.66 to 2.00 > 1.0, Not Adequate Design

Note: Maximum allowable depth from Part A is 10.5-feet (94.5-Feet MSL), with 1-foot freeboard. D/W ratio should be 1.0 or less in chlorine disinfection basins. The drag on the sides of a deep, narrow tank or channel causes relatively poor dispersion characteristics.

5. Calculate Cross-Section Areas (Required) using Water Depths calculated in Step B3:

@ 3.0 MGD (9.93')	Cross-Section @ 5' = 49.65 SF	Cross-Section @ 6' = 59.58 SF
@ 3.5 MGD (9.97')	Cross-Section @ 5' = 49.85 SF	Cross-Section @ 6' = 59.82 SF
@ 4.0 MGD (10.02')	Cross-Section @ 5' = 50.10 SF	Cross-Section @ 6' = 60.12 SF

6. Calculate Total Length (Required), using the Volume calculated in Step B2:

@ 3.0 MGD, Volume Q1 = 4176 CF	@ 5-feet Width: 84'	@ 6-feet Width: 70'
@ 3.5 MGD, Volume Q2 = 4874 CF	@ 5-feet Width: 98'	@ 6-feet Width: 81.5'
@ 4.0 MGD, Volume Q3 = 5571 CF	@ 5-feet Width: 111'	@ 6-feet Width: 93'

7. Calculate Actual Length of Chlorine Contact Basin, Area 2 (Baffled Area) Plus Area 1 (Influent):

*Note: Length of Baffled Area of Basin is 32-feet, total existing length is 32-feet * 3 channels = 96-feet. Basin influent area length is 18-feet (width 8-feet), total existing length is 96-feet + 18-feet = 114-feet.*

Total Existing Length of Influent and Baffle Area of Contact Basin: 114-feet

8. Calculate the exiting L/W Value:

Length (Baffle Area Only): 96-feet

Average Channel Width: 5.333-feet

L/W Ratio: 96-feet / 5.333-feet = 18.0 < 40 to 70, Not Adequate Design

Note: Adequate plug-flow tanks can be achieved by Length/Width (L/W) ratios of 40-70 to 1.

APPENDIX D

MAPS AND EXHIBITS



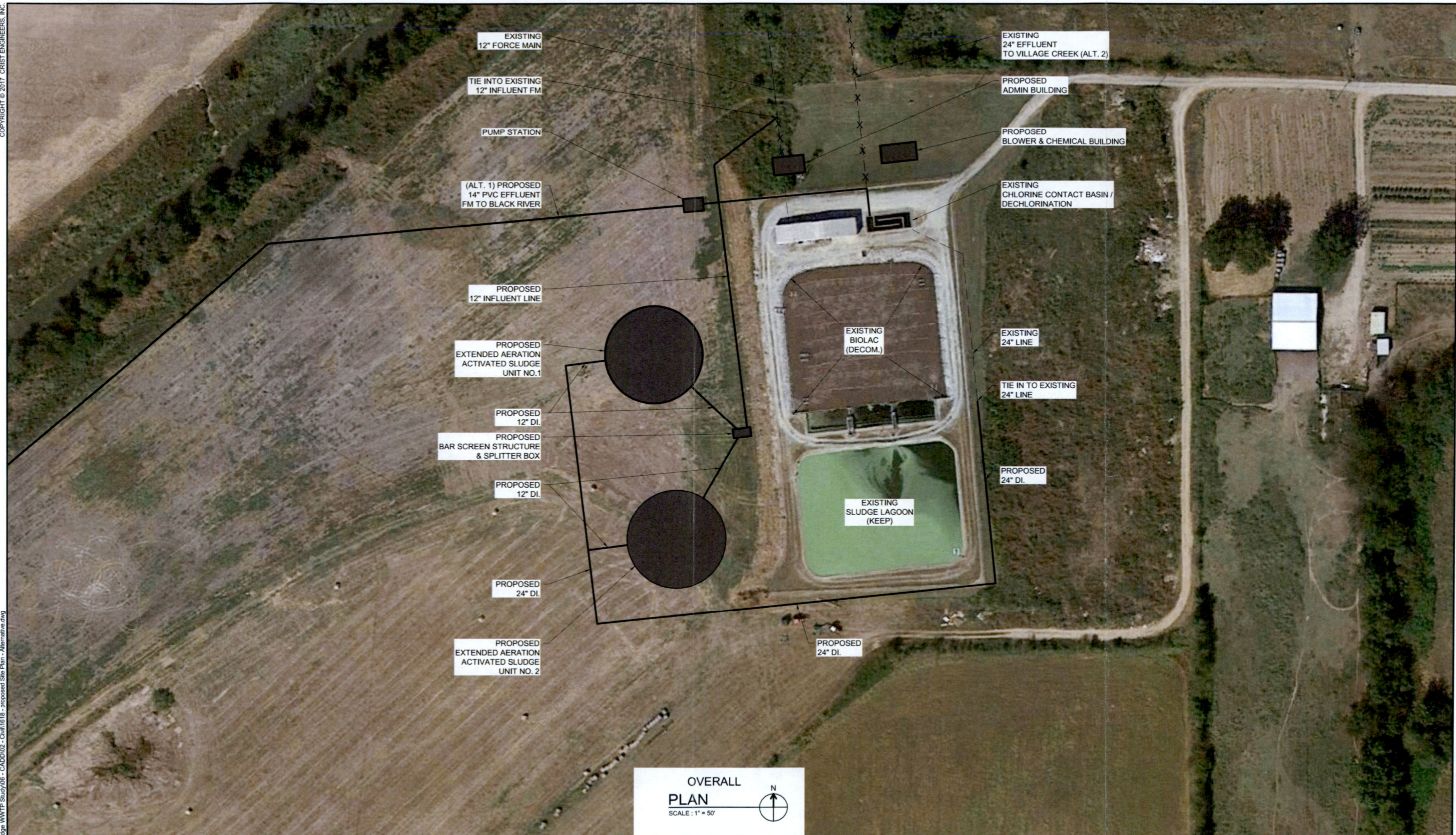
CRIST JOB NO.
1618



PRELIMINARY ENGINEERING REPORT
WASTEWATER IMPROVEMENTS
JANUARY 2018

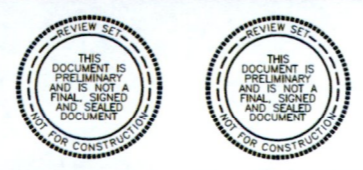
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P:\2016 Projects\1618 - Walnut Ridge WWTP Study\06 - CADD\02 - Civil\1618 - proposed Site Plan - Alternative.dwg



OVERALL
PLAN
SCALE: 1" = 50'

REV. NO.	DATE	DRWN	CHKD	REMARKS



1" = 1"
THIS LINE MEASURES 1" WHEN PLOTTED FULL SIZE

DESIGNED: CAJ
DRAFTED: SBM
CHECKED: ST
DATE: JAN. 2018



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WWW.CRISTENGINEERS.COM

WALNUT RIDGE, ARKANSAS
**PROPOSED WWTP IMPROVEMENTS
ALTERNATIVES NO. 1 & NO. 2**
GENERAL LAYOUT
EXHIBIT 1

JOB NO.
1618
SHEET NO.
1

City of Walnut Ridge, Arkansas
WWTP Improvements Project
January 2018
EXHIBIT 2: Proposed Outfall Forcemain



Black River

Proposed Discharge Location on Black River (near the convergence of the Black River and the Spring River)

Lawrence Road 411

City of Walnut Ridge (Not Shown for Clarity)

City of Portia

Proposed 14" Outfall Forcemain (8.45 Mi)

Proposed Outfall Pump Station: 4 Pumps Total



Image: Google Earth

Walnut Ridge, AR Wastewater Treatment Plant Site





City of Walnut Ridge, Arkansas
 WWTP Improvements Project
 January 2018
 EXHIBIT 3: Partial Mix Aerated Lagoon
 By EDI (Alternate No. 3)

Google Earth

LEGEND

- Manhole
- ▲ Pump Station

GRAVITY SEWER

- UNKNOWN
- 6-INCH
- 8-INCH
- 10-INCH
- 12-INCH
- 15-INCH

FORCE MAIN

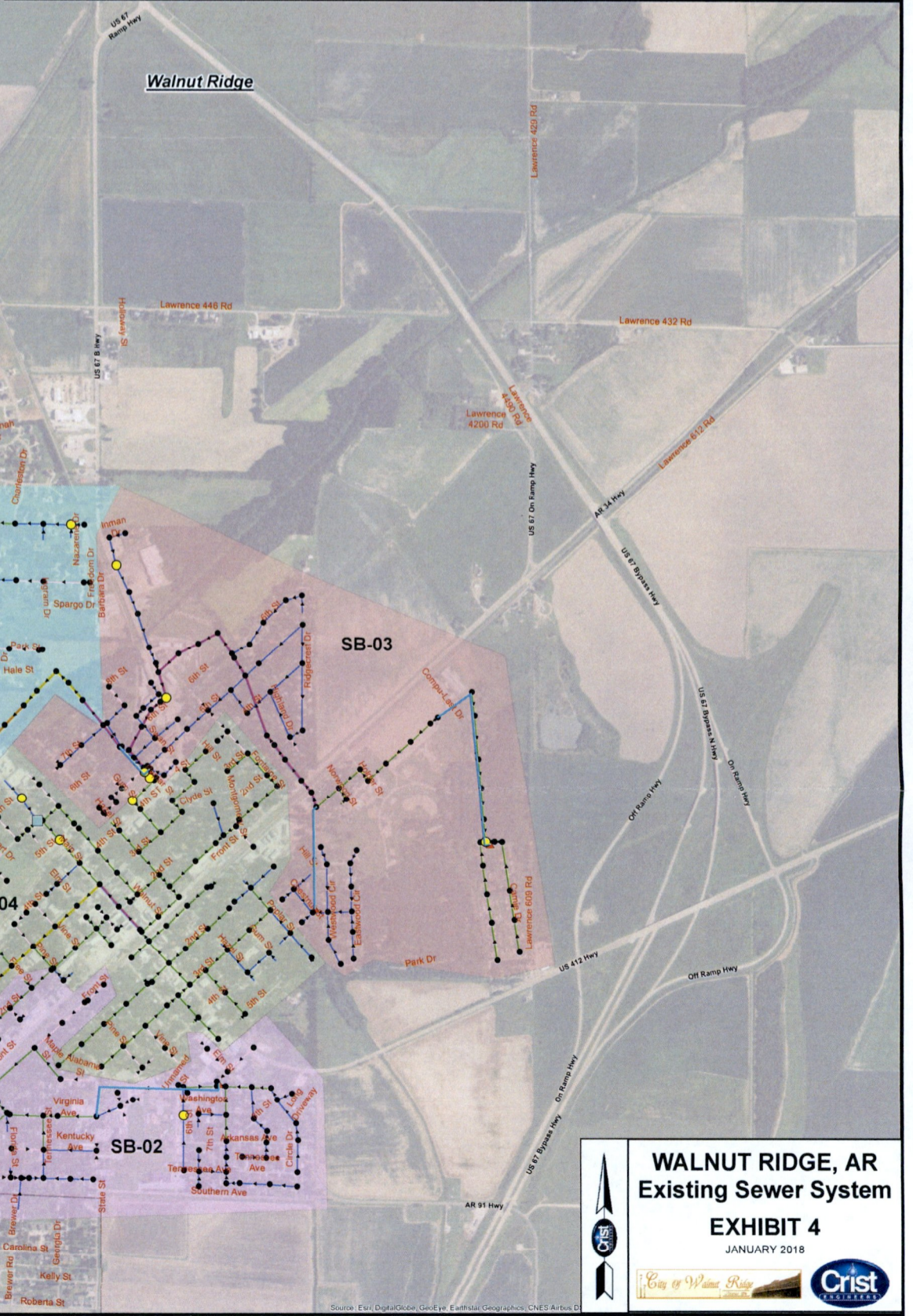
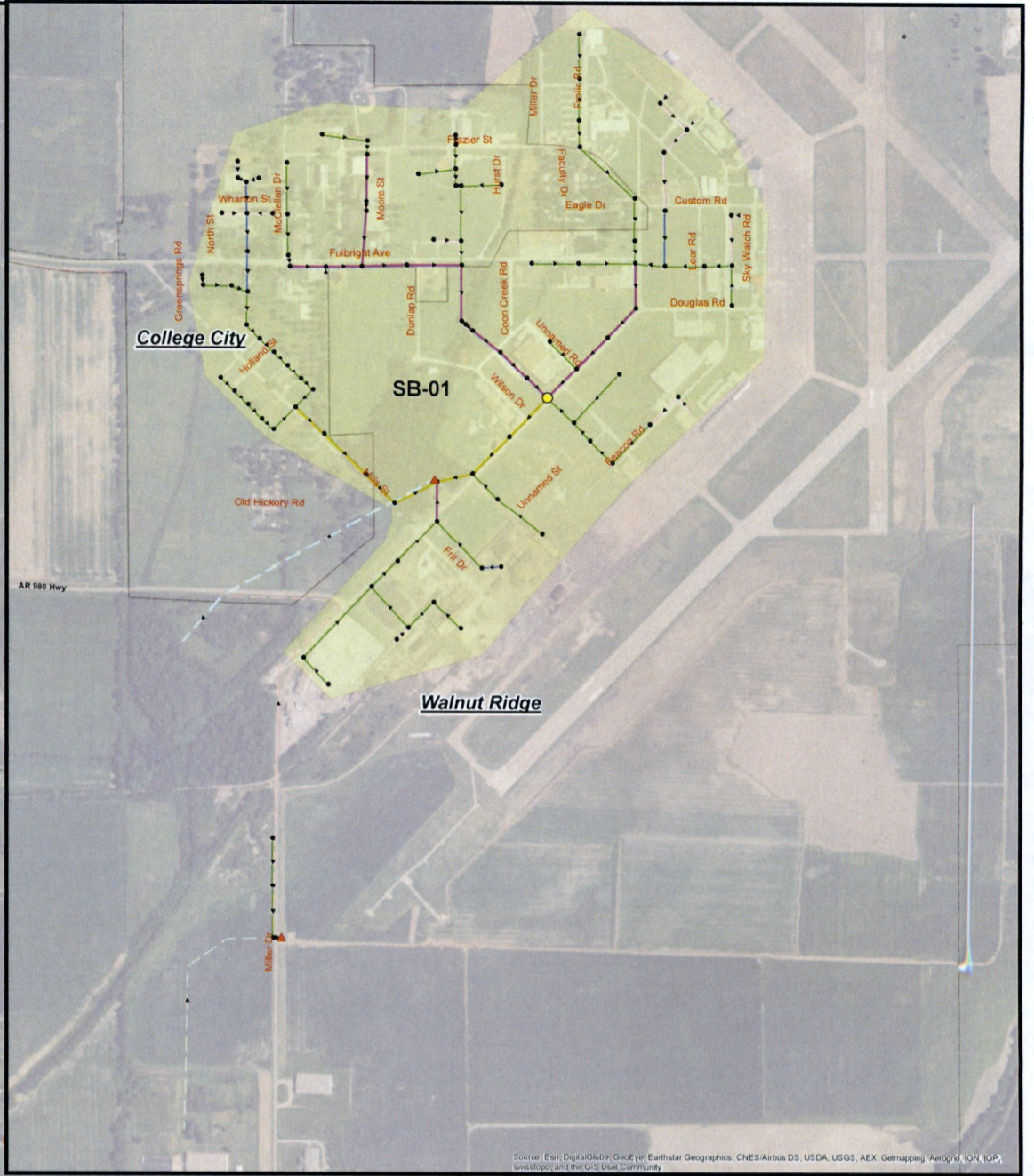
- 4
- 6
- 8
- 10
- 12

- Sub-Basin01
- Sub-Basin02
- Sub-Basin03
- Sub-Basin04
- Sub-Basin05

PUMP STATIONS

- | | |
|-------------------------------------|----------------------------|
| 1. Oak Street PS | 13. Luther Bridges Road PS |
| 2. Village Creek PS | 14. Ray Martin PS |
| 3. Frit Pump Station (College City) | 15. Highway 34 PS |
| 4. Midway Road PS | 16. State Street PS |
| 5. Hope Street PS | 17. Burris PS |
| 6. Wal-Mart PS | 18. Farm Service PS |
| 7. Highway 412 PS | 19. North Ridge PS |
| 8. School PS | 20. Skil PS |
| 9. Bowling Alley PS | 21. Poplar Street PS |
| 10. Skil Drive PS | 22. 4th Street PS |
| 11. Brushes PS | 23. Robin Lane PS |
| 12. Teel Road PS | |

Sub Basin	Manholes	Unknown	Gravity Sewer					Force Main					
			4"	6"	8"	10"	12"	4"	6"	8"	10"	12"	
1	99	3489.90	0.00	1440.30	15217.99	5272.11	2635.33	0.00	0.00	3790.99	1923.64	0.00	
2	77	6276.14	0.00	10008.66	8657.29	0.00	0.00	0.00	1900.31	0.00	0.00	0.00	
3	108	2302.27	0.00	17266.72	7252.13	5206.22	0.00	0.00	2401.53	1227.27	519.11	0.00	
4	123	4219.91	0.00	7266.14	23619.61	733.75	2540.10	0.00	0.00	0.00	0.00	0.00	
5	118	1605.97	0.00	9711.58	18711.72	3142.18	1049.86	2699.24	0.00	0.00	519.11	0.00	
Not in Box	8	272.14	0.00	0.00	1807.98	0.00	78.74	0.00	2030.10	0.00	2128.99	1360.40	
Totals	531	20166.34	0.00	45667.41	75296.93	14348.26	6304.03	2099.239	4431.633	3127.379	4829.202	4052.631	1390.399



WALNUT RIDGE, AR
Existing Sewer System
EXHIBIT 4
JANUARY 2018

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Geomatics, AeroGRID, IGN, IGP, Swirestop, and the GIS User Community