



## PRELIMINARY ENGINEERING REPORT

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# PIRTLE SPRING WATER TREATMENT PLANT AND GRAY LANE RAW WATER PUMP STATION IMPROVEMENTS

PRESENTED TO  
HARDIN COUNTY WATER DISTRICT NO. 1  
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## PROJECT PLANNING

### LOCATION

The proposed projects evaluated herein are at three locations within Hardin County, Kentucky. These projects for the Hardin County Water District No. 1 (HCWD1) include improvements at the Pirtle Spring Water Treatment Plant (WTP), improvements to the existing Gray Lane Raw Water Pump Station (RWPS), and a new booster station to service the existing Brizendine Water Tank. **Exhibit 1** shows the general project areas, HCWD1's existing water service area, and Hardin County boundary to scale on USGS topographic map.

### ENVIRONMENTAL RESOURCES PRESENT

The proposed work at the WTP will be inside the existing treatment building while the proposed work at the RWPS will be done in the same location as the existing pump station that is on property owned by HCWD1. The pump station property is mostly mature forest with some grass clearings. The existing pump station site lies within one of these clearings among a patch of mature forest with a gravel driveway and site pad (see **Figure #1**). The new booster station to service the Brizendine Tank will be constructed on public right-of-way and utility easement. The property is cleared and contains maintained grasses and is surrounded by agricultural fields (**Figure #2**).



*Figure #1 – Existing Gray Lane Raw Water Pump Station*



*Figure #2 – Proposed Site of Brizendine Booster Station*

**POPULATION TRENDS**

The project’s service area is the HCWD1 water service area in western Hardin County. HCWD1 has a service area containing the City of Radcliff, rural northwestern Hardin County, and small portions of rural Meade and Breckinridge Counties. HCWD1 also supplies 100% of the water to the City of Vine Grove and the Meade County Water District. The size and urban vs rural make-up of HCWD1’s service area makes it difficult to estimate the population of their system boundary. Therefore, **Figure #3** below shows the population trend of Hardin County from 1990-2040 in order to show historical and projected growth of the region in which HCWD1 serves a part of. The historical and estimated data was obtained from the Kentucky Data Center, with the projections performed by the University of Louisville. The population of Hardin County has increased by 18,708 persons from 1998 to 2018 and has grown 20% over the same period. Projections estimate that the population of Hardin County will increase approximately 1% per year for the next twenty years. The average household size is estimated to remain at about 2.4 persons per household for the next twenty years.

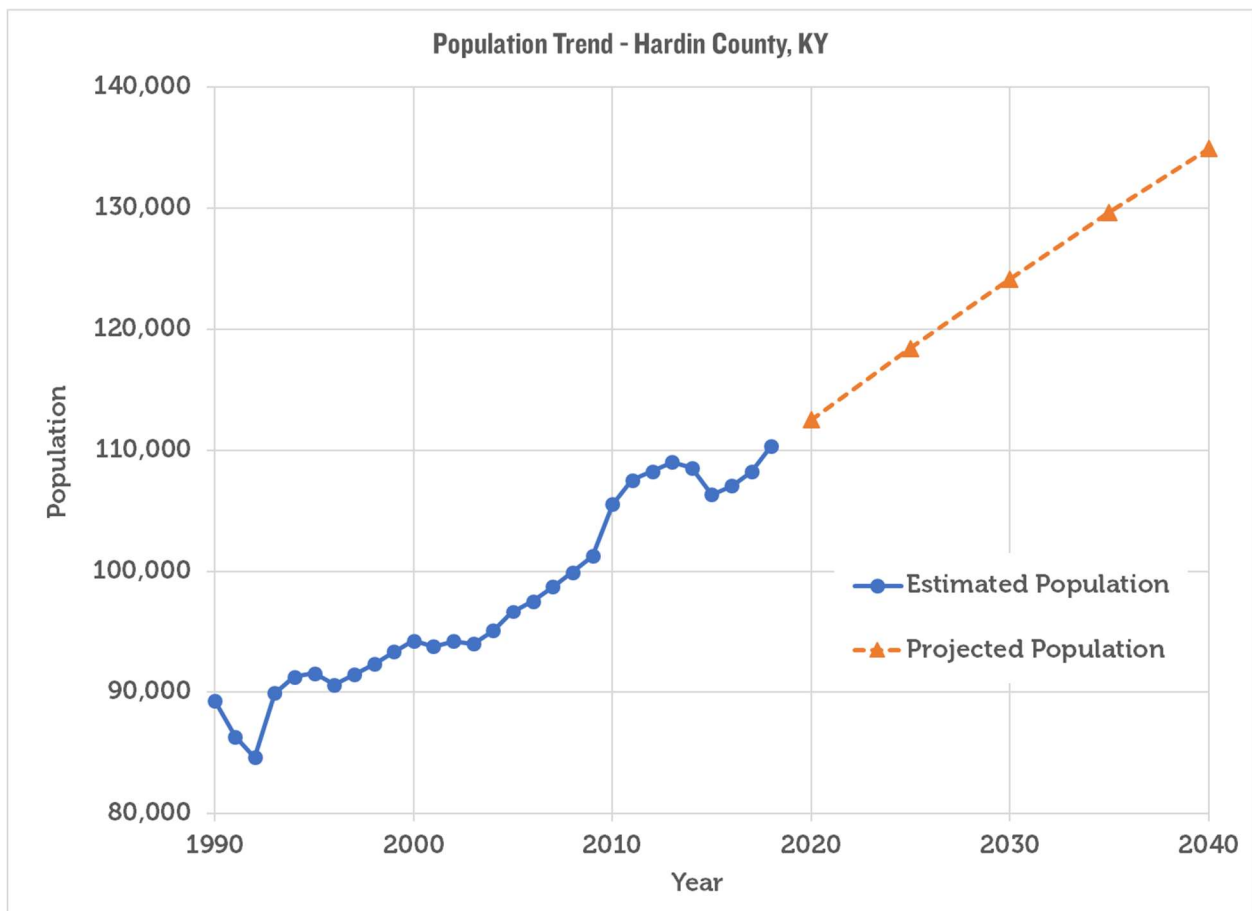


Figure #3 – Population Trend of Hardin County, Kentucky

## COMMUNITY ENGAGEMENT

To gauge public input on the project, Hardin County Water District No. 1 held a public meeting on October 15<sup>th</sup>, 2019 at its District office. The meeting was attended by Stephen Hogan (General Manager), Daniel Clifford (Engineering Manager), Justin Metz (County System Manager), and Tucker Baker (consultant). The meeting was held to discuss the project and the impact the project would have on the water system.

## EXISTING FACILITIES

### LOCATION MAP

#### Pirtle Spring WTP

The existing Pirtle Spring WTP is located at 1500 Shipley Road, Ceclia, KY 42724. A layout of the WTP's main building is shown in **Exhibit 2**, sheets P1.01 to P1.05.

#### Gray Lane Raw Water Pump Station

The existing Gray Lane Raw Water Pump Station is located on the east side of Gray Lane, approximately 0.3 miles north of the intersection with KY Highway 1357 (St. John Road), on Lot 9 of the Lella and Loetta Subdivision. Lot 9 is owned by HCWD1 and totals approximately 15.17 acres. The property is mostly woods with some grassed clearings. **Exhibit 3** shows the layout of the existing pump station and property.

#### Brizendine Tank and Control Valve

The existing Brizendine Tank site is located at the west end of Brizendine Lane and is approximately 6.3 miles north of the Pirtle Spring WTP. An existing control valve is located in a buried vault on the north shoulder of the intersection of New Salem Church Road and KY-920 (Salt River Road). The proposed booster station will be located adjacent to the existing control valve vault and constructed on existing right-of-way and new easement along New Salem Church Road. The existing valve and proposed booster station layouts are shown in **Exhibit 4**.

### HISTORY

Hardin County Water District No. 1 was established in 1952 under KRS Chapter 74 and is the oldest operating county water district in Kentucky. HCWD1 now operates five separate utility systems. These include the original "County" water system which has a service area of over 120 square miles, the City of Radcliff, the Fort Knox Sanitary and Storm Sewer utilities (acquired in 2005), the Radcliff Sanitary Sewer system (acquired in 2008) and the Fort Knox Water system (acquired in 2012).

#### Pirtle Spring WTP

The Pirtle Spring WTP is one of three water plants within the HCWD1 system, but the only WTP that directly serves the HCWD1's County water system. HCWD1 may also supplement with purchased water from neighboring Hardin County Water District No. 2 and from the Louisville Water Company.

The Pirtle Spring WTP was constructed in 1983 and upgraded in 2009 to increase current capacity and provide space for future capacity increases. The WTP's raw water source is Pirtle Spring located at the plant site and is permitted to withdraw 3.10 MGD (2,150 GPM) from the spring. The plant utilizes a system of flocculator-clarifiers, gravity filters, a clearwell, and chloramine disinfection to treat influent raw groundwater.



### Gray Lane Raw Water Pump Station

The Gray Lane Raw Water Pump Station was constructed at the Head of Rough Springs in 1990 as a secondary raw water source for the Pirtle Spring WTP (located about 2.2 miles south of the pump station). Raw water is withdrawn via a single pump at the Gray Lane station and is then conveyed directly to the Pirtle Spring WTP via a 12-inch PVC transmission pipeline. The pump was last pulled for maintenance and the electric motor replaced in 2005. In addition to owning the property where the pump station is located, HCWD1 also holds a Source Water Protection Easement totaling approximately 35.4 acres in the area surrounding the pump station.

### Brizendine Tank and Control Valve

The Brizendine Water Tank was constructed in 2005. The glass-lined elevated tank has a capacity of 218,000 gallons and has an overflow elevation of 1,087 feet. Water is fed into the pressure zone through a 12-inch control valve that is normally closed and opens when the Brizendine Tank reaches low water level. The water into the pressure zone comes directly from 16-inch transmission main leaving the Pirtle Spring WTP. Because the water level of the Brizendine Tank (HGL 1086.6 feet elevation) is significantly higher than main pressure zone (Lincoln Trail Tank HGL 901.2 feet elevation), pressure at the WTP will spike from 145 psig to 203 psig when the Brizendine Tank is being filled. This has led to numerous water transmission main breaks and leaks over the years, and has forced WTP operators to slow the high-service pumps and stop feeding water toward the other three pressure zones sending all effluent to the Brizendine zone when the tank needs to be filled. This process reduces the potential for new leaks on the transmission main, but also results in other storage tanks draining faster than normal during the filling process, because of the lack of influent water.

## **CONDITION OF EXISTING FACILITIES**

### Distribution System

The current County water distribution system is in good condition. HCWD1's treatment and distribution operations remain in compliance with all applicable regulations. The most recent water audit shows that HCWD1's water loss is approximately 14.9% as of December 2018. Because of the good condition of the distribution system no major distribution infrastructure replacement projects are planned for the next few years. A five-year capital improvement budget of \$1,207,197 per year is set for the county water utility system for ongoing repair and replacement of short-lived assets.

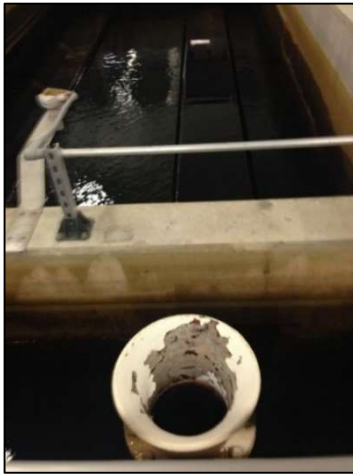
### Pirtle Spring WTP

The Pirtle Spring WTP is in overall good condition since the recent 2009 improvements and has received no violations since that time. The 2009 plant improvements were made to a few major systems (interior piping, filters, chemical storage, offices, etc.), however the plant's capacity remained at 3.1 MGD. The 2009 upgrades did include future provisions for the WTP to increase capacity to 4.5 MGD through the construction of four filter bays. Other systems such as the clarifiers, clearwell, and high service pumps remained sized for 3.1 MGD capacity.

The WTP's primary source water is Pirtle Spring located at the plant site and is permitted to withdraw 3.1 MGD (2,150 GPM) from the spring. The spring has a 27 square-mile watershed and is listed as a "groundwater source under the influence of surface water". Because the spring is under the influence of surface water rain events and seasonal changes have a large effect on the quality and quantity of the spring's water. A heavy rain event will commonly lead

to high turbidity or while during the summer season a minor drought will lead to low groundwater levels. These influences have caused HCWD1 to rely more on the Gray Lane RWPS or purchase water from other utilities to supply the County water system.

The WTP's new filter system consists of four multi-media, gravity filter bays using a combination of anthracite coal, sand, and gravel to remove fine particulates post-flocculation-clarification. Each filter on average treats approximately 1.0 MGD (allowable maximum is 1.5 MGD/filter based on a 5 GPM/sqft overflow rate). Currently only three of the filters are operational, with the fourth not in-service. **Figure 4** is photograph of Filter No. 3, currently in operation; **Figure 5** is a photograph of Filter No. 4 currently not in-service.



**Figure #4** – Filter No. 3 (In-Service)



**Figure #5** – Filter No. 4 (Out-of-Service)

The WTP's flocculator-clarifiers were not upgraded in 2009 with the rest of the plant but are still in good working order. However, the fiberglass handrails and steps have been in-place since 2003 and are starting to deteriorate. The handrails have required sanding and painting twice in the last three years due to wear and the steps are becoming a safety hazard. **Figure #6** and **Figure #7** are photographs of the existing stairs leading to the top of the flocculator-clarifier units.



**Figure #6** – Clarifier Stairs



**Figure #7** – Bottom of Clarifier Stairs

The WTP conveys potable water to the distribution system through two water mains of 12-inch and 16-inch diameters. As described in the "History" section above, if the high service pumps are left in automatic operation when filling the Brizendine Tank pressure at the WTP will reach 203 psig, and the two transmission water mains will experience breaks and leaks. Therefore, WTP staff must manually operate the high service pumps to limit the distribution pressure to 190 psig to minimize future damages to the water main.

#### Gray Lane Raw Water Pump Station

The Gray Lane RWPS withdraws water from The Head of Rough Springs which is the head of the Rough River and has a 17 square-mile watershed. The spring has been a reliable and good quality water source for the Pirtle Spring WTP, with the only exception being limited quantity in extreme drought conditions.

The Gray Lane RWPS is in moderate operational condition. The station consists of a single 30 HP, vertical turbine pump set in a 76-foot deep groundwater well casing. The pump, piping, electrical, and controls are housed at surface level without a covering structure. The station has a current capacity of 770 GPM (1.11 MGD) but is permitted to withdraw a maximum of 2,000 GPM (2.88 MGD) December through April and 800 GPM (1.15 MGD) May through November. The existing facility exhibits multiple leaks, the existing well casing is not of sufficient size for the maximum capacity, and the screen must be frequently flushed during high turbidity events. The raw water transmission pipeline leaving the station is in good operational condition. WTP staff will withdraw water from this spring to supplement withdrawals from Pirtle Spring. **Figure #9** is a photograph of the existing pump station.



*Figure #9 – Gray Lane Raw Water Pump Station*

#### Brizendine Tank and Control Valve

The Brizendine Pressure Zone services approximately 193 customers and is supplied by an elevated 218,000-gallon tank. Current operations to fill the tank require a control valve to open the 12-inch main leading to the tank and use the high service pumps to directly supply the Brizendine Tank. However, this method redirects all flow from Pirtle Spring WTP to the Brizendine pressure zone and allows no flow to the rest of the system. Also filling the Brizendine Tank with the high service pumps raises the pressure at the WTP to a level that causes water main breaks as previous described. The existing Brizendine Tank is shown in **Figure #10**.



*Figure #10 – Brizendine Elevated Storage Tank*

**NEED FOR PROJECT**

HCWD1’s mission is to provide affordable public water to individuals within its district and to citizens of Hardin County. During certain times of the year, HCWD1 must purchase water from nearby utilities to meet demand within their County water system. In 2018 HCWD1 had to purchase water 10% of days. Pirtle Spring WTP is able to produce 106% of the County water system’s current average annual daily demand of 2.917 MGD (2018), but only 77% of the peak day demand of 4.038 MGD (reached on 8/26/2018). Sudden demand peaks that require HCWD1 to purchase water may be caused by: major system leak, facility maintenance such as tank cleaning or system flushing, drought limiting withdrawal from groundwater sources, or increased seasonal domestic demand. During these events HCWD1 will first boost production of its Fort Knox WTP, but because the Fort Knox WTP must be operated as a separate utility, the County water system must wholesale purchase this water. If both the HCWD1 and Fort Knox water systems are experiencing supply issues, HCWD1 has the option to purchase up to 3.5 MGD of water from the Louisville Water Company which draws surface water from the Ohio River. Over the last 3 years HCWD1 has had to purchase an average of approximately 22.3 MG of water per year from neighboring systems to meet the demand of the County water system.

Figure #11 shows the current and projected demand for the HCWD1 County water system and their wholesale customers. Demands are projected to increase at a rate of 1% each year based on population increase projections at the same rate (see Section 1).

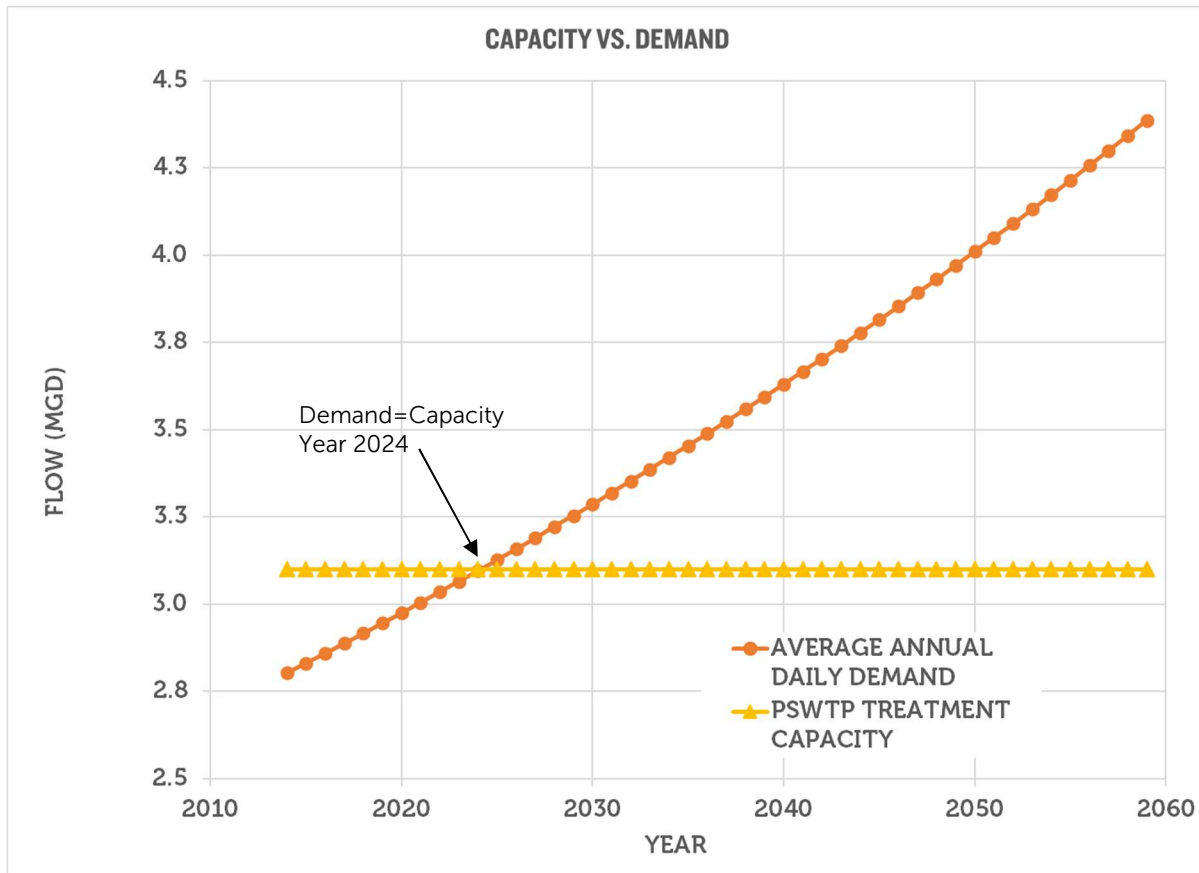


Figure #11 – Current and Projected Water Demand vs Current Treatment Capacity

To meet current and future demands due to growth, HCWD1 will either have to purchase more and more water from other utilities, or produce more water from the Pirtle Spring WTP. HCWD1 does not desire to continue purchasing water because of increasing wholesale costs. The Pirtle Spring WTP does not currently have the capacity to meet future water demand within the County system due to several limitations:

1. Raw water withdrawal from Pirtle Spring is permit limited to 3.1 MGD;
2. Raw water withdrawal rates from Pirtle Springs are sometimes limited below the permitted rate due to environmental influences such as heavy turbidity after a heavy rain or low water levels during drought;
3. Raw water withdrawal capacity at Head of Rough Springs is limited to 1.11 MGD because of the existing pump at the Gray Lane Pump Station but has a permitted limit of 2.88 MGD December to April and 1.15 MGD May to November;
4. The filtration capacity of the Pirtle Spring WTP is bottlenecked because the plant is only operating three of four filter bays;
5. Pirtle Spring WTP has a designed firm capacity of 3.1 MGD, with major systems such as clarifiers, clearwell, and high-service pumps already operating at maximum capacity.

The deteriorating condition of the existing fiberglass hand rails and steps to the clarifiers at the WTP has caused WTP staff to devote valuable time to repair them in order to operate and maintain the clarifiers. Additionally, HCWD1 is concerned that the condition of the hand rails and steps could become hazardous to the WTP staff, leading to unsafe conditions and limited access to the clarifiers.

Increases in demand also mean that when operators must redirect all WTP effluent to the Brizendine Tank, storage tanks in other pressure zones will empty at ever increasing rates. This could lead to areas within those zones dropping below a minimal allowable pressure and also cause a decrease in the County water system's available fire volume. During a period of unusually high demand, this would cause HCWD1 to have to purchase water from other utilities in order to service those pressure zones only to fill the Brizendine Tank.

HCWD1's first goal is to make improvements that address current needs, but to also to allow for future projects that will meet demands for the next 40 years (target year 2059). HCWD1 understands that there will have to be major upgrades to the Pirtle Spring WTP to be able to supply the 4.5 MGD demand required in 2059. These improvements would cause a significant rate increase to finance upgrading the WTP in one project. Therefore, HCWD1 has decided to phase the improvements to ease the burden on their rate payers. The improvements selected as part of this project have been identified by HCWD1 as highly beneficial to continue providing service, while making provisions for future projects to increase the overall capacity of the WTP. The provisional items are planned to be upgraded in the next phase to reach HCWD1's ultimate goal of reducing dependence on purchase water.

HCWD1 has retained Cannon & Cannon (CCI) to provide professional engineering services to evaluate alternatives and design solutions to address water capacity limitations for the County water system and to prepare a RD loan application for the proposed work.

## **ALTERNATIVES CONSIDERED**

To address HCWD1's ability to meet their ever-increasing water demand, two alternatives were considered:

- Alternative 1: Increase HCWD1's Treatment and Distribution Capacities within the County System; or
- Alternative 2: Purchase Water from Neighboring Utilities.

### **ALTERNATIVE I**

Alternative 1 evaluates upgrades in order to meet increasing demand from HCWD1's County system. Because of the Pirtle Spring WTP's limitations listed in Section 3 "Need for Project", potential improvements have been identified and are broken into several areas; those areas are:

1. Raw water supply,
2. Filtration capacity,
3. Operation & safety,
4. New booster station for the Brizendine Tank, and
5. Capacity of major WTP systems not upgraded in 2009: clarifiers, clearwell, and high-service pumps.

HCWD1's first goal is to make improvements that address current needs, but to also consider future projects that will meet demands for the next 40 years (target year 2059). HCWD1 understands that major upgrades to the Pirtle Spring WTP are necessary to be able to supply the 4.5 MGD estimated demand in 2059. These improvements would cause a significant rate increase to finance upgrading the WTP all in one project. Therefore, HCWD1 has decided to phase the improvements listed above to ease the burden on their customers. The improvements proposed for this project and for immediate implication under Phase I are upgrades to areas 1 thru 4 above. HCWD1 has identified these areas as highly beneficial to continue providing service, while making provisions for future projects to increase the overall capacity of the WTP. The remaining areas are planned to be upgraded in future phases (Phase II) to reach HCWD1's ultimate goal of providing high quality, economically sourced water to its customers. These Phase II projects, although not described in this alternative, were investigated and their estimated construction cost tabulated in order to compare the cost of the whole alternative of producing HCWD1's total water demand at Pirtle Spring WTP.

#### Raw Water Supply Improvements – Gray Lane Raw Water Pump Station (Phase I)

The Pirtle Spring WTP already fully maximizes the withdrawal limits (3.05 MGD) of its primary water source Pirtle Spring. Therefore, when source water from Pirtle Spring is unavailable or is limited, HCDW1 must utilize an additional water source to meet current system demands. Additionally, as the population of HCWD1's service area increases, the need for a second raw water source to supplement Pirtle Spring is essential. The most straight forward means of supplementing Pirtle Spring and upgrading the raw water capacity is to increase the pumping capacity of the plant's existing second raw water source, the Gray Lane Pump Station, because of the excess withdrawal limit available at Head of Rough Springs. Increasing the capacity of the Gray Lane Pump Station to match the December to April withdrawal limit of 2.88 MGD (2,000 GPM) would provide the Pirtle Spring WTP with a total influent capacity of approximately 5.98 MGD (4,150 GPM) December to April and 4.20 MGD (2,917 GPM) May to November.

To improve pumping capacity, it is proposed to demolish the existing station and construct a new station over the existing well. The proposed new station will consist of a new vertical turbine pump with a capacity of 2,000 GPM (2.88 MGD). The selected pump will maximize motor and hydraulic efficiencies to conserve power consumption

and operate off a variable frequency drive (VFD). The estimated motor size required to provide capacity is approximately 100 HP. The existing property is of sufficient size to accommodate a new station. The existing well casing will need to be removed and a larger casing installed to accommodate the larger pump. The existing station's radio communication tower is in good condition and will remain. The existing 12-inch raw water transmission main to the WTP is appropriately sized for the increased flow rate and will remain.

Shutdown of the existing RWPS will occur during a period of historically low water demand for the County water system. This will minimize the amount of water to be purchased by HCWD1 during construction of the new Gray Lane Pump Station. Using the existing pump station site and well location will minimize environmental impacts and construction problems during or after construction of the new pump station. The location of the proposed pump station improvements are shown in **Exhibit #3**.

#### Filter Capacity Improvements – Pirtle Spring Water Treatment Plant (Phase I)

HCWD1's Pirtle Spring WTP currently has enough treatment capacity to provide 100% of the County water system's projected average daily demand for year 2024. The 2009 upgrades were completed so that the WTP could have a potential filtration capacity of 4.5 MGD which would provide 103% of the County's average daily water demand through year 2059. A major component within the WTP that has to be initiated to reach this future treatment capacity is to bring Filter No. 4 online. In addition, bringing filter No. 4 online also provides added filtration capacity and redundancy, spreading out the filtration load between four filters and allowing for increased time to maintain and repair the operating filter Nos. 1-3.

The Filter No. 4 basin and piping was built during the 2009 upgrades and is the same size as existing Filter Nos 1 through 3. Each filter basin has a surface area of 210 sqft and with an allowable overflow rate of 5 GPM/sqft (KY Division of Water), each filter has a capacity of 1.5 MGD. Bringing Filter No. 4 online will increase the firm capacity of the filtration system to up to 4.5 MGD.

To bring Filter No. 4 online will require new filter media, a block underdrain system, backwash water collection trough, air piping, and other miscellaneous appurtenances. Existing Filter Nos. 1 – 3 utilize a multi-media mixture of anthracite coal, sand, and gravel. A block system supports the media while providing a clear space for the collection of effluent water and air/water flow during backwash. Filter No. 4 will require these items as well as a trough system for collecting backwash water, an ultrasonic level meter for measuring water level in the filter bay, a filter effluent turbidimeter, and a flow meter. Filter No. 4 is already plumbed with all necessary exterior piping including two flow control valves with electric actuators. The existing filter basins are shown in **Exhibit #2, page P1.01**.

#### Operation and Safety Improvements – Pirtle Springs Water Treatment Plant Clarifier Steps and Catwalk (Phase I)

In order to access the Pirtle Spring WTP flocculator-clarifiers, a set of fiberglass stair and hand rails is used. Installed in 2003, the handrails and steps have to be sanded and repainted often to be maintained. HCWD1 wishes to remove the existing fiberglass railing and decking and install coated aluminum handrailing and decking. The proposed aluminum decking and handrail system will reduce labor hours and increase the safety of personnel that operate, maintain, and inspect the flocculator-clarifiers.



New Brizendine Booster Station (Phase I)

To maintain a continuous flow of water to all pressure zones within the County distribution system, we recommend the construction of a new booster station to fill the Brizendine Tank and removal of the existing control valve. A new booster station for the Brizendine pressure zone will also minimize pressure fluctuations on the water transmission main and the high service pumps that currently feed water directly to the pressure zone.

The proposed booster station would be located at the system entrance to the Brizendine pressure zone which is at the intersection of New Salem Church Road and Salt River Road. The station will consist of two booster pumps (design duty point 150 GPM, 205 feet TDH), piping, valves, variable frequency drives (VFDs), and other electrical and control equipment housed in a small building located off of New Salem Church Road. The proposed site will require new permanent easement to be obtained for the building and access drive. The proposed site is on a mounded portion of land located between an existing two-lane paved road and an agriculture field (see **Figure #2**), therefore, we do not foresee any significant environmental impacts caused by the new station. A layout of the proposed Brizendine Booster Station is depicted in **Exhibit #4**.

An Engineer’s Opinion of Probable Construction Costs for the proposed Phase I projects of Alternative 1 are shown in **Table #1** below.

Table #1   Opinion of Probable Construction Cost Alternative 1 Phase I			
Item No.	Description	Unit	Cost
1	Gray Lane Raw Water Intake Pump Station	LS	\$ 195,000
2	Pirtle Spring WTP-Filter No. 4	LS	\$ 122,150
3	Pirtle Spring WTP-Clarifier Steps	LS	\$ 100,000
4	Brizendine Booster Station	LS	\$ 266,550
<b>Sub Total</b>			\$ 683,700
<b>Contingency-15%</b>			\$ 102,700
<b>TOTAL</b>			\$ 786,400

Future Capacity Upgrades to Other Major Systems of the WTP (Phase II)

The existing up-flow clarifiers have a filtration capacity of 3.6 MGD entering Pirtle Spring WTP, with each clarifier able to filter 1.8 MGD at full capacity. Retrofitting the existing clarifiers with tube settlers is recommended to increase the filtration capacity of the clarifiers to supply 4.5 MGD of future demand. Tube settlers increase the individual capacity of each clarifier to 2.88 MGD and the overall capacity to 5.76 MGD. Installing tube settlers in the existing clarifiers will not require major modification to the existing clarifier structure and minimal downtime during installation.

The existing clearwell of Pirtle Spring WTP can be operated at 3.1 MGD treatment capacity. To bring the WTP up to 4.5 MGD, the clearwell will have to be upsized 50% by volume by extending the clearwell 35'. The optimum location has been determined to be north of the existing WTP as this area is adjacent to the existing clearwell, would require minimal grading, and doesn't conflict with any of the other WTP operations. To install the new section of clearwell, existing inflow lines, asphalt driveway, electrical, and fencing will also have to be relocated.

The Pirtle Spring WTP high service distribution system utilizes two pumps of equal size, with a current firm capacity of 2,150 GPM (3.10 MGD). It is recommended that the high service distribution capacity be increased by upgrading the two existing high service pumps with larger units and associated electrical upgrades. Hydraulic modeling of the HCWD1's County water system suggests that upsizing the existing pump system to a firm capacity of 4.5 MGD is suitable and recommended to meet future demands of the system.

An Engineer's Opinion of Probable Construction Costs for proposed Phase II projects of Alternative 1 and total Opinion of Probable Construction Costs are shown in **Table #2** below.

Table #2   Opinion of Probable Construction Cost Alternative 1 Phase II				
Item No.	Description	Unit	Cost	
1	Pirtle Spring WTP-Clarifier Tube Settlers	LS	\$	334,000
2	Pirtle Spring WTP-Clearwell	LS	\$	750,000
3	Pirtle Spring WTP-High Service Pumps	LS	\$	650,900
<b>Sub Total</b>			\$	1,734,900
<b>Contingency-30%</b>			\$	520,470
<b>TOTAL</b>			\$	2,255,370
<b>Alternative 1 Phase I Total</b>			\$	786,400
<b>ALTERNATIVE I TOTAL</b>			\$	3,041,770

### ALTERNATIVE 2: PURCHASE ADDITIONAL WATER FROM NEIGHBORING UTILITIES

This alternative evaluates the possibility of HCWD1 purchasing additional water from neighboring utilities to accommodate the future water demand within HCWD1's County system. HCWD1 currently has water system interconnections with the following utilities:

- City of Vine Grove,
- City of Hardinsburg,
- Fort Knox Water System (owned and operated by HCWD1 as a separate system),
- Hardin County Water District No. 2,
- Louisville Water Company, and
- Meade County Water District.

Of these utilities HCWD1 currently supplies the City of Vine Grove and Meade County Water District with the majority of their water. The connection to the City of Hardinsburg's water system is to supply that community with emergency water only. The Fort Knox and Hardin County Water District No. 2 water systems have only enough capacity to supply short-term emergency quantities of water. Therefore, the only utility with an excess supply to meet increased long-term demand is the Louisville Water Company (LWC). LWC has excess supply because their primary water source is the Ohio River and not a groundwater source that is drought sensitive as in the case of HCWD1 and Fort Knox Water System.

In May 2012 HCWD1 executed an agreement with the LWC to purchase up to 3.5 MGD of wholesale water at a current rate of \$2.35 per thousand gallons (rate effective July 1, 2019) and is set to increase to \$2.41 per thousand gallons in 2020. In 2016 HCWD1 constructed a water pump station and transmission main to interconnect the HCWD1 and LWC water systems. **Table #3** presents the estimated water purchase costs if HCWD1 were to continue to supplement demands above 3.1 MGD with wholesale water at the same usage rate they have been for the last three years, including current wholesale obligations and an increasing population. The wholesale water rate is projected to increase each year to match an inflation rate of 2.5% (source: US Bureau of Labor Statistics). The estimated wholesale water purchase cost total through year 2059 is \$39,051,511 (see Table #3).

## ALTERNATIVES CONSIDERED | SECTION 4

Table #3 | Estimate of Wholesale Water Costs - Alternative 2

YEAR	AVERAGE ANNUAL DAILY DEMAND (MGD)	PSWTP CURRENT TREATMENT CAPACITY (MGD)	% CAPACITY VS DEMAND	AVG. WATER PURCHASE PER DAY (MGD)	LWC WHOLESAL WATER RATE (\$/1000 GAL)	COST OF PURCHASED WATER PER YEAR
2014	2.803	3.1	111%	0.00	\$1.93	\$ -
2015	2.831	3.1	110%	0.00	\$1.98	\$ -
2016	2.859	3.1	108%	0.00	\$2.03	\$ -
2017	2.888	3.1	107%	0.00	\$2.08	\$ -
2018	2.917	3.1	106%	0.00	\$2.30	\$ -
2019	2.946	3.1	105%	0.00	\$2.35	\$ -
2020	2.975	3.1	104%	0.00	\$2.41	\$ -
2021	3.005	3.1	103%	0.00	\$2.47	\$ -
2022	3.035	3.1	102%	0.00	\$2.53	\$ -
2023	3.066	3.1	101%	0.00	\$2.59	\$ -
2024	3.096	3.1	100%	0.00	\$2.66	\$ -
2025	3.127	3.1	99%	0.03	\$2.73	\$ 27,075
2026	3.158	3.1	98%	0.06	\$2.79	\$ 59,637
2027	3.190	3.1	97%	0.09	\$2.86	\$ 94,137
2028	3.222	3.1	96%	0.12	\$2.93	\$ 130,662
2029	3.254	3.1	95%	0.15	\$3.01	\$ 169,306
2030	3.287	3.1	94%	0.19	\$3.08	\$ 210,163
2031	3.320	3.1	93%	0.22	\$3.16	\$ 253,332
2032	3.353	3.1	92%	0.25	\$3.24	\$ 298,917
2033	3.386	3.1	92%	0.29	\$3.32	\$ 347,025
2034	3.420	3.1	91%	0.32	\$3.40	\$ 397,768
2035	3.454	3.1	90%	0.35	\$3.49	\$ 451,263
2036	3.489	3.1	89%	0.39	\$3.58	\$ 507,630
2037	3.524	3.1	88%	0.42	\$3.67	\$ 566,996
2038	3.559	3.1	87%	0.46	\$3.76	\$ 629,491
2039	3.595	3.1	86%	0.49	\$3.85	\$ 695,252
2040	3.631	3.1	85%	0.53	\$3.95	\$ 764,420
2041	3.667	3.1	85%	0.57	\$4.05	\$ 837,143
2042	3.704	3.1	84%	0.60	\$4.15	\$ 913,573
2043	3.741	3.1	83%	0.64	\$4.25	\$ 993,871
2044	3.778	3.1	82%	0.68	\$4.36	\$ 1,078,202
2045	3.816	3.1	81%	0.72	\$4.47	\$ 1,166,738
2046	3.854	3.1	80%	0.75	\$4.58	\$ 1,259,658
2047	3.892	3.1	80%	0.79	\$4.69	\$ 1,357,148
2048	3.931	3.1	79%	0.83	\$4.81	\$ 1,459,402
2049	3.971	3.1	78%	0.87	\$4.93	\$ 1,566,621
2050	4.010	3.1	77%	0.91	\$5.05	\$ 1,679,014
2051	4.051	3.1	77%	0.95	\$5.18	\$ 1,796,797
2052	4.091	3.1	76%	0.99	\$5.31	\$ 1,920,198
2053	4.132	3.1	75%	1.03	\$5.44	\$ 2,049,450
2054	4.173	3.1	74%	1.07	\$5.58	\$ 2,184,797
2055	4.215	3.1	74%	1.12	\$5.72	\$ 2,326,493
2056	4.257	3.1	73%	1.16	\$5.86	\$ 2,474,800
2057	4.300	3.1	72%	1.20	\$6.01	\$ 2,629,993
2058	4.343	3.1	71%	1.24	\$6.16	\$ 2,792,356
2059	4.386	3.1	71%	1.29	\$6.31	\$ 2,962,183
<b>TOTAL</b>						<b>\$ 39,051,511</b>

**SELECTION OF ALTERNATIVE**

Providing quality water service to a rural population at an affordable cost is in keeping with the core principles and goals of HCWD1. These upgrades ensure the quality of life and health for HCWD1’s customers, and HCWD1 is able to finance these improvements if given the opportunity to partner with public funding agencies.

In order to supply the added demand from future growth in the County Water System additional supply must come from HCWD1 sources or be purchased from other utilities. **Table #4** below shows the life cycle cost analysis for increasing treatment capacity at the Pirtle Spring WTP (Alternative 1). Please note that this alternative analysis includes costs for future projects that will be constructed not as part of this PER to bring the Pirtle Spring WTP to a future capacity of 4.5 MGD.

Table #4   PRESENT WORTH LIFE CYCLE COST ANALYSIS ALTERNATIVE 1	
ITEM	PRESENT WORTH
INSTALLATION COST OF UPGRADES INCLUDING ENGINEERING AND INSPECTION (\$) FINANCED AT 2.75% FOR 40 YEARS	\$3,677,823
UPGRADES O&M COST FIRST YEAR (\$/YEAR)	\$10,394
ANNUAL INCREASE IN DEMAND (%)	1.00%
LABOR RATE (%)	1.40%
UPGRADES O&M COST (\$/40 YEARS)	\$16,425,696
SALVAGE VALUE	\$132,963
# YEARS OF SERVICE	40
DISCOUNT RATE (%)	1.50%
<b>PRESENT WORTH COST (\$)</b>	<b>\$19,970,555</b>

Table #5 presents the life cycle costs analysis for purchasing wholesale water from LWC (Alternative 2).

Table #5   PRESENT WORTH LIFE CYCLE COST ANALYSIS ALTERNATIVE 2	
ITEM	PRESENT WORTH
WHOLESALE PURCHASE COST (\$/40 YEARS)	\$39,051,511
WHOLESALE O&M COST FIRST YEAR (\$/YEAR)	\$0
ANNUAL INCREASE IN DEMAND (%)	1.00%
WHOLESALE RATE INCREASE (%/YEAR)	2.50%
WHOLESALE O&M COST (\$/40 YEARS)	\$0
SALVAGE VALUE	\$0
# YEARS OF SERVICE	40
DISCOUNT RATE (%)	1.50%
<b>PRESENT WORTH COST (\$)</b>	<b>\$39,051,511</b>

Based on the Present Worth Analysis above, it is recommended that HCWD1 implement the improvements specified in Alternative 1, and that the proposed improvements be phased.

## PROPOSED PROJECT (RECOMMENDED ALTERNATIVE)

### PRELIMINARY PROJECT DESIGN

The proposed project is for the increase of the filtration capacity and safety at the Pirtle Spring WTP (**Exhibit #2**), increase the raw water withdrawal pumping capacity of the Gray Lane Pump Station, and construct a new water booster station to serve the Brizendine Tank (Phase I of Alternative 1). A breakdown of the proposed project's design criteria is outlined below. All improvements are to be designed in accordance with The Kentucky Division of Water's General Design Criteria for Drinking Water Systems.

Increase Filtration Capacity and Safety at Pirtle Spring WTP (Alternative 1- Phase I):

- WTP filtration capacity being increased by means of bringing Filter No. 4 online with new filter media, piping; and miscellaneous appurtenances as shown in **Exhibit #2**, sheets P1.01 to P1.05, and
- Improve safety by replacing handrails and steps at the flocculator-clarifiers as shown in **Exhibit #2**, sheets P1.01.

Increase Raw Water Influent Rate to Pirtle Spring WTP (Alternative 1 – Phase I):

- Improve the Gray Lane Pump Station to increase withdrawal rate as generally shown in **Exhibit #3**, sheet P2.01;
- Firm withdrawal rate shall match that of the permitted withdrawal rate of 2.88 MGD;
- New pump station will consist of one pump of approximately 100 HP to provide firm capacity; and
- Reuse existing SCADA radio tower and raw water transmission main.

New Brizendine Booster Station (Alternative 1 – Phase I):

- New booster pump station to service the existing Brizendine Tank with the proposed layout in **Exhibit #4**;
- Install two new 15HP pumps;
- Install VFDs for the pumps compatible with single phase electric service;
- Construct building to enclose pumps and electrical equipment; and
- Reuse existing SCADA radio tower at valve vault near the KY-920 (Salt River Road) intersection.

### PROJECT SCHEDULE

Once funding is approved for the project the total project duration is estimated to be 17 months. A breakdown of the project schedule by phase is estimated as follows:

- Design Phase to be completed within four months of engineer receiving notice to proceed;
- Permit acquisitions within one month of completing the design phase;
- Advertise Bids and Contract Award phase to be completed within two months of receiving permits and approvals;
- Pre-Loan Closing within one month of Contract Award;
- Construction duration is estimated to be eight months until equipment start-up and Substantial Completion is issued; and
- Final Construction Completion estimated to be within one month after Substantial Completion is issued.

**PERMIT REQUIREMENTS**

A summary list of permits and approvals is provided below:

- Kentucky Division of Water for Public Drinking Water Systems approval will cover the design of the treatment, pump station improvements, and booster station construction.
- Kentucky Transportation Cabinet Right-of-Way Encroachment Permits will be obtained for the Brizendine Booster Station and access road.

**SUSTAINABILITY CONSIDERATIONS**

The proposed project will be designed with energy efficiency and resource preservation as goals. Process pumps and motors will be selected to maximize electrical efficiency. VFDs will be utilized for new high service, raw water, and booster pumps to optimize motor and pumping efficiency. New gravity filter hardware will be selected that will help increase the efficiency and quality of the filter’s backwash cycle.

**ENGINEER’S OPINION OF PROBABLE PROJECT COST**

The Engineer’s Opinion of Probable Project Cost is shown in **Table #6** below.

Table #6  Engineer's Opinion of Probable Project Cost Alternative 1 Phase I		
ITEM	ESTIMATED COST	
CONSTRUCTION & EQUIPMENT	\$	683,700
CONSTRUCTION CONTINGENCY (15%)	\$	102,700
ENGINEERING/INSPECTION	\$	113,000
LEGAL	\$	25,000
LAND AND RIGHTS	\$	10,000
INTEREST	\$	60,000
<b>TOTAL</b>	<b>\$</b>	<b>994,400</b>



**ANNUAL OPERATING BUDGET**

HCWD1’s proposed budget for the first full year after project completion is shown in **Table #7** below.

Table #7   Proposed Budget First Full Year After Completion			
ITEM NO	Description	Current Rates	Proposed Rates (32.81% Increase)
<b>A</b>	<b>Operating Income</b>		
	Water Sales	\$ 2,662,456	\$ 3,535,913
	Wholesale Sales	\$ 1,791,174	\$ 2,378,795
	Customer Meter Service Charges	\$ 837,401	\$ 1,112,122
	Disconnect/Reconnect/Late Charge Fees	\$ 172,650	\$ 172,650
	Storm Sewer Billing Contract Revenue	\$ 48,996	\$ 48,996
	Less Allowances and Deductions	\$ -	\$ -
	<u>Other Misc Revenues (Non-Sales)</u>	<u>\$ 117,000</u>	<u>\$ 117,000</u>
	<i>Total Operating Income</i>	<i>\$ 5,629,677</i>	<i>\$ 7,365,476</i>
<b>B</b>	<b>Operation and Maintenance Expenses</b>		
	Source of Supply Expense	\$ 21,800	\$ 21,800
	Pumping Expense	\$ -	\$ -
	Water Treatment Expense	\$ 1,351,000	\$ 1,351,000
	*Transmission and Distribution Expense	\$ 2,164,917	\$ 2,164,917
	Customer Accounts Expense	\$ 386,413	\$ 386,413
	Purchase Water Expense	\$ 806,719	\$ 806,719
	Maintenance Expense	\$ 113,989	\$ 113,989
	<u>Administrative and General Expense</u>	<u>\$ 1,012,226</u>	<u>\$ 1,012,226</u>
	<i>Total Operating Expense</i>	<i>\$ 5,857,064</i>	<i>\$ 5,857,064</i>
	<i>Net Operating Income</i>	<i>\$ -227,387</i>	<i>\$ 1,508,412</i>
<b>C</b>	<b>Non-Operating Income</b>		
	Interest on Deposits	\$ 52,700	\$ 52,700
<b>D</b>	<b>Net Income</b>	<b>\$ -174,687</b>	<b>\$ 1,561,112</b>
<b>E</b>	<b>Debt Repayment</b>		
	RUS Interest	\$ 59,439	\$ 59,439
	Rus Principle	\$ 32,344	\$ 33,344
	Non-RUS Interest	\$ 143,167	\$ 143,167
	<u>Non-Rus Principle</u>	<u>\$ 1,183,828</u>	<u>\$ 1,183,828</u>
	<i>Total Debt Repayment</i>	<i>\$ 1,418,779</i>	<i>\$ 1,418,779</i>
	<b>**Balance Available for Coverage</b>	<b>-0.12</b>	<b>1.10</b>

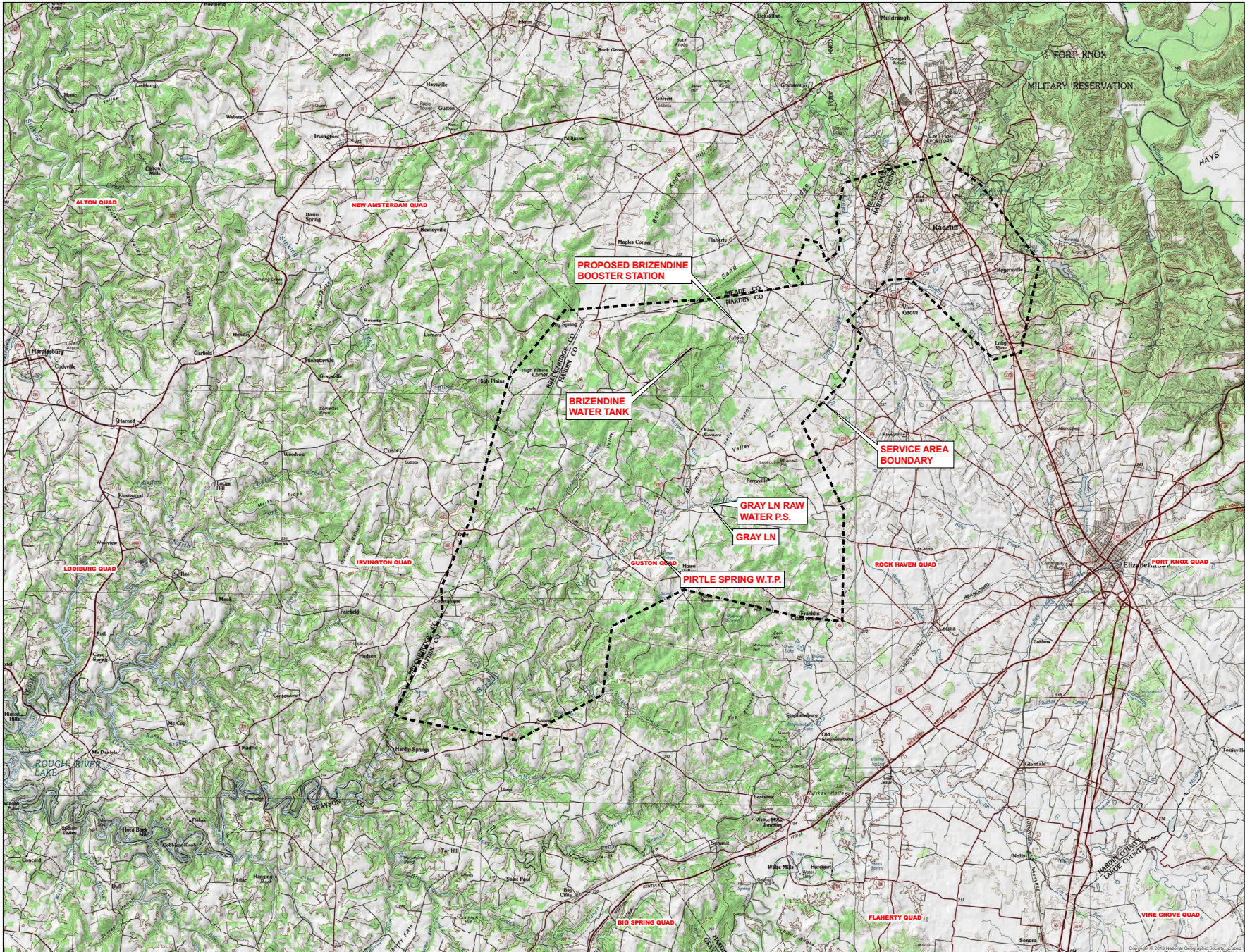
\*Includes \$ 1,207,197 annually for ongoing repair/replacement of short lived assets.

\*\* Balance for coverage calculated as: (NI+depreciation+interest+amortization)/Total Debt Repayment

## CONCLUSION AND RECOMMENDATION

Providing quality drinking water to the residents of Hardin County is HCWD1's mission and as well as providing it a reasonable cost. The recommended project will increase HCWD1's water treatment and distribution capacities and raw water capacity giving HCWD1's customers a quality product without paying the markup on wholesale water prices. Providing the framework to increase treatment capacity now also keeps HCWD1 ahead of future growth and development. The selected alternative and its phased approach is a technically, operationally, and financially suitable solution for continuing the mission and meeting the goals of HCWD1's County water system while maintaining the service integrity of HCWD1's existing customers.

# EXHIBITS



**Legend**

--- Project Service Area

0 0.5 1 2 Miles  
Scale: 1" = 1 mile



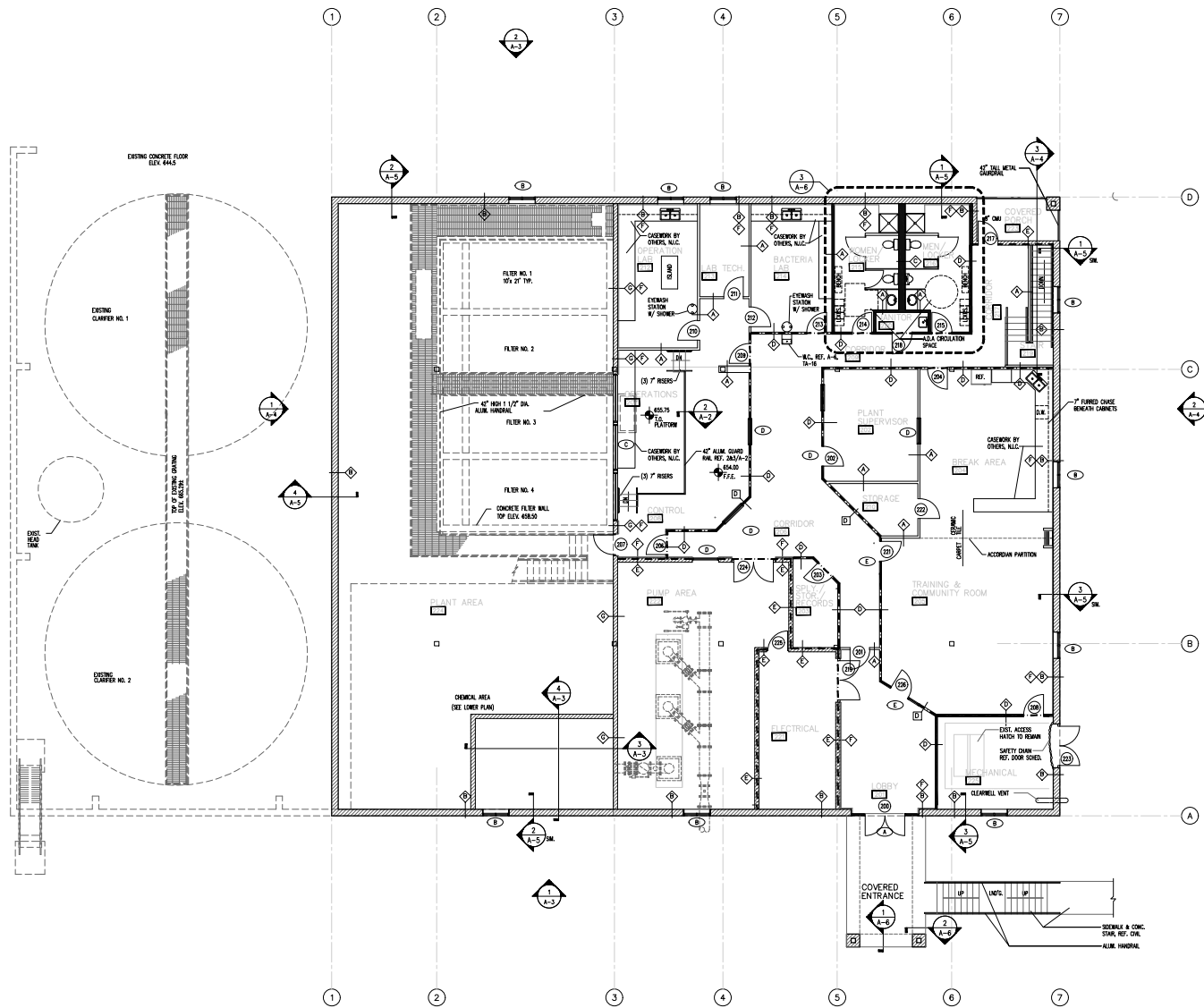
**CANNON & CANNON INC**  
CONSULTING ENGINEERS - FIELD SURVEYORS  
TEL 865.670.8555 8550 Kingston Pike  
WWW.CANNON-AND-CANNON.COM KNOXVILLE, TN 37939

**PIRTLE SPRING WATER TREATMENT PLANT AND GRAY LANE RAW WATER PUMP STATION IMPROVEMENTS**

EXHIBIT 1 - PROJECT AND SERVICE AREA

**EX 1**

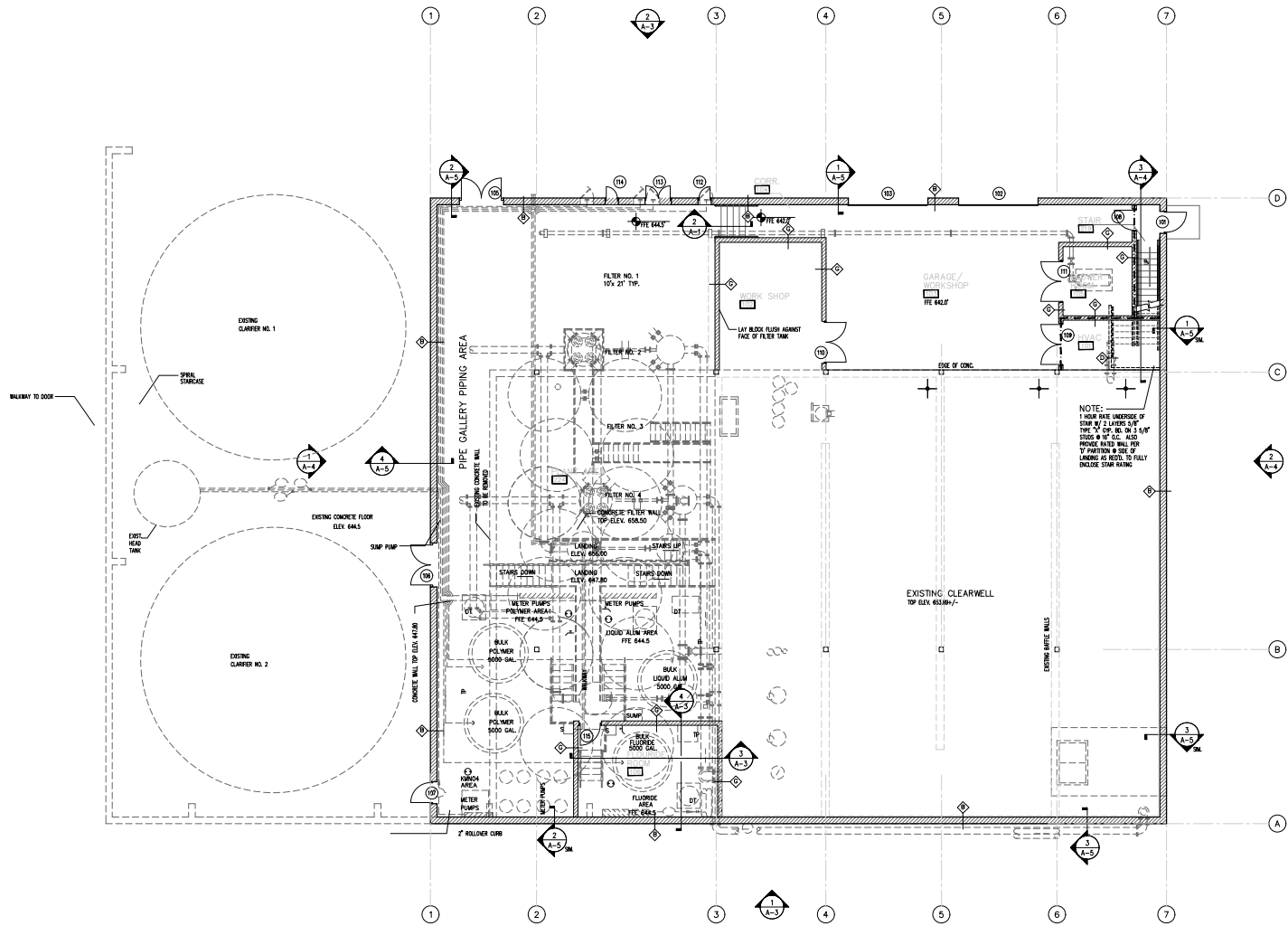
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PLAN  
SCALE: 1/8" = 1'-0"



REVISED	DATE
<b>CANNON &amp; CANNON INC.</b> CONSULTING ENGINEERS - FIELD SURVEYORS	
TEL: 865.670.8555	8550 KINGSTON PIKE KNOXVILLE, TN 37919
<b>Hardin County</b> <b>Water District</b> 1400 RODGERSVILLE ROAD RADCLIFF, KENTUCKY 40160	
PROJECT: <b>PIRTLE SPRING W.T.P. AND GRAY LANE RAW WATER PUMP STATION IMPROVEMENTS</b>	
<b>PIRTLE SPRING W.T.P. FILTER EXISTING UPPER LEVEL PLAN</b>	
CDI PROJECT NO.	09904-0016
DRAWING DATE	OCTOBER 15, 2018
PN	TPT PC S&P
DRAWN	W&W FR -
<b>PRELIMINARY FOR REVIEW ONLY</b>	
<b>P1.01</b>	



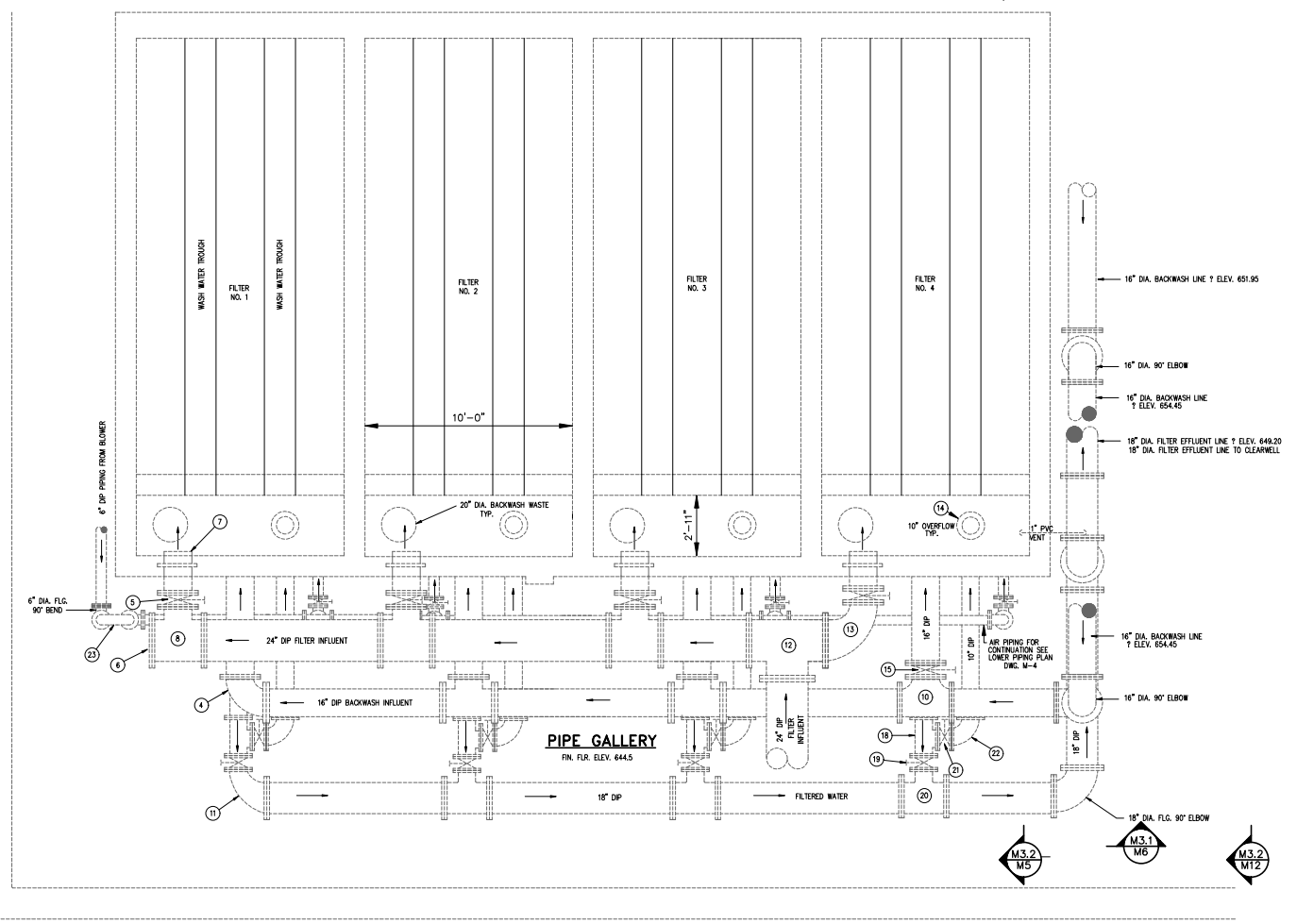
PLAN  
SCALE: 1/8" = 1'-0"



REVISED	DATE
 CONSULTING ENGINEERS - FIELD SURVEYORS TEL: 865.670.8555   8550 Kingston Pike WWW.CANNON-CANNON.COM   KNOXVILLE, TN 37919	
CLIENT:	 1400 RODGERSVILLE ROAD RADCLIFF, KENTUCKY 40160
PROJECT:	PIRTLE SPRING W.T.P. AND GRAY LANE RAW WATER PUMP STATION IMPROVEMENTS
<b>PIRTLE SPRING W.T.P. FILTER          EXISTING LOWER LEVEL PLAN</b>	
<b>PRELIMINARY          FOR REVIEW          ONLY</b>	C&C PROJECT NO. 09904-0010 DRAWING DATE OCTOBER 15, 2018
	PW TYP PC SAF DRAWN W/WHY FR -
	<b>P1.02</b>

**NOTES:**

- 1 16" DIA. FLG. 90° ELBOW.
- 2 16" DIA. MAG METER FOR BACKWASH RATE OF FLOW CONTROLLER.
- 3 16" DIA. FLG. BUTTERFLY VALVE WITH ELECTRIC OPERATOR, WORKS WITH MAG METER FOR RATE OF FLOW CONTROLLER.
- 4 16" DIA. FLG. 90° ELBOW.
- 5 16" DIA. FLG. BFV WITH ELECTRIC OPERATOR.
- 6 32" DIA. BLIND FLANGE.
- 7 16" DIA. PE-FLG. WALL PIPE, 24" LONG.
- 8 24" x 16" FLG. TEE.
- 9 16" DIA. FLG. 90° ELBOW.
- 10 16" FLG. TEE.
- 11 10" x 18" FLG. 90° REDUCING ELBOW.
- 12 24" FLG. TEE.
- 13 24" x 16" FLG. 90° REDUCING ELBOW.
- 14 10" DIA. CI FLARE FITTING
- 15 16" DIA. FLG. BFV WITH ELECTRIC OPERATOR.
- 16 16" DIA. FLG. 90° ELBOW.
- 17 10" DIA. MAG METER, FOR RATE OF FLOW CONTROLLER (BY OTHERS)
- 18 10" DIA. FLG. TEE.
- 19 10" DIA. FLG. ELEC. BFV WORKS WITH RATE OF FLOW CONTROLLER.
- 20 18" x 18" x 10" FLG. TEE
- 21 10" DIA. FLG. BFV WITH ELECTRIC OPERATOR.
- 22 10" DIA. FLG. 90° ELBOW.
- 23 INSTALL 6" DIA. FLG. RETURN BEND, HAVING 7 ELEV. 657.50. THE RETURN BEND PIPING WILL COME UP THRU THE PROPOSED GRATING, BEING ELEV. 656.00.



PIPE GALLERY-FILTER UPPER PIPING PLAN  
SCALE: 3/8" = 1'-0"

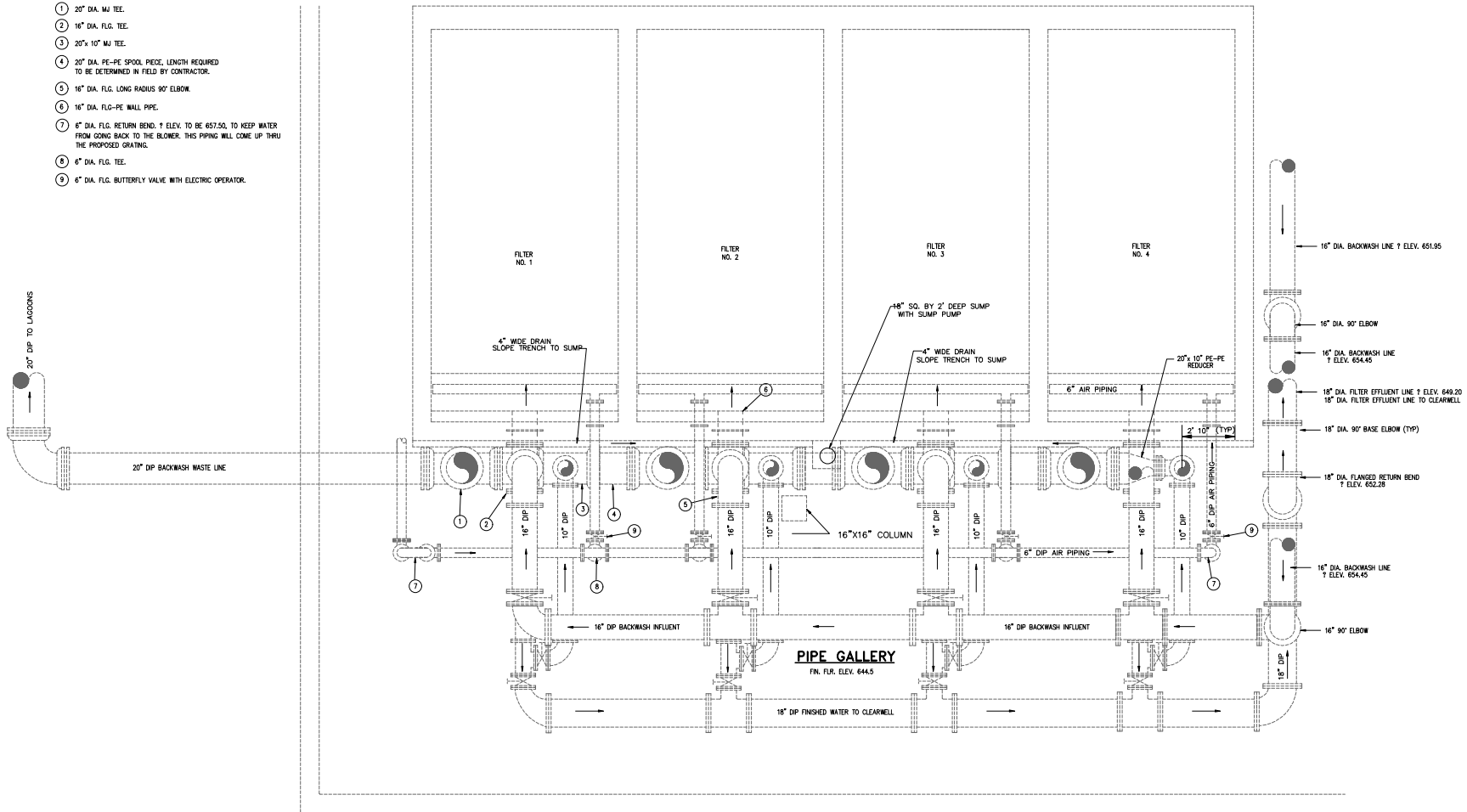


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<b>CANNON &amp; CANNON INC</b> CONSULTING ENGINEERS - FIELD SURVEYORS	
TEL: 865.670.8555	8550 Kingston Pike Knoxville, TN 37919
<b>Hardin County Water District</b> 1400 RODGERSVILLE ROAD RADCLIFF, KENTUCKY 40160	
PROJECT: <b>PIRTLE SPRING W.T.P. AND GRAY LANE RAW WATER PUMP STATION IMPROVEMENTS</b>	
PROJECT: <b>PIRTLE SPRING W.T.P. FILTER EXISTING UPPER LEVEL PIPING PLAN</b>	
CDI PROJECT NO.	09934-0010
DRAWING DATE	OCTOBER 15, 2018
PN	TYP PC SAF
DRAWN	W/WH FR -
<b>PRELIMINARY FOR REVIEW ONLY</b>	
<b>P1.03</b>	



NOTES:

- ① 20" DIA. MJ TEE.
- ② 16" DIA. FLG. TEE.
- ③ 20"x 10" MJ TEE.
- ④ 20" DIA. PE-PE SPOOL PIECE. LENGTH REQUIRED TO BE DETERMINED IN FIELD BY CONTRACTOR.
- ⑤ 14" DIA. FLG. LONG RADIUS 90° ELBOW.
- ⑥ 16" DIA. FLG-PE WALL PIPE.
- ⑦ 6" DIA. FLG. RETURN BEND. † ELEV. TO BE 657.50. TO KEEP WATER FROM GOING BACK TO THE BLOWER. THIS PIPING WILL COME UP THRU THE PROPOSED GRATING.
- ⑧ 6" DIA. FLG. TEE.
- ⑨ 6" DIA. BUTTERFLY VALVE WITH ELECTRIC OPERATOR.



PIPE GALLERY-FILTER LOWER PIPING PLAN  
SCALE: 3/8" = 1'-0"

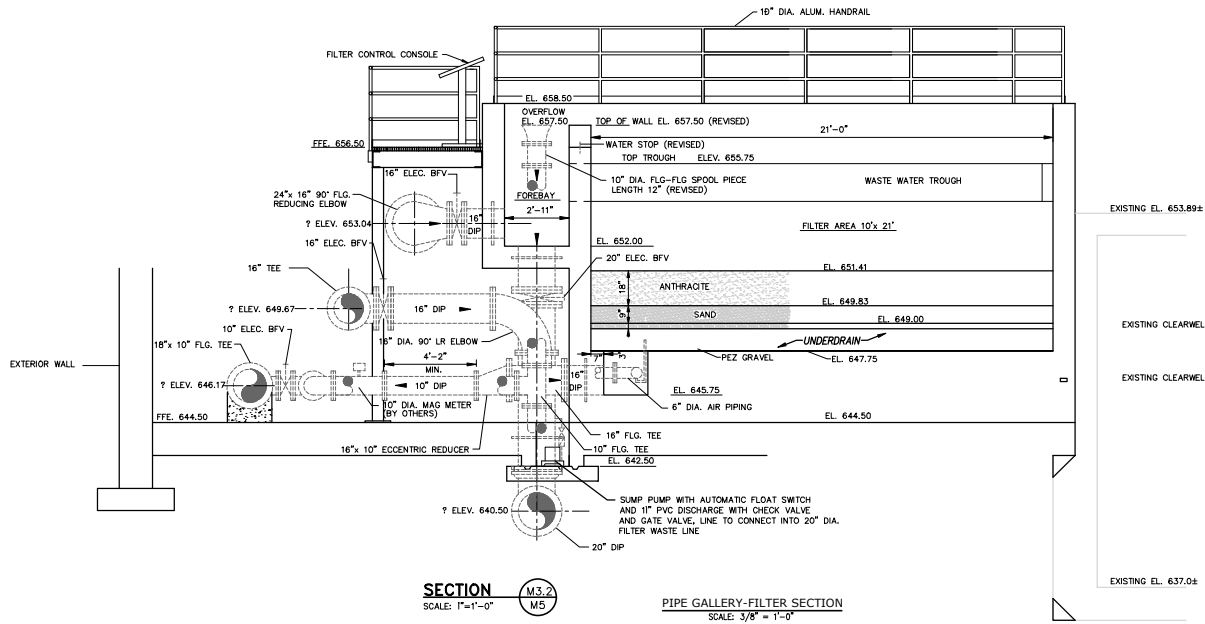
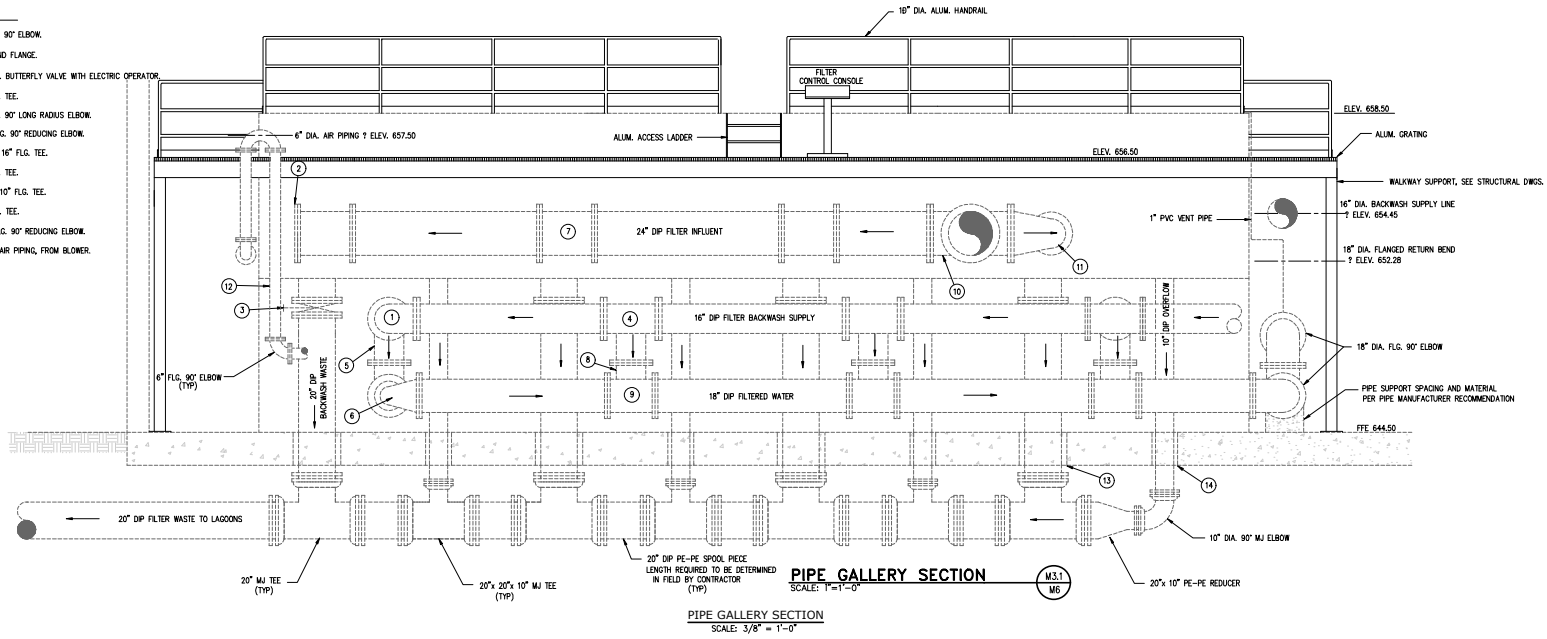


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<b>CANNON &amp; CANNON INC</b> CONSULTING ENGINEERS - FIELD SURVEYORS									
TEL 865.670.8555	8550 Kingston Pike Knoxville, TN 37919								
<b>Hardin County</b> <b>Water District</b> 1400 RODGERSVILLE ROAD RADCLIFFE, KENTUCKY 40160									
PROJECT: <b>PIRTLE SPRING W.T.P. AND GRAY LANE RAW WATER PUMP STATION IMPROVEMENTS</b>									
PROJECT: <b>PIRTLE SPRING W.T.P. FILTER EXISTING LOWER LEVEL PIPING PLAN</b>									
<b>PRELIMINARY FOR REVIEW ONLY</b>	CD# PROJECT NO. 09934-0010								
	DRAWING DATE OCTOBER 15, 2018								
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DRAWN	W/WH	FR	-						
<b>P1.04</b>									



NOTES:

- ① 16" DIA. FLG. 90° ELBOW.
- ② 32" DIA. BLIND FLANGE.
- ③ 20" DIA. FLG. BUTTERFLY VALVE WITH ELECTRIC OPERATOR.
- ④ 16" DIA. FLG. TEE.
- ⑤ 16" DIA. FLG. 90° LONG RADIUS ELBOW.
- ⑥ 18" x 10" FLG. 90° REDUCING ELBOW.
- ⑦ 24" x 24" x 16" FLG. TEE.
- ⑧ 16" DIA. FLG. TEE.
- ⑨ 18" x 18" x 10" FLG. TEE.
- ⑩ 24" DIA. FLG. TEE.
- ⑪ 24" x 16" FLG. 90° REDUCING ELBOW.
- ⑫ 6" DIA. DIP AIR PIPING, FROM BLOWER.

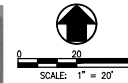


REVISED	DATE								
 CONSULTING ENGINEERS - FIELD SURVEYORS TEL: 865.670.8555    8550 Kingston Pike WWW.CANNON-CANNON.COM    KNOXVILLE, TN 37919									
 1400 RODGERSVILLE ROAD RADCLIFF, KENTUCKY 40160									
PROJECT: <b>PIRTLE SPRING W.T.P. AND GRAY LANE                  RAW WATER PUMP STATION IMPROVEMENTS</b>									
CLIENT: <b>PIRTLE SPRING W.T.P. FILTER                  EXISTING PIPE GALLERY &amp; FILTER SECTIONS</b>									
C&C PROJECT NO. 09934-0010 DRAWING DATE: OCTOBER 15, 2018									
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PK	TYT	PC	SAP						
DRAWN	W/WH	FR	-						

066\28  
HAROLD JOSEPH & LANA SAMPSON  
GARY LANE  
D.B. 744 Pg. 345

067\01  
HARDIN COUNTY WATER DISTRICT NO. 1  
1400 ROGERSVILLE RD.  
D.B. 1442 Pg. 249

067\01  
LOETTA GLENN MORRIS  
ST. JOHN ROAD  
D.B. 819 Pg. 721



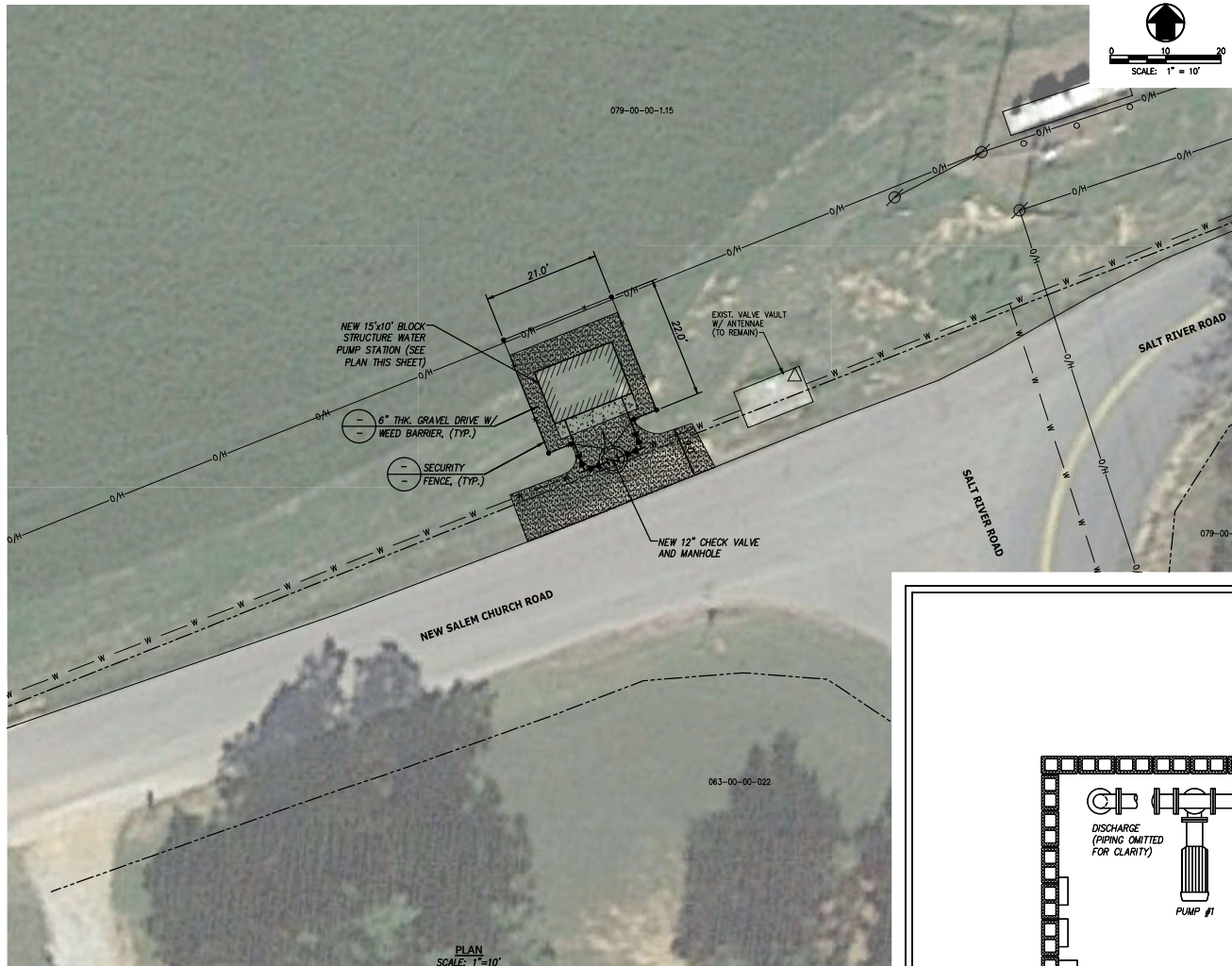
- NOTES:**
- 1) EXISTING RAW WATER PUMP STATION TO BE DEMOLISHED
  - 2) EXISTING 13-1/8" WELL CASING TO BE REPLACED W/ NEW 22" CASING USING SAME LOCATION
  - 3) INSTALL NEW (1) 2,000 GPM, 100 HP RAW WATER PUMP
  - 4) INSTALL NEW ELEVATED PLATFORM AND PREFABRICATED CANOPY STATION COVER
  - 5) INSTALL NEW STATION PIPING AND VALVES
  - 6) INSTALL VFD, ELECTRICAL AND CONTROL PANELS
  - 7) EXISTING SCADA TOWER TO REMAIN

- LEGEND**
- OH— OVERHEAD ELECTRIC LINE
  - - - - - RIGHT OF WAY/PROPERTY LINE
  - - - - - EX. FENCE LINE
  - - - - - EX. WATER LINE (TO REMAIN)
  - EX. WATER LINE (TO BE RETIRED)
  - ##### EX. MAILBOX
  - ⊠ EX. WATER METER
  - ⊕ EX. UTILITY POLE
  - ⊙ EX. FIRE HYDRANT
  - ⊗ EX. GAS VALVE
  - ⊘ EX. WATER VALVE
  - ⊙ EX. FIRE HYDRANT
  - ⊗ PROP. FIRE HYDRANT
  - ⊙ PROP. WATER METER

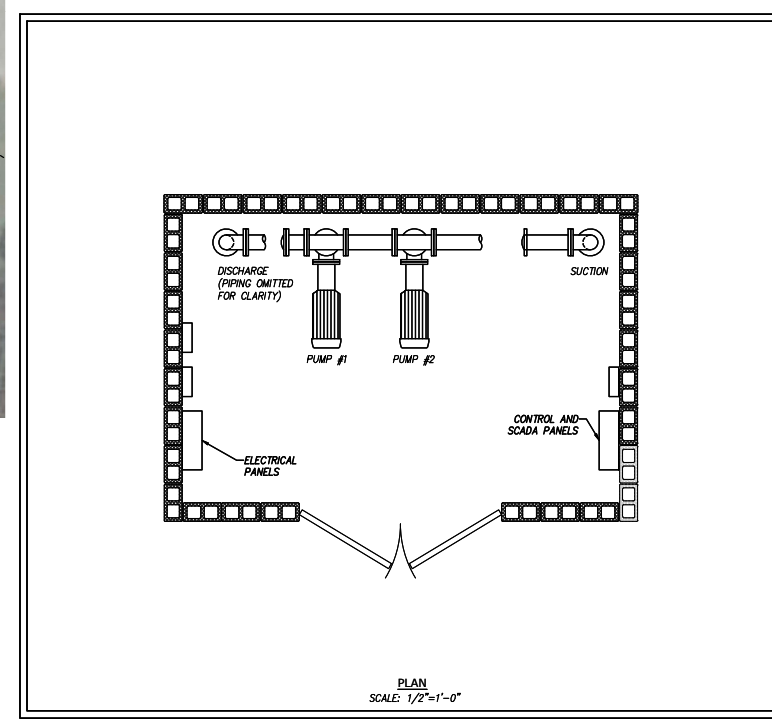


REVISED	DATE								
 CONSULTING ENGINEERS - FIELD SURVEYORS TEL: 865.670.6555   8550 Kingston Pike WWW.CANNON-CANNON.COM   Knoxville, TN 37919									
 1400 ROGERSVILLE ROAD RADCLIFFE, KENTUCKY 40160									
PROJECT: PIRTLE SPRING W.T.P., GRAY LANE P.S. AND BRIZENDINE B.S. IMPROVEMENTS									
<b>GRAY LANE RAW WATER INTAKE PUMP STATION SITE PLAN</b>									
<b>PRELIMINARY FOR REVIEW ONLY</b>	C&C PROJECT NO. 09904-0010								
	DRAWING DATE MARCH 19, 2020								
	<table border="1"> <tr> <td>PN</td> <td>TYF</td> <td>PC</td> <td>SAY</td> </tr> <tr> <td>DRAWN</td> <td>WEM</td> <td>PR</td> <td>-</td> </tr> </table>	PN	TYF	PC	SAY	DRAWN	WEM	PR	-
	PN	TYF	PC	SAY					
DRAWN	WEM	PR	-						
<b>C1.01</b>									

066\28  
RAYMOND CAMPBELL, JR.  
D.B. 869 Pg. 330



PLAN  
SCALE: 1"=10'



PLAN  
SCALE: 1/2"=1'-0"

- NOTES:**
- 1) INSTALL (2) NEW 274, 15 HP GPM BOOSTER PUMP
  - 2) RELOCATE EXISTING PIPING AND VALVES FROM 1882 PUMP STATION WHERE FEASIBLE
  - 3) INSTALL SPUI-BLOCK STATION BUILDING
  - 4) INSTALL WFD, ELECTRICAL AND CONTROL PANEL
  - 5) EXISTING SCADA TOWER TO REMAIN



REVISED	DATE												
<b>CANNON &amp; CANNON INC</b> CONSULTING ENGINEERS - FIELD SURVEYORS TEL: 865.670.6555   8550 Kingston Pike WWW.CANNON-CANNON.COM   Knoxville, TN 37919													
CLIENT:	<b>Hardin County Water District</b> 1400 RODGERSVILLE ROAD RADCLIFF, KENTUCKY 40160												
PROJECT:	PIRTLE SPRING W.T.P., GRAY LANE P.S. AND BRIZENDINE B.S. IMPROVEMENTS												
<b>BRIZENDINE TANK BOOSTER STATION SITE PLAN</b>													
<table border="1"> <tr> <td>C&amp;C PROJECT NO.</td> <td>09904-0010</td> </tr> <tr> <td>DRAWING DATE</td> <td>MARCH 19, 2020</td> </tr> <tr> <td>PN</td> <td>TYP</td> </tr> <tr> <td>PC</td> <td>SAP</td> </tr> <tr> <td>DRWN</td> <td>WFW</td> </tr> <tr> <td>FR</td> <td>-</td> </tr> </table>		C&C PROJECT NO.	09904-0010	DRAWING DATE	MARCH 19, 2020	PN	TYP	PC	SAP	DRWN	WFW	FR	-
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