PRELIMINARY ENGINEERING REPORT

RELATED TO THE

NORTH WATER TRANSMISSION LINE

FOR THE

OHIO COUNTY WATER DISTRICT
OHIO COUNTY, KENTUCKY

JOB NUMBER 2021

August 2014

J. R. WAUFORD & COMPANY
CONSULTING ENGINEERS, INC.
2835 LEBANON ROAD
NASHVILLE, TENNESSEE 37214
WWW.JRWAUFORD.COM

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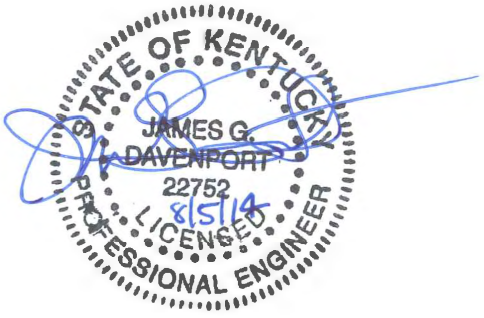

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2021
August 2014

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NORTH WATER TRANSMISSION LINE
OHIO COUNTY WATER DISTRICT

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NORTH WATER TRANSMISSION LINE
OHIO COUNTY WATER DISTRICT

I. Purpose and Scope

The purpose of this report is to relate the findings of studies and field investigations related to: (1) providing increased potable water distribution and transportation capacity from the Water Treatment Plant located near Cromwell, Kentucky to the cities of Beaver Dam and Hartford, Kentucky, and (2) eliminating the existing IPE and Goshen water booster stations. The scope of this report includes the analysis of the existing water distribution in the areas under consideration to arrive at the size and location of facilities proposed herein.

II. Existing Facilities

A. General

The Ohio County Water District (OCWD) was chartered in 1962 and provides potable water service to customers in Ohio, Davies, Butler, Breckinridge, McLean, and Grayson County, Kentucky. A new 4.0 MGD membrane type Water Treatment Plant was constructed and placed into service in 2011 which uses the Green River as a source of raw water. The distribution system is divided into three separate pressure zones which are discussed hereinafter. The OCWD furnishes water to the cities of Beaver Dam, McHenry, and Centertown. The City of Hartford, Kentucky produces its own potable water utilizing the Rough River as a source of raw water and purchases only limited amounts of water from the OCWD at locations which are difficult for Hartford to serve. The information related to existing distribution pipeline size and location and existing water storage tank size and overflow elevations was determined from existing water system maps. This information should be verified during the field survey of the facilities proposed herein.

B. Water Treatment Plant

The OCWD owns and operates a new 4.0 MGD membrane type Water Treatment Plant located near Cromwell, Kentucky which utilizes the Green River as a source of raw water. Raw water is transported from the river using vertical turbine type raw water pumps with variable frequency drives. As raw water enters the plant it passes through mechanical flash mixing and then through conventional settling basins with covers to prevent algae growth. The settled water is filtered by vacuum style membranes furnished by General Electric which acquired the original manufacturer, Xenon. The filtered water flows to a chlorine contact chamber although a portion of the flow can be pumped through vertical granular activated carbon filters which remove organics aiding in compliance with disinfection byproduct regulations. The plant contains five vertical turbine style high service pumps which allow finished water to be pumped into two separate pressure zones. One set of high service pumps discharges to the main 685 pressure zone serving the central and southwest areas of the distribution system and one set of high service pumps discharges to the 860 pressure zone which serves the northeast area of the distribution system. The plant location and distribution systems are shown on Exhibit No. 1 in the Appendix of this report.

C. Distribution System

The water distribution system is divided into three separate pressure zones as shown on Exhibit No. 1 in the Appendix of this report. Finished water is transported to the 685 pressure zone (referred to as Main pressure zone hereinafter) and the 860 pressure zone using different high service pumps at the Water Treatment Plant. Water is furnished to the north 739 pressure zone (referred to as North pressure zone) by the Hartford water booster station which contains three horizontal split case pumps each with nameplate capacities of 220 GPM at 295 feet total dynamic head. The

Hartford water booster station pulls suction from the Main pressure zone as shown on Exhibit No. 1 in the Appendix. The north pressure zone contains two tanks with overflow elevations of 739.5; the 0.5 MG Hoover Hill and 0.3 MG Bells Run tanks. The configuration of the suction and discharge lines allows the Hartford water booster station to use separate pumps to independently fill each tank which accounts for differences in headloss between the booster station and each of the two tanks.

As previously mentioned, the North pressure zone pulls suction from the Main pressure zone which requires water to be transported approximately 16 miles from the Water Treatment Plant to the Hartford water booster station through a series of lines and water booster stations that overcome the friction headloss in the existing water lines. The high service pumps at the Water Treatment Plant transport water north along Hwy 231 from the plant into the Main pressure zone using 16-inch, 8-inch and 10-inch lines. The 1.0 MG BCBC tank located near the intersection of the parkway and Hwy 231 provides storage for the Main pressure zone. From the BCBC tank, water is transported to the Beaver Dam master meter and the Beaver Dam water booster station which pumps to the 0.5 MG IPE Tank. Even though the BCBC and IPE tanks have the same overflow elevation of 685, a booster station is required between the two tanks to overcome the friction headloss in the undersized lines. The Beaver Dam water booster station contains two horizontal split case pumps each rated at 750 GPM at 235 feet total dynamic head. Water is sold to the City of Beaver Dam through a wholesale master meter located on the suction side of the Beaver Dam water booster station. Beaver Dam utilizes a 0.25 MG elevated water storage tank with an overflow elevation of 596.

As previously mentioned, water is pumped into the 0.5 MG IPE Tank by the 750 GPM Beaver Dam water booster station. From the IPE Tank, water flows northward through an 8-inch line toward the City of Hartford. Due to the excessive headloss, water cannot flow by gravity at sufficient rates to

supply customers which requires the use of the Goshen water booster station which is shown on Exhibit No. 1 in the Appendix. The Goshen water booster station contains three horizontal split case pumps each capable of transporting 300 GPM at 150 feet total dynamic head. This station discharges to an 8-inch water line which travels north to a 10-inch water line which ultimately provides suction to the Hartford booster station through smaller 6-inch and 8-inch water lines. The existing Goshen booster station and distribution system is incapable of providing all of the potable water demand of the City of Hartford if they were to request same from the OCWD.

III. Existing Water Usage and Population Projections

A. Population Growth

The cities of Beaver Dam and Hartford, Kentucky and Ohio County experienced moderate growth from 1980 to 2010 according to available records from the Kentucky State Data Center maintained by the University of Louisville. The data indicate that census data is available for Ohio County for the years of 1980, 1990, 2000, and 2010 and for the cities of Beaver Dam and Hartford for the years of 2000 and 2010. The census data is presented in the following Table III-1.

TABLE III-1
CENSUS DATA
OHIO COUNTY AND BEAVER DAM AND HARTFORD CITIES

Year	Ohio County	10 Year Growth Rate	Beaver Dam City	10 Year Growth Rate	Hartford City	10 Year Growth Rate
1980	21,765	n/a	*	n/a	*	n/a
1990	21,105	-3.03%	*	n/a	*	n/a
2000	22,916	8.6%	3,033	n/a	2,571	n/a
2010	23,842	3.9%	3,409	12.4%	2,672	3.9%

The census data in Table III-1 shows that the peak growth rate for the cities of Beaver Dam and Hartford and Ohio County is approximately 12.4 % in

10 years which is due to growth in Beaver Dam from 2000 to 2010. The next highest growth period occurred for Ohio County from 1990 to 2000 at 8.6%, although this period followed a 3.03% loss in Ohio County from 1980 to 1990. Projected population data from the Kentucky State Data Center is available for Ohio County for the period of 2015 through 2035 although no data is available for Beaver Dam or Hartford. Table III-2 shows the population projections for Ohio County and projected growth rates applied to the cities of Beaver Dam and Hartford population.

TABLE NO. III-2
PROJECTED POPULATION DATA
BEAVER DAM AND HARTFORD CITIES AND OHIO COUNTY

Year	Ohio County Population	5 Year Growth Rate	10 Year Growth Rate	Beaver Dam Population	Hartford Population	Total City Population
2010	23,842	-	-	3,409	2,672	6,081
2015	24,362	2.18%	-	3,483	2,730	6,213
2020	24,781	1.72%	3.79%	3,543	2,777	6,320
2025	25,073	1.18%	2.84%	3,584	2,810	6,394
2030	25,309	0.94%	2.09%	3,617	2,836	6,453
2035	25,495	0.73%	1.66%	3,643	2,857	6,500

Examination of the aforementioned tables indicates that the forecasters at the Kentucky State Data Center believe that the rate of growth in Ohio County will decline in the future. Table III-2 shows that the growth rate will decline from 2.18% to 0.73% from the year 2015 to year 2035. The planning period for the North Transmission Line is 20 years which ends in the year 2035. Based upon forecasted population data increases in Ohio County from 24,362 in the year 2015 to 25,495 in the year 2035, the calculated 20 year population growth rate is 4.65 %.

B. Potential Water Sales Increases

Records were obtained from the OCWD which show the raw water usage from April 2004 through March 2014 which are shown at Exhibit No. 2 in the

Appendix. Records were not readily available for high service flow rates. The data show that the Year 2035 forecast water usage is approximately 2.3 MGD. The future water usage could increase significantly if additional customers are added to the system through line extensions. Another factor that could significantly increase water usage is if the City of Hartford were to decide to purchase all of their water from the OCWD. Although this would only result in one wholesale customer, the average daily flow would increase significantly as discussed hereinafter.

The total water customers for the month of December of the years 2004 through 2013 were obtained from the OCWD as shown in the following table.

TABLE III-3
OCWD TOTAL WATER CUSTOMERS

Year	Total Water Customers
2004	4,903
2005	5,608
2006	5,622
2007	5,758
2008	5,858
2009	5,606
2010	5,765
2011	5,813
2012	5,851
2013	5,835

From December of 2004 through December 2013, the total number of customers served by the Ohio County Water District increased from 4,903 to 5,835 which equals a 19.0 percent growth rate in nine years. When compared to the population growth rate, this data indicates customer growth due to water system expansion.

C. City of Hartford Connection

The calculated growth rate of Ohio County was used to calculate the projected population increases in cities of Beaver Dam and Hartford, Kentucky. Hartford is of particular importance when considering future water usage rates since they do not currently purchase an appreciable amount of water from the OCWD. Hartford currently utilizes the Rough River as a source of raw water which reportedly causes treatability issues due to low flows during dry periods. It is possible that Hartford may decide in the future to purchase all of their potable water from the OCWD in lieu of continuing to treat their own water. If this were to occur, it would be necessary to upgrade the distribution system from the IPE Tank to the City of Hartford to insure adequate supply for the city. Since the OCWD currently furnishes water to areas surrounding the City of Hartford, it makes sense to supply Hartford water if sufficient capacity exists or can be obtained in a reasonable amount of time. The City of Hartford was not approached as part of this study as those negotiations must take place between the City of Hartford and the OCWD.

In order to estimate the amount of water that Hartford would use if they were to connect to the OCWD system, the per capita water usage of the City of Beaver Dam was calculated for comparison. From May 2013 through April 2014, the City of Beaver Dam purchased 101,130,000 gallons from the OCWD. Based upon a service population of 3,450 persons, the average daily per capita usage equals 80.3 gallons per day. Applying the same usage rate to the population of the City of Hartford yields a daily usage rate of approximately 217,000 gallons per day or approximately 150 gallons per minute.

IV. Proposed Water System Improvements

A. General

As mentioned hereinbefore, the existing water pumping and distribution system serving the main pressure zone of 685 needs improvements to: (1) provide adequate water flows and pressures to existing and potential customers, and (2) reduce energy consumption related to the use of pumps to overcome pipe friction headloss. The proposed improvements are separated into two projects with Project No. 1 consisting of installing approximately 43,000 L.F. of new 16-inch water transmission line from the vicinity of the BCBC Tank to the IPE Tank and the northward to Hwy 231 as shown on Exhibit No. 3 in the Appendix at an estimated cost of $3,400,000 as shown on Cost Estimate No. 1. Project No. 1 will allow for the elimination of the existing Beaver Dam and Goshen water booster stations at significant savings to the OCWD. Project No. 2 consists of approximately 7,000 L.F. of 12-inch water transmission line from the north end of the proposed 16-inch line to the termination at the City of Hartford as shown on Exhibit No. 3. This project is estimated to cost $420,000 as shown on Cost Estimate No. 2 and will be required to furnish Hartford water if they elect to purchase water from the OCWD.

B. Pressure and Flow Stabilization Benefits

The new 16-inch water line proposed in Project No. 1 will significantly decrease the amount of friction headloss in the existing water system and allow an increased water transfer capacity and more energy efficient transfer of potable water in the system. The configuration of the water distribution system will require that an altitude or other type control valve be installed at the BCBC Tank so that it can be isolated from the system allowing the IPE Tank to fill up at which time the water plant should be shut down. After the water plant shuts down, usage will cause the pressure to drop outside the BCBC Tank which will cause the control valve to open,

allowing this tank to float on the system. Usage in Beaver Dam and north past Hartford will begin to lower the elevation of the IPE Tank which will cause water to flow from the BCBC Tank to the north towards the IPE Tank helping stabilize the system. When the level in the IPE Tank drops to a preset level, the Water Treatment Plant should begin operation and refill both tanks as previously described.

The hydraulic grade line of the existing and proposed water lines from the Water Treatment Plant to the Hartford water booster station is shown at Exhibit No. 4 in the Appendix. This exhibit shows that there is approximately 10 feet of headloss between the BCBC Tank and the IPE Tank at a flow of 1,700 GPM which is the approximate discharge rate of two BCBC high service pumps at the Water Treatment Plant. The hydraulic grade line then drops from elevation 685 at the IPE Tank to approximate elevation 636 at the Hartford water booster station. The hydraulic grade line drop is in response to 1,100 GPM being transported to Hartford which represents the average daily usage of Hartford (if they were to connect to OCWD) and surrounding customers plus an allowance for fire flow. With the Water Treatment Plant off, and the BCBC Tank down 10 feet, the lowest calculated hydraulic grade line elevation at the Hartford water booster station is elevation 616. This equates to a static head condition of 123.5 feet between the Bells Run/Hoover Hill Tanks overflow elevation of 739.5 and the suction pressure. Since the Hartford water booster station pumps are rated at 220 GPM at 295 feet, the hydraulics of this area should be improved and result in stabilized water pressure. For reference, the overflow elevation of the City of Hartford Tank is reported as elevation 585 which is below the operating hydraulic grade line of the proposed improvements allowing for sufficient pressure to furnish water to the City of Hartford.

C. Reduced Energy Consumption

The existing BCBC Tank and IPE Tank have the same overflow elevation of 685 according to available records. It is necessary to utilize the Beaver Dam pumping station to overcome the excessive friction headloss in the undersized lines between these two tanks. The same situation occurs between the IPE Tank and the Hartford water booster station which requires the use of the Goshen water booster station. The improvements proposed herein include the use of larger water transmission lines to reduce friction headloss and thereby eliminate the need of the Beaver Dam and Goshen water booster stations. This concept will result in significant energy savings which is summarized in Table IV-1 hereinafter.

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TABLE NO. IV-1
BEAVER DAM AND GOSHEN WATER BOOSTER STATIONS
ELECTRICAL USAGE JUNE 2011 THROUGH JULY 2014

Year	Month	Beaver Dam Electrical Bill	Goshen Electrical Bill
2011	June	$2,385.19	$1,189.22
	July	$2,333.78	$1,206.67
	August	$2,314.24	$1,137.43
	September	$2,218.74	$1,112.57
	October	$1,895.20	$1,056.66
	November	$1,787.74	$800.89
	December	$1,854.40	$920.96
2012	January	$2,225.22	$1,096.18
	February	$2,003.52	$962.67
	March	$1,781.22	$848.61
	April	$1,826.24	$1,000.68
	May	$1,995.56	$969.62
	June	$2,219.18	$1,180.33
	July	$2,597.25	$1,746.98
	August	$2,132.04	$1,083.32
	September	$2,023.22	$1,244.88
	October	$1,895.60	$1,041.55
	November	$1,805.22	$980.19
	December	$1,817.47	$961.18
2013	January	$2,065.56	$1,080.00
	February	$2,070.05	$1,101.05
	March	$1,668.29	$881.09
	April	$1,865.25	$1,070.06
	May	$1,932.79	$959.70
	June	$2,188.25	$1,083.36
	July	$2,177.16	$1,210.29
	August	$2,284.39	$1,072.84
	September	$2,073.50	$1,102.51
	October	$1,850.45	$1,050.26
	November	$2,062.37	$981.49
	December	$2,109.97	$1,116.30
2014	January	$2,659.59	$1,471.47
	February	$2,743.78	$1,464.74
	March	$3,354.57	$1,740.61
	April	$2,442.54	$1,315.80
	May	$3,089.37	$1,601.03
	June	$3,358.74	$1,745.18
	July	$2,627.53	$1,330.02
	June	$2,385.19	$1,189.22
	July	$2,333.78	$1,206.67

The average yearly combined electric bill for Beaver Dam and Goshen water booster stations is $43,918 resulting in an average monthly bill of $2,204.

D. Proposed Pipeline Material

Two common material alternatives exist for the 12-inch and 16-inch water lines: (1) Class 250 or 350 Ductile Iron Pipe and (2) C900 12-inch and C905 16-inch Polyvinyl Chloride (PVC) Pipe. The maximum estimated static pressure at the lowest point on the 16-inch and 12-inch line (Elevation 380) calculates to be 132 psi with the IPE Tank full. Based on this static head, Class 250 or 350 ductile iron pipe is a suitable choice as well as dimension ratio (DR) 18 PVC which has a Pressure Class rating of 235 psi. Ductile Iron Pipe is known for its longevity while PVC can be more economical and easier to handle during connection or repairs. For cost estimating purposes, PVC pipe was used for the open cut installation and Ductile Iron Pipe was used in the bored highway crossings.

E. Constructability Concerns

Project No. 1 – 16-inch Water Transmission Line as recommended hereinafter should be bid in one construction contract to attract competitive pricing due to contractor interest in a large quantity pipeline project. Construction will likely take approximately 10 to 12 months including testing, clean up, and project closeout. It is recommended that the project be bid in mid-winter so construction can start early spring to take advantage of a full construction season. This strategy should result in cost savings due to increased daily production from longer work days and drier working conditions.

V. Summary and Recommendations

The improvements proposed herein are separated into two projects. Project No. 1 consists of the installation of approximately 43,000 L.F. of 16-inch water

transmission line as shown on Exhibit No. 3 in the Appendix. These improvements are estimated to cost $3,400,000 as shown on Cost Estimate No. 1. Project No. 2 consists of the installation of approximately 7,000 L.F. of 12-inch water transmission line from the termination of the north end of the proposed 16-inch water line north to the City of Hartford. These improvements are estimated to cost $420,000 as shown on Cost Estimate No. 2.

The installation of the 16-inch water line will provide stabilized flow and pressure in the main pressure zone and will allow for the Beaver Dam and Goshen water booster stations to be taken out of service which will result in an annual savings of approximately $44,000. In addition, implementation of this project will allow the Ohio County Water District to serve the City of Hartford if they elect to become a customer by simply constructing the additional 7,000 L.F. of 12-inch water line described in Project No. 2. As a result, we recommend that Project No. 1 – 16-inch Water Transmission Line be designed and constructed immediately. We recommend construction of Project No. 2 – 12-inch Water Transmission Line be delayed until the City of Hartford executes a long term water sales contract with the OCWD.

COST ESTIMATES

COST ESTIMATE NO. 1 – PROJECT NO. 1
16-INCH WATER TRANSMISSION LINE
OHIO COUNTY WATER DISTRICT
OHIO COUNTY, KENTUCKY
JRWCO JOB NO. 2021

Item	Quantity	Description	Unit Price	Cost
1.	43,000 L.F.	16-inch C905 DR18 PVC Water Line	$53 / L.F.	$2,279,000
2.	200 L.F.	24-inch Bored Crossing of Western Kentucky Parkway with 16-inch DIP Carrier Pipe	$400 / L.F.	$80,000
3.	200 L.F.	24-inch Bored Crossing of Hwy 62 and Hwy 273 with 16-inch DIP Carrier Pipe	$400 / L.F.	$80,000
4.	Lump Sum	Control Valve & Pit at BCBC Tank	Lump Sum	$20,000
5.	7 Each	Connection to Existing Water Line	$2,000 / Ea.	$14,000
6.	22 Each	Fire Hydrant for Manual Air Release	$3,000 / Ea.	$66,000
7.	8 Each	16-inch Butterfly Valve Assemblies	$2,000 / Ea.	$16,000
8.	43,000 L.F.	Roadway and Easement Repair	$3 / L.F.	$129,000
		ESTIMATED CONSTRUCTION COST		$2,684,000
		CONSTRUCTION CONTINGENCIES		$266,000
		1. Budgeted for Construction		$2,950,000
		2. Engineering: Preliminary		$12,000
		Survey, Design & Easement Preparation		$174,000
		Bidding and Award		$6,000
		During Construction (12 months)		$192,000
		3. Project Contingencies		$66,000
		TOTAL ESTIMATED PROJECT COST		$3,400,000

ENR CONSTRUCTION COST INDEX – 9835 (July 2014)

COST ESTIMATE NO. 2 – PROJECT NO. 2
12-INCH WATER TRANSMISSION LINE
OHIO COUNTY WATER DISTRICT
OHIO COUNTY, KENTUCKY
JRWCO JOB NO. 2021

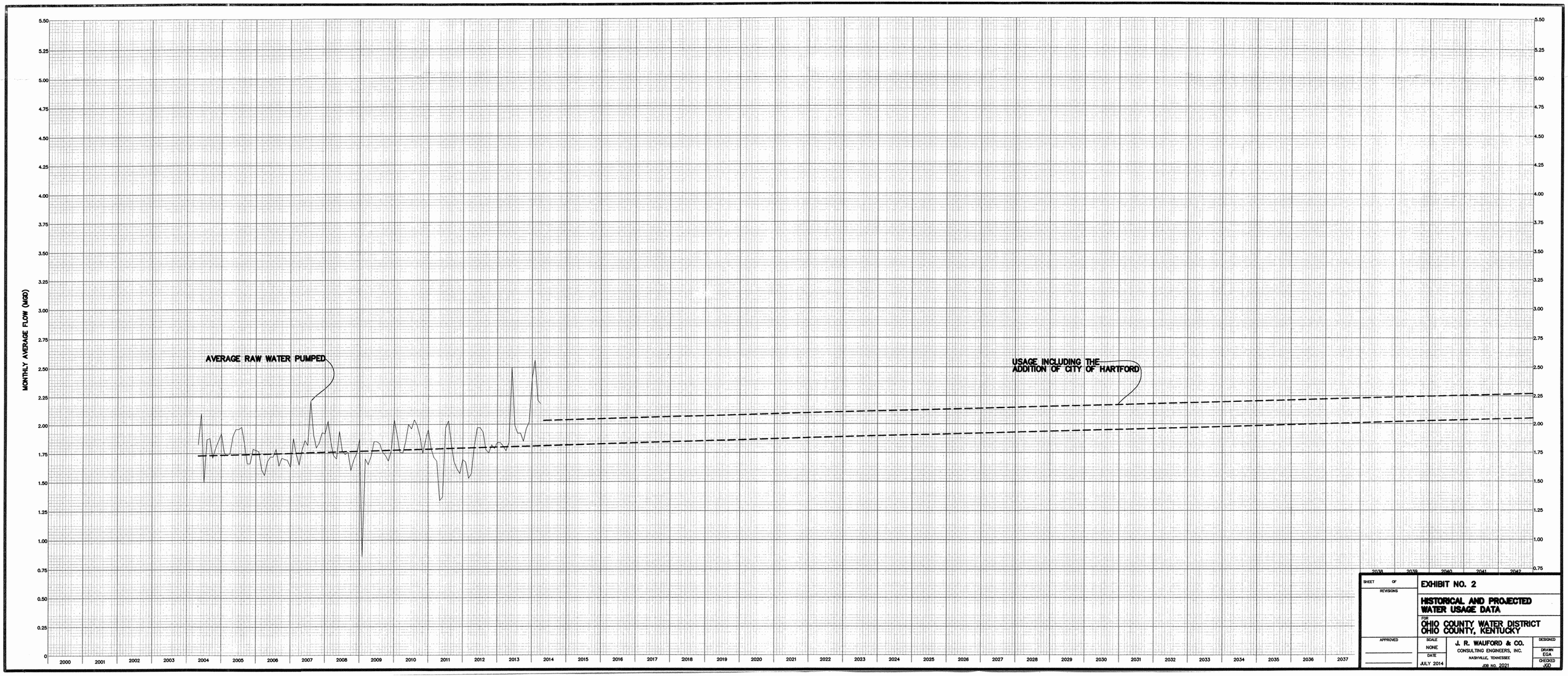
Item	Quantity	Description	Unit Price	Cost
1.	7,000 L.F.	12-inch C900 DR18 PVC Water Line	$38 / L.F.	$266,000
2.	4 Each	Connection to Existing Water Line	$2,000 / Ea.	$8,000
3.	3 Each	Fire Hydrant for Manual Air Release	$3,000 / Ea.	$9,000
4.	7,000 L.F.	Roadway and Easement Repair	$3 / L.F.	$21,000
		ESTIMATED CONSTRUCTION COST		$304,000
		CONSTRUCTION CONTINGENCIES		$31,000
		1. Budgeted for Construction		$335,000
		2. Engineering: Survey, Design & Easement Preparation		$27,000
		Bidding and Award		$6,000
		During Construction (2 months)		$32,000
		3. Project Contingencies		$20,000
		TOTAL ESTIMATED PROJECT COST		$420,000

ENR CONSTRUCTION COST INDEX – 9835 (July 2014)

APPENDIX

860 PRESSURE ZONE
739 PRESSURE ZONE
685 PRESSURE ZONE
WHITESVILLE 4" MASTER METER
"T-3" BELLS RUN 300K ELEV. TANK OV. EL. 739.5 (FAIR) NEEDS REPAIR
PINCHED VALVE
FORDSVILLE 4" MASTER METER
PRESSURE REDUCER
"T-1" HOOVER HILL 500K ELEV. TANK OV. EL. 739.5 (GOOD)
N. McLEAN 2" MASTER METER
"T-5" CLATON 500K ELEV. TANK OV. EL. 860 (GOOD)
GRAYSON 2" MASTER METER
CLOSED LINE
OROUGH RIVER PUMP STATION 150 GPM (OUT OF SERVICE)
HARTFORD PUMP STATION 220 GPM (SEE DETAIL "A")
500K GROUND TANK OV. EL. 505
125K ELEV. TANK OV. EL. 520
CITY OF HARTFORD
CITY OF CENTERTOWN
GOSHEN PUMP STATION 300 GPM
CITY OF BEAVER DAM
"T-12" BEAVER DAM 250K ELEV. TANK OV. EL. 594 (OWNED AND OPERATED BY CITY OF BEAVER DAM)
"T-5" WINDY HILL 500K ELEV. TANK OV. EL. 860 (OUT OF SERVICE)
4" MASTER METER
BEAVER DAM MASTER METER
BEAVER DAM PUMP STATION 750 GPM
"T-2" INDUSTRIAL PARK EAST 500K ELEV. TANK OV. EL. 685 (GOOD)
"T-4" BOBO 1MG ELEV. TANK OV. EL. 685 (GOOD) SERVES NEW IND. PARK
U.S. HWY.
STATE HWY.
ROCKPORT VALVE HOUSE
CITY OF ROCKPORT
"T-10" ROCKPORT TANK STANDPIPE OV. EL. 620 (GOOD)
"T-9" ECHOLS 100K STANDPIPE OV. EL. 685 (FAIR)
ECHOLS PUMP STATION 100 GPM
4.0 MGD MEMBRANE WATER TREATMENT PLANT
CREEK RIVER
DAVIESS CO.
OHIO CO.
McLEAN CO.
MUHLENBERG CO.
HANCOCK CO.
BRECKINRIDGE CO.
GRAYSON CO.
BUTLER CO.

SHEET — OF —	EXHIBIT NO. 1	
REVISIONS	EXISTING WATER SYSTEM MAP	
	FOR OHIO COUNTY WATER DISTRICT OHIO COUNTY, KENTUCKY	
APPROVED	SCALE 1" = 5000'	DESIGNED JGD
	DATE JULY 2014	DRAWN WZM
	J. R. WAUFORD & CO. CONSULTING ENGINEERS, INC. NASHVILLE, TENNESSEE JOB NO. 2021	CHECKED JGD



SHEET OF

REVISIONS

APPROVED

EXHIBIT NO. 2

HISTORICAL AND PROJECTED WATER USAGE DATA

FOR

OHIO COUNTY WATER DISTRICT
OHIO COUNTY, KENTUCKY

SCALE NONE

DATE JULY 2014

J. R. WAUFORD & CO.
CONSULTING ENGINEERS, INC.
NASHVILLE, TENNESSEE
JOB NO. 2021

DESIGNED

DRAWN EGA

CHECKED JGD

739 PRESSURE ZONE

860 PRESSURE ZONE

HARTFORD PUMP STATION 220 GPM

CITY OF HARTFORD 400K GROUND TANK OV. EL. 585

CITY OF HARTFORD 125K ELEV. TANK OV. EL. 520

CITY OF HARTFORD

CLOSED LINE

PRV

CLOSED LINE

CLOSED LINE

PROJECT NO. 2– 12" WATER TRANSMISSION LINE

PROJECT NO. 1– 16" WATER TRANSMISSION LINE

685 PRESSURE ZONE

GOSHEN PUMP STATION 300 GPM (ABANDON)

CITY OF BEAVER DAM

T-12" BEAVER DAM 250K ELEV. TANK OV. EL. 596 (OWNED AND OPERATED BY CITY OF BEAVER DAM)

685 PRESSURE ZONE

860 PRESSURE ZONE

PROJECT NO. 1– 16" WATER TRANSMISSION LINE

BEAVER DAM MASTER METER

BEAVER DAM PUMP STATION 750 GPM (ABANDON)

"T-2" INDUSTRIAL PARK EAST 500K ELEV. TANK OV. EL. 685

PROJECT NO. 1– 16" WATER TRANSMISSION LINE

"T-4" BCBC 1MG ELEV. TANK OV. EL. 685 SERVES NEW IND. PARK

CLOSED LINE

U.S. HWY.

STATE HWY.

ECHOLS PUMP STATION 100 GPM

4.0 MGD MEMBRANE WATER TREATMENT PLANT

RIVER INTAKE

685 PRESSURE ZONE

"T-9" ECHOLS 100K STANDPIPE OV. EL. 685 (FAIR)

SHEET — OF —

REVISIONS

APPROVED

EXHIBIT NO. 3

PROPOSED WATER SYSTEM IMPROVEMENTS

FOR

OHIO COUNTY WATER DISTRICT
OHIO COUNTY, KENTUCKY

SCALE 1" = 2000'

DATE JULY 2014

J. R. WAUFORD & CO.
CONSULTING ENGINEERS, INC.
NASHVILLE, TENNESSEE
JOB NO. 2021

DESIGNED JGD

DRAWN WZM

CHECKED JGD

SHEET — OF —

REVISIONS

APPROVED

EXHIBIT NO. 4

NORTH WATER TRANSMISSION LINE HYDRAULIC PROFILE

FOR

OHIO COUNTY WATER DISTRICT
HARTFORD, KENTUCKY

SCALE
1"=2000' HOR.
1"=20' VER.

DATE
JULY 2014

J. R. WAUFORD & CO.
CONSULTING ENGINEERS, INC.
NASHVILLE, TENNESSEE
JOB NO. 2021

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