
Witness: Brent E. O'Neill, Krista E. Citron

1. Refer to the Direct Testimony of Kurt A. Stafford, pages 13–15.

   a. For the approximately $800,000 Kentucky-American plans to spend on replacing hydrants and valves under Budget Line F, indicate the amount of that $800,000 that will be attributable to replacing mains connected to those hydrants and valves.

   b. For the approximately $530,000 Kentucky-American plans to spend on replacing services under Budget Line H, indicate the amount of that $530,000 that will be attributable to replacing mains connected to those services.

Response:

   a. Approximately 10% of the spend on Budget Line F is attributable to replacing mains connected to hydrants and valves so the amount attributable is $80,000.

   b. Service lines are actually small diameter water mains that connect larger transmission and distribution mains to individual meters. They are subject to the same modes of failure as transmission and distribution mains as they age. Just like transmission and distribution mains, the likelihood of service line failure greatly increases as these lines reach the end of their useful life. KAW projects that all $530,000 of the planned spend on Budget Line H will be attributable to replacing these small diameter mains.

Witness: Brent E. O'Neill, Krista E. Citron

2. Refer to Kentucky-American's Response to Commission Staff's First Request for Information (Staff's First Request), Items 1, 2, and 7.

   a. Explain whether contractors who are not pre-qualified may bid on qualified infrastructure plan (QIP) projects and, if not, why not.

   b. Identify all pre-qualified contractors.

   c. Explain in detail the process for contractors to apply for and become pre-qualified by Kentucky-American, and describe the notice provided to contractors to inform them of the opportunity to become pre-qualified.

Response:

   a. Contractors who are not pre-qualified and wish to submit a bid on projects may approach Kentucky-American and request to become pre-qualified. As this process may take several weeks to months to complete, Kentucky-American does not typically invite contractors to bid if they are not pre-qualified.

   b. Kentucky-American's pre-qualified pipeline contractors are:

1	CJ Hughes Construction
2	Dix & Associates Pipeline Contractors Inc
3	Edward Hall Trucking and Excavating Co.
4	Garney Companies, Inc.
5	Humphrey Construction LLC
6	Lagco, Inc
7	Revivify Service Company, LLC
8	Reynolds Construction, LLC
9	RT infrastructure
10	TFH, LLC
11	Todd Johnson Contracting Inc.
12	Wayne Construction Service LLC

c. Although no formal notice is given, contractors who are interested in becoming qualified to work for KAW may request to be pre-qualified. Once a formal request has been made, a pre-qualification package is initiated by American Water's Supply Chain team. Upon completion of the package, the contractor's qualifications are technically and commercially reviewed to determine if the contractor is qualified. Areas that are reviewed include, but are not limited to, work experience/technical competency, safety, and risk. Once the contractor meets all the American Water requirements, the contractor is set up in the American Water business systems and will be approved to participate in bid events and is eligible to be awarded work. It is the contractors' responsibility to maintain their approved standing by providing required information on an ongoing basis. Contractors who are pre-qualified in other American Water states may be added to KAW's list at their request. Any contractor may request to be pre-qualified by contacting American Water's Supply Chain team.

KENTUCKY-AMERICAN WATER COMPANY
CASE NO. 2021-00090
COMMISSION STAFF'S SECOND REQUEST FOR INFORMATION

Witness: Brent E. O'Neill, Krista E. Citron

3. Refer to Kentucky-American's Response to Staff's First Request, Items 10 and 12.

   a. Explain whether the prioritization model has been revised since 2018 and, if so, describe what changes were made and the reason for the change.

   b. Provide copies of the documents filed in other cases that Kentucky-American referenced in these responses.

   c. Please identify where in Case No. 2018-00358 and in Case No. 2020-00017 that the process for identifying projects to be included in the model has been detailed. The responses refer to the explanation of the main replacement criteria and how projects are identified by the model, but it does not appear to detail how Kentucky American identifies the projects initially.

Response:

a. The prioritization model is updated annually. As first described in Brent O'Neill's Direct Testimony, Exhibit 2, pages 12-13, in Case No. 2018-00358, the prioritization model consists of an electronic database which is used to assess and prioritize main replacement projects. The inputs to the model consist of eight criteria which are each ranked on a scale of 1 to 5 and individually weighted between 5 and 15 points out of a possible 100.

   Please see attachment KAW_R_PSCDR2_NUM003_050321_Attachment A which illustrates the ranking matrix for these eight criteria. These inputs are dynamic and are therefore updated each year to create the most accurate snapshot of system conditions. Each year, the criteria for low pressure, number of main break/leaks, fire flow, age, water quality and customer impact need to be checked and/or updated as conditions can change resulting in a possible adjustment to the replacement priority of a given water main. Project areas are chosen by using the prioritization model along with external drivers such as paving schedules, Customer impact and other construction considerations. Combining the prioritization model results with external drivers allows KAW to create a reactive replacement program which allows for the efficient use of available resources.

b. The prioritization model was first described in Brent O'Neill's Direct Testimony, Exhibit 2, pages 12-13, in Case No. 2018-00358. On pages 23-35 of Exhibit 2, projected cast iron projects for the first five years of QIP are illustrated on maps by street block. This Exhibit is attached as KAW_PSCDR2_NUM003_050321 Attachment B.

In QIP Year 1 or Case No. 2020-00027, the overlap between the seven approved budget line B projects and the projects shown in Exhibit 2 to Mr. O'Neill's testimony was discussed in KAW_PSCHDR2_NUM002_052820 and KAW_PSCHDR2_NUM003_052820. The same ranking criteria was utilized in Case No 2018-00358 and 2020-00027. However, in Case No 2020-00027, projects were prudently arranged into larger area projects to minimize Customer impact and disruption and account for the external drivers described in part a above. Part b of KAW_PSCHDR2_NUM003_052820 illustrates the correlation between the projects proposed in Mr. O'Neill's Exhibit 2 and budget line B projects described in QIP Year 1. There is generally overlap between the mains identified for replacement QIP Year 1 and the mains developed for the projected initial five-year QIP period in Case No. 2018-00358. All of the mains currently being replaced in QIP Year 1 fell within the total weighted score of the mains developed for the projected initial five-year QIP period in Case No. 2018-00358 with the majority falling within the top half of the list. Please see KAW_PSCDR2_NUM003_Attachment C for copies of these data requests along with the QIP Year 1 project maps.

In the current proceeding, KAW addressed the comparison and prioritization of the projects described in Brent O'Neill's Exhibit 2 and the ones proposed under budget line B for QIP Year 2 in response to PSC 1-10 and PSC 1-12. It should be noted that the same criteria were used in Case Nos. 2018-00358, 2020-00027 and 2021-00090 to create the prioritization model. As mentioned in part a, the model is dynamic and is updated annually based on the criteria. Projects are chosen based on the rankings from the model along with external drivers.

c. Part b of this response addresses documents related to Case Nos. 2018-00358 and 2020-00027 which identify the criteria used to create the model and how projects are chosen. The pipe segments added to the model consist of <u>all</u> of the cast iron mains in the KAW system. These segments are then ranked and then projects are created by combining segments into larger area projects while also considering external drivers such as paving, Customer impact and other construction considerations. Please also see part a.

MAIN REPLACEMENT CRITERIA						
Criteria (Max. Points)	***Weight***	***Rating***				
		1	***2***	***3***	***4***	***5***
Low Pressure (75)	15x	50 psi or greater	50 psi to 45 psi	45 psi to 40 psi	40 psi to 35 psi	< 35 psi
Number of Breaks/Leaks (75)	15x	0 breaks/5-year avg.	1-2 breaks/5-year avg.	3-4 breaks/5-year avg.	5-6 breaks/5-year avg.	< 6 breaks/5-year avg.
Fire Flow (50)	10x	Greater than 1,500 gpm (Blue)	1,500 to 1,000 gpm (Green)	999 gpm to 500 gpm (Yellow)	Less than 500 gpm (Red)	Known problems
Age (75)	15x	1995 or later	1980 to 1994	1970 to 1979	1960 to 1969	1959 and prior
Material Type (75)	15x	DI/RCP	PVC/HDPE	Transite/AC	CI/CLCI	Gal. / Steel
Size of Main (50)	10x	8 inch and above	6 inch	4 inch	2 inch to 3 inch	Main smaller than 2 inch
Water Quality (75)	15x	Flushing but not routine	Monthly Flushing	Bi weekly Flushing	Weekly (or more frequent) Flushing	Continuous Flushing (w/ discussion)
Customer Impact (25)	5x	less than 2 customers	2 to 10 customers	11 to 20 customers	greater than 20 customers	School/Hospital (Critical Customer)

Replacement Program Report 2018

2018

Kentucky-American Water Company

Contents

Introduction

Kentucky-American Water Company's infrastructure provides a critical service in providing clean and safe water that is essential to our customers and the survival of the communities that we serve. Similar to other water utilities, the infrastructure of treatment plants, pipes, storage tanks and pumps are starting to age past their useful life. Kentucky-American Water has embarked on a plan to prioritize and undertake drinking water infrastructure renewal investments to ensure that our water utilities can continue to reliably and cost-effectively support the public health, safety, and economic vitality of our communities. If we do not effectively plan the investment in our infrastructure, we will incur the haphazard and growing costs of living with aging and failing drinking water infrastructure and place in jeopardy all of the work that past generations have undertaken in building our system and communities.

The water distribution system of Kentucky-American Water is beginning to reach the end of its expected life. Even though the company has made investments in the replacement of the aging infrastructure, existing infrastructure continues to reach the end of its useful life at a quicker pace than the work to replace the outdated mains and supporting facilities occurs.

One of the major challenges that water utilities face is that their distribution systems were installed to support community growth that varied over time. The mains installed during the high growth periods reach their life expectancy at the same time, resulting in sections of communities that need all of the mains replaced in a short time period.

In addition, during the periods of system expansions, different pipe materials were used as they were introduced as an alternative to the existing main materials. With each pipe material, the life expectancy of the main is different. Unfortunately, that results in periods when pipes of different materials that were installed at different times in the past reach the end of their useful lives at the same time, increasing the number of mains that need to be replaced throughout the system in a compressed timeframe.

Although Kentucky-American has made investments in the replacement of mains over the past decades, the amount of main replaced cannot keep up with the expected amount of main requiring replacement that will occur in the coming decades.

Along with aging infrastructure, Kentucky-American Water is facing the impact of climate variability and its effects on the resiliency of the system. Updating infrastructure to keep up with the increase in extreme weather and ensure that adequate service can be maintained for extended time periods after an extreme event is just as important as addressing the aging infrastructure.

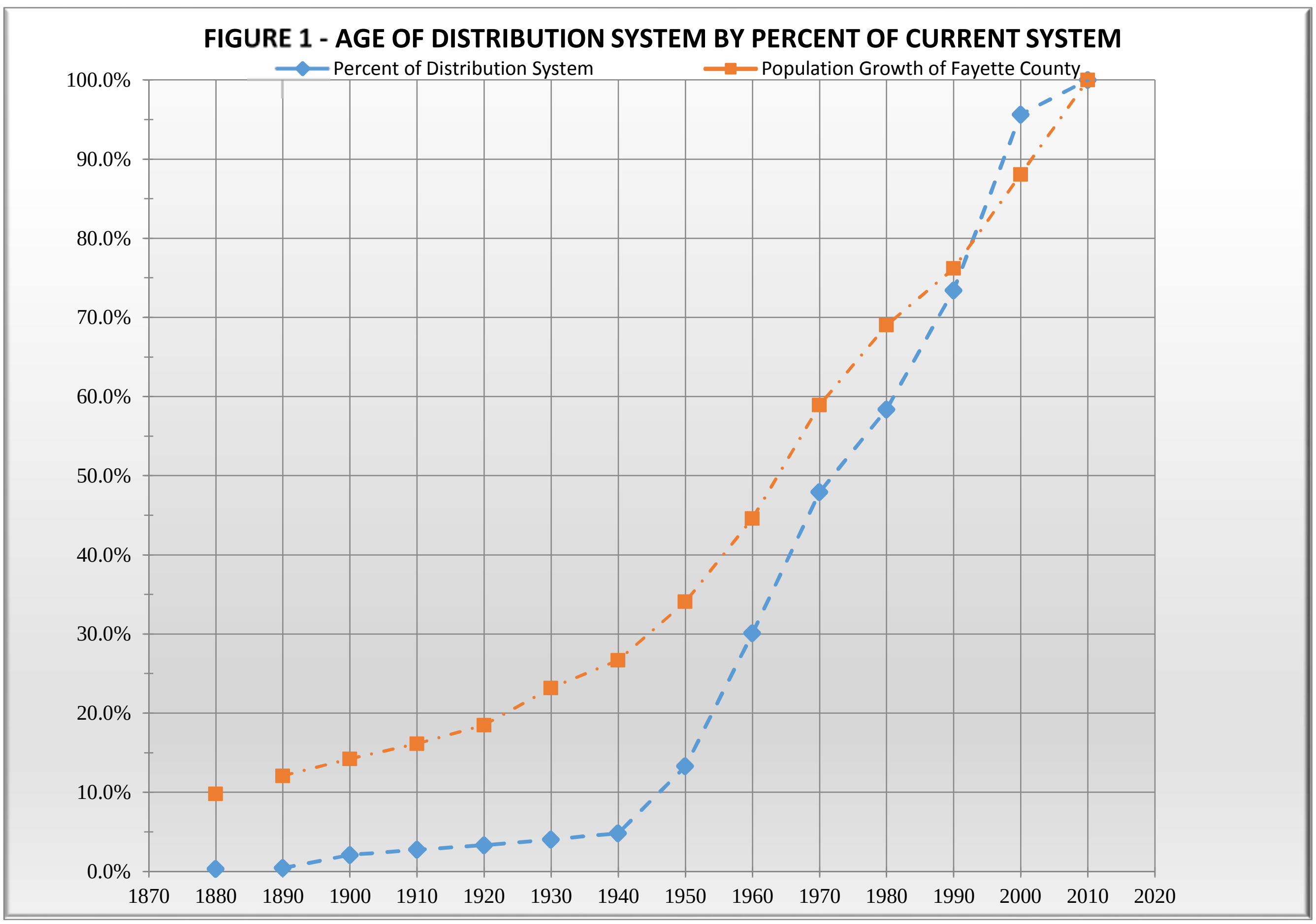
System Background

Kentucky-American Water first began operation as the Lexington Hydraulic and Manufacturing Company providing water to Lexington in 1885. The company was started by three local businessmen who saw a need for a water system to help fight fires and prevent disease. During the early 1970s the name changed from the Lexington Water Company to the current Kentucky-American Water Company.

Since 1885 the system has grown from serving approximately 200 customers to about 130,000 customers within 14 counties, including Fayette County. With that growth the distribution system has expanded to include approximately 2,038 miles of water mains various sizes and material types.

History of the Growth of the Distribution System

Kentucky-American's water distribution system growth mirrors the growth of the City of Lexington and Fayette County. Figure 1 shows the percent of the water distribution system that was installed within each of the decades from 1880 to present.



From the start of the system in 1885 through the 1940s, the area had predominately an agricultural economy and growth was steady. Main installed during that period was cast iron. Today, approximately 63 miles of the cast iron main that was installed during this period remains, representing approximately 3% of the current distribution system. This amount used to be greater; however, during the 1980s, 1990s and 2010s the Company undertook a concerted effort to replace this era of cast iron main.

Following World War II, Lexington experienced an increased growth rate due to the move away from agriculture and the baby boom. During the 1950s and 1960s, the distribution system also grew substantially to keep up with this expansion. Main installed during that period was cast iron, both cement lined and unlined. During this period, asbestos cement pipe was introduced for the first time into the distribution system. The main installed during this period represents 25% of the current distribution system (514 miles of main).

The Lexington system underwent its greatest growth from the 1970s through the housing boom of the first part of 2000. During this period, Lexington grew due to industry and service companies locating and growing in Fayette County. At the same time, Kentucky-American acquired several outlying systems by growing into the counties surrounding Fayette County. Also during this period, the main extension from Kentucky River Station Two to the Lexington distribution system was placed into service. During this period of time approximately 1,290 miles of main was installed, which represents 63% of the current distribution system. Asbestos Cement pipe was the predominate material installed during the first part of this period, with Ductile Iron pipe and PVC becoming the predominant materials during the 1980's.

From 2010 to present, the distribution system has seen a much slower growth rate, with additions representing little more than 3% (80 miles) of the current distribution system. Currently, the predominant materials installed are Ductile Iron with some PVC pipe.

Pipe Materials in Distribution System

The Kentucky-American distribution system contains mostly five major material types. Those types are Ductile Iron, PVC, Asbestos Cement, Cast Iron Lined and Cast Iron Unlined. The period that the system was growing determines the areas and the amount of each material type in the system. Table 2 provides a listing of the major material types in the distribution system along with the amount of each material in miles and percentage of that material within the system:

Table 2 – Distribution System Material Types		
	Miles of Material	Percentage of System
Ductile Iron	897.8	44.1
PVC	441.1	21.6
Asbestos Cement	338.2	16.6
Cast Iron Unlined	176.8	8.7
Cast Iron Lined	133.5	6.6
Prestressed Concrete	34.8	1.7
Galvanized	3.2	0.2
Other (Brass, Lead, Steel)	2.4	0.1
Unknown	10.0	0.5

Distribution of Pipe Material by Decade

When the material type is compared to the timeline of growth of the distribution system, certain periods were dominated by particular pipe materials. During the first part of the system development, from 1885 to 1950, Cast Iron Unlined and Lined were the predominant materials. During 1950 to 1980, Asbestos Cement pipe was used along with Cast Iron pipe, and Ductile Iron pipe was introduced into the system. After 1980, Ductile Iron pipe was the predominant material type used to meet system growth. PVC pipe use in new water main was not prevalent in the distribution system except for small diameter pipe. During the 1980s, 1990s and 2000s with the acquisition of systems, PVC was introduced into the Kentucky-American distribution system that included PVC that was installed during the 1960's and 1970's. Table 3 provides a breakdown by decade of the material types used in the expansion of the distribution system.

Table 3 – Miles of Existing Material Types Installed by Decade							
Decade	Material Types						
	Cast Iron Unlined	Cast Iron Lined	Asbestos Cement	PVC	Ductile Iron	Galvanized[2]	Other[1]
1881 - 1890	6.8						
1891 - 1900	1.9						
1901 - 1910	16.0	0.2					
1911 - 1920	11.9	0.7					
1921 - 1930	8.9	2.1					
1931 - 1940	7.7	6.4	0.1				
1941 - 1950	2.8	5.2	14.1				
1951 - 1960	21.4	51.6	76.6	4.7	0.5	1.7	9.2
1961 - 1970	50.9	64.1	102.2	64.7	51.9	1.4	13.9
1971 - 1980	48.2	3.3	130.6	140.1	40.3	0.1	24.1
1981 - 1990			14.6	37.6	171.7		
1991 - 2000				28.7	292.3	0.1	
2001 - 2010				149.4	274.7		
2011 -				15.9	66.5		

1 – Other represents Lead Pipe, Reinforced Concrete Pipe and PEP Pipe
2- In most cases the Galvanized Pipe indicated on this table occurred during acquisitions during these periods

Expected Life of Pipe Material

Based on information developed by the American Water Works Association for the "Buried No Longer" report released in February 2012, Table 4 provides an estimated expected service life for pipes of varying material. The expected life was determined based on operating experiences of water utilities and insight from research and professional experiences with typical pipe conditions, according to pipe material, at different ages and sizes.

Table 4 – Average Expected Life of Pipe Material

Material Types						
Cast Iron Unlined	Cast Iron Lined	Asbestos Cement	PVC	Ductile Iron	Galvanized	Concrete
110 yrs	100 yrs	90 yrs	55 yrs	80 yrs	70 yrs	105 yrs

This table is a simplification, since, in Kentucky-American's experience, pipe life depends on many variables, such as soil conditions, installation practices and climate conditions, in addition to the age of the pipe itself. The company has had many pipes last longer than the typical service life indicated, but it also has had other pipes fail sooner than expected. For the purpose of this report, in view of the lack of specific data that allows the company to develop an understanding of each condition that affects each pipe segment in the system, the average life expectancy provides a reasonable approximation of the replacement rate.

Using the average expected life for Kentucky-American's distribution system indicates that the pipe that has been installed over the past 130 years will need to be replaced over the next 85 years to ensure that the system is maintained within the expected life of the system's pipe material.

Importance of Replacing Mains

Access to clean, reliable water is critical for the communities served and has become an intrinsic responsibility of those who manage the water infrastructure throughout the world. Safe drinking water is important to the health and economic welfare of a community. The ability to obtain clean water, free of contaminants, reduces sickness and related health costs. In addition, the ability to access a sufficient supply creates economic opportunities throughout the community.

As portions of the water distribution system begins to reach the end of its useful life, failures in the infrastructure begins to occur that impact the ability to provide safe and reliable service to the community. Neglecting this aging infrastructure will increase the frequency of water main breaks and leaks, corroding surrounding utility pipes, disrupting automobile, pedestrian and public transportation and stymieing local economic activity.

Although most of these breaks are minor, serious ruptures can and do occur. With these serious breaks the impact can be catastrophic due to flooding of streets and sidewalks, and in some instances flooding of local businesses and residences. In rare instances, the leaking water can undermine pavement or building foundations, which can result in significant property damage and the risk of serious injuries.

We have seen numerous examples of serious failures over the past few years that have affected major metropolitan areas. On June 18, 2015 Louisville Water Company experienced a break on a 60-inch water main that impacted 33,000 customers and caused the road to buckle, breaking apart huge pieces of pavement that floated and damaged vehicles in the area. The break also caused damage in adjacent parking lots and disrupted the local residents' activities.

This break followed a 48-inch water main break during April 24, 2014 near the intersection of Eastern Parkway and Baxter Avenue, which caused the intersection to be closed for at least 6 days. The break sent water cascading down Baxter Avenue, flooding Tyler Parks and nearby yards. In addition, the break flooded athletic fields on the University of Louisville campus and caused concern for athletic camp participants that were on the fields at the time of the break.

Nationally, one of the most significant breaks of 2015 was a water main break near the University of California in Los Angeles on July 29 that caused massive street flooding and damage on the campus. The break caused the loss of more than 20 million gallons during the three and one half hours required to turn off the main. The water flooded into the university campus and entered numerous buildings and structures, causing significant damage. Firefighters saved up to five people who were stuck in underground parking structures. The water trapped more than 730 cars, with half of the vehicles being entirely submerged.

Kentucky-American Water has not experienced dramatic main breaks like these over the past few years, but it has had several main breaks that have not only caused impact to the adjacent area that is surrounding the break but have also caused traffic disruptions and inconveniences due to repair activities. Some of these breaks have resulted in business disruptions and economic impact to the community.

The American Society of Civil Engineers study, "Failure to Act Closing the Infrastructure Investment Gap," released in 2016, considered the economic impact of under-investing in our water and wastewater infrastructure. It estimated that remaining on the current track will cost American businesses and households $105 billion in increased costs to assist in filling the funding gap between 2016 and 2025, and the cumulative loss to our gross domestic product (GDP) will be $896 billion, all directly due to deteriorating water infrastructure. Without additional investment in the infrastructure, almost 489,000 jobs will be threatened due to unreliable water delivery and wastewater treatment services over the same period.

The impact of a water main break is mostly a localized impact, with the exception of large main breaks that impact a large portion of the community or cause the loss of the service to the entire community. In contrast, the loss of water through leaking pipe as the infrastructure ages affects the entire community, most of the time with no one knowing it is occurring. This loss of water typically manifests itself in an increase in "non-revenue water." A high level of non-revenue water affects the financial viability of water utilities through lost revenues and increased operational costs. Although Kentucky-American Water's non-revenue water is at or below the industry standard, there is concern that over time its ability to manage non-revenue water will deteriorate without a systematic approach to replacing aging infrastructure.

In addition to reducing pipe failure and loss of water, investing in the replacement of the infrastructure enhances the system's ability to meet the service expectations of the customers. The ability to replace this aging infrastructure allows the company to provide improved service to the customer and usually improves fire protection. In addition, the areas of the system that are replaced are made more robust and are more resilient during periods of high demands, reducing the number of service disruptions.

The investment in infrastructure replacement allows for a more robust system, which enhances the ability of the community to compete for new business and industries. This is an important economic benefit to the community. According to the U.S. Conference of Mayors, every dollar invested in water infrastructure adds $6.35 to the national economy.

Previous Review of Network

During 2009, Kentucky-American Water commissioned Gannett Fleming to conduct an Analysis of Non-Revenue Water for the system as ordered by the Commission as part of Case No. 2007-00134. A part of that analysis was a determination if there was a correlation or trend in the occurrence of main breaks and leaks in the Central Division. The analysis was conducted on 1,927 main breaks reported from January 2000 to October 2008.

Review of the main break data indicated that a majority of breaks (82%) in the system during this period were reportedly caused by Ground Shift/Other. Age and Deterioration was reported to be the cause of approximately 10% of the breaks. Pressure Surge, Tree Roots, and Clamp Failure were reported to be collectively the cause of the remaining 8% of the breaks during the period of January 2000 to October 2008.

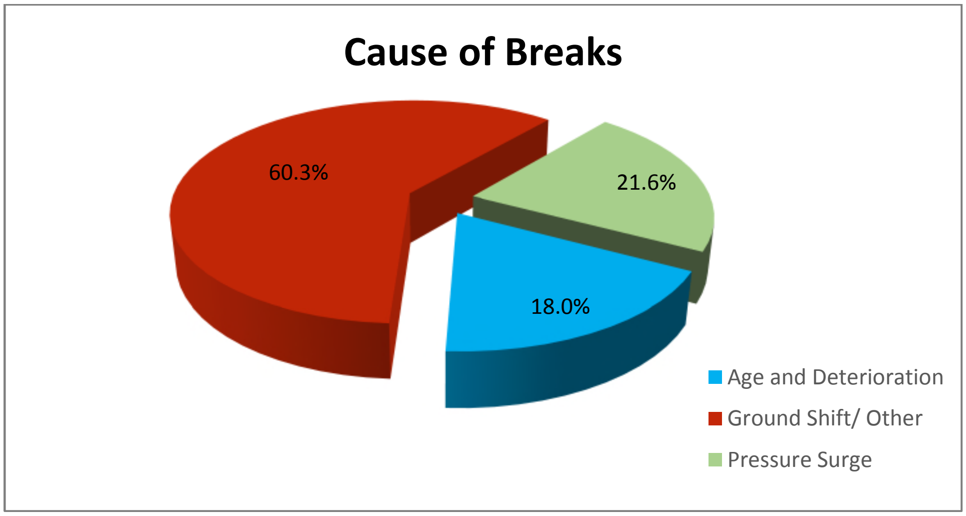
The main breaks that were reportedly caused by Age and Deterioration or Ground Shift/Other occurred on unlined cast iron main 53% of the time and, in particular, a significantly high percentage of reported breaks associated with Age and Deterioration -- 37% -- occurred on unlined cast iron mains. The analysis indicated that the highest percentage of breaks caused by Ground Shift/Other occurred on unlined cast iron main and asbestos cement main (34% and 26%, respectively).

The analysis by Gannett Fleming found that replacing specific main sizes or types of material that exhibit a high concentration of breaks would not have a substantial impact on reducing non-revenue water. Gannett Fleming concluded that other factors should be considered with regard to replacement of problematic main rather than trying to control non-revenue water. However, the study provided useful information regarding the types of main most susceptible to breaks.

During the review of the main break history, Gannett Fleming found that the highest concentration of reported main breaks occurred on unlined cast iron. The concentration of reported main breaks on galvanized steel main was also significantly higher than the system average of 0.9 breaks per mile of main. Gannett Fleming suggested that a main replacement program targeting unlined cast iron main and galvanized steel main, specifically those less than 4 inches in diameter, should be considered to reduce the occurrence of main breaks.

Current Review of Network

Review of the main break history from January 2012 to December 2017 indicated that there have been 953 breaks during this period, averaging about 159 per year. Similar to the finding of the 2009 Gannett Fleming report, the current break history indicates that 60% of the main breaks are caused by ground shift. This percentage decreased from 82%, while the age and deterioration breaks increased to 18% compared to 10% during the past review. Although the increase, it is an indication that the distribution system is aging, and we would expect to see an increase in these types of breaks as the age of the mains increase.



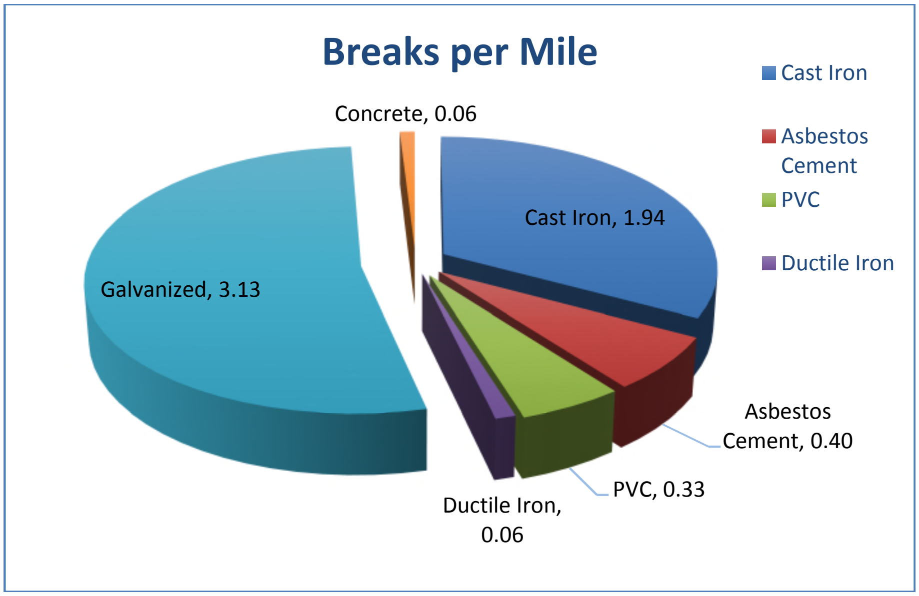
The average number of breaks per year has decreased from 222 per year for the period of January 2000 to October 2008 to 159 per year for January 2012 to December 2017. This reduction is indicative of the main replacement work conducted following 2008 that specifically targeted mains with numerous break incidents.

Review of the reported breaks from January 2012 to December 2017 indicated that main breaks on cast iron main represented 63.2% of all of the breaks. Since cast iron main lined and unlined material only represents 15.3% of the total inventory of mains in the ground, the break rate on this type of material is significantly higher than the other material in the system.

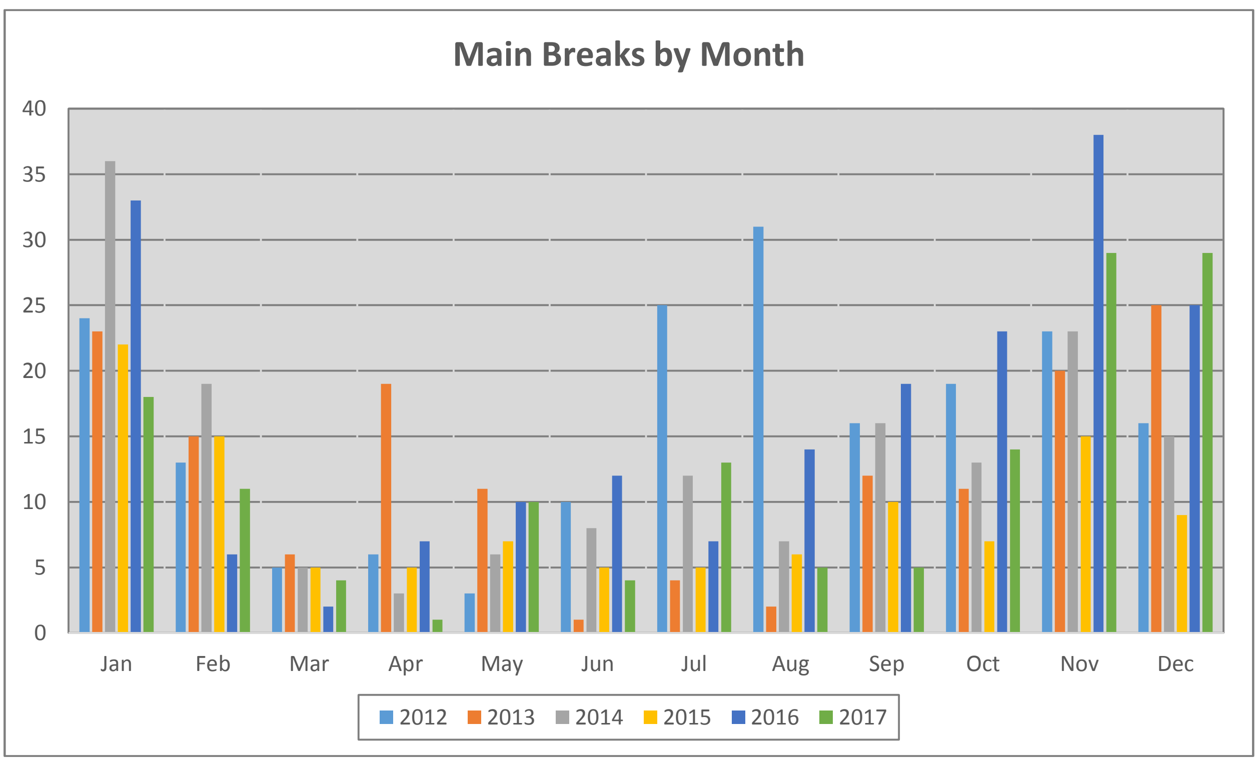
Table 5 – Breaks by Material

Material Types					
Cast Iron	Asbestos Cement	PVC	Ductile Iron	Galvanized	Concrete
63.2%	14.3%	15.2%	6.1%	1.0%	0.5%

The break rate per mile of main shows that cast iron main had a break rate of 1.9 breaks per mile of main compared to ductile iron which saw a break rate of 0.06 breaks per mile of main from January 2012 to December 2017. The worst performing material was galvanized steel which had a break rate of 3.13 breaks per mile of main.



Another area reviewed in the main break data from January 2012 to December 2017 indicated that 52.7% of the breaks occur between November to February of each year with the lowest break period being during May and June. Analysis of the break reports would support that ground shift breaks cause the most failure of the pipe material and we would expect to see the ground shifts occur during the November to February time frame. It should be noted that the high break occurrence that is observed in July and August of 2012 is believed to be caused by ground shift breaks that occurred following high rain events during each of those months.



With ground shift breaks being 64% of the overall breaks that occurred during January 2012 to August 2015, this would correlate with pipe materials that are susceptible to ground movement or shifting being at greater risk than other materials. Cast iron and galvanized steel are not as resilient to the tension and bending forces that result from ground shifting, and this contributes to the higher break per mile numbers that the system has experienced.

Cast iron and galvanized steel are good at controlling internal forces and crushing forces that were generally used during the design stage when this material was placed into service. The industry gained the knowledge that cast iron and galvanized steel were susceptible to bending forces and encouraged the introduction of other materials. Materials such as ductile iron and PVC handle these types of forces and as such are more resilient to this type of ground movement. This resulted in the water utility industry moving away from cast iron and galvanized steel and standardizing on ductile iron and PVC.

Current Replacement Effort

Following the Gannett Fleming report in 2009, the replacement effort was predominantly driven by mains that exhibit high break frequency, relocations and requests by operations to replace mains to address multiple repair trips to the same main. During the period of 2009 to 2013 the average spend on main replacement projects was $2.6 million per year. The main replacement projects replaced all types of material that were experiencing high break frequencies, but the majority of the type of main replaced during this period was cast iron main. With this effort the amount of cast iron main replaced in the system was 10.7 miles with an average of 2.1 miles a year.

In 2014 there was a renewed effort to review the distribution infrastructure and start to address the aging infrastructure needs of the system. During 2014 and through 2017 the average spend on main replacement projects was $4.3 million per year. Based on this current effort the amount of cast iron main replaced in the system from January 2014 through December 2017 was 21.7 miles with an average of 5.4 miles per year.

Since 2009 the main replacement work has replaced 32.4 miles of cast iron main from the system and replaced it primarily with ductile iron main. This represents a replacement rate for cast iron main of 2.7 miles per year during the 9 year period including the accelerated rate of 5.4 miles per year over the past 4 years from 2014 and 2017. While this is making significant progress, it is still not enough to address the rapidly aging distribution system. At the current rate it would take approximately 57.4 years to replace the remaining 310 miles of the cast iron main in the distribution system. At the end of the 57 year period the possible age of a cast iron main could be nearly 200 years old or over twice the life expectancy for this type of material.

Main Replacement Criteria Development

With the renewed effort to review the distribution system in 2014, Kentucky-American Water analyzed the methodology for planning main replacement to ensure that the distribution system could meet the needs of its customers and strategize ways to reduce the failure rate of mains. The previous method of determining main replacement was based on break history and requests from the operations group on which mains to replace, and this was determined to be too limited in identifying the most critical mains to replace.

With the understanding that continued enhancement of the Kentucky-American Water system would require a systematic replacement plan to ensure that the right mains were being replaced at the right time, the company established a goal in 2013 to research and develop tools to assist in developing the plan.

The first step was to develop the criteria that would be used to assess the existing mains and develop a list of mains that were in critical need of being replaced. It was determined that a main replacement assessment standard would require adoption of several criteria to determine which mains would need to be replaced. Development of the assessment standard considered the inclusion of eight criteria that played a major role in providing reliable service and were a good indicator of the condition of the main. These criteria are included in Table 6.

During development of the criteria it was determined that several of the criteria had interrelationships with each other and contributed to the performance of a section of water main. One of the interrelationships was main size and fire flow. In addition, it was determined that leaks can also be related to the age and material of the mains, and material types can be related to the water quality aspect of the main.

Due to the interrelationships of the eight criteria, the team established relative weights for each criterion to ensure that the targeted drivers for the main are given greater consideration. Age, material type, low pressure, number of breaks and water quality were the primary criteria that would be used to determine main replacement. These criteria allowed the main replacement program to ensure that mains that were not meeting the needs of the community and customers were addressed quickly.

Along with the criteria weighting, the assessment contains a rating standard for each of the eight criteria. A numeric rating of between 1 and 5 was used for each criterion – with 1 being the better rating and 5 being the worst rating.

TABLE 6 - MAIN REPLACEMENT CRITERIA						
Criteria (Max. Points)	***Weight***	***Rating***				
		1	***2***	***3***	***4***	***5***
Low Pressure (75)	15x	50 psi or greater	50 psi to 45 psi	45 psi to 40 psi	40 psi to 35 psi	< 35 psi
Number of Breaks/Leaks (75)	15x	0 breaks/5-year avg.	1-2 breaks/5-year avg.	3-4 breaks/5-year avg.	5-6 breaks/5-year avg.	< 6 breaks/5-year avg.
Fire Flow (50)	10x	Greater than 1,500 gpm (Blue)	1,500 to 1,000 gpm (Green)	999 gpm to 500 gpm (Yellow)	Less than 500 gpm (Red)	Known problems
Age (75)	15x	1995 or later	1980 to 1994	1970 to 1979	1960 to 1969	1959 and prior
Material Type (75)	15x	DI/RCP	PVC/HDPE	Transite/AC	CI/CLCI	Gal. / Steel
Size of Main (50)	10x	8 inch and above	6 inch	4 inch	2 inch to 3 inch	Main smaller than 2 inch
Water Quality (75)	15x	Flushing but not routine	Monthly Flushing	Bi weekly Flushing	Weekly (or more frequent) Flushing	Continuous Flushing (w/ discussion)
Customer Impact (25)	5x	less than 2 customers	2 to 10 customers	11 to 20 customers	greater than 20 customers	School/Hospital (Critical Customer)

An electronic database was developed to assist in the assessment and prioritization of the replacement mains and subsequent development of replacement schedules. The database is designed to perform the necessary queries and calculations to determine the main section overall rating and ranking. Initially 62 mains were entered into the database as a pilot to ensure that the assessment tool was capturing the critical needs of the system and identified the more critical sections to replace.

During most of 2013 through 2016 this initial list has provided a schedule for which mains are in need of replacement and provided a schedule that has been used to guide the main replacement program.

As with any tool, there are still external drivers that influence the main replacement program. These external items such as roadway paving schedules, weather or construction considerations are combined with the results of the assessment tool to make adjustments in the replacement program. This combination of tools and subjective considerations allows for a more reactive replacement program that is in concert with the community and allows for efficient use of available resources.

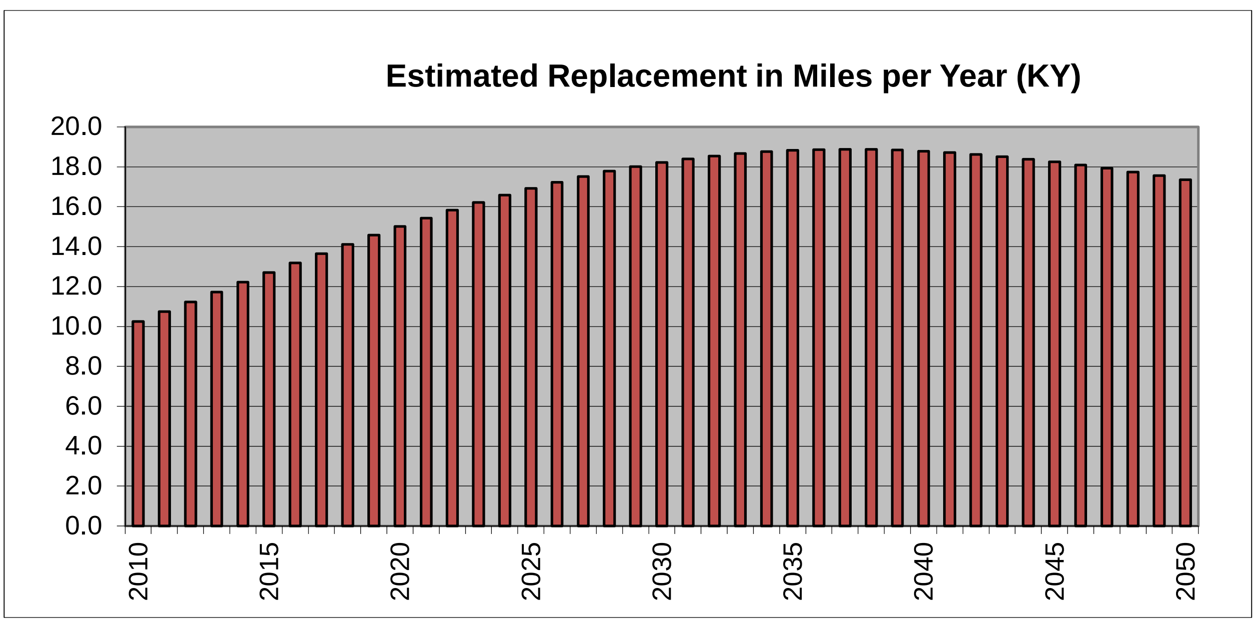
Nessie Model

While the assessment tool provides a numerical approach of determining the critical mains to replace, the company needed to determine the overall scope and financial impact over a longer planning horizon. The company looked for tools that could provide assistance in determining the capital needs for water main replacement in the coming years that considered the life expectancy of the infrastructure.

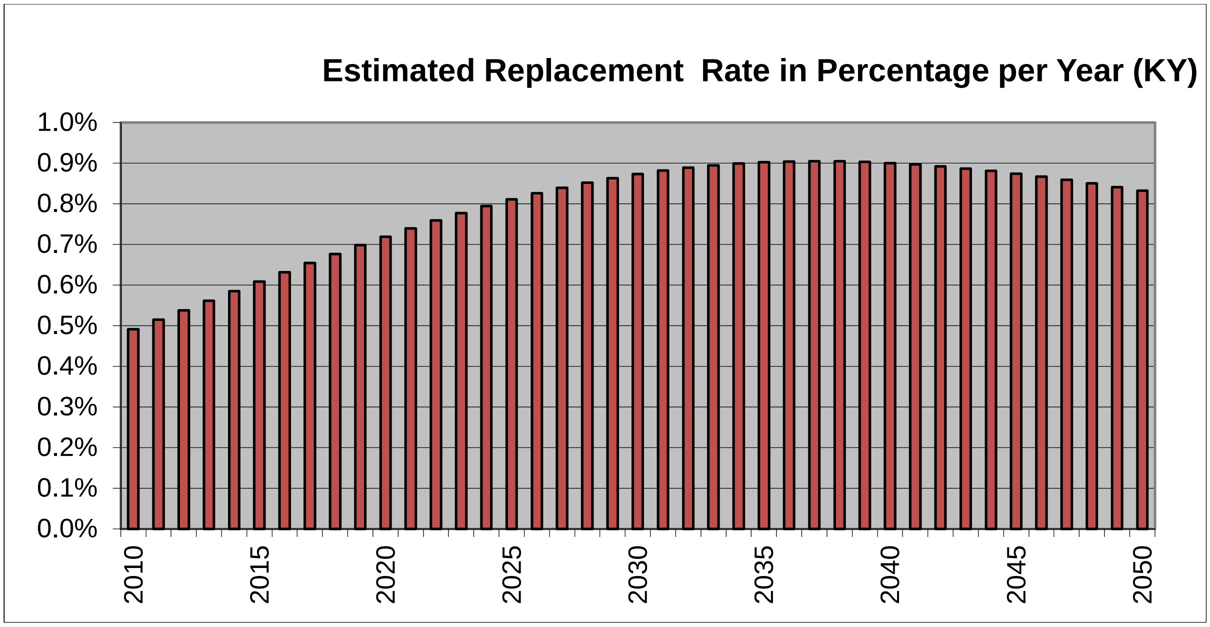
The American Water Works Association report “Dawn of the Replacement Era” developed a process that created a “Nessie Curve” for the 20 systems it reviewed in the report. The Nessie Curve, so called because the graph follows an outline this is likened to a silhouette of the Loch Ness Monster, provided a visual representation of the capital needs during a defined time frame to rebuild the underground infrastructure of the 20 systems. With the report “Buried No Longer,” AWWA further developed the analysis of the underground infrastructure and developed the “Nessie Model.”

The model uses pipe failure probability distributions based on past research with typical pipe conditions at different ages and sizes coupled with the indicative costs to replace each size and type of pipe, as well as the cost to repair the projected number of pipe breaks over time. The model projects the “typical” useful service life of the infrastructure based on pipe inventories of the system and estimates how much pipe of each type should be replaced in each of the coming 40 years.

Kentucky-American Water utilized the model to provide an insight into the replacement rate suggested during the 40 year planning horizon. The chart below provides the estimated replacement in miles of main per year that peaks to 19 miles per year by 2034.

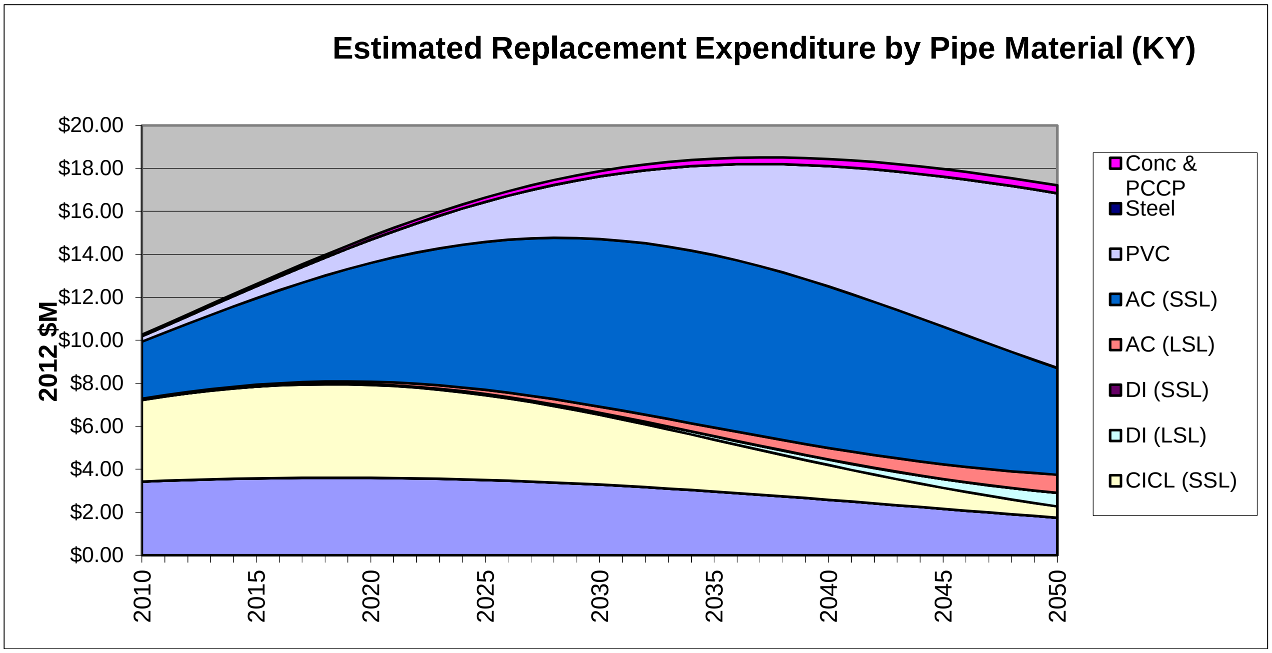


The analysis of the distribution system with the estimated replacement rate of 10 to 19 miles of main per year translates into a replacement rate of 0.49 to 0.90 as percent of the system per year. This estimated replacement rate in percentage of the distribution system per year from 2010 to 2050 is indicate on the chart below.



The model then combines the amount of infrastructure that should be replaced with the typical cost to replace the mains to create an estimate of the total investment cost for the 40 year planning horizon. The model represents this data through a series of Nessie Curves to depict the suggested amount of spending required to replace the main at the optimal life cycle for each material type.

The Nessie Model provides an insight on the amount of capital that is suggested to ensure that the distribution system is being replaced to account for the useful life of the distribution mains. The chart below provides the Nessie Curve developed by the model over a 40 year time frame of the estimated capital needed to replace the appropriate pipe material in the system based on the materials useful life.



The model identifies that cast iron main is the material that needs to be replaced initially followed by asbestos cement. During the 40 year period the model projects that during the first 20 years approximately $6 to $8 million each year is needed for cast iron main replacement declining to $3 million during the final 20 years. At the same time the model suggests that asbestos cement main be replaced at a rate of $3 to $7 million each year during the 40 year period. In the outer years of the planning horizon, replacement of PVC main and ductile main begin to be shown as a need in order to address the life expectancy of those material types.

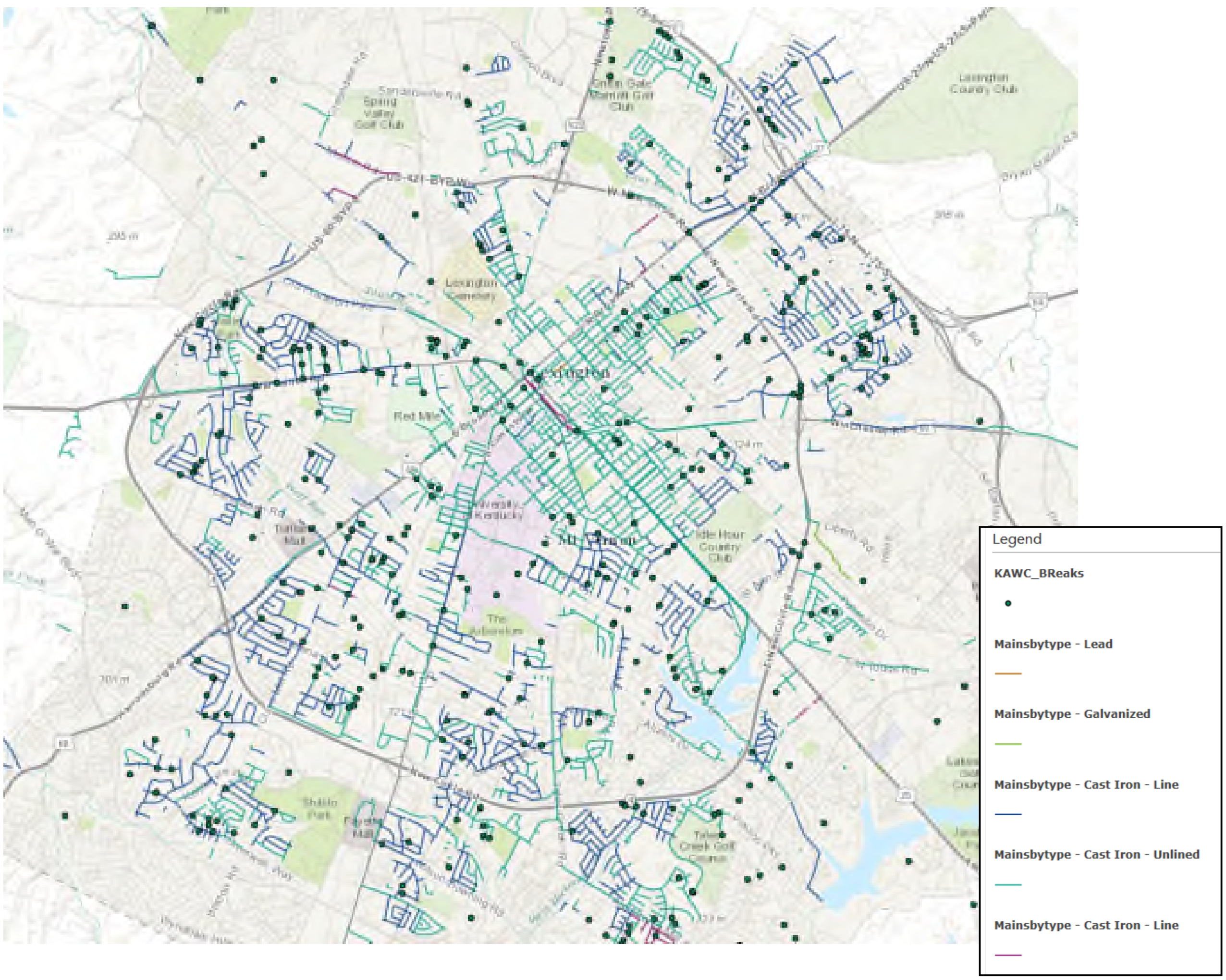
The curve reflects an “echo” of the original trends that shaped the development of the system starting in 1885. The identified capital needs is a reflection of the main installed nearly a century ago that have created a future obligation to replace the mains as they reach their useful life that is now coming due.

Proposed Accelerated Replacement Plan

Kentucky-American recognizes that the past rate of replacement of aging mains the company has employed is not sufficient to address the increased replacement rate that will be required over the coming decades. The need to begin to rebuild the distribution infrastructure that was bequeathed to us by earlier generations is essential to maintain the needs of the community and customers.

Upon review of the distribution system and the material types used in the development of the system, Kentucky-American believes that the first materials that need to be replaced in the system are cast iron main and galvanized steel. These two materials represent approximately 16.1% of the distribution system but account for approximately 61.4% of all main breaks in a given year.

The company utilized its Graphical Information System (GIS) to query the main breaks during the period of January 2012 to August 2015 against the main types in the system and found that empirical data from the database is depicted graphically. The following map shows the main breaks during the 2012 to 2015 period against cast iron and galvanized steel main.



The map identifies two items rather definitively. The first is that a majority of the cast iron main was installed during the first half of the development of Lexington. The map clearly shows that a majority of downtown Lexington remains cast iron and to the most extent unlined cast iron. In addition, with the development of the community away from downtown, the map shows those subdivisions during this period that cast iron was used as the predominate material to serve these areas. It is interesting to note that a majority of the development during the time was within the inner circle, with only small pockets of development along the outside of the circle.

The second item that the map shows is the correlation of the main breaks within the areas that are predominately cast iron and galvanized steel. The remaining main breaks shown on the map are scattered throughout the system and have no indication that there are significant trouble spots from the other distribution system material types at this time.

Based on the information reviewed by the company over the past few years and the data developed for this report, a majority of the mains that are susceptible to breaks are cast iron and galvanized steel. Kentucky-American believes that the best course at this time is to target this type of pipe material over the next 25 years for replacement. The replacement of this type of material allows the company to address underperforming mains and reduce the impact of main breaks in the areas served by this type of material. A review of several replacement periods was reviewed and illustrated in Table 7, indicating that with a 15 year plan would cost $20.2 to $12.6 million annually and a 30 year period would cost $9.6 to $6.3 million per year.

TABLE 7 - POSSIBLE REPLACEMENT RATES FOR CAST IRON

Period Length	15 year	20 year	25 year	30 year
Miles Replaced per year	21 - 16	16 -12	13 - 10	10 - 8
Cost per year (million)	$20.3 to $12.6	$15.5 to $9.5	$12.6 to $6.9	$9.6 to $6.3

Analysis of the four possible replacement rates lead the company to believe that a 25 year replacement period was more realistic. The 30 year replacement rate would result in a greater overlap of replacement activity between the completion of the cast iron main replacement and the start of the asbestos cement main replacement period.

With the 15 year and the 20 year replacement periods, the removal of the cast iron is quicker and allows for the effort to replace asbestos cement to begin sooner. However, the amount of capital required per year was a concern with respect to support from the community. In addition, the level of capital commitment per year for the 15 year and 20 year replacement rates could have a negative impact on Kentucky-American to address other infrastructure replacement needs such as water treatment components at the water treatment plants that are also entering the end of their useful life.

Finally, the amount of miles of replacement main per year of 16 and 12 miles for the 15 year and 20 year replacement rates is a concern for the impact on available resources to complete the construction each year. The 15 year replacement rate is a fourfold increase in the amount of main replaced during 2014 to 2016. This increase would be a significant strain on the available company and contractor resources and would require a substantial increase in labor and equipment that Kentucky-American is concerned can be sustained over the period of the replacement program.

Through a 25 year replacement period, the 310 miles of cast iron main will be replaced at a rate of 10 to 13 miles per year at an expected cost of $6.9 to $12.6 million per year. At the conclusion of the 25 year replacement period for cast iron, the company will start to focus on the replacement of the 339 miles of asbestos cement pipe, which the earliest pipe installed during 1935, and at which point will be entering its 105th year of useful life.

Infrastructure Resilience

Whatever the debate may be concerning the causes of climate variability, it is hard to dispute that utilities face the reality of climatic variability and attendant stresses on water resources and system recovery. Although climate models for the Southwestern U.S. generally predict overall annual precipitation amounts to remain similar to average historical experience, increasingly intense storms and repeated, extended dry periods are anticipated. That means we can expect more droughts of varying degrees of severity and more frequent and intense high-precipitation events and floods, along with high damaging storm events – which impacts the ability of the distribution system to provide service.

As indicated in the Black & Veatch 2016 Strategic Directions: Water Industry Report, *"water utilities have a responsibility to anticipate and manage crises before they happen. Drought in the Southwestern U.S. and flooding in the Northeastern U.S. are two sides of the same coin. Changes in climate and weather patterns are highlighting the effects of why "kicking the can down the road" approaches to addressing infrastructure and maintenance needs do not work. Natural disasters in New Orleans and Houston, or the events in Flint, should serve as wake-up calls to water providers that resilience requires long term infrastructure, resources, financial planning, utility leadership and customer engagement."*

The effects of climate variability impacts the resilience of a system to withstand an event without interruption of providing service to the customers or, if service is interrupted, to restoring the service in a timely manner. Like all large users dependent on electricity from the grid, water utilities must plan for power outages and develop plans for maintaining continuity of operations when such outages occur. Nonetheless, recent weather patterns combined with the issue of aging infrastructure are causing utilities to review traditional planning and design criteria. The design standards for supplies, treatment plants, pump stations and tanks are taken together to achieve a level of zero service outages. The so-called new normal has led experts to look beyond traditional reliability and emergency planning into a world that needs the speed of recovery and resiliency for much more widespread and damaging events. Updating infrastructure to keep up with the increase in extreme weather and insuring that adequate service can be maintained for extended time periods after an extreme event is just as important as addressing the aging infrastructure.

Improvements for Infrastructure Resilience

The Kentucky-American Water's distribution system contains 22 storage facilities throughout its system with a combined volume of 27.25 million gallons. The system also contains 17 pump stations throughout the system that work in concert with the storage facilities to maintain the system's ability to meet the needs of the community.

A majority of the storage and pumping facilities were installed during its greatest growth during the 1970s through the housing boom of the first part of 2000. Ongoing maintenance and repainting of the storage facilities has allowed Kentucky-American to sustain its facilities, ensuring that the facilities will not need to be replaced until around 2050.

The pumping facilities are reaching a life of 20 to 40 years in service and are at or exceeding the typical useful life of 30 years. It is anticipated that over the next ten years, Kentucky-American water will be replacing the existing below grade pump stations and installing above grade pump stations. Through the systematic replacement of the pump stations Kentucky-American will be able to address the aging infrastructure and address work site conditions imposed by the existing below grade installations. In addition, Kentucky-American will be reviewing and adding or supplementing the standby generation to a majority of the pump stations to ensure adequate service can be maintained for extended time periods after an extreme weather events.

Conclusion

Thanks to the work of past generations that developed and built the water distribution system to support the growth of our community, we have enjoyed the access to clean water and economic advantages that it has provided. Because these water mains last a long time we have never had to replace a significant amount of pipe on a large scale. We are on the edge of the period when these mains are reaching the end of their useful life and future generations will need to undertake large scale replacement efforts to ensure that we continue to benefit from our access to clean water.

It is important that instead of a entering this period in with a careless plan that only addresses the system as it fails, we undertake a prioritized renewal of the mains to ensure that our water infrastructure can reliably and cost-effectively support the public health, safety, and economic vitality of our community.

Kentucky-American believes that the replacement of cast iron and galvanized steel main through a 25 year replacement period and its ability to replace other infrastructure facilities to address resilience issues within the system is important to ensure the company can responsibly enter into the period of water infrastructure renewal.

Through careful prioritization of projects and looking at emerging technology, the cost of replacing facilities just prior to failure will be of significant benefit to the community. Through the reduction of the number of failures the system experiences and the ability to recover from damaging events, we can reduce the negative effects of property damage, disruption of businesses and the community, and wasting of our water resources and thereby ensure our future generations continue to benefit from access to reliable clean water that will support the economic growth of the community.

Resources

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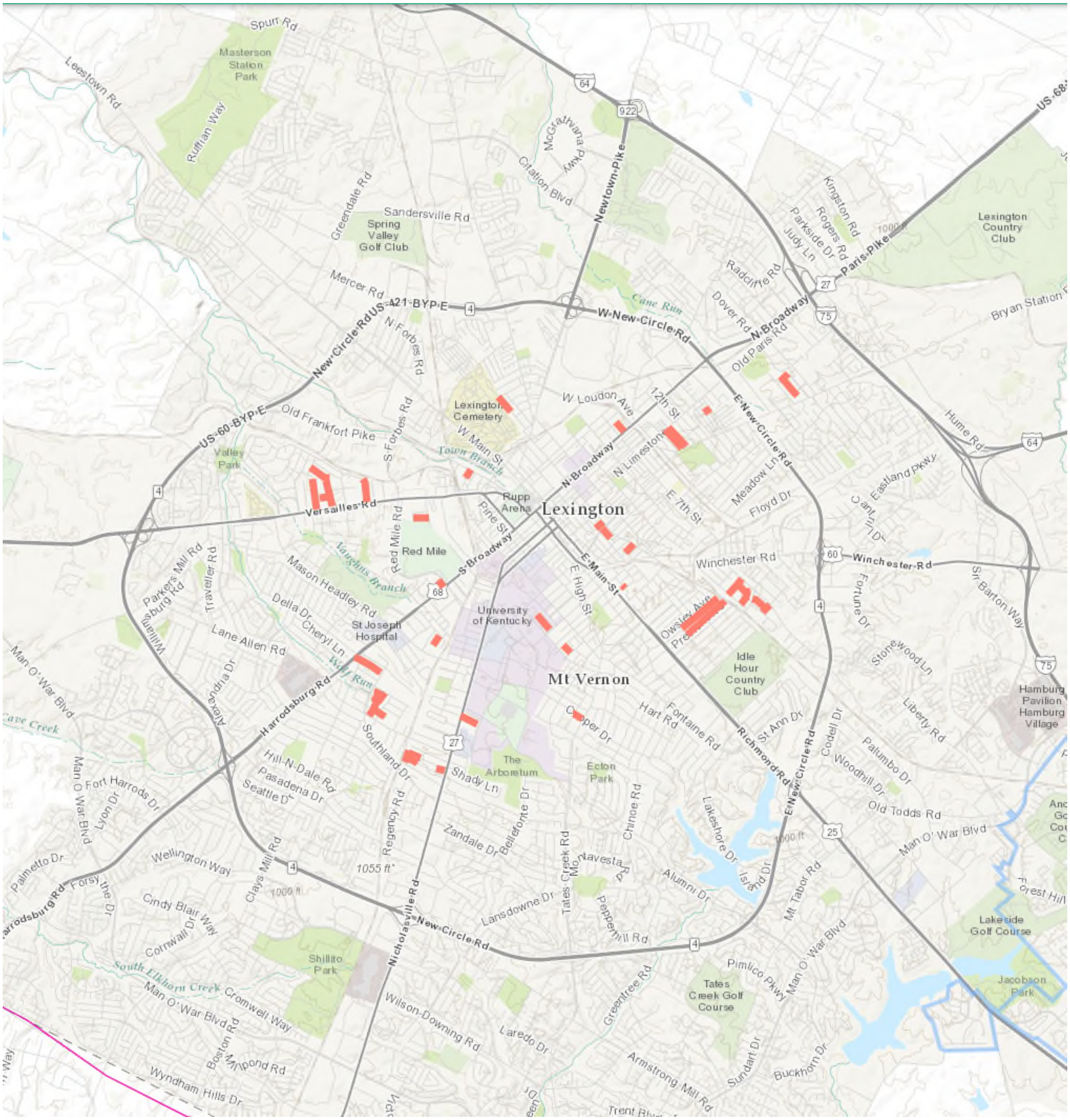
APPENDIX

KENTUCKY AMERICAN WATER

Projected Year One Projects For Main Replacement Program

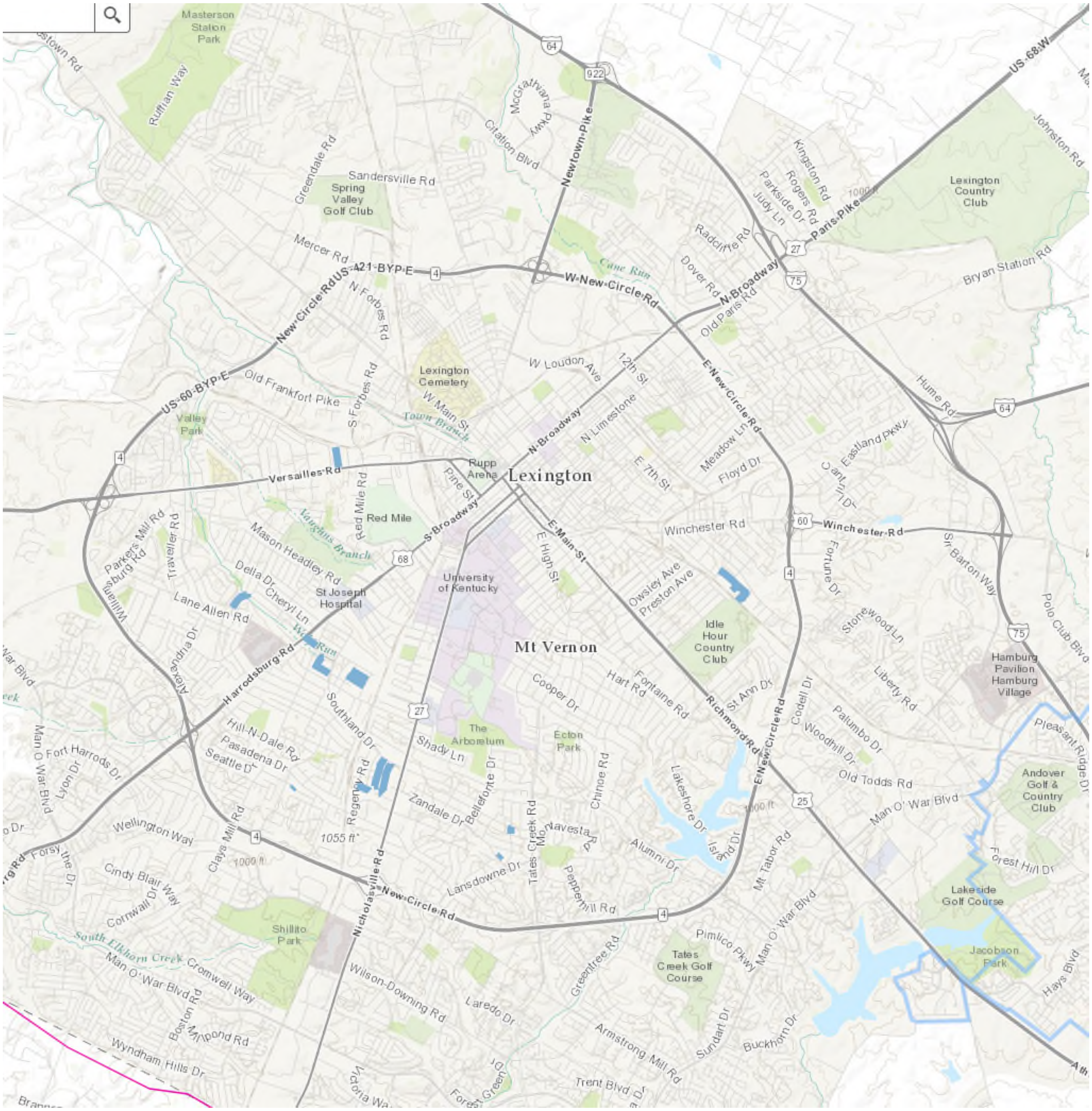


PROJECTED YEAR ONE PROJECTS FOR MAIN REPLACEMENT PROGRAM

PROJECT NUMBER	PROJECT LOCATION	AMOUNT OF MAIN TO BE REPLACED (FEET)	ANTICIPATED COST
1	600 BLOCK SAYRE AVE	212	$31,800
2	900 BLOCK WHITNEY AVE	1,030	$154,500
3	200 BLOCK PERRY ST	466	$69,900
4	1000 BLOCK KASTLE RD	512	$76,800
5	1200 BLOCK EMBRY AVE	536	$80,400
6	200 BLOCK SPRUCE ST	624	$93,600
7	200 BLOCK HAMILTON PARK	978	$146,700
8	300 BLOCK GUNN ST	184	$27,600
9	100 BLOCK SHAWNEE PL	568	$85,200
10	200 BLOCK WARNOCK ST	492	$73,800
11	600 BLOCK ORCHARD AVE	380	$57,000
12	100 BLOCK AVON AVE 100 BLOCK BURNETT AVE	1,340	$201,000
13	1400 BLOCK CAMDEN AVE	1,082	$162,300
14	100 BLOCK WABASH DR 1800 BLOCK PENSACOLA DR 200 BLOCK LACKAWANNA RD 180 WABASH DR 140 WABASH DR	3,160	$474,000
16	200 AND 300 BLOCK LINCOLN AVE	3,928	$589,200
17	200 TO 400 BLOCKS OF PRESTON AVE	2,452	$367,800
18	300 BLOCK RICHMOND AVE 200 BLOCK WHITE AVE	814	$122,100
19	300 BLOCK PENNSYLVANIA CT	1,422	$213,300
20	300 BLOCK STRATHMORE RD	1,436	$215,400
21	100 BLOCK GARRETT AVE	968	$145,200
22	200 BLOCK GARRETT AVE	1,508	$226,200
23	300 BLOCK N PICADOME PARK	1,648	$247,200
24	600 BLOCK COOPER DR	218	$32,700
25	1300 BLOCK WILLOWLAWN AVE	438	$65,700
26	400 BLOCK UHLAN CT	768	$115,200
27	100 DELMONT DR	1,052	$157,800
28	200 BLOCK E VISTA ST	1,260	$189,000
29	200 BLOCK W VISTA ST	1,204	$180,600
30	100 BLOCK E VISTA ST	1,502	$225,300
31	400 BLOCK MORRISON AVE	608	$91,200
32	200 BLOCK LINWOOD DR	948	$142,200
33	500 BLOCK MCCUBBING DR	2,290	$343,500
34	1100 BLOCK SPARKS RD	2,358	$353,700
35	600 BLOCK LAGONDA AVE	1,980	$297,000
36	7OO BLOCK APPLETREE LN	980	$147,000
37	1600 BLOCK CLAYTON AVE	1,644	$246,600
ANTICIPATED YEAR TOTAL		42,990	$6,448,500

KENTUCKY AMERICAN WATER

Projected Year Two Projects
For Main Replacement Program

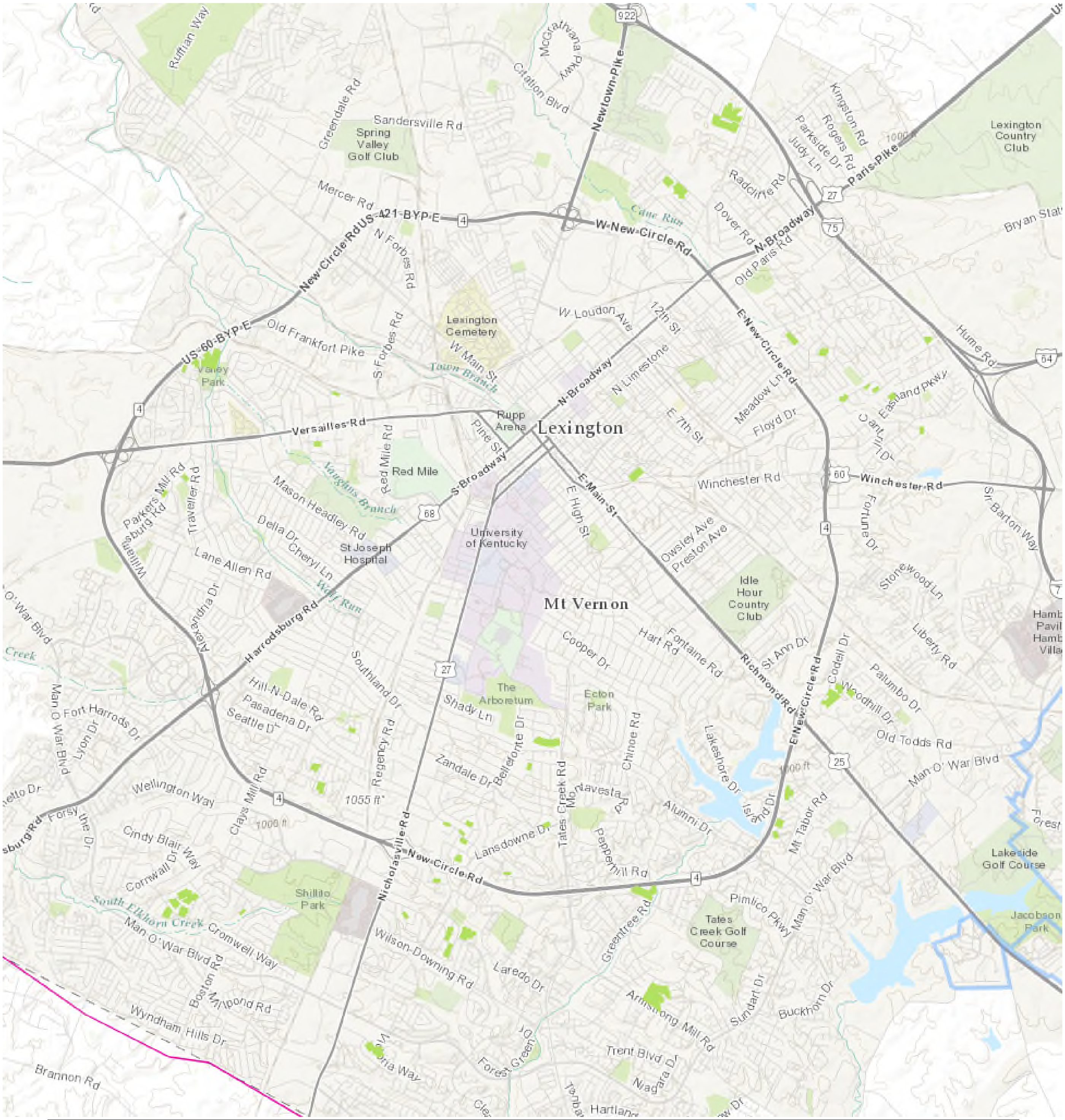


PROJECTED YEAR TWO PROJECTS FOR MAIN REPLACEMENT PROGRAM

PROJECT NUMBER	PROJECT LOCATION	AMOUNT OF MAIN TO BE REPLACED (FEET)	ANTICIPATED COST
1	1600 BLOCK COURTNEY AVE	1,490	$223,500
2	EMERY CT 1600 BLOCK COURTNEY AVE	2,058	$308,700
3	600 BLOCK BLUE ASH DR	940	$141,000
4	200 BLOCK KOSTER DR	1,860	$279,000
5	200 BLOCK NORWAY ST	1,702	$255,300
6	100 BLCOK HALLS LANE	1,626	$243,900
7	LONE OAK DR	3,468	$520,200
8	2000 BLOCK RAINBOW RD 200 BLOCK DERBY DR 2000 BLOCK REBEL RD	1,508	$226,200
9	4800 BLOCK BOONE LN	3,762	$564,300
10	1100 BLOCK N CLEVELAND RD	5,356	$803,400
11	5400 BLOCK BRIAR HILL RD	4,280	$642,000
12	4400 BLCOK HALEY RD	50	$7,500
13	4600 BLOCK TODDS RD	3,496	$524,400
14	3500 BLOCK ROLLING HILLS CT	610	$91,500
15	5000 BLOCK SULPHUR LN	1,462	$219,300
16	5200 BLOCK WINCHESTER RD	5,423	$813,450
17	5400 BLOCK WINCHESTER RD	230	$34,500
18	1900 BLOCK BEACON HILL RD	1,576	$236,400
19	3100 BLOCK BRECKENWOOD DR	356	$53,400
20	LAMONT CT	226	$33,900
21	700 BLOCK LANDSDOWNE CIR	314	$47,100
22	3500 BLOCK MADDOX LN	2,732	$409,800
ANTICIPATED YEAR TOTAL		44,525	$6,678,750

KENTUCKY
AMERICAN WATER

Projected Year Three Projects
For Main Replacement Program



PROJECTED YEAR THREE PROJECTS FOR MAIN REPLACEMENT PROGRAM

PROJECT NUMBER	PROJECT LOCATION	AMOUNT OF MAIN TO BE REPLACED (FEET)	ANTICIPATED COST
1	100 BLOCK NEW ZION RD	2,302	$345,300
2	SAMUEL LN	1,156	$173,400
3	TILLYBROOK CT	624	$93,600
4	3200 BLOCK RAVEN CIRCLE	360	$54,000
5	MALABU CT	1,556	$233,400
	HUNTER CIRCLE		
	HEATHER CT		
	300 BLOCK BELVOIR DR		
6	200 BLOCK BRADFORD CIR	352	$52,800
7	SHIRLEE CT	372	$55,800
8	OLD DOBBIN RD	482	$72,300
9	DELMONT CT	168	$25,200
10	1300 BLOCK HIALEIAH CT	1,682	$252,300
	1300 BLOCK HOT SPRINGS CT		
	1300 BLOCK KEENELAND CT		
11	CROSS KEYS CT	490	$73,500
12	200 BLOCK LEWIS ST	260	$39,000
13	THISTLETON CIRCLE	522	$78,300
14	EDINBURGH CT	258	$38,700
15	CROYDEN CT	942	$141,300
	SHEFFIELD CT		
16	100 BLOCK GENTRY RD	176	$26,400
17	100 BLOCK N CLEVELAND RD	238	$35,700
18	7300 BLOCK OLD RICHMOND RD	646	$96,900
19	WILLIAMSBURG CT	368	$55,200
20	WOODSIDE CIRCLE	304	$45,600
21	600 BLOCK TATESWOOD DR	340	$51,000
22	RANGE CT	672	$100,800
23	GREENLAWN CT	1,438	$215,700
	JADE CIRCLE		
	KIMBERLITE CT		
	GRANITE CIRCLE		
24	DURHAM CT	504	$75,600
25	100 BLOCK COLLEGE ST	1,098	$164,700
26	GAYLE CIRCLE	388	$58,200
27	SAYBROOK CT	282	$42,300
28	WAYCROSSE CIRCLE	676	$101,400
	SHILOH CT		
29	KELSEY CT	1,694	$254,100
	KELSEY PL		
	YARMOUTH CT		
	1100 BLOCK KILRUSH DR		
30	CRICKLEWOOD CT	340	$51,000
31	1100 BLOCK APPIAN CROSSING WAY	978	$146,700
32	600 BLOCK CARDIGAN CT	1,416	$212,400
	3500 BLOCK BERWIN CT		
	3400 BL0CK IPSWICH CT		
33	3400 BLOCK FLINTRIDGE CIRCLE	426	$63,900
34	500 BLOCK FOLKSTONE DR	302	$45,300
35	1100 BLOCK GREENTREE CT	1,252	$187,800
	GREENTREE PL		
	GREENTREE CIRCLE		

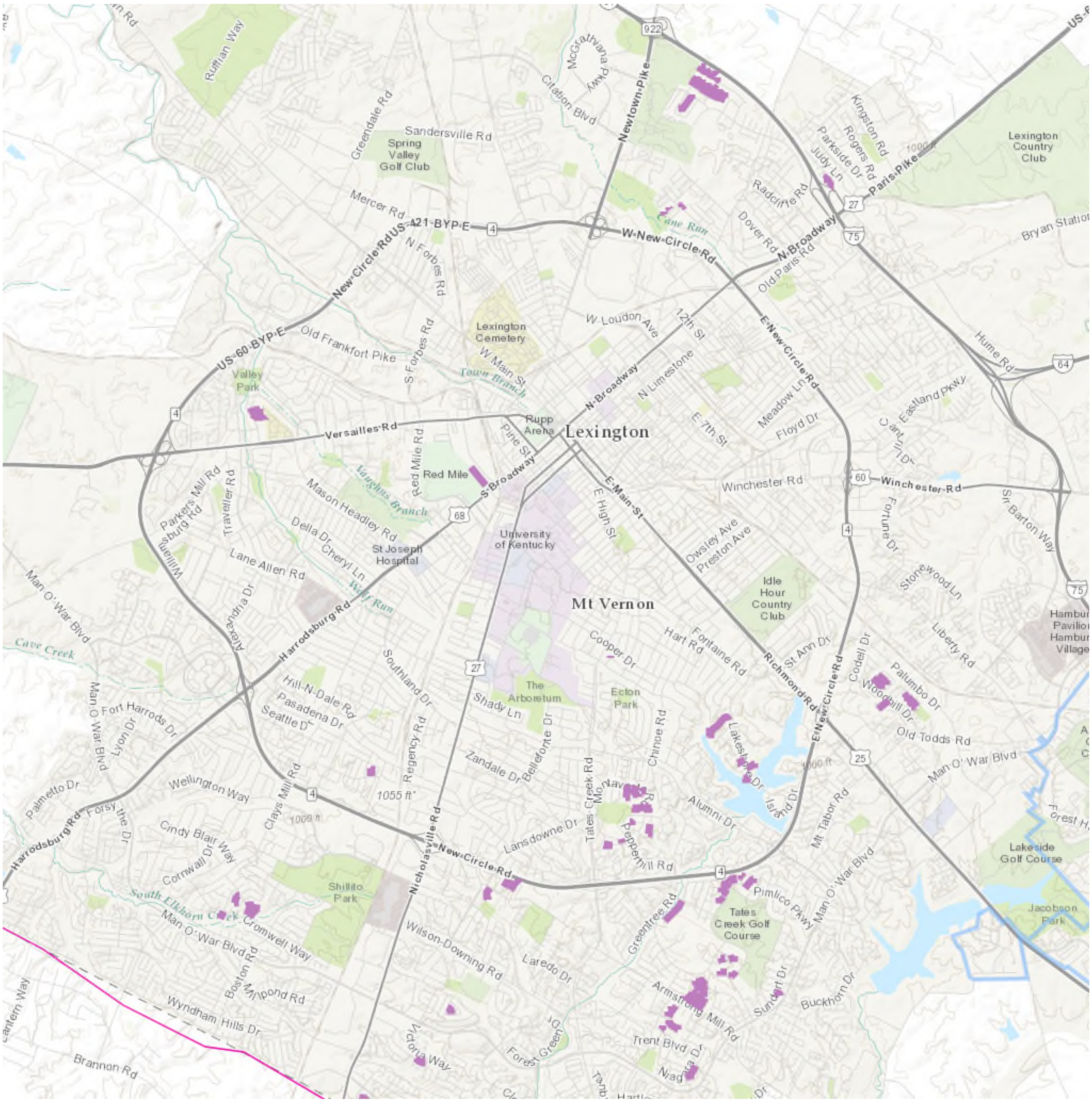
PROJECTED YEAR THREE PROJECTS FOR MAIN REPLACEMENT PROGRAM

PROJECT NUMBER	PROJECT LOCATION	AMOUNT OF MAIN TO BE REPLACED (FEET)	ANTICIPATED COST

36	KING ARTHUR CT 3400 BLOCK KING ARTHUR DR	1,272	$190,800
37	PADDOCK CT	436	$65,400
38	TANNER CT	438	$65,700
39	PENWAY CT	438	$65,700
40	400 BLOCK PLAINVIEW RD	248	$37,200
41	100 BLOCK TORONTO DR 4000 BLOCK VICTORIA WAY 4000 BLOCK VICTORIA WAY 200 BLOCK TORONTO RD	1,286	$192,900
42	2600 BLOCKI WINBROOKE LN	408	$61,200
43	2800 BLOCK MIDDLESEX CT	778	$116,700
44	700 BLOCK HILL RISE CT	542	$81,300
45	1500 BLOCK HALSTED CT KILDARE CT KIRK CT	2,420	$363,000
46	800 BLOCK GENTRY LN	1,236	$185,400
47	200 BLOCK MULBERRY RD OSAGE CT 2500 BLOCK BUTTERNUT HILL CT	1,148	$172,200
48	BLACKARROW CT	730	$109,500
49	BARBADOS LN 3100 BLOCK TABAGO CT 2700 BLOCK MARTINIQUE LN	2,508	$376,200
50	1800 BLOCK COLCHESTER DR FELTNER CT 1800 BLOCK BOWEN CT 1800 BLOCK BARKSDALE DR 1800 BLOCK COLCHESTER DR	2,484	$372,600
51	HAVELOCK CIR 600 BLOCK SAGINAW CT 3400 BLOCK ALDERSHOT DR	1,614	$242,100
52	KILKENNY CT	932	$139,800
ANTICIPATED YEAR TOTAL		43,982	$6,597,300

KENTUCKY AMERICAN WATER

Projected Year Four Projects
For Main Replacement Program



PROJECTED YEAR FOUR PROJECTS FOR MAIN REPLACEMENT PROGRAM

PROJECT NUMBER	PROJECT LOCATION	AMOUNT OF MAIN TO BE REPLACED (FEET)	ANTICIPATED COST
1	3100 BLOCK OLD CROW CT 3100 BLOCK CLAIR RD MONTAVESTA CT	1,916	$287,400
2	2000 BLOCK CUMMINS CT 2000 BLOCK DANIEL CT	758	$113,700
3	400 BLOCK CURRY AVE	468	$70,200
4	4000 BLOCK LILYDALE CT 4000 BLOCK WHITEMARK CT	1,634	$245,100
5	3500 BLOCK ORMOND CIR	636	$95,400
6	1900 BLOCK RITTENHOUSE CT	328	$49,200
7	2400 BLOCK PLUMTREE CT 2400 BLOCK THORNBERRY CT	1,236	$185,400
8	1200 BLOCK MAYWOOD PARK 1200 BLOCK OAKLAWN PARK 1200 BLOCK TANFORAN DR 1200 BLOCK NARRAGANSETT PARK LATONIA PARK 3200 BLOCK WATERFORD PARK	2,744	$411,600
9	200 BLOCK KELLY CT	1,352	$202,800
10	600 BLOCK FOGO CT 600 BLOCK CREWE CT 3400 BLOCK FRASERDALE CT 3400 BLOCK BIRKENHEAD CIR	2,020	$303,000
11	LOOKOUT CIR 2900 BLOCK MONTAVESTA RD	866	$129,900
12	WEM CT	562	$84,300
13	4100 BLOCK WINNIPE CT	630	$94,500
14	400 BLOCK WOODLAKE WAY	250	$37,500
15	3200 BLOCK WOOD VALLEY CT	256	$38,400
16	3500 BLOCK SUTHERLAND DR	1,020	$153,000
17	3500 BLOCK NIAGRA DR	688	$103,200
18	3300 BLOCK MOUNDVIEW CT	434	$65,100
19	LISA CIR MONA CT	912	$136,800
20	MARGO CT KAREN CT	1,846	$276,900
21	VERSIE CT JANNELLE CT	1,270	$190,500
22	200 BLOCK HEDGEWOOD CT	512	$76,800
23	TAMMY CT LAVERNE CT GREVEY CT HARRIS CT	2,726	$408,900
24	GRANT CT HOLLOW CREEK CT GRANT PL	1,034	$155,100
25	GRAIG CT	626	$93,900
26	LYNNWOOD CT WOODSTON CT CLEARWOOD CT	1,746	$261,900
27	3600 BLOCK CAYMAN LN JAMAICA CT	1,574	$236,100

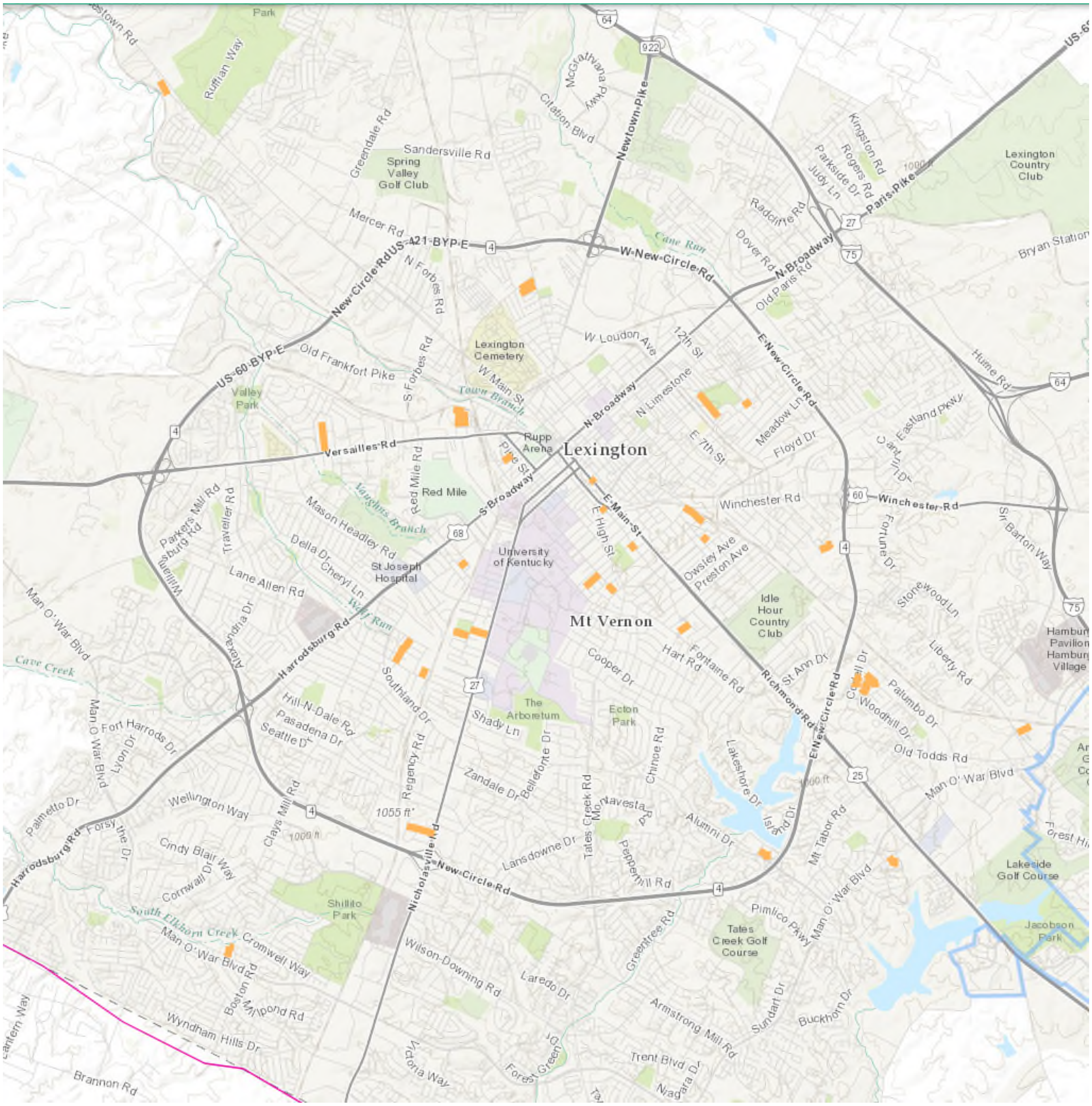
PROJECTED YEAR FOUR PROJECTS FOR MAIN REPLACEMENT PROGRAM

PROJECT NUMBER	PROJECT LOCATION	AMOUNT OF MAIN TO BE REPLACED (FEET)	ANTICIPATED COST

28	WATERS EDGE PL	1,580	$237,000
	2000 BLOCK HARMONY CT		
	2100 BLOCK BRIDGEPORT DR		
29	1600 BLOCK COSTIGAN DR	3,536	$530,400
	1900 BLOCK LEITNER CT		
	1900 BLOCK BEDINGER CT		
	1900 BLOCK COBYVILLE CT		
	900 BLOCK VALLEY FARM DR		
	1900 BLOCK CHRIS DR		
30	3400 BLOCK BELLMEADE RD	884	$132,600
	3400 BLOCK WARWICK CT		
31	1300 BLOCK OX HILL DR	758	$113,700
	BASS CT		
32	1200 BLOCK ASCOT PARK	1,594	$239,100
	1200 BLOCK BEULAH PARK		
	1300 BLOCK ATOKAD PARK		
	1300 BLOCK GOLDEN GATE PARK		
	1200 BLOCK AK-SAR-BEN PARK		
33	BRANDON CT	418	$62,700
34	SWOONALONG CT	2,350	$352,500
	PERSONALITY CT		
	1300 BLOCK CANONERO DR		
	GUNBOW CT		
	PERSONALITY CT		
35	3500 BLOCK GINGERTREE CIR	484	$72,600
36	KENIL CT	138	$20,700
37	2000 BLOCK VON LIST WAY	2,156	$323,400
ANTICIPATED YEAR TOTAL		43,942	$6,591,300

KENTUCKY
AMERICAN WATER

Projected Year Five Projects
For Main Replacement Program



PROJECTED YEAR FIVE PROJECTS FOR MAIN REPLACEMENT PROGRAM

PROJECT NUMBER	PROJECT LOCATION	AMOUNT OF MAIN TO BE REPLACED (FEET)	ANTICIPATED COST
1	TREPASSEY CT	808	$121,200
2	100 BLOCK WESTGATE DR	2,022	$303,300
3	100 BLOCK MOORE DR	170	$25,500
4	3300 BLOCK PITTMAN CREEK CT	634	$95,100
5	4700 BLOCK HUFFMAN MILL PIKE	56	$8,400
6	300 BLOCK ROBERTSON ST	3,476	$521,400
	1100 BLOCK MARTIN AVE		
	300 BLOCK FERGUSON ST		
	300 BLOCK ANDERSON ST		
	300 BLOCK ROBERTSON ST		
7	3200 BLOCK BRACKTOWN RD	1,946	$291,900
8	400 BLOCK BRADLEY CT	1,602	$240,300
9	100 BLOCK CASTLEWOOD DR	1,152	$172,800
10	800 BLOCK CAMPBELL LN	1,184	$177,600
11	600 BLOCK CENTRAL AVE	362	$54,300
12	100 BLOCK CHELAN CT	700	$105,000
13	700 BLOCK E EUCLID AVE	378	$56,700
14	200 BLOCK E MAIN ST	478	$71,700
15	200 BLOCK SOUTHPORT DR	2,672	$400,800
16	TIMBERHILL CT	858	$128,700
	ELDERBERRY CT		
17	HEATON CT	1,042	$156,300
	2400 BLOCK MIRAHILL DR		
	2400 BLOCK WINDWOOD CT		
18	1400 BLOCK ELIZABETH ST	2,352	$352,800
	100 BLOCK FOREST PARK RD		
19	200 BLOCK WESTWOOD CT	1,364	$204,600
20	100 BLOCK WESTWOOD DR	1,640	$246,000
21	1100 BLOCK FERN AVE	1,896	$284,400
22	1000 BLOCK FLOYD DR	232	$34,800
23	400 BLOCK GREENWOOD AVE	1,280	$192,000
24	800 BLOCK JOHNSDALE DR	552	$82,800
25	3200 BLOCK HALEY RD	1,616	$242,400
26	500 BLOCK LONGVIEW DR	94	$14,100
27	400 BLOCK MACADAM DR	2,604	$390,600
	600 BLOCK ROSEMILL DR		
28	3400 BLOCK MCFARLAND LN	3,650	$547,500
29	500 BLOCK MCKINLEY ST	308	$46,200
30	500 BLOCK MERINO ST	542	$81,300
31	300 BLOCK MEMORY LN	396	$59,400
32	600 BLOCK MONTGOMERY AVE	226	$33,900
33	700 BLOCK NATIONAL AVE	1,242	$186,300
	900 BLOCK NATIONAL AVE		
34	1100 BLOCK OAK HILL DR	470	$70,500
35	300 BLOCK OLD VINE ST	162	$24,300
36	2100 BLOCK PAIGE CT	358	$53,700
37	400 BLOCK PARK AVE	634	$95,100
38	500 BLOCK PINE ST	382	$57,300
39	200 BLOCK RIDGEWAY RD	556	$83,400
40	1400 BLOCK RUSSELL CAVE RD	210	$31,500
ANTICIPATED YEAR TOTAL		42,306	$6,345,900

KENTUCKY-AMERICAN WATER COMPANY
CASE NO. 2020-00027
COMMISSION STAFF'S SECOND POST-HEARING REQUEST FOR INFORMATION

Witness: Kurt Stafford

2. Refer to Case No. 2018-00358, the O'Neill Testimony, Exhibit 2, page 13, which includes main replacement criteria table and an explanation that main replacement prioritization and replacement schedules are developed using an electronic database and external drivers.

a. Provide a copy of the database output showing the overall rating and ranking of each main that was developed in Case No. 2018-00358 and the proposed replacement schedule for the initial five-year QIP period.

b. Provide a copy of the database output showing the overall rating and ranking of each main that was developed for the QIP proposed in this proceeding.

c. Provide the main replacement criteria table implemented for this proceeding, and, if there are differences in criteria between Case No. 2018-00358 and this proceeding, explain the basis for the differing criteria.

Response:

a. Please see attachment KAW_R_PSCHDR2_NUM002A_052820. This Excel file shows rating and ranking information for the mains discussed in the initial five-year QIP period as shown in Exhibit 2 of Mr. O'Neill's Testimony in Case No. 2018-00358. Additionally, the mains proposed for year one of QIP (Case No. 2020-00027) are also shown within the file and highlighted blue.

b. The rating and ranking for mains developed for year one of this QIP proceeding are included in Excel attachment KAW_R_PSCHDR2_NUM002A_052820 and highlighted blue.

c. Please see attachment KAW_R_PSCHDR2_NUM002B_052820. These main replacement criteria match the ones utilized in Case No. 2018-00358. Please be aware that this is a living document that is updated at least yearly to ensure data is as up-to-date as possible. Therefore, overall weighted score and rankings can change over time.

			Ratings (1-5)											
Street/Project	**Address**	**City**	**Low Pressure**	**Number of Breaks/Leaks (data from 2017-present)**	**Fire Flow**	**Age**	**Material Type**	**Size of Main**	**Water Quality**	**Customer Impact**	**Total Weighted Score**	**Comments**	**CASE NO. 2020-00027**	**CASE NO. 2018-00358**
Lincoln Ave	Entire Street	Lexington	2	3		5	4	4	1	4	285	2" and 6" CI		CASE YEAR 1
Delmont Dr	Entire Street	Lexington	2	3		5	4	4	1	3	280	2" CI	QIP	CASE YEAR 1
Halls Ln	100 Block	Lexington	2	3		5	4	4	1	3	280	2" CI	QIP	CASE YEAR 2
Avon Ave	Entire Street	Lexington	2	2		5	4	4	1	4	270	2" and 6" CI	QIP	CASE YEAR 1
Winchester Rd	5000 and 5200 Blocks	Lexington	3	3		5	4	1	1	4	270	8" CI	QIP	CASE YEAR 2
Westgate Dr	Entire Street	Lexington	2	2		5	4	4	1	4	270	2" and 6" CI; 6" from 1937		CASE YEAR 5
Elizabeth St	Sioux to Transcript	Lexington	2	2		5	4	4	1	4	270	2", 8", 16" CI		CASE YEAR 5
N Cleveland Rd	100 and 1100 Blocks	Lexington	3	2		4	4	5	1	2	270	1.25" and 6" CI		CASE YEAR 2
Montavesta Rd	Old Crow to End	Lexington	2	3		4	4	4	1	4	270	2" and 8" CI		CASE YEAR 4
Kastle Rd	1000 Block	Lexington	2	1		5	4	5	1	4	265	1" and 4" CI		CASE YEAR 1
McCubbing Dr	500 Block	Lexington	2	2		5	4	4	1	3	265	2" CI		CASE YEAR 1
Hunter Cir	Entire Street	Lexington	2	2		5	4	4	1	3	265	2" CI		CASE YEAR 3
Delmont Ct	Entire Street	Lexington	2	2		5	4	4	1	2	260	2" CI	QIP	CASE YEAR 3
Forest Park Rd	100 Block	Lexington	2	2		5	4	3	1	4	260	4" and 8" CI		CASE YEAR 5
Fern Ave	1100 Block	Lexington	2	1		5	4	5	1	3	260	1" CI		CASE YEAR 5
Greenwood Ave	Entire Street	Lexington	2	1		5	4	5	1	3	260	1" and 8" CI		CASE YEAR 5
University Ave	Entire Street	Lexington	2	2		5	4	3	1	4	260	4" CI; from 1925	QIP	
State St	Entire Street	Lexington	2	2		5	4	3	1	4	260	4" and 16" CI; 4" from 1925	QIP	
Rosemill Dr	Entire Street	Lexington	1	2		5	4	4	1	4	255	2" CI & 6" CI; replace with 1,150' of 8" DI		
Burnett Ave	Entire Street	Lexington	2	1		5	4	4	1	4	255	2" and 6" CI	QIP	CASE YEAR 1
Pensacola Dr	1800 Block	Lexington	1	2		5	4	4	1	4	255	2" CI		CASE YEAR 1
Lackawanna Rd	200 Block	Lexington	1	2		5	4	4	1	4	255	2" CI		CASE YEAR 1
Preston Ave	Entire Street	Lexington	2	1		5	4	4	1	4	255	2" and 6" CI		CASE YEAR 1
Cooper Dr	600 Block	Lexington	2	2		5	4	2	1	5	255	6" and 12" CI		CASE YEAR 1
Clayton Ave	Entire Street	Lexington	1	2		5	4	4	1	4	255	2" and 6" CI	QIP	CASE YEAR 1
Haley Rd	Small Section	Lexington	2	2		5	4	4	1	1	255	2" CI		CASE YEAR 2
Rolling Hills Ct	3500 Block	Lexington	2	1		5	4	5	1	2	255	1" CI		CASE YEAR 2
Lansdowne Cir	700 Block	Lexington	2	1		5	4	5	1	2	255	1" CI		CASE YEAR 2
Samuel Ln	Entire Street	Lexington	2	1		5	4	5	1	2	255	1" CI		CASE YEAR 3
Westwood Dr	100 Block	Lexington	1	2		5	4	4	1	4	255	2" CI		CASE YEAR 5
Rosemill Dr	Southgate to Clays Mill	Lexington	1	2		5	4	4	1	4	255	2" and 6" CI		CASE YEAR 5
Gentry Ln	Small Section	Lexington	2	2		4	4	5	1	2	255	1" CI		CASE YEAR 3
National Ave	Entire Street	Lexington	1	4		3	4	4	1	4	255	2" and 6" CI		CASE YEAR 5
Morrison Ave	400 Block	Lexington	2	1		5	4	4	1	3	250	2" CI		CASE YEAR 1
Blue Ash Dr	600 Block	Lexington	2	1		5	4	4	1	3	250	2" CI		CASE YEAR 2
Briar Hill Rd	Entire Street	Lexington	2	2		5	4	2	1	4	250	6" CI		CASE YEAR 2
Raven Cir	Entire Street	Lexington	2	1		5	4	4	1	3	250	2" CI		CASE YEAR 3
Johnsdale Dr	800 Block	Lexington	1	2		5	4	4	1	3	250	2.25" CI		CASE YEAR 5
Memory Ln	Entire Street	Lexington	2	1		5	4	4	1	3	250	2" and 6" CI		CASE YEAR 5
Arceme Ave	Entire Street	Lexington	1	2		5	4	3	1	5	250	4" and 6" CI; from 1930s; School	QIP	
New Zion Rd	100 Block	Lexington	2	1		5	4	4	1	2	245	2.25" CI		CASE YEAR 3
Tillybrook Ct	Entire Street	Lexington	2	1		5	4	4	1	2	245	2" CI		CASE YEAR 3
Shirlee Ct	Entire Street	Lexington	2	1		5	4	4	1	2	245	2" CI		CASE YEAR 3
Hill Rise Ct	Entire Street	Lexington	2	1		5	4	4	1	2	245	2" CI	QIP	CASE YEAR 3
Crescent Ave	Entire Street	Lexington	2	1		5	4	3	1	4	245	4" and 6" CI; 4" from 1925	QIP	
Greentree Ct	1100 Block	Lexington	2	2		4	4	4	1	2	245	2" CI		CASE YEAR 3
Hamilton Park	Entire Street	Lexington	1	1		5	4	4	1	4	240	2", 4", 6" CI		CASE YEAR 1
Camden Ave	1400 Block	Lexington	1	1		5	4	4	1	4	240	2" CI		CASE YEAR 1
Wabash Dr	100 Block	Lexington	1	1		5	4	4	1	4	240	2" CI		CASE YEAR 1
Appletree Ln	Entire Street	Lexington	1	1		5	4	4	1	4	240	2" and 6" CI		CASE YEAR 1
Courtney Ave	Entire Street	Lexington	1	1		5	4	4	1	4	240	2" and 6" CI		CASE YEAR 2
Euclid Ave	Entire Street	Lexington	1	2		5	4	2	1	5	240	6" and 12" CI; 6" from 1914 and 12" from 1937; in conjunction with LFUCG project		CASE YEAR 5
Old Vine St	300 Block	Lexington	2	2		5	4	2	1	2	240	6" CI		CASE YEAR 5
Old Richmond Rd	7300 Block	Lexington	1	3		4	4	3	1	3	240	4" CI		CASE YEAR 3
Greentree Pl	Entire Street	Lexington	2	1		4	4	4	1	4	240	2" CI		CASE YEAR 3
Greentree Rd	Entire Street	Lexington	2	3		4	4	1	1	4	240	12" CI		
King Arthur Dr	3400 Block	Lexington	1	2		4	4	4	1	4	240	2" CI		CASE YEAR 3
Barbados Ln	Entire Street	Lexington	2	1		4	4	4	1	4	240	2.25" CI		CASE YEAR 3
Clair Rd	Entire Street	Lexington	2	1		4	4	4	1	4	240	2" CI		CASE YEAR 4
Central Ave	600 Block	Lexington	2	2		4	4	3	1	3	240	4" and 8" CI		CASE YEAR 5
Gemini Trail Road	Entire Street	Georgetown	2	5		3	3	1	1	4	240	6" & 8" AC		
Aylesford Place	Entire Street	Lexington	1	2		5	4	2	1	4	235	6" CI; replace w/ 8" DI; replace with approximately 1,500' of 8" DI		
Newtown Pike	Louden Ave-Charles Ave	Lexington	1	2		5	4	2	1	4	235	6" CI; replace with approximately 1,800' of 8" DI		
Sayre Ave	Entire Street	Lexington	1	1		5	4	4	1	3	235	2" and 4" CI		CASE YEAR 1
Whitney Ave	Entire Street	Lexington	1	1		5	4	4	1	3	235	2" and 6" CI		CASE YEAR 1

Shawnee Pl	100 Block	Lexington	1	1		5	4	4	1	3	235	2" CI		CASE YEAR 1
White Ave	200 Block	Lexington	1	1		5	4	4	1	3	235	2" CI		CASE YEAR 1
Strathmore Rd	300 Block	Lexington	1	1		5	4	4	1	3	235	2" CI		CASE YEAR 1
Willowlawn Ave	1300 Block	Lexington	1	1		5	4	4	1	3	235	2" CI		CASE YEAR 1
Lone Oak Dr	Entire Street	Lexington	1	1		5	4	4	1	3	235	2" CI		CASE YEAR 2
Rainbow Rd	2000 Block	Lexington	1	1		5	4	4	1	3	235	2.25" CI		CASE YEAR 2
Boone Ln	4800 Block	Lexington	1	1		5	4	4	1	3	235	2" CI		CASE YEAR 2
Sulphur Ln	5000 Block	Lexington	1	1		5	4	4	1	3	235	2.25" CI		CASE YEAR 2
Malabu Ct	Entire Street	Lexington	1	1		5	4	4	1	3	235	2" CI		CASE YEAR 3
Bradford Cir	200 Block	Lexington	1	1		5	4	4	1	3	235	2" CI		CASE YEAR 3
Bradford Dr	Entire Street	Lexington	1	2		5	4	2	1	4	235	6" CI		
Ridgeway Rd	Entire Street	Lexington	1	1		5	4	4	1	3	235	2" and 6" CI; 2" from 1927 and 6" from 1928		CASE YEAR 5
Russell Cave Rd	1400 Block	Lexington	1	3		5	4	1	1	3	235	8" and 12" CI		CASE YEAR 5
Conn Terrace	Entire Street	Lexington	2	1		5	4	2	1	4	235	6" CI and 6" AC	QIP	
Transcript Ave	Entire Street	Lexington	2	1		5	4	2	1	4	235	6" and 8" CI; from 1935	QIP	
Gazette Ave	Entire Street	Lexington	2	1		5	4	2	1	4	235	6" CI; from 1927	QIP	
Monroe Ave	Entire Street	Lexington	2	1		5	4	2	1	4	235	6" CI; from 1936		
Sherman Ave	Entire Street	Lexington	2	1		5	4	2	1	4	235	6" CI; from 1935		
N Limestone St	E. Loudon Ave - New Circle Rd	Lexington	1	3		4	4	2	1	4	235	6" CI & 12" CI; replace with 3,700' of 12" DI		
Heather Ct	Entire Street	Lexington	1	2		4	4	4	1	3	235	2" CI		CASE YEAR 3
Thistleton Cir	Entire Street	Lexington	1	2		4	4	4	1	3	235	2" CI		CASE YEAR 3
Martinique Ln	Entire Street	Lexington	2	1		4	4	4	1	3	235	2.25" and 6" CI		CASE YEAR 3
Colchester Dr	Entire Street	Lexington	2	1		4	4	4	1	3	235	2.25" and 8" CI		CASE YEAR 3
Derby Dr	200 Block + Court	Lexington	2	2		3	4	4	1	3	235	2.25" and 6" CI		CASE YEAR 2
Uhlan Ct	400 Block	Lexington	1	1		5	4	4	1	2	230	2" CI		CASE YEAR 1
Emery Ct	Entire Street	Lexington	1	1		5	4	4	1	2	230	2" CI		CASE YEAR 2
Lamont Ct	Entire Street	Lexington	1	1		5	4	4	1	2	230	2" CI		CASE YEAR 2
Bradley Ct	Entire Street	Lexington	1	1		5	4	4	1	2	230	2" and 6" CI		CASE YEAR 5
Chelan Ct	100 Block	Lexington	1	1		5	4	4	1	2	230	2" CI		CASE YEAR 5
Westwood Ct	200 Block	Lexington	1	1		5	4	4	1	2	230	2" CI		CASE YEAR 5
Longview Dr	500 Block	Lexington	1	2		5	4	2	1	3	230	6" CI		CASE YEAR 5
Oak Hill Dr	1100 Block	Lexington	2	1		5	4	2	1	3	230	6" CI		CASE YEAR 5
Old Richmond Rd	7641-Durbin Ln	Lexington	1	3		4	3	3	1	4	230	4" AC; replace with 8,500' of 6" DI		
Old Dobbin Cir	Entire Street	Lexington	2	1		4	4	4	1	2	230	2" CI		CASE YEAR 3
Edinburgh Ct	Entire Street	Lexington	2	1		4	4	4	1	2	230	2" CI		CASE YEAR 3
Croyden Ct	Entire Street	Lexington	2	1		4	4	4	1	2	230	2" CI		CASE YEAR 3
Woodside Cir	Entire Street	Lexington	2	1		4	4	4	1	2	230	2" CI		CASE YEAR 3
Jade Cir	Entire Street	Lexington	2	1		4	4	4	1	2	230	2" CI		CASE YEAR 3
Granite Cir	Entire Street	Lexington	2	1		4	4	4	1	2	230	2" CI		CASE YEAR 3
Shiloh Ct	Entire Street	Lexington	2	1		4	4	4	1	2	230	2" CI		CASE YEAR 3
Cricklewood Ct	Entire Street	Lexington	1	2		4	4	4	1	2	230	2" CI		CASE YEAR 3
Berwin Ct	3500 Block	Lexington	2	1		4	4	4	1	2	230	2.25" CI		CASE YEAR 3
Ipswich Ct	3400 Block	Lexington	1	2		4	4	4	1	2	230	2.25" CI		CASE YEAR 3
Flintridge Cir	3400 Block	Lexington	2	1		4	4	4	1	2	230	2" CI		CASE YEAR 3
Greentree Cir	Entire Street	Lexington	2	1		4	4	4	1	2	230	2" CI		CASE YEAR 3
Paddock Ct	Entire Street	Lexington	2	1		4	4	4	1	2	230	2.25" CI		CASE YEAR 3
Penway Ct	Entire Street	Lexington	2	1		4	4	4	1	2	230	2.25" CI		CASE YEAR 3
Kirk Ct	Entire Street	Lexington	2	1		4	4	4	1	2	230	2" CI		CASE YEAR 3
Black Arrow Ct	Entire Street	Lexington	2	1		4	4	4	1	2	230	2.25" CI		CASE YEAR 3
Montavesta Ct	Entire Street	Lexington	2	1		4	4	4	1	2	230	2" CI		CASE YEAR 4
Cummins Ct	Entire Street	Lexington	1	2		4	4	4	1	2	230	2" CI		CASE YEAR 4
Lilydale Ct	Entire Street	Lexington	2	1		4	4	4	1	2	230	2.25" CI		CASE YEAR 4
Burton Road	578-1457	Georgetown	2	3		3	3	3	1	4	230	4" & 3" AC; replace with 10,200' of 6" DI		
Tabago Ct	Entire Street	Lexington	1	3		3	4	4	1	2	230	2.25" and 6" CI		CASE YEAR 3
Margo Ct	Entire Street	Lexington	2	2		3	4	4	1	2	230	2.25" CI		CASE YEAR 4
Jamaica Ct	Entire Street	Lexington	2	2		3	4	4	1	2	230	2.25" CI		CASE YEAR 4
Bedinger Ct	Entire Street	Lexington	2	2		3	4	4	1	2	230	2.25" and 6" CI		CASE YEAR 4
Cobyville Ct	Entire Street	Lexington	2	2		3	4	4	1	2	230	2.25" and 6" CI		CASE YEAR 4
Ralston Lane	Entire Street	Winchester	1	2		2	2	4	5	2	230	2" PVC; Continuous Flushing		
Schoolhouse Lane	Entire Street	Winchester	1	2		2	2	4	5	2	230	2" & 3" PVC; Continuous Flushing		
Silver Maple Way	Entire Street	Lexington	1	1		5	4	1	2	4	225	8" CI; Reference 4th St/Chestnut St Flushing; tied to N Martin Luther King Blvd Replacement (do at same time)		
Breckenwood Dr	Small Section	Lexington	1	1		5	4	4	1	1	225	2" CI		CASE YEAR 2
Avenue of Champions	Entire Street	Lexington	1	1		5	4	2	1	5	225	6" and 12" CI; 6" from 1914 and 12" from 1937; in conjunction with LFUCG project		
W Main St	Vine to Old Georgetown	Lexington	1	2		5	4	1	1	4	225	8" CI; from 1884		
Pine St	500 Block	Lexington	2	1		5	4	2	1	2	225	6" CI; from 1926		CASE YEAR 5
Eastland Drive	Industry Rd-New Circle Rd	Lexington	2	2		4	4	1	1	4	225	8" CI		
Plainview Rd	Small Section	Lexington	2	1		4	4	4	1	1	225	2" CI		CASE YEAR 3

Barksdale Dr	Entire Street	Lexington	1	1		4	4	4	1	4	225	2.25" and 6" CI		CASE YEAR 3
Sutherland Dr	3500 Block	Lexington	1	1		4	4	4	1	4	225	2.25" and 8" CI		CASE YEAR 4
Leesburg-Newtown Road	100-1899	Paris	2	3		3	3	3	1	3	225	4" AC		
Montavesta Road	2917-2994	Lexington	1	4		3	4	1	1	4	225	8" CL; Street Recently Paved		
Maywood Park	Entire Street	Lexington	2	1		3	4	4	1	4	225	2" CI		CASE YEAR 4
Oaklawn Park	Entire Street	Lexington	2	1		3	4	4	1	4	225	2" CI		CASE YEAR 4
Narragansett Park	Entire Street	Lexington	2	1		3	4	4	1	4	225	2" and 6" CI		CASE YEAR 4
Ox Hill Dr	Entire Street	Lexington	2	1		3	4	4	1	4	225	2" and 6" CI		CASE YEAR 4
Golden Gate Park	Entire Street	Lexington	2	1		3	4	4	1	4	225	2.25" and 6" CI		CASE YEAR 4
Kenil Ct	Entire Street	Lexington	2	1		3	4	5	1	2	225	1" CI		CASE YEAR 4
Linden Walk/Rose Lane	Entire Street (Linden Walk)/Linden Walk to Aylesford Place (Rose Lane)	Lexington	1	1		5	4	2	1	4	220	6" CI; replace with 1,900' of 8" DI		
Kentucky Avenue	Euclid Ave-Maxwell St	Lexington	1	1		5	4	2	1	4	220	6" CI; replace w/ 8" DI		
Richmond Ave	300 Block	Lexington	1	1		5	4	2	1	4	220	6" CI		CASE YEAR 1
Folkstone Dr	Plainview to RR track	Lexington	1	2		5	4	1	1	3	220	16" CI		CASE YEAR 3
Curry Ave	Most of Street	Lexington	1	1		5	4	2	1	4	220	6" and 8" CI; 6" is from 1901		CASE YEAR 4
Lakeshore Dr	Backside of RR to Island	Lexington	1	2		5	4	1	1	3	220	16" CI; from 1912		
Journal Ave	Entire Street	Lexington	2	1		5	3	2	1	4	220	6" AC	QIP	
Glenn Pl	Entire Street	Lexington	1	1		5	4	2	1	4	220	6" CI; some from 1930s	QIP	
Wittland Ln	Entire Street	Lexington	1	1		5	4	2	1	4	220	6" CI; some from 1922	QIP	
Devonia Ave	Entire Street	Lexington	1	1		5	4	2	1	4	220	6" CI; from 1930s	QIP	
Carlisle Ave	Entire Street	Lexington	1	1		5	4	2	1	4	220	6" CI; from 1930s	QIP	
Orion Way	Entire Street	Lexington	1	1		5	4	2	1	4	220	6" CI; from 1930s	QIP	
Grant Pl	Entire Street	Lexington	2	1		3	4	4	1	3	220	2" CI		CASE YEAR 4
Cayman Ln	3600 Block	Lexington	1	2		3	4	4	1	3	220	2.25" and 6" CI		CASE YEAR 4
Bridgeport Dr	Entire Street	Lexington	2	1		3	4	4	1	3	220	2.25" and 6" CI		CASE YEAR 4
Costigan Dr	Entire Street	Lexington	1	2		3	4	4	1	3	220	2.25", 6", 8" CI		CASE YEAR 4
Beulah Park	Entire Street	Lexington	2	1		3	4	4	1	3	220	2.25" and 6" CI		CASE YEAR 4
Atokad Park	Entire Street	Lexington	2	1		3	4	4	1	3	220	2.25" and 6" CI		CASE YEAR 4
Von List Way	Entire Street	Lexington	1	2		3	4	4	1	3	220	2" and 8" CI		CASE YEAR 4
Perry St	200 Block	Lexington	1	1		5	4	2	1	3	215	6" CI		CASE YEAR 1
Gunn St	300 Block	Lexington	1	1		5	4	2	1	3	215	6" CI		CASE YEAR 1
Warnock St	200 Block	Lexington	1	1		5	4	2	1	3	215	6" CI		CASE YEAR 1
Castlewood Dr	Entire Street	Lexington	1	1		5	4	2	1	3	215	6" and 8" CI		CASE YEAR 5
Merino St	500 Block	Lexington	1	1		5	4	2	1	3	215	6" CI; from 1884		CASE YEAR 5
Hialeiah Ct	Entire Street	Lexington	1	1		4	4	4	1	2	215	2.25" and 6" CI		CASE YEAR 3
Hot Springs Ct	Entire Street	Lexington	1	1		4	4	4	1	2	215	2.25" and 6" CI		CASE YEAR 3
Keeneland Ct	1300 Block	Lexington	1	1		4	4	4	1	2	215	2.25" and 6" CI		CASE YEAR 3
Cross Keys Ct	Entire Street	Lexington	1	1		4	4	4	1	2	215	2" CI		CASE YEAR 3
Sheffield Ct	Entire Street	Lexington	1	1		4	4	4	1	2	215	2" CI		CASE YEAR 3
Gentry Rd	100 Block	Lexington	1	2		4	4	2	1	3	215	6" CI		CASE YEAR 3
Williamsburg Ct	Entire Street	Lexington	1	1		4	4	4	1	2	215	2" CI		CASE YEAR 3
Range Ct	Entire Street	Lexington	1	1		4	4	4	1	2	215	2" CI		CASE YEAR 3
Kimberlite Ct	Entire Street	Lexington	1	1		4	4	4	1	2	215	2" CI		CASE YEAR 3
Durham Ct	Entire Street	Lexington	1	1		4	4	4	1	2	215	2" CI		CASE YEAR 3
Gayle Cir	Entire Street	Lexington	1	1		4	4	4	1	2	215	2" CI		CASE YEAR 3
Saybrook Ct	Entire Street	Lexington	1	1		4	4	4	1	2	215	2" CI		CASE YEAR 3
Waycrosse Cir	Entire Street	Lexington	1	1		4	4	4	1	2	215	2" CI		CASE YEAR 3
Kelsey Ct	Entire Street	Lexington	1	1		4	4	4	1	2	215	2.25" CI		CASE YEAR 3
Cardigan Ct	600 Block	Lexington	1	1		4	4	4	1	2	215	2.25" CI		CASE YEAR 3
King Arthur Ct	Entire Street	Lexington	1	1		4	4	4	1	2	215	2" CI		CASE YEAR 3
Tanner Ct	Entire Street	Lexington	1	1		4	4	4	1	2	215	2" CI		CASE YEAR 3
Toronto Rd	100 and 200 Blocks	Lexington	2	2		4	4	1	1	2	215	12" CI		CASE YEAR 3
Middlesex Ct	2800 Block	Lexington	1	1		4	4	4	1	2	215	2.25" CI		CASE YEAR 3
Halsted Ct	1500 Block	Lexington	1	1		4	4	4	1	2	215	2" and 6" CI		CASE YEAR 3
Kildare Ct	Entire Street	Lexington	1	1		4	4	4	1	2	215	2" CI		CASE YEAR 3
Butternut Hill Ct	Entire Street	Lexington	1	1		4	4	4	1	2	215	2.25", 6", 8" CI		CASE YEAR 3
Feltner Ct	Entire Street	Lexington	1	1		4	4	4	1	2	215	2.25" CI		CASE YEAR 3
Bowen Ct	Entire Street	Lexington	1	1		4	4	4	1	2	215	2.25" and 6" CI		CASE YEAR 3
Havelock Cir	Entire Street	Lexington	1	1		4	4	4	1	2	215	2.25" CI		CASE YEAR 3
Old Crow Ct	Entire Street	Lexington	1	1		4	4	4	1	2	215	2" and 6" CI		CASE YEAR 4
Daniel Ct	2000 Block	Lexington	1	1		4	4	4	1	2	215	2" and 6" CI		CASE YEAR 4
Whitemark Ct	4000 Block	Lexington	1	1		4	4	4	1	2	215	2.25" CI		CASE YEAR 4
Ormond Cir	3500 Block	Lexington	1	1		4	4	4	1	2	215	2" CI		CASE YEAR 4
Newtown Pike	4305-4626	Lexington	2	2		3	3	4	1	2	215	3" AC		
Yarmouth Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2" CI		CASE YEAR 3
Victoria Way	4000 Block	Lexington	2	1		3	4	4	1	2	215	2" and 8" CI		CASE YEAR 3
Saginaw Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2.25" CI		CASE YEAR 3

Rittenhouse Ct	1900 Block	Lexington	2	1		3	4	4	1	2	215	2" and 6" CI		CASE YEAR 4
Fogo Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2.25" and 6" CI		CASE YEAR 4
Birkenhead Cir	Entire Street	Lexington	2	1		3	4	4	1	2	215	2.25" and 6" CI		CASE YEAR 4
Moundview Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2" and 6" CI		CASE YEAR 4
Lisa Cir	Entire Street	Lexington	1	2		3	4	4	1	2	215	2.25" CI		CASE YEAR 4
Mona Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2.25" CI		CASE YEAR 4
Karen Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2.25" CI		CASE YEAR 4
Versie Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2" CI		CASE YEAR 4
Jannelle Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2.25" CI		CASE YEAR 4
Tammy Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2.25" CI		CASE YEAR 4
Laverne Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2.25" CI		CASE YEAR 4
Grevey Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2.25" CI		CASE YEAR 4
Lynnwood Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2.25" CI		CASE YEAR 4
Woodston Ct	Entire Street	Lexington	1	2		3	4	4	1	2	215	2.25" CI		CASE YEAR 4
Clearwood Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2.25" and 6" CI		CASE YEAR 4
Waters Edge Pl	Entire Street	Lexington	1	2		3	4	4	1	2	215	2.25" CI		CASE YEAR 4
Leitner Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2.25" and 6" CI		CASE YEAR 4
Bass Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2.25" CI		CASE YEAR 4
Swoonalong Ct	Entire Street	Lexington	1	2		3	4	4	1	2	215	2.25" CI		CASE YEAR 4
Gunbow Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2.25" CI		CASE YEAR 4
Pittman Creek Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2.25" CI		CASE YEAR 5
Timberhill Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2.25" CI		CASE YEAR 5
Elderberry Ct	Entire Street	Lexington	2	1		3	4	4	1	2	215	2.25" CI		CASE YEAR 5
La Somme Dr & Riviera Rd	Entire Street	Lexington	1	3		2	4	3	1	4	215	4" CI		
E Main St	MLK to Richmond Rd	Lexington	1	1		5	4	1	1	4	210	12" and 16" CI; 2x16" from 1900 and 1909		CASE YEAR 5
Ransom Ave	Entire Street	Lexington	1	1		5	4	2	1	2	210	6" CI; from 1911		
Shreve Ave	Entire Street	Lexington	1	1		5	4	2	1	2	210	6" CI; from 1910		
Woodland Ave	Entire Street	Lexington	1	1		5	4	2	1	2	210	6" CI; from 1891		
Kentucky Ave	Entire Street	Lexington	1	1		5	4	2	1	2	210	6" CI; from 1895		
Eastland Parkway	E Cantrill Dr - Biloxi Ct	Lexington	1	2		4	4	1	1	4	210	8" CI		
Pennebaker Dr	Entire Street	Lexington	1	2		4	4	1	1	4	210	8" CI		
Bahama Road	2030-Winchester Rd.	Lexington	1	3		3	4	1	1	4	210	8" CI		
Kilrush Dr	1100 Block	Lexington	2	2		3	4	1	1	4	210	8" CI		CASE YEAR 3
Aldershot Dr	3400 Block	Lexington	1	1		3	4	4	1	4	210	2.25" and 8" CI		CASE YEAR 3
Tanforan Dr	Entire Street	Lexington	1	1		3	4	4	1	4	210	2" and 8" CI		CASE YEAR 4
Latonia Park	Entire Street	Lexington	1	1		3	4	4	1	4	210	2.25" CI		CASE YEAR 4
Valley Farm Dr	Entire Street	Lexington	1	1		3	4	4	1	4	210	2.25" and 8" CI		CASE YEAR 4
Chris Dr and Ct	Entire Street	Lexington	1	1		3	4	4	1	4	210	2.25" and 6" CI		CASE YEAR 4
Bellmeade Rd	Entire Street	Lexington	1	1		3	4	4	1	4	210	2" and 6" CI		CASE YEAR 4
Canonero Dr	Entire Street	Lexington	1	1		3	4	4	1	4	210	2.25" and 6" CI		CASE YEAR 4
Pepperhill Rd	Gingertree to Simcoe	Lexington	2	2		3	4	1	1	4	210	8" CI		
Mirahill Dr	Entire Street	Lexington	1	1		3	4	4	1	4	210	2.25" and 6" CI		CASE YEAR 5
Macadam Dr	Entire Street	Lexington	1	1		3	4	4	1	4	210	2" and 8" CI		CASE YEAR 5
Gentry Road	177-550	Winchester	2	3		2	2	5	1	2	210	1.5" PVC		
Meadow Lane	950-1199	Lexington	1	1		4	4	2	1	4	205	6" CL		
Beacon Hill Rd	1900 Block	Lexington	2	1		4	4	1	1	3	205	8" CI		CASE YEAR 2
Terrace View Dr	Entire Street	Lexington	2	1		4	4	1	1	3	205	8" CI	QIP	CASE YEAR 3
US 25	Hurricane Hall Rd-Lisle Rd	Lexington	1	3		3	3	2	1	4	205	6" AC		
Rebel Rd	2000 Block + Court	Lexington	1	1		3	4	4	1	3	205	2" CI		CASE YEAR 2
Kelsey Pl	Half of Street	Lexington	2	2		3	4	1	1	3	205	8" CI		CASE YEAR 3
Mulberry Dr and Ct	Entire Street	Lexington	1	1		3	4	4	1	3	205	2" and 8" CI		CASE YEAR 3
Waterford Park	3200 Block	Lexington	1	1		3	4	4	1	3	205	2.25" and 6" CI		CASE YEAR 4
Fraserdale Dr	Entire Street	Lexington	1	2		3	4	2	1	4	205	6" CI		
Ascot Park	Entire Street	Lexington	1	1		3	4	4	1	3	205	2" and 6" CI		CASE YEAR 4
Ak-sar-ben Park	Entire Street	Lexington	1	1		3	4	4	1	3	205	2" and 6" CI		CASE YEAR 4
Gingertree Cir	3500 Block	Lexington	1	1		3	4	4	1	3	205	2" and 6" CI		CASE YEAR 4
Niagara Dr	Trout to End	Lexington	1	2		2	4	4	1	3	205	2" and 8" CI		CASE YEAR 4
Grand Ave	Entire Street	Lexington	1	1		5	4	1	1	2	200	8" CI; from 1884		
Tateswood Dr	600 Block	Lexington	1	1		4	4	2	1	3	200	6" CI		CASE YEAR 3
Newtown Pike	4626-5022	Lexington	2	1		3	3	4	1	2	200	2 1/4" AC		
North Cleveland Road	1301-2999	Lexington	2	1		3	3	3	1	4	200	4" AC		
Lewis St	Entire Street	Lexington	2	1		3	4	2	1	3	200	6" CI		CASE YEAR 3
Kilkenny Ct	Entire Street	Lexington	1	1		3	4	4	1	2	200	2" CI		CASE YEAR 3
Plumtree Ct	2400 Block	Lexington	1	1		3	4	4	1	2	200	2.25" and 6" CI		CASE YEAR 4
Thornberry Ct	2400 Block	Lexington	1	1		3	4	4	1	2	200	2.25" and 6" CI		CASE YEAR 4
Tanforan Ct	Entire Street	Lexington	1	1		3	4	4	1	2	200	2" CI		
Crewe Ct	Entire Street	Lexington	1	1		3	4	4	1	2	200	2.25" and 6" CI		CASE YEAR 4
Fraserdale Ct	Entire Street	Lexington	1	1		3	4	4	1	2	200	2.25" and 6" CI		CASE YEAR 4

Lookout Cir	Entire Street	Lexington	1	1		3	4	4	1	2	200	2" CI		CASE YEAR 4
Wem Ct	Entire Street	Lexington	1	1		3	4	4	1	2	200	2" CI		CASE YEAR 4
Winnipe Ct	Entire Street	Lexington	1	1		3	4	4	1	2	200	2" and 6" CI		CASE YEAR 4
Woodlake Way	Entire Street	Lexington	2	1		3	4	2	1	3	200	6" CI		CASE YEAR 4
Wood Valley Ct	Entire Street	Lexington	1	1		3	4	4	1	2	200	2.25" and 8" CI		CASE YEAR 4
Harris Ct	Entire Street	Lexington	1	1		3	4	4	1	2	200	2.25" CI		CASE YEAR 4
Grant Ct	Entire Street	Lexington	1	1		3	4	4	1	2	200	2" CI		CASE YEAR 4
Hollow Creek Ct	Entire Street	Lexington	1	1		3	4	4	1	2	200	2" CI		CASE YEAR 4
Graig Ct	Entire Street	Lexington	1	1		3	4	4	1	2	200	2.25" CI		CASE YEAR 4
Harmony Ct	Entire Street	Lexington	1	1		3	4	4	1	2	200	2.25" CI		CASE YEAR 4
Warwick Ct	Entire Street	Lexington	1	1		3	4	4	1	2	200	2" and 6" CI		CASE YEAR 4
Brandon Ct	Entire Street	Lexington	1	1		3	4	4	1	2	200	2" CI		CASE YEAR 4
Personality Ct	Entire Street	Lexington	1	1		3	4	4	1	2	200	2" CI		CASE YEAR 4
Trepassey Ct	Entire Street	Lexington	1	1		3	4	4	1	2	200	2.25" and 6" CI		CASE YEAR 5
Heaton Ct	Entire Street	Lexington	1	1		3	4	4	1	2	200	2.25" CI		CASE YEAR 5
Windwood Ct	Entire Street	Lexington	1	1		3	4	4	1	2	200	2.25" and 6" CI		CASE YEAR 5
North Cleveland Road	176-584	Lexington	3	2		2	2	4	1	2	200	2" PVC		
Montrose Drive	Entire Street	Lexington	1	1		4	4	1	1	4	195	8" CI; replace w/ approx. 1,000 of 8" DI		
Wilderness Rd	Entire Street	Lexington	2	2		3	3	1	1	4	195	8" AC		
Newtown Pike	3500-4305	Lexington	1	3		3	3	2	1	2	195	6" AC		
Kilkenny Dr	End of Street	Lexington	1	2		3	4	1	1	4	195	8" CI		
Tisdale Dr	Entire Street	Lexington	1	2		3	4	1	1	4	195	8" CI		
Lakeshore Dr	Island	Lexington	1	2		3	4	1	1	4	195	12" CI		
Moore Dr	Entire Street	Lexington	1	2		3	4	1	1	4	195	12" CI		CASE YEAR 5
Bassett Ave	Entire Street	Lexington	2	1		3	4	1	1	4	195	8" CI		
Elk Lake		Owenton	2	1		3	2	3	1	5	190	Various water mains		
Wyse Sq	Entire Street	Lexington	1	1		3	4	2	1	4	190	6" CI		
Hedgewood Ct	Whole Complex	Lexington	1	1		3	4	2	1	4	190	6" and 8" CI		CASE YEAR 4
Ferguson St	Entire Street	Lexington	2	2			4	4	1	3	190	2" and 8" CI		CASE YEAR 5
Georgetown Rd	6000-14200	Owenton	2	1		3	2	3	1	4	185	4"		
Lagonda Ave	Entire Street	Lexington	1	1		3	4	2	1	3	185	6" CI		CASE YEAR 1
Sidwell Lane	204-dead end	Lexington	2	2		2	2	4	1	2	185	2" PVC		
Spruce St	200 Block	Lexington	2	1		2	4	2	1	3	185	6" CI		CASE YEAR 1
Campbell Ln	800 Block	Lexington	2	2			4	4	1	2	185	2" CI		CASE YEAR 5
Turner Station Road	Entire Street	Lexington	1	1		4	3	2	1	2	180	6" AC		
Carriage Lane	Entire Street	Lexington	1	2		3	3	1	1	4	180	8" AC		
Grassy Creek Drive	3881-3929	Lexington	1	2		3	3	1	1	4	180	8" AC		
Osage Ct	Entire Street	Lexington	1	1		3	4	2	1	2	180	6" CI		CASE YEAR 3
Aqueduct Dr	Half of Street	Lexington	1	1		3	4	1	1	4	180	8" CI		
Stephen Foster Dr	Ox Hill to End	Lexington	1	1		3	4	1	1	4	180	8" CI		
Anderson St	Entire Street	Lexington	2	1			4	4	1	4	180	2" CI		CASE YEAR 5
Robertson St	300 Block	Lexington	1	2			4	4	1	3	175	2" and 6" CI		CASE YEAR 5
Martin Ave	Entire Street	Lexington	2	1			4	4	1	3	175	2" CI		CASE YEAR 5
Newtown Pike	3290-3500	Lexington	1	2		3	3	1	1	2	170	8" AC		
Paige Ct	2100 Block	Lexington	2	1			4	4	1	2	170	2.25" and 6" CI		CASE YEAR 5
KY 330	2600	Owenton	2	1		3	2	2	1	2	165	Road has slipped and affected the ability to maintain the main		
Iron Works Pike	1600-289	Lexington	1	1		3	3	1	1	4	165	8" AC		
Carrick Pike	100-1698	Georgetown	1	3		2	2	1	1	4	165	8" C900 & PVC		
Leestown Road	Scott Co.	Georgetown	1	3		2	2	1	1	3	160	8" C900 PVC		
Floyd Dr	Small Cluster	Lexington	1	1			4	5	1	1	160	1" CI		CASE YEAR 5
Montgomery Ave	600 Block	Lexington	1	2			4	2	1	3	155	6" CI		CASE YEAR 5
Deer Haven Road	1000-1361	Lexington	1	2		2	2	1	1	4	150	12" PVC		
Coolidge St	Entire Street	Lexington	1	1			4	2	1	4	145	6" CI		
											0			
											0			

MAIN REPLACEMENT CRITERIA						
Criteria (Max. Points)	***Weight***	***Rating***				
		1	***2***	***3***	***4***	***5***
Low Pressure (75)	15x	50 psi or greater	50 psi to 45 psi	45 psi to 40 psi	40 psi to 35 psi	< 35 psi
Number of Breaks/Leaks (75)	15x	0 breaks/5-year avg.	1-2 breaks/5-year avg.	3-4 breaks/5-year avg.	5-6 breaks/5-year avg.	< 6 breaks/5-year avg.
Fire Flow (50)	10x	Greater than 1,500 gpm (Blue)	1,500 to 1,000 gpm (Green)	999 gpm to 500 gpm (Yellow)	Less than 500 gpm (Red)	Known problems
Age (75)	15x	1995 or later	1980 to 1994	1970 to 1979	1960 to 1969	1959 and prior
Material Type (75)	15x	DI/RCP	PVC/HDPE	Transite/AC	CI/CLCI	Gal. / Steel
Size of Main (50)	10x	8 inch and above	6 inch	4 inch	2 inch to 3 inch	Main smaller than 2 inch
Water Quality (75)	15x	Flushing but not routine	Monthly Flushing	Bi weekly Flushing	Weekly (or more frequent) Flushing	Continuous Flushing (w/ discussion)
Customer Impact (25)	5x	less than 2 customers	2 to 10 customers	11 to 20 customers	greater than 20 customers	School/Hospital (Critical Customer)

KENTUCKY-AMERICAN WATER COMPANY
CASE NO. 2020-00027
COMMISSION STAFF'S SECOND POST-HEARING REQUEST FOR INFORMATION

Witness: Kurt Stafford

3. Refer to Case No. 2018-00358, the O'Neill Testimony, Exhibit 2, pages 24-25, which projects replacing 42,990 feet of main at a cost of $6,448,500 in year one of the proposed QIP. In this proceeding, Kentucky-American proposes to replace 32,160 feet of main at a projected cost of $7,400,000.

a. Provide a list of Line B main replacement projects proposed in this proceeding in the same granular detail as was provided in Case No. 2018-00358.

b. Explain in detail the basis for the difference between the projected year one QIP projects identified in Case No. 2018-00358 and the Line B main replacement projects identified in this proceeding.

c. Identify the projects that were included in or excluded from the Line B main replacement projects in this proceeding as opposed to those proposed in the year one proposed QIP projects in Case No. 2018-00358, and explain why a project was included or excluded.

Response:

a. Pages 24-25 of Mr. O'Neill's Testimony, Exhibit 2, include a map and information (street location, replacement footage and estimated cost) for each projected year-one QIP project shown on the map. Page 24 of Mr. O'Neill's Testimony contains a map highlighting mains to replaced. As part of the proposed QIP filing, KAW provided individual maps for each of the seven main replacement project areas as Exhibit 3 to the QIP Application. Page 25 of Mr. O'Neill's Testimony contains information on projected year-one QIP projects (street location, replacement footage and estimated cost). KAW provided information for each of the seven main replacement projects proposed in this QIP case in Mr. Stafford's Direct Testimony. Please see pages 8-9 of his testimony setting forth project replacement footages, streets located within the project areas, material and size of mains to be replaced, along with the proposed main replacement pipe material and size. Additionally, in KAW's response to PSC 1-3 in this matter, KAW provided the expected start and completion dates for each of the seven proposed main replacement projects. Later, as part of KAW's response to PSC 2-5, KAW provided the estimated in-service month for each of the seven proposed main replacement projects. Below is a table showing the estimated cost for each of the seven proposed main replacement projects, the total of which is approximately the $7.4 million amount set forth in Exhibit 1 to Mr. Stafford's Direct Testimony in this matter.

Project	Amount of Main to be Replaced (Feet)	Anticipated Cost
Versailles Road Area - Phase 1	3,300	$759,000
Versailles Road Area - Phase 2	2,470	$568,100
State Street - Phase 1	3,750	$862,500
State Street - Phase 2	3,720	$855,600
Winchester Road	8,000	$1,840,000
Castlewood - Phase 1	6,170	$1,419,100
Castlewood - Phase 2	4,750	$1,092,500

b. The projects outlined on pages 24-25 of Mr. O'Neill's Testimony, Exhibit 2, contain smaller segments of main identified by the assessment tool as being in higher need of replacement. On page 13 of Exhibit 2, Mr. O'Neill notes that the assessment tool needs to consider external factors. The seven main replacement projects proposed in the QIP filing represent a balance of external factors and the main replacement assessment tool. External factors that have helped identify these projects include roadway paving schedules, knowledge of upcoming municipal projects, and impact on Customers. The projects were coordinated to ensure that they will not impact recently paved streets or planned paving projects. Additionally, rather than replace shorter segments of main on specific streets, the proposed projects are slightly larger in order to replace all cast iron and asbestos cement mains within a larger footprint. This reduces repeated Customer impacts caused by performing multiple smaller projects in an area. QIP will include the replacement of approximately 300 miles of cast iron water mains over a 25-year time period. This means projects need to be prudently planned to reduce Customer impact while considering applicable external factors and the results of the assessment tool. Please see Attachment KAW_R_PSCHDR2_NUM002A_052820. All the mains shown in this file rank relatively high on the assessment tool. There is generally overlap between the mains identified for replacement in this QIP proceeding and the mains developed for the projected initial five-year QIP period in Case No. 2018-00358. All of the proposed mains to be replaced within this proceeding fall within the total weighted score of the mains developed for the projected initial five-year QIP period in Case No. 2018-00358 with the majority in the top half of the list.

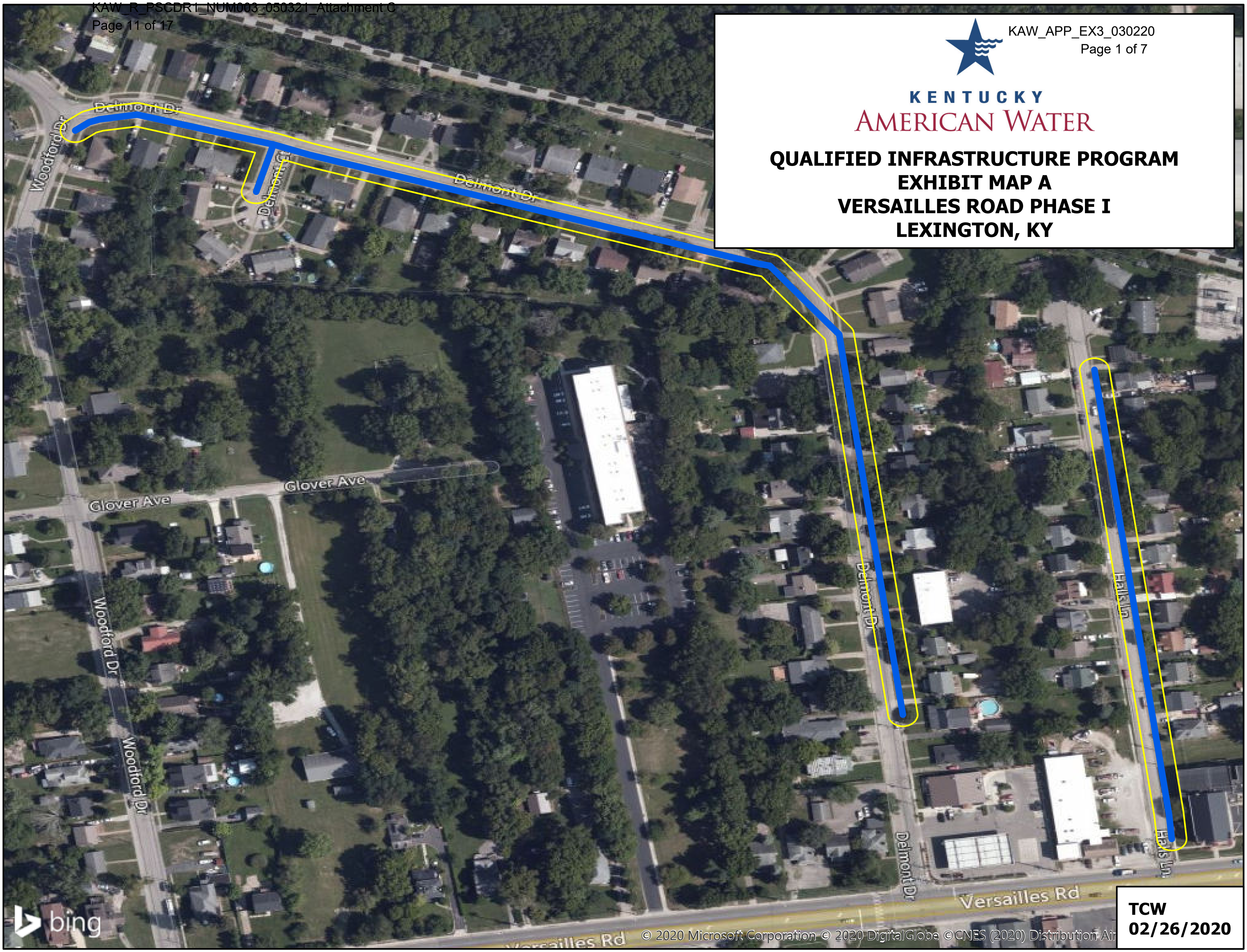
In Case No. 2018-00358, Mr. O'Neill's Testimony, Exhibit 2, showed projects replacing 42,990 feet of main at a cost of $6,448,500 in year one of the proposed QIP. In this proceeding, KAW is proposing to replace 32,160 feet of main at a projected cost of $7,400,000. One difference to note here is that the Lexington-Fayette Urban County Government has modified their paving and restoration specifications. This requires additional paving and restoration for projects located within rights-of-way. These modifications include full lane width paving and even up to curb-to-curb paving depending on the amount and extent of pavement cuts. Historically, these paving and restoration requirements were not as extensive when Case No. 2018-00358 was developed. If one compares the average price per foot of main replacement between

Case No. 2018-00358 and the current QIP proceeding, it is $150 per foot versus $230 per foot, respectively. The main difference in these two estimates is related to additional paving and restoration requirements within rights-of-way.

c. As discussed in item b above, all the mains proposed to be replaced within this proceeding fall within the total weighted score of the mains developed for the projected initial five-year QIP period in Case No. 2018-00358 with the majority in the top half of the list. The assessment tool is only a tool which also needs to consider other external factors described in part b above. Therefore, KAW believes the seven main replacement projects outlined in this filing represent cast iron mains in high need of replacement.

KENTUCKY AMERICAN WATER

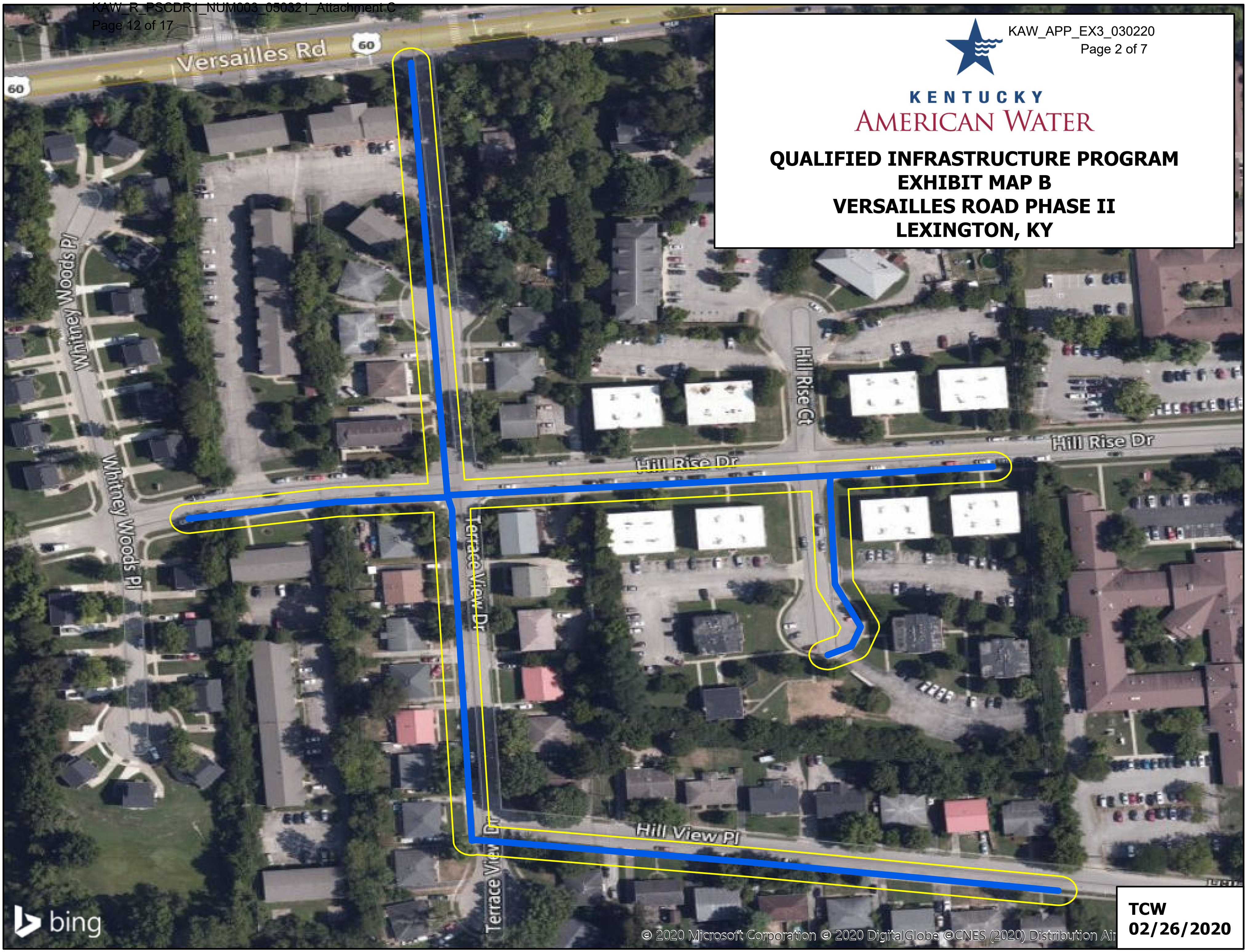
QUALIFIED INFRASTRUCTURE PROGRAM
EXHIBIT MAP A
VERSAILLES ROAD PHASE I
LEXINGTON, KY



TCW
02/26/2020

KENTUCKY AMERICAN WATER

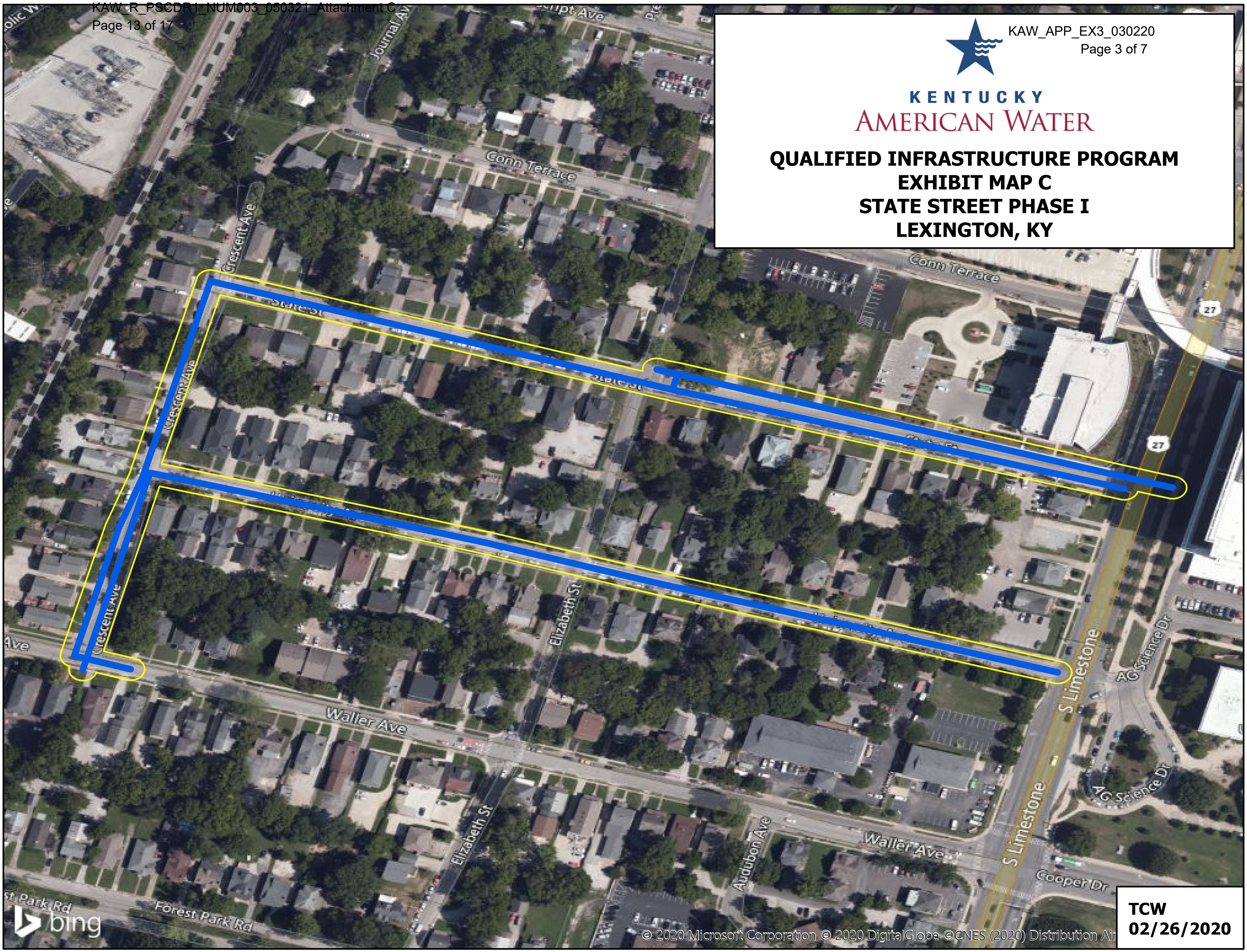
QUALIFIED INFRASTRUCTURE PROGRAM
EXHIBIT MAP B
VERSAILLES ROAD PHASE II
LEXINGTON, KY



TCW
02/26/2020

KENTUCKY AMERICAN WATER

QUALIFIED INFRASTRUCTURE PROGRAM
EXHIBIT MAP C
STATE STREET PHASE I
LEXINGTON, KY



TCW
02/26/2020


KAW_APP_EX3_030220
Page 4 of 7
KENTUCKY
AMERICAN WATER
QUALIFIED INFRASTRUCTURE PROGRAM
EXHIBIT MAP D
STATE STREET PHASE II
LEXINGTON, KY
Press Ave
Gazette Ave
Transcript Ave
Conn Terrace
College of Medicine
Leader Ave
S Limestone
27
UK Alber
Parking Structure #8
State St
bing
© 2020 Microsoft Corporation © 2020 DigitalGlobe ©CNES (2020) Distribution Air
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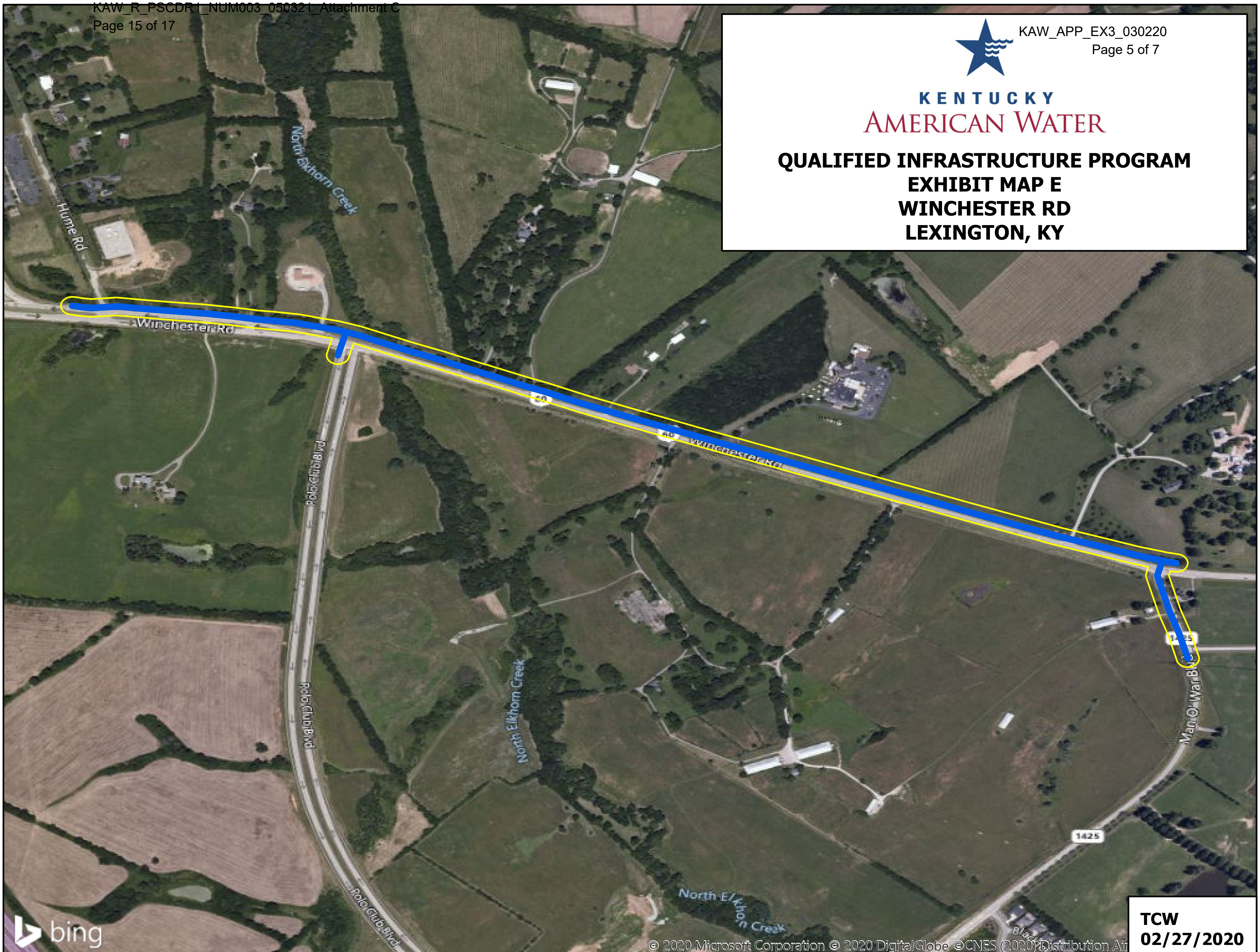
KENTUCKY AMERICAN WATER

QUALIFIED INFRASTRUCTURE PROGRAM
EXHIBIT MAP E
WINCHESTER RD
LEXINGTON, KY



TCW
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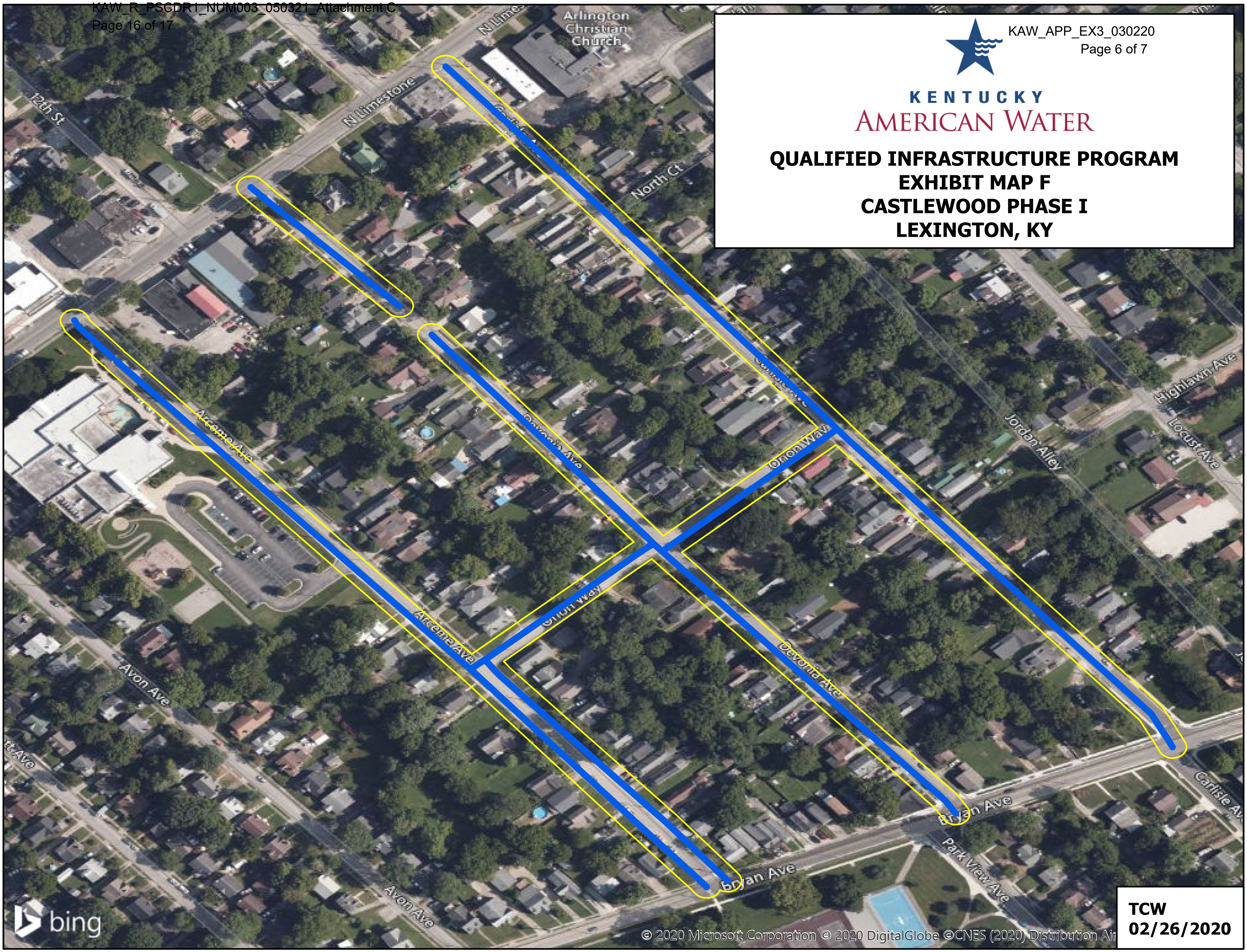
KENTUCKY AMERICAN WATER

QUALIFIED INFRASTRUCTURE PROGRAM
EXHIBIT MAP F
CASTLEWOOD PHASE I
LEXINGTON, KY



TCW
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KENTUCKY AMERICAN WATER

QUALIFIED INFRASTRUCTURE PROGRAM
EXHIBIT MAP G
CASTLEWOOD PHASE II
LEXINGTON, KY

TCW
02/26/2020

Witness: Brent E. O'Neill, Krista E. Citron

4. Refer to Kentucky-American's Response to Staff's First Request, Item 14.

   a. Explain in detail why QIP construction expenditures increased dramatically between October 2020 and March 2021.

   b. Explain and describe in detail why there were only $634 in QIP expenditures in May 2020 and what projects were completed using those funds.

   c. Explain and describe in detail why there were $2,155,424 in QIP expenditures in March 2021 and what projects were completed using those funds.

   d. Explain why there are construction expenditures of $101,208 outside of the test period. Please identify the specific projects and purposes of those construction expenditures.

Response:

a. There are several reasons why QIP construction expenditures increased between October 2020 and March 2021. The biggest part of this was due to some delays in the early months of the QIP Year 1 Period. First, the COVID-19 pandemic slowed construction in the middle and latter half of 2020 due to additional restrictions around worker interaction and travel as well as limited crew availability as contractors tried to reduce potential exposures. Similar delays also carried into material deliveries such as pipe and fitting in the latter part of 2020. Lead times on these items were increased. Finally, engineering designs for the 7 budget line B QIP Year 1 main replacement projects were not started in earnest until the QIP Year 1 Order was received on June 17, 2020 allowing for their inclusion in QIP Year 1. These three factors contributed to a slower than expected start in the early months of QIP Year 1. However, after overcoming these obstacles, work on QIP Year 1 projects has ramped up. As noted in KAW_PSCDR1_NUM015_041621, KAW is on track to place all the QIP Year 1 projects in service by June 30, 2021.

b. As mentioned in the response to part a, design work on these projects was not begun in earnest until the QIP Year 1 Order was received on June 17, 2020. This QIP expenditure of $634 in May 2020 was related to the design of the Winchester Road Main Replacement Project.

c. The $2,155,424 of expenditures in March 2021 breaks down to $2,068,737 related to budget line B main replacements and $86,687 related to budget line C or unscheduled main replacements. The spend related to budget line B projects were related to construction work for Winchester Road, Versailles Phases 1 and 2, State Street Phases 1 and 2 and Castlewood Phases 1 and 2.

d. These QIP expenditures are related to the design of main replacement projects including Versailles Road Phase 1, State Street Phase 1, Castlewood Phase 1 and Winchester Road. In order to begin construction after the QIP year 1 began in July 2020, consultant engineering design work needed to be initiated prior to July 1, 2020.

Witness: Brent E. O'Neill, Krista E. Citron

5. Refer to Kentucky-American's Response to Staff's First Request, Item 15. Explain why only 10 percent of QIP1 plant additions was placed in service between July 2020 and March 2021, and provide the total expected QIP 1 plant additions that are expected to be in service by June 30, 2021.

Response:

Construction start dates for QIP Year 1 occurred in a more condensed timeline than originally projected. Please see part a of KAW_PSCDR2_NUM004_050321 for the reasons for that delay which include COVID-19 related delays for labor and materials as well as Kentucky-American waiting for the approving Order in Case No. 2020-00027 on June 17, 2020 before ramping up QIP project designs and construction. As a result, multiple projects are under construction at the same time and will go into service around the same time, rather than the staggered in-service dates that were projected. By June 30, 2021, the Company anticipates that all or nearly all of the QIP 1 budget line B and C projects will be placed in service, totaling approximately $8.3 million.

Witness: Brent E. O'Neill, Krista E. Citron

6. Refer to Kentucky-American's Response to Staff's First Request, Items 17 and 19. Also refer to Case No. 2018-00358,[2] June 27, 2019 Order, which cited Kentucky-American President Nick Rowe's testimony that Kentucky-American would spend between $6 million to $10 million in annual incremental capital spending on QIP projects, and the Commission's finding that it was reasonable to "approve an alternative cost recovery based on smaller, more gradual rate increases" as one of the bases the Commission approved the QIP.

   a. Explain in specific detail what "economies of scale" are achieved by expanding the scope and scale of QIP projects, and provide a schedule of the economies of scale that Kentucky-American expects to achieve with these projects.

   b. Provide the expected in-service dates for the QIP2 projects.

   c. Explain Kentucky-American's rationale for doubling-to-tripling the amount projected to be expended annually on QIP projects between Mr. Rowe's May 13, 2019 hearing testimony and the proposed QIP2 projects filed in April 2021.

   d. Provide an estimate of the annual cost for QIP plant additions for QIP 3 in 2022-2023, QIP 4 in 2023-2024, and QIP 5 in 2024-2025.

   e. Please explain why projects on QIP Exhibit Maps C, I and J are included in QIP 2 when they appear not to have been included in Exhibit 2 to Mr. O'Neill's testimony in Case No. 2018-00358.

Response:

a. The economies of scale related to QIP projects are achieved by doing larger area replacement projects which reduce the number of contractor mobilizations and demobilizations and also minimize the amount of crew downtime as construction crews work within the same area for several months.[3] Mobilization and demobilization charges consist of crew time to set up and break down equipment and move between job sites.

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[2] Case No. 2018-00358, *Electronic Application of Kentucky-American Water Company for an Adjustment of Rates* (Ky. PSC June 27, 2019), Order at 74 and 81.

[3] The Commission has recognized the general concept that fewer larger projects can result in economies of scale when compared to more numerous smaller projects. Case No. 2020-00016, *Application of Louisville Gas and Electric Company and Kentucky Utilities Company for Approval of a Solar Power Contract and Two New Renewable Power Agreements to Satisfy Customer Requests for a Renewable Energy Source under Green Tariff Option #3, (*PSC Order, June 18, 2020, at p. 10).

Costs are incurred for transporting and storing heavy equipment such as excavators, pumps and other machinery. Crew time is not efficient because they are dedicated to setting up and breaking down equipment instead of focusing on the installation of pipe. In typical pipeline projects, mobilization and demobilization account for roughly 7-10% of the project cost. Additionally, if crews are able to work continuously in adjacent areas, labor costs are maximized with minimal down time. This results in favorable labor costs and resulting "economies of scale." Finally, the pipe and other materials for the work are procured by American Water through our national contracts and supplied to contractors. The high volume at which American Water procures these materials helps create economies of scale which reduce material costs. Maximizing the efficiency of labor while reducing material costs and multiple mobilization and demobilizations creates economies of scale which benefit Customers and the reliability of the water system.

KAW does not bid out projects in a manner that produces the data necessary to provide the economies of scale "schedule" requested in this question. For example, KAW does not bid a 1-mile pipe replacement project in 1/10 mile increments, 1/4 mile increments, or 1/2 mile increments. It bids it out as a 1-mile project instead of several smaller piecemeal projects. Clearly, it would be less efficient to contract for ten separate 1/10 mile projects than to contract for a single 1-mile project. So, while KAW does not have the data necessary for a schedule, it does note that the cost per foot of pipe replacement projects is generally lower, all things being equal, as the amount of pipe to be replaced increases (see the example below from two developer green site projects).

Project	Scope	Total Cost	Price per Foot
Waldorf Estates at Deer Haven Lane	Install 1,480' of 8-inch ductile iron pipe, 2 hydrants	$94,059	$64
Candlewood Suites at Waller Avenue	Install 780' of 8-inch ductile iron pipe, 3 hydrants, 1 fire service	$103,446	$133

b. QIP 2 projects have been organized into two groups for ease of bidding and to utilize available contractor crews efficiently. The first group of projects will be bid during May-June 2021, with estimated construction start dates in July-August 2021. In service dates are estimated in October-November 2021. Group 2 projects will be bid in October-November 2021, with estimated construction start dates in December 2021-January 2022, and in service dates of April-May 2022. Within these groups, projects may move ahead or back based on factors including but not limited to coordination with other utilities or availability of contractors.

QIP 2 projects are shown on individual maps at Exhibit 3 of the Application in this case and are labeled as "Map A," "Map B," etc. Group 1 projects are: A, B, C, D, E, F, G, H, I, J, K, L as labeled in Exhibit 3 to the Application. Group 2 projects are: M, N, O, P, Q, R, S as labeled in Exhibit 3 to the Application.

c. KAWC disagrees that the amount was doubled or tripled. It should be noted the $6 to $10 million in annual incremental capital spending on QIP projects which is referenced from Mr. Nick Rowe's testimony is not total amount of spend expected for budget line B or pipe replacement projects. It was the amount of accelerated spending expected for QIP projects when the 2018 rate case was submitted (Case No. 2018-00358). It was expected that existing levels of spending would continue at their existing pace with an incremental increase of $6 to $10 million annually across QIP eligible projects. To help illustrate this, please see KAW_PSCDR2_NUM006_050321_AttachmentA. This was a sample Strategic Capital Expenditure Plan or "SCEP" submitted as KAW_R_AGDR1_NUM059_012519 in Case No. 2018-00358. See the expected spend for 2023 as an example. KAW is expecting to spend $12 million on the B2 or QIP – Mains – Replaced/Restored projects. This spend is specifically for cast iron and galvanized replacements. For 2023, KAW projected to invest a total of $19,521,960 for QIP eligible projects. The $6 to $10 million figure referenced in Mr. Rowe's testimony is the accelerated or incremental amount of the $19,521,960 above the normally expected spend which helps KAW increase its water main replacement rate and replace critical aging infrastructure. It should also be noted that the yearly totals on this sample SCEP are shown on a calendar year basis whereas QIP Years 1 and 2 have test years from July 1st to June 30th.

   Additionally, KAW's QIP proposal in this case is consistent with the Commission's June 17, 2020 decision in Case No. 2020-00027 (KAW's QIP 1 case) and its focus on the replacement of mains. In fact, at the May 12, 2020 hearing in that matter, then Vice Chairman stated that the Commission wants KAW to use the QIP to focus on replacing pipe[4] and that the Commission wants "more money spent on main replacement"[5] than on other asset classes. Following that directive, KAW's proposal in this case focuses on main replacement.

d. The estimated annual cost for QIP plant additions for QIP Years 3-5 will be similar to QIP Year 2. They will include similar level of spend for budget lines B, C, F and H and continue the strong focus on cast iron and galvanized main replacement projects.

e. Exhibit 2 to Mr. O'Neill's testimony was an educated projection of QIP projects made at a single point in time when that exhibit was prepared. But it was never intended to be an inflexible mandate of exactly which projects would occur in each QIP year. As previously mentioned, external drivers must be considered in addition to annual updates to the prioritization model. Rankings from the prioritization model are not static and change from year-to-year and KAW needs to be and is flexible and nimble in deciding which projects to include in any given QIP year. The rankings for the main in projects C, I and J fall between a score of 215 to 325 which is well within the range of other QIP Year 1 and 2

[4] Case No. 2020-00027, May 12, 2020 Video Hearing, 9:54:53 a.m. and 10:03 a.m. through 10:05:30 a.m.
[5] Case No. 2020, 00027, May 12, 2020 Video Hearing, 10:48:47 a.m.

projects. Please see the results of the most recent prioritization model at KAW_R_PSCDR1_NUM012_041621_Attachment. Project C consists of Bluegrass and Highlawn Avenues which rank 280 and 325 respectively. Project I consists of Montclair Drive that ranks 220 and Project J includes Scoville, Summit and Eldemere which all rank 215. The rankings for all QIP Year 2 projects fall between 180 and 325.

Witness: Brent E. O'Neill, Krista E. Citron

7. Refer to Kentucky-American's Response to Staff's First Request, Item 18. Also refer to Case No. 2018-00358, Kentucky-American's Post-Hearing Brief,[3] which projected that Kentucky-American would spend an additional $4 to $10 million annually to replace aging distribution under the proposed QIP in the first 20 years of its 40 year planning horizon.

   a. Explain why Kentucky-American did not revise the estimated cost of the QIP for pavement restoration given that Lexington-Fayette Urban County Government revised the rights-of-way ordinance in March 2019, which was two months before the May 13, 2019 formal hearing in Case No. 2018-00358 and Kentucky-American filed its post-hearing brief on May 31, 2019.

   b. State when Kentucky-American began to utilize corrosion control practices, include using a heavier class of ductile iron pipe and a protective zinc coating on the pipe exterior, which increased the price per foot cost from $150 per foot to $250 per foot.

   c. Has Kentucky-American performed a cost-benefit analysis on these additional corrosion control practices?

   d. Has Kentucky-American identified issues with corrosion that were previously not identified?

Response:

a. At the time the filings were submitted in 2019, Kentucky-American did not yet know the cost impact of the revisions to the ordinance on pavement restoration practices. Only as Kentucky-American completed main replacement projects following the revision did the additional costs associated with paving become apparent. The ordinance does not provide a straightforward process for estimating the amount of pavement that will be required to be restored. Projects are evaluated on a street by street basis by LFUCG inspectors.

b. Since 2018, American Water has been utilizing heavier classes of pipe and corrosion prevention measures to counteract premature ductile iron pipe failures. These practices did not cause a price increase of $100 per foot. The bulk of the cost increase is due to increased pavement restoration requirements. Zinc coating on ductile iron pipe increases the cost by approximately $2-3 per linear foot, and the

[3] Case No. 2018-00358, Kentucky-American Post-Hearing Brief (filed May 31, 2019) at 10.

heavier class of pipe is an increase of approximately $2-4 per linear foot on the typical pipe sizes for QIP main replacement projects.

c. No cost-benefit analysis has been performed to date. However, given the low cost of the zinc coating, it is prudent to use this measure of protection for the pipe which increases its longevity. In conjunction with the thicker walled pipe class, the ductile iron pipe is better able to resist corrosion or thinning of the pipe wall which leads to breaks. Use of zinc coating helps ductile iron pipe last through its expected useful life under corrosive conditions.

d. Kentucky-American periodically uncovers corroded ductile iron or cast iron mains when responding to main breaks. While Kentucky is not prone to extensive areas of highly corrosive soil types, KAW has uncovered areas where corrosion has occurred due to interaction with the soil or because of electric currents near the pipe. The measures outlined in parts b and c prevent corrosion and breaks in newly installed mains.

Witness: Brent E. O'Neill, Krista E. Citron

8. Refer to Kentucky-American's Response to Staff's First Request, Item 24. For the hydrants, valves, and services replaced in 2020 that were not part of the QIP1 projects, provide the total cost to replace those hydrants, valves, and services and indicate the amount of the total cost that was attributable to replacing mains connected to those hydrants, valves, and services.

Response:

Hydrants and valves replaced total cost for 2020: $368,926.77. Of this, approximately $40,250 was attributable to replacing mains connected to those hydrants and valves.

Services replaced total cost for 2020: $946,106.17. As noted in the response to Item No. 1(b) of these data requests, service lines are small diameter water mains that connect larger transmission and distribution mains to individual meters. Thus, all $946,106.17 of the spend on service replacements is attributable to replacing these small diameter mains.

KENTUCKY-AMERICAN WATER COMPANY
CASE NO. 2021-00090
COMMISSION STAFF'S SECOND REQUEST FOR INFORMATION

Witness: Brent E. O'Neill, Krista E. Citron

9. Refer to the Direct Testimony of Kurt A. Stafford, pages 13–14 and to Case No. 2020-00027 Direct Testimony of Kurt A. Stafford, pages 12–13. In the table below is a comparison of the projected costs in QIP year 1 and 2 for Line Item F (Hydrants and Valves) and Line Item H (Service Lines). Provide a detailed explanation for the cost installation differences between QIP year 1 and QIP Year 2.

		Direct Testimony of Kurt A. Stafford					
		CN 2020-00027; QIP 1			CN 2021-00090; QIP 2		
		No.	Amount	Cost per Installation	No.	Amount	Cost per Installation
a.	Line F - Valves	70	$ 500,000	$ 7,142.86	37	$ 674,000	$ 18,216.22
b.	Line F - Hydrants	32	$ 175,000	$ 5,468.75	23	$ 126,000	$ 5,478.26
c.	Line H - Service Lines	118	$ 530,000	$ 4,491.53	242	$ 530,000	$ 2,190.08

Response:

For Budget Line F for hydrants, the cost per installation is nearly identical between QIP 1 and QIP 2. The average cost per hydrant replacement was $5,468.75 and $5,478.26 for QIP 1 and 2, respectively.

For Budget Line H for service lines, it should be noted that there was a correction to the quantity of service lines projected to be replaced in QIP 1 in Case No. 2020-00027. KAW made that correction on March 25, 2020 when it responded to Items 4 and 6(b) of Commission Staff's First Set of Information Requests. KAW explained the correction in response to PSC 1-6(b) in that case and the corrected data was provided in Table 6 of the Excel file that accompanied PSC 1-4 in that case. An image of Table 6 in that Excel file is:

Table 6 - Services and Laterals Replaced

District	Estimated Quantity	Estimated Unit Cost	Estimate Total
Central - Short Side Service	180	$1,500	$270,000
Central - Long Side Service	50	$4,500	$225,000
Northern - Service	30	$1,200	$36,000
		Total	*$531,000*

The total spend was $531,000 to replace a total of 260 services (not 180 as noted in question). This equates to an average cost per service line replacement of $2,042.31. Taking this correction into account, the projected cost per replacement is $2,042.31 in QIP 1 versus $2,190.08 in QIP 2. Similar to the hydrant portion of budget line F, these numbers are extremely close.

For Budget Line F for valves, the average project cost per valve replacement is $7,142.86 in QIP 1 versus a projected $18,216.22 in QIP 2. The main reason for this difference is that in QIP 2, there are several larger transmission valves slated for replacement which are estimated to cost approximately $50,000 each. These large transmission valve replacement projects significantly increase the average cost for QIP 2. In QIP 1, the majority of the valve replacements were for distribution line valves instead of transmission line valves. Distribution line valves typically cost less to replace due to lower material costs, less labor, and less pavement restoration.

KENTUCKY-AMERICAN WATER COMPANY
CASE NO. 2021-00090
COMMISSION STAFF'S SECOND REQUEST FOR INFORMATION

Witness: Brent E. O'Neill, Krista E. Citron

10. Please refer to Kentucky-American's Response to Staff's First Request, Item 9. Has any galvanized pipe been identified for any of the projects for replacement? If so, please identify those projects. If not, please explain why not.

Response:

For QIP 2, no projects are for galvanized pipe. Kentucky-American's system contains approximately 3.2 miles of galvanized pipe compared to over 310 miles of cast iron pipe, so the focus for QIP 2 is small diameter cast iron mains. Projects containing galvanized pipe may be selected as part of QIP 3-5 if their ranking in the prioritization model is consistent with the cast iron main projects that are selected. As noted in the response to Item 6(e) of these data requests, all QIP Year 2 projects rankings fall between 180 and 325.

KENTUCKY-AMERICAN WATER COMPANY
CASE NO. 2021-00090
COMMISSION STAFF'S SECOND REQUEST FOR INFORMATION

Witness: Brent E. O'Neill, Krista E. Citron

11. Please refer to Kentucky-American's Response to Staff's First Request, Item 11 and Kentucky-American's Application, Exhibit 3. Please explain the rationale for including projects on QIP Exhibit Maps D, E and J in QIP2 if there have been no main breaks on those projects in the last 10 years.

Response:

The statement about the number of leaks on Projects D, E and J is not entirely accurate. As shown in response to PSC 1-11, Projects D and E have both had 2 leaks within the past 10 years. Project J has had 0 leaks within the past 10 years.

It should be noted that the presence of leaks or breaks is important but not the sole factor in prioritizing when and which mains should be replaced. Other factors include pressure levels, fire flow levels, age of pipe, pipe material, pipe size, water quality, and customer impact. This list of criteria is used to determine the replacement priority. Thus, while the number of main breaks on a given section of pipe is important, it is one of the eight criteria used to rank aging mains. It is weighted 15 points of a total of 100. This illustrates the relative importance of main breaks in the model. Factoring in the other 7 criteria, projects D, E and J all fall within the 180 to 325 score of QIP Year 2 mains. For more information, please see the prioritization model KAW provided at KAW_R_PSCDR1_NUM012_041621_Attachment.

KENTUCKY-AMERICAN WATER COMPANY
CASE NO. 2021-00090
COMMISSION STAFF'S SECOND REQUEST FOR INFORMATION

Witness: Todd P. Wright

12. Please refer to Kentucky-American's Response to Staff's First Request, Item 13.

    a. Why is the accumulated depreciation so much less at 12/31/2020 and 6/30/2021 than the amount authorized at 6/30/2020?

    b. Why is the accumulated depreciation change more than the change in utility plant at original cost from 6/30/2021 to 6/30/2022 without QIP?

    c. Why is the net original cost rate base decreasing from the actual amount at 12/31/2020 through 6/30/2022 without QIP?

Response:

a. The amount authorized at 6/30/2020 was based on the Company's projections made as part of Case No. 2018-0035 (KAW's last rate case) based on the 22-month period from 09/01/2018 through 06/30/2020. The actual amount of original cost retirements recorded, the cost of removal expenditures charged, and the salvage receipts received to the depreciation reserve were higher than what was included in the forecasted 22-month period ended 06/30/2022.

A 3-year historical average was utilized in forecasting the authorized depreciation reserve in the last case and was based on the historical years 2015 – 2017. Forecasted retirements were $4.98M based on the 3-year average of $2.72M. Forecasted cost of removals were $2.47M based on 3-year average of $1.35M. Forecasted salvage were ($266K) based on 3-year average of ($145K). Actuals were $8.61M, $8.43M, and ($57K), respectively.

Actuals are higher than what was forecasted because what was experienced in 2019 and 2020 was different than what was experienced in the 2015-2017 period used for projections. Reasons for this are, but not limited to, specific larger investment projects not performed in the historical years, retirement only projects not performed in the historical years, more general plant assets reaching the end of their service lives, and the value of salvage receipts not experienced as compared to the historical years. It should be noted that retirements also reduce the Utility Plant in Service line as shown in Kentucky-American's Response to Staff's First Request, Item 13. For rate base purposes, retirements offset to zero in the total rate base amount for the company.

b. Depreciation expense from plant in-service prior to the QIP test periods is greater than the non-QIP utility plant investment for the QIP test years.

c. Refer to the response to b.

KENTUCKY-AMERICAN WATER COMPANY
CASE NO. 2021-00090
COMMISSION STAFF'S SECOND REQUEST FOR INFORMATION

Witness: Brent E. O'Neill, Krista E. Citron

13. Please refer to Kentucky-American's Response to Staff's First Request, Item 17. The response is unresponsive.

    a. Please identify in the table whether the proposed scope of the project is less than, the same or greater than the project identified in O'Neill Direct Testimony, Exhibit

    b. Please provide a table that includes the amount of pipe to be replaced for each project in QIP2, identified by both size and material, and the estimated cost of the project, compared to the same information for the projects from O'Neill Direct Testimony, Exhibit 2 identified in the table in Part a.

Response:

a. Many of the Exhibit 2 projects are smaller sections of cast iron mains or individual blocks of streets that have been combined or redistributed into larger projects proposed for QIP 2. Thus, they are larger in scope than the standalone projects in Exhibit 2. For example, see Stafford Map A, which contains four of the Exhibit 2 identified projects under one single project proposed. This helps to minimize customer disruption and increase economies of scale while still achieving the primary goal of the QIP program which is to replace aging cast iron pipe. KAW strives to group and work the projects in the most efficient way while still achieving that goal. The same is true for the projects approved in QIP 1. Please also see the responses to Item 3(a) and 6(e).

   To be as responsive as possible to the question which seeks a "less than or greater than" response, KAW has done so in the table below. But that does not necessarily mean that the sum of a QIP 2 project is "greater than" its individual components in Exhibit 2 as explained in the example provided above. A more accurate description would be "expanded from Exhibit 2" based on combining of smaller projects as described in the far right column below and as shown in the Excel file produced in response to part b of this question.

Exhibit 2 Year 1 Project #2	Stafford Map Exhibit G	Greater than Exhibit 2	QIP Year 2 project contains 6 streets, Exhibit 2 project is 1 street.
Exhibit 2 Year 1 Project #7	Stafford Map Exhibit N	Greater than Exhibit 2	QIP Year 2 project contains 3 streets, Exhibit 2 project is 2 streets.

Exhibit 2 Year 1 Project #33	Stafford Map Exhibit H	Greater than Exhibit 2	QIP Year 2 project contains 3 streets, Exhibit 2 project is 2 streets.
Exhibit 2 Year 1 Project #36	Stafford Map Exhibit A	Greater than Exhibit 2	QIP Year 2 project contains 4 streets, Exhibit 2 project is 1 street.
Exhibit 2 Year 1 Project #37	Stafford Map Exhibit A	Greater than Exhibit 2	QIP Year 2 project contains 4 streets, Exhibit 2 project is 1 street.
Exhibit 2 Year 2 Project #1	Stafford Map Exhibit A	Greater than Exhibit 2	QIP Year 2 project contains 4 streets, Exhibit 2 project is 1 street.
Exhibit 2 Year 2 Project #2	Stafford Map Exhibit A	Greater than Exhibit 2	QIP Year 2 project contains 4 streets, Exhibit 2 project is 1 street.
Exhibit 2 Year 2 Project #3	Stafford Map Exhibit H	Greater than Exhibit 2	QIP Year 2 project contains 3 streets, Exhibit 2 project is 2 streets.
Exhibit 2 Year 3 Project #29	Stafford Map Exhibit P	Greater than Exhibit 2	QIP Year 2 project contains 9 streets, Exhibit 2 project is 4 streets.
Exhibit 2 Year 3 Project #36	Stafford Map Exhibit O	Greater than Exhibit 2	QIP Year 2 project contains 3 streets, Exhibit 2 project is 2 streets.
Exhibit 2 Year 3 Project #50	Stafford Map Exhibit L	Greater than Exhibit 2	QIP Year 2 project contains entire streets, Exhibit 2 project is singular blocks of the same streets.
Exhibit 2 Year 4 Project #1	Stafford Map Exhibit S	Greater than Exhibit 2	QIP Year 2 project contains entire streets, Exhibit 2 project is singular blocks of the same streets.
Exhibit 2 Year 4 Project #10 (partial)	Stafford Map Exhibits Q (partial) and R (partial)	Greater than Exhibit 2	Exhibit 2 project contains 4 streets that are split over 2 QIP Year 2 projects. Together, the QIP Year 2 projects contain 7 streets.
Exhibit 2 Year 4 Project #11	Stafford Map Exhibit S	Greater than Exhibit 2	QIP Year 2 project contains entire streets, Exhibit 2 project

			is singular blocks of the same streets.
Exhibit 2 Year 4 Project #29	Stafford Map Exhibit K	Greater than Exhibit 2	QIP Year 2 project contains entire streets, Exhibit 2 project is singular blocks of the same streets.
Exhibit 2 Year 5 Project #2	Stafford Map Exhibit N	Greater than Exhibit 2	QIP Year 2 project contains 3 streets, Exhibit 2 project is 2 streets.
Exhibit 2 Year 5 Project #10	Stafford Map Exhibit M	Same as Exhibit 2	Projects are the same.
Exhibit 2 Year 5 Project #17	Stafford Map Exhibit D	Greater than Exhibit 2	QIP Year 2 project contains 7 streets, Exhibit 2 project is 3 streets.
Exhibit 2 Year 5 Project #24	Stafford Map Exhibit B	Greater than Exhibit 2	QIP Year 2 project contains 5 streets, Exhibit 2 project is 1 street.
Exhibit 2 Year 5 Project #31	Stafford Map Exhibit E	Greater than Exhibit 2	QIP Year 2 project contains 5 streets, Exhibit 2 project is 1 street.
Exhibit 2 Year 5 Project #33	Stafford Map Exhibit F	Greater than Exhibit 2	QIP Year 2 project contains 3 streets, Exhibit 2 project is singular blocks of 1 street.

b. Refer to Attachment A (an Excel file) for a side by side comparison of the information for both the QIP Year 2 projects and the related projects in Exhibit 2.

Witness: Brent E. O'Neill, Krista E. Citron

14. Please refer to Kentucky-American's Response to Staff's First Request, Item 22. Please identify where in the application or the direct testimony filed that Kentucky American identified that it was including categories for capital expenditures for QIP2 that were specifically excluded for QIP1, along with the explanation for the inclusion of those items that were specifically excluded in Case No. 2020-00027. If they were not specifically identified as new exclusions and explained in either the application or the direct testimony, please explain why not.

Response:

Proposed QIP 2 includes the following budget line categories sometimes referred to as "asset classes":

B – mains replaced
C – mains unscheduled
F – valves, hydrants, and manholes replaced
H – services and laterals replaced

These budget lines represent investment to replace aging infrastructure that is non-revenue producing. When the Commission approved the Company's QIP program in its June 27, 2019 Order in Case No. 2018-00358, it approved the QIP just as KAW had proposed it. That proposal included a range of asset classes falling into two categories of QIP Eligible Utility Plant: (1) Distribution Infrastructure; and (2) Water Treatment Infrastructure. The Commission approved what would be QIP Eligible Utility Plant when it approved the QIP in general and when it approved KAW's QIP tariff sheets specifically. Sheets 48 and 49 of KAW's tariff provide detailed descriptions of the asset classes making up what is defined as QIP Eligible Utility Plant. In fact, in the June 27, 2019 Order approving QIP, the Commission considered and rejected the intervenors' argument that the proposed range of asset classes was too broad.[1]

In KAW's first QIP case (Case No. 2020-00027) after the decision approving the QIP with all of the asset classes KAW had proposed, naturally, KAW proposed projects in many of the asset classes the Commission had approved. At the May 12, 2020 hearing in Case No. 2020-00027, KAW learned, for the first time, that the Commission was reconsidering the range of asset classes it has just approved less than a year before. During that hearing, then Vice Chairman Cicero repeatedly stated that KAW should use the QIP to place more emphasis on accelerated pipe replacement than on other asset classes.[2] Then, in the Commission's June 17, 2020 Order in Case No. 2020-00027 for QIP 1, the Commission

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[1] Case No. 2018-00358, June 17, 2019 Order, pp. 81-82.
[2] Case No. 2020-00027, May 12, 2020 Video Hearing, 9:54:53 a.m. and 10:03 a.m. through 10:05:30 a.m.

limited its approval to just main replacement projects and rejected all other projects KAW proposed.[3] While KAW recognizes the Commission's plenary authority to modify the QIP, KAW respectfully believes that the Commission's decision on this point was too narrow when it rejected 7 of the 9 asset classes as it does not maximize the benefits that can be achieved under the QIP. Revisiting that decision would be appropriate. Nevertheless, KAW's proposal in this case is predominantly main replacement (Budget Lines B and C which were the two asset classes approved in for QIP 1) along with relatively small proposals for Budget Lines F and H that are "incidental"[4] to main replacements. In response to this question, KAW explained why it was including those asset classes in Kurt Stafford's Direct Testimony at pages 2-4, 8 and 13-15.

[3] Case No. 2020-00027, June 17, 2020 Order, pp. 16-17.
[4] Case No. 2020-00027, June 17, 2020 Order, p. 17.