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KENT COUNTY WATER AUTHORITY

WATER SUPPLY SYSTEM
FIVE YEAR CAPITAL IMPROVEMENT PROGRAM UPDATE
2012 - 2017

KCWA
Kent County Water Authority

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INTRODUCTION

1.1 PURPOSE AND SCOPE

The Kent County Water Authority (Authority) has commissioned C&E Engineering Partners, Inc. (C&E) to prepare an update to the 2009 - 2014 Capital Improvement Program (CIP) for the Authority's water supply and distribution system that was previously updated in 2008. The Authority's original CIP was prepared in 2001 and was directed at identifying and prioritizing water system needs and improvements through fiscal year 2005 as updated in 2008 through 2014. This 2001 and 2008 updated CIP provided a program of capital improvement projects for replacement of existing and installation of new infrastructure that was required to improve the water system's function, operation and maintenance.

Through the 2001 and 2008 CIP, the Authority sought to implement projects that were aimed at correcting inherent deficiencies in transmission and distribution resultant from the original combining of several small water distribution systems to create the Kent County Water Authority. These projects were necessary to improve and maintain an adequate level of customer service. This included increasing pressure and flow, increasing system reliability and reinforcement of the storage (new tank), transmission and distribution piping portion of the water system. This 2012 update to the CIP continues to maintain consistency with the principles and goals of the Authority and its commitment to:

- Provide a consistent source of high quality, potable water for public consumption and fire protection;
- Reduce overall short and long-term maintenance costs;
- Coordinate water system improvements to comply with local and federal guidelines for consistent management and operation of a public water supply system;

The revised CIP consists of a system-wide evaluation to produce a detailed plan for installation of new infrastructure required to improve the water system's operation and maintenance. It provides the Authority with a planning document with systematic approach to implementing projected short-term (immediate) and long-term (out to 5-year) needs and requirements. The evaluation phase includes necessary improvements that are required to enhance water supply, storage, pumping, treatment, transmission and distribution systems that are necessary to meet regulators and service needs of the water system.

The Authority routinely reviews it's capital program in order to re-prioritize, modify and update projects from previous CIP's based on economic growth pattern and supply needs throughout the service area. As part of the preparation of this update to the CIP plan, the 2001 and 2008 CIP was examined in consideration of those capital projects which have not been completed in order to evaluate their relative merit towards achieving the current overall goal of water system improvement.

The CIP in addition to describing and detailing the recommended projects provides an estimated cost for developing funding strategies and implementation. This includes estimated budget

costs in consideration of planning, design and construction. These cost estimates are necessary for the Authority to justify finance initiatives to fulfill the rate filing process required to sell bonds to finance for both ongoing and planned capital projects. This process is intended to ensure that sufficient funding can be made available throughout the ongoing life cycle of the capital program.

This CIP document includes:

- A description of the CIP and the evaluation process used to develop the program.
- Evaluation of the projects from the 2001 and 2008 updated CIP which have not been implemented.
- A detailing of the capital systems, strategies, and programs highlighting key projects, anticipated costs over the period of the capital projects program.
- A description of each capital improvement project, including planned goals, justification, priority, impact on the operation budget, responsible section, projected in-service date, project cost and financing strategy.
- Mapping to graphically detail the location of the project in the service system.

This revised Capital Improvement Program (CIP) for the Kent County Water Authority Water System was in part prepared upon information including recommendations and assessments that were developed in the following studies, reports and plans:

- Kent County Water Authority Strategic Plan, 2005
- Kent County Water Authority 2001 Capital Improvement Program
- Comprehensive Community Plans for City of Warwick and Cranston, Towns of West Warwick, East Greenwich, Coventry, West Greenwich and Scituate
- Kent County Water Authority, Hydraulic Storage Tank Evaluation Report, 2007
- Kent County Water Authority, Water Supply System Management Plan, 2007
- Water Supply System Capital Improvement Program 2009 – 2014, July 2008

The Community Comprehensive Plans contained information that was utilized to evaluate the various municipalities that comprise the Authority's water system including projections related to population changes and resulting water demands.

1.2 CAPITAL IMPROVEMENT PROGRAM GOALS

The Authority provides public water and fire service to customers in Coventry, East Greenwich, West Greenwich, Warwick and West Warwick as well as small isolated areas in Cranston, North Kingstown and Scituate. A primary goal of the Authority is to ensure that all customers are provided with a safe, reliable and adequate supply of water. To that end, the CIP is directed at providing the Authority with a planning strategy to improve water supply efficiency, optimizing withdrawal from existing and identified future sources, infrastructure redundancy and identification of water system improvements necessary to meet existing and anticipated future system needs.

This Capital Improvement Program is highlighted by the Authority's continued efforts to improve water supply capacity, treatment, pumping, storage, transmission, and distribution facilities. It is imperative that capital-funded new facilities be planned and implemented in an orderly manner to ensure that all current and future customers within the service territory benefit from the proposed improvements while assuring compliance with all State and Federal Safe Drinking Water Standards.

The implementation of this CIP for the Kent County Water Authority is premised upon the need to eliminate or reduce existing deficiencies, the ability to fund projects, and the priority of the projected requirements for capital facilities in order to ensure that the Authority's service customers are supplied with an adequate quantity of high quality water.

This evaluation process also considered those locations within the distribution system which realize substandard flows and pressures. The Authority recognizes that this could be the result of undersized or "aged" water mains, distances from supply sources or storage facilities, customers previously serviced above limiting service elevations or operational considerations with regard to capacity and limitations of pumping facilities. The evaluation considered the viability and effectiveness of existing facilities and where deemed necessary provided recommendation for either upgrade or new facilities that are necessary to meet current standards of service, maintain a high level of water quality and supply reliability.

1.3 ASSESSMENT CRITERIA

The measure by which the water supply, transmission and distribution system were assessed recognize standard practices for water works design, publications and regulations including the following: Ten State Design Standards – Recommended Guide for the Design of Water Works Facilities, American Water Works Association Standards, Rhode Island Department of Health Regulations, regulations of the Rhode Island Division of Utilities and Carriers (RIDPUC), prudent engineering judgment and Regulations of the Authority, as amended.

Areas of system deficiencies were identified and recommendations for system improvements for both short (immediate one to two year) and five (5) year planning horizon were quantified. Improvement projects deemed intrinsic to increase the reliability and operation of the water system were also quantified.

1.4 PRIORITIZATION CRITERIA

Prioritizing projects is a critical aspect to any capital program planning process. The project Prioritization Criteria provided below establishes a methodology to rate the relative importance of each of the individual projects. This rating criteria was premised upon a number of factors including protection of public health and safety, improving service conditions to consumers, regulatory requirements and the ability to provide and maintain adequate levels of service to existing and future customers.

This criteria also provides a basis for decision making in determining which projects are projected to be implemented in any given year and for general scheduling of projects over the five year span of the program.

The prioritization criteria provides a methodology that can be applied in order to rank the projects in terms of relative importance for completion. External influences that could affect implementation such as determinations from political and governmental oversight present unknown and situational factors that in most instances are beyond the Authority's control. These determinations often finance strategies to secure funding and the ability to implement any particular project. These include but are not limited to: socioeconomic factors, regulatory agencies requirements and approvals, municipal and state government, Authority policy, funding availability and infrastructure condition.

The Authority is cognizant of the need to periodically review and update its capital program and the necessity for such planning documents to be ***dynamic*** in nature based on economic indices and other influences and maintaining the ability to restructure to meet the intrinsic needs of the water system. Therefore, it is important that the Authority throughout the implementation of the program elements periodically reassess the relative merit of the upcoming year's projects. It is critical that the assessment process weigh the essential need for the specific project as well as consider other factors which could affect implementation of a specific project. These factors could affect the overall program and may require reconsideration of the implementation schedule in the best interest of the customer and system requirements.

The following categories were utilized to categorize each of the projects. These include a range of priorities from high to low:

<u>Priority 1 – Essential Projects</u>

These include projects that represent the highest priority of all capital projects. These projects meet one or more of the following criteria:

- Those projects deemed essential for providing reliable water supply to meet current and/or projected consumer demands. These generally include projects involving supply, storage, transmission and distribution.

- Those projects that are required by legislation, regulation, and/or for protecting the public health and safety and projects that is already under design or construction.

<u>Priority 2 – Necessary Projects</u>

These include projects that must be completed, but for which the Authority has a moderate level of control as to when they should be performed. These projects generally meet the following criteria:

- Those projects which increase water supply reliability and improve delivered water quality.

- Those projects which maintain or improve level of service goals and/or operating efficiencies within the next five years.

Priority 3 - Discretionary Projects

These include all projects that should be implemented to improve level of service goals, but for which the Authority has a significant level of control as to when they may be implemented. For example, this could include projects related to installation of transmission or distribution mains required for redundancy, demolition of infrastructure as part of an improvement project, etc.

1.5 EVALUATION PROCESS

This project related to the revision of a Capital Improvement Program for the Authority which detailed necessary improvements to be completed over a five (5) year planning period. This included evaluation of potential infrastructure improvements for the entire Kent County Water Authority Water Supply District. The water system is supplied with a combination of surface and groundwater with water coming from groundwater wells owned by the Authority and from water purchased wholesale from the Providence Water Supply Board (PWSB), a municipal authority regulated by the Public Utilities Commission. In addition to the supply sources, the water system is comprised of a distribution and transmission pipe system, pumping stations, storage facilities and fire hydrants. The water system contains approximately 400 miles of distribution and transmission mains, nine storage tanks of the standpipe ground storage or elevated design, four pressure booster (pumping) stations, four wells, 2,226 public fire hydrants and 156 private fire hydrants. The water system is also divided into nine distinct pressure service gradients that are designed to provide adequate water pressure to service customers within each gradient.

The evaluation of capital infrastructure projects considered water system consumer demands for the current maximum day plus fire flow scenario as well as the projected consumer demands for the planning period (year 2025). By considering potential future water demands within the service area, recommended CIP projects could be evaluated for their ability to maintain customer service level goals throughout the project planning period.

For purposes of projected consumer water demands, those developed as part of the 2007 Hydraulic Storage Tank Evaluation Report for planning year 2025 were utilized. These water demands were premised upon population projections from Rhode Island Statewide Planning in conjunction with information derived from the Comprehensive Community Plans and Planners from each of the service communities. These population projections also included a 10 percent "allowance" for additional "unplanned" growth within the service territory. This allowance accounts for water demands that could occur from unanticipated growth, in-fill development, weather conditions, or changes in water usage trends.

These projected water demands were assigned to the demand database of the Authority's computerized hydraulic model. The hydraulic model was utilized to assist in the evaluation of the water supply and distribution system and to assess the potential need for CIP projects based on consideration of current as well as future (year 2025) anticipated customer demands. The model

simulations were intended to evaluate the effectiveness of the water system with and without the recommended CIP projects to meet anticipated consumer demands.

As part of the evaluation process, the Authority's computer hydraulic model of the supply and distribution system was updated to include all recent (within past five years) infrastructure and capital improvement projects which were implemented by the Authority. A review of the as-built condition plans for completed projects or available design plans for pending or in progress projects was performed. This update included consideration of the following projects.

- Black Rock Road Water Transmission Mains
- Knotty Oak Road Water Transmission Mains
- Clinton Avenue Pump Station Upgrade / Rehabilitation
- Hope Road Re-service – Seven Mile Road Tank Removal from Service
- Tiogue Area Re-service with Pressure Reducing Valve
- Read School House Road 500 Foot Gradient Tank Construction and Related Transmission Service Mains from 2008 CIP
- Bald Hill Road Pump Station Upgrade
- Mishnock Water Treatment Plant and Well Field Expansion
- Setian Lane Booster Pump Station
- Emergency Interconnections with Providence Water
- Infrastructure Replacement (IFR) 2000
- Infrastructure Replacement (IFR) 2001
- Infrastructure Replacement (IFR) 2002
- Infrastructure Replacement (IFR) 2003
- Infrastructure Replacement (IFR) 2004
- Infrastructure Replacement (IFR) 2005
- Infrastructure Replacement (IFR) 2006
- Infrastructure Replacement (IFR) 2007
- Infrastructure Replacement (IFR) 2008
- Infrastructure Replacement (IFR) 2009
- Infrastructure Replacement (IFR) 2010

1.6 EXISTING SYSTEM OVERVIEW

The Authority provides water service to customers in the Towns of Coventry, East Greenwich, West Greenwich, West Warwick and the City of Warwick. In addition, water service is also provided to customers in isolated areas of the City of Cranston and the Towns of North Kingston and Scituate. There exist approximately 26,000 service accounts (including residential, commercial/industrial, and government users) serving a population of approximately 88,000 within these locales. The primary sources of water supply for the distribution system include the wholesale interconnections with Providence Water and the City of Warwick (which also receives wholesale supply from Providence Water) and groundwater from well fields that are owned and operated by the Authority.

The Authority's existing piping system consists of approximately 400 miles of water mains with distribution and transmission pipe sizes ranging from 2-inches to 30-inches in diameter (exclusive of customer service connections). Elevations within the service territory range from approximately 15 feet Mean Sea Level (MSL) at coastal areas to over 500 feet MSL in West Greenwich and in isolated areas within the west and southwestern portions of the service territory. The limiting customer service elevation of the 500 foot Pressure Gradient is 410 feet MSL.

There exist two primary transmission booster pump stations and six distribution system booster pump stations. The transmission booster pump stations boost pressure from the wholesale connections while the distribution system booster pump stations serve to boost pressure to higher localized pressure zones within the service territory.

The water distribution system is currently divided into nine pressure zones which operate at varied hydraulic pressure gradients. These pressure zones are necessary in order to maintain an adequate level of service to the customers throughout the varied topography of the service territory. Of these nine pressure zones, three serve the majority (approximately 88%) of the service territory and include the Low Service Pressure Gradient (334 feet), the High Service Pressure Gradient (500 feet), and the Low Service Reduced Pressure Gradient (266 feet). There are also ten water storage facilities located within the distribution system. These storage facilities serve to meet customer demands and provide reserve storage for fire and emergency needs. The nine pressure gradients are as follows:

- Low Service Pressure Gradient - hydraulic grade of 334 feet with a limiting customer service elevation of 250 feet.
- High Service Pressure Gradient South - hydraulic grade of 500 feet with a limiting customer service elevation of 410 feet.
- Low Service Reduced Pressure Gradient - hydraulic grade of 266 feet
- High Pressure Gradient North (Read School House) - hydraulic grade of 500 feet with a limiting customer service elevation of 410 feet.
- Oaklawn Pressure Gradient (Providence Water) - hydraulic grade of 232 feet
- High Service Reduced Pressure Gradient South - hydraulic grade of 430 feet
- Warwick Tanks Pressure Gradient - hydraulic grade of 232 feet
- Hope Road Booster Pressure Gradient - hydraulic grade of 500) feet – (conversion to High Service North Gradient)
- Tiogue PRV Pressure Gradient - hydraulic grade of 355 feet

1.7 CAPITAL AND INFRASTRUCTURE REPLACEMENT PROGRAMS

The Authority in addition to its capital improvement program maintains an ongoing program for the rehabilitation of existing infrastructure through the Infrastructure Renewal and Replacement (IFR) program. This IFR program is directed at renewing and replacing existing infrastructure components including transmission and distribution water mains, mechanical equipment and building facility components that are beyond their useful life or have sufficiently deteriorated such that they can no longer sustain service at or above the minimum standards for "adequacy of service" in the published Engineering Standards and Regulators Requirements.

To aid in the process of identifying infrastructure projects, the Authority maintains a comprehensive inventory database of distribution and transmission system water mains in its infrastructure replacement plan. This inventory provides a methodology for a numerical ranking for water mains most in need of replacement. This ranking system considers material, age, diameter, dead-end location, failure and maintenance history, and approximation of the physical condition and properties of a particular water main which allows an objective comparison of all water mains to calculate approximately when a particular water main should be replaced. This ranking system is not however the sole determining factor in the development of a pipeline replacement program.

This IFR program is intended to comply with State mandates to upgrade and reinforce the water distribution system by replacing old, deteriorated and undersized water mains in an effort to improve and maintain an adequate level of customer service and fire flow. The funding mechanism for the IFR program is a cash basis independent of the bond financing used for the capital programs. The IFR program relies upon rates applied to customer billing. As such, this program is considered a "cash based" funding system. A fixed percentage of customer billing which is based upon customer water usage is assigned to a restricted cash account for funding the IFR program.

The evaluation process for capital projects also identifies particular water main replacement projects that result in an overall benefit to the water supply and distribution system. These projects would not have otherwise been evident through the pipeline ranking system process as it differs from the capital project evaluation process. Therefore, those identified projects which impact proposed capital projects consisting of pipeline replacements are identified herein as infrastructure replacement projects for consideration under the IFR program.

The benefit of identifying an intrinsic IFR project is to coordinate projects and potentially accelerate the construction within the IFR program. For example, based on the pipeline ranking system a particular water main within the system may not be scheduled for rehabilitation within the foreseeable future. The identification of this pipeline in this capital program could provide the necessary justification to consider an earlier rehabilitation through the IFR program. The Authority must weigh the collective merit of these identified infrastructure rehabilitations against other infrastructure projects identified within the IFR program.

Potential IFR projects which have been identified to hold significant benefit to the capital program will be identified herein. The identification of these projects included a description and intended benefit, location mapping, and description of interrelationship with capital projects, if any. A construction cost estimate was developed for these infrastructure projects however the project would necessarily be funded under the process of IFR program.

1.8 COST ESTIMATING

The costs estimated for the capital improvement plan are based on current dollar value with an annual escalation for inflation and were generated based upon the extent and size of the particular capital improvement project. The cost estimate for each project is presented as a distinct component which includes construction (i.e. the cost to physically construct the project).

Construction Costs

Construction costs for recent water main projects completed by the Authority were utilized to assist in estimating construction costs. These include unit prices for general water main installation in public rights of way which include pavement restoration (temporary, final trench and permanent overlay restoration).

The following unit costs for water main material and installation were utilized.

Size (diameter)	Cost per Linear Foot
12 inch	$ 200.00
16 inch	$ 225.00
20 inch	$ 250.00
24 inch	$ 300.00

The costs identified above are utilized herein are premised on data obtained from 2010 and 2011projects which the Authority has placed out for public bid. These construction costs for similar type projects provide the best source of available information related to "actual bid" costs and were therefore utilized to develop costs for projects.

For purposes of updating budgeting costs in the future and in the fiscal year in which a project is anticipated to take place, it is recommended that the ENR (Engineering News Record) published Construction Cost Index (CCI) be utilized. Again, the costs that were utilized herein were premised upon actual construction costs for similar type projects for which the Authority has recently received competitive bids.

These capital improvement cost estimates are intended to be utilized for planning and financing purposes and are not to be considered as an actual construction cost estimate. An engineer's opinion of probable construction cost would be required following successful preparation of detailed construction design documentation to account for current market and construction costs.

Design and Related Construction Services Costs

For purposes of developing design and related construction services costs, 15 percent of the cost of the estimated construction cost was utilized. Design and related construction services costs include those costs associated with planning, preliminary and final design; geotechnical investigations, surveying and permitting; construction oversight related services and representation. This percentage is considered a general industry standard for water works utility projects of this scale and complexity.

Contingency Allowance Costs

It is also necessary to include a contingency for unanticipated and unforeseen costs which could occur. This amount is added to the estimate to allow for items, conditions or events for which the condition, occurrence or effect is uncertain at this time and that experience shows will likely result in increased costs to complete the project. For purposes of developing an estimate for total project cost of construction a dollar value of twenty (20) percent of the anticipated total project cost (construction, design and related services costs) was utilized.

Inflation Adjustment Factor
In order to account for the increase in costs associated with goods and services, an annual inflation factor was utilized. Most recently, the escalating cost of energy and raw materials such as steel would have a significant impact on these type construction projects. Energy costs have more than tripled since 2001 and steel has risen upwards of twenty five (25%) due to increase in global demand. Most recently, inflation has been in the range of two (2) to five (5) percent. For purposes of accounting for annual inflation a conservative value of four (4) percent compounded escalation factor shall be utilized.

1.9 OVERVIEW OF CURRENT PROJECTS

The Authority has ongoing construction and design related projects which are directed at redefining several of the existing service gradients. These projects are part of a long-term plan to better service customers (i.e. increase water supply, pressure, service reliability and flow capacity) in these areas and to provide a more manageably efficient system with redundant supply and transmission capabilities.

Redefining pressure gradients is generally considered a capital program goal and will have an impact on some of the projects identified herein. There may however exist portions of projects that incorporate infrastructure related improvements and as such are funded through that program. A brief description of the ongoing and most recently completed project(s) and status is provided below.

A. The Read School House Road Pressure Gradient was increased from the current HGL of 430 feet to 500 feet. The future goal is to combine this gradient with the existing High Service Pressure Gradient such that the combined gradient will operate at an HGL of 500 feet. A new 1.5 million gallon storage tank with an overflow elevation of 500 feet was placed into operational service in late 2009. The new tank is supplied from pumps that were installed as part of the Clinton Avenue Booster Pump rehabilitation project. The Knotty Oak Pump Station which supplied the existing Read School House Road Storage Tank was decommissioned.

   In addition to this new storage tank, new water transmission mains were installed placed in service in 2009. These included a 20-inch transmission main on Read School House Road from the new tank to Flat River Road (approximately 5,600 feet); a 20-inch transmission main on Flat River Road from Read School House Road to Reservoir Road (approximately 1,700 feet).

B. A project is scheduled for 2012 involving the Re-service of the Fiskeville area (Seven Mile Road and Hope Road) from the Read School House Road Pressure Gradient, which is at a hydraulic grade of 500 feet. All water mains in this area were converted from the existing Low Service Pressure Gradient to the Read School House Road Pressure Gradient through installation of new water mains and isolation valves. This included the following

Cranberry Drive, Pasture View Lane and Kerri Court – Convert 3,550 feet of existing 16 inch ductile iron water main from the Low Service Pressure Gradient to the Read School House Road Pressure Gradient by connecting to the new 16 inch water main on Hope Avenue.

Meadow Road, Country Lane and Garden Lane – Convert 1,300 feet of existing 6 inch asbestos cement water main from the Low Service Pressure Gradient to the Read School House Road Pressure Gradient by connecting to the new 16 inch water main on Hope Avenue.

Hope Road – Discontinue operation and remove the Hope Road Booster Pump Station from operational service. Replace 500 feet of existing unlined 12 inch cast iron water main and convert from the Low Service Pressure Gradient to the Read School House Road Pressure Gradient by connecting to the new 16 inch water main on Hope Avenue. Replace 1,400 feet of existing unlined 6 inch cast iron water main and 1,050 feet of existing 4 inch ductile iron water main with 2,450 feet of 8 inch ductile iron water main and connect to new 12 inch ductile iron water main on Hope Road.

Hall Lane – Convert 575 feet of existing 6 inch asbestos cement water main and 140 feet of existing 6 inch PVC water main from the Low Service Pressure Gradient to the Read School House Road Pressure Gradient by connecting to the new 8 inch ductile iron water main on Hope Road.

C. In October 2011, the Authority broke ground on the new Mishnock Water Treatment Plant located of Nooseneck Hill Road in Coventry Rhode Island. The facility will provide treatment to groundwater wells for removal of aesthetic complaints, iron and manganese and future EPA requirements for radon reduction in water supply. The treatment plant will provide for membrane filtration to remove iron and manganese, aeration to remove radon, disinfection and pH adjustment of the groundwater supply to meet all Rhode Island Department of Health and EPA requirements for drinking water quality. The completed plant will provide additional capacity of 2.4 million gallons per day and will significantly improve the Authority's ability to meet the growing demand in this portion of the water distribution system. It is anticipated that the treatment facility will be fully operational by 2013.

The following projects are primarily related to infrastructure replacement and as such funded through the IFR program.

A. The Tiogue Tank Pressure Gradient was re-serviced from the High Service Pressure Gradient to the south in 2008. This gradient previously operates at the overflow elevation of the Tiogue storage tank (355 feet) and received supply from the Low Service Pressure Gradient via a booster pump station. New replacement water mains and a pressure reducing valve station were also completed in late 2008. The Tiogue storage tank was removed from operational service and is scheduled for future demolition.

B. The Quaker Lane Pump Station is scheduled for a complete rehabilitation which will include a complete mechanical/process, electrical, instrumentation, site work and drainage, roof replacement and increase total pump capacity to 7,100 gpm (10.2 MGD). The facility currently supplies water from the wholesale connection with Warwick Water to the Authority's Low Service Pressure Gradient. In addition, the facility will be retrofit to provide the ability for future pumping into the Authority's High Service Gradient at a rate of 1,400 gpm (2.0 MGD). It is intended that facility rehabilitation will be complete by early 2013.

2.0 CAPITAL IMPROVEMENT PROJECTS – GENERAL

All capital projects that are identified herein are presented in the following general format. A brief description of the contents of the sections is also provided.

Project Description
A description of the project including need for project, benefit, goals and objectives.

Calendar Year for Implementation
The year in which the project is anticipated to commence. The duration of the project may extend beyond the fiscal year in which it is initiated.

Type of Project
Project classification which includes new construction, rehabilitation or replacement as related to the following type of project: supply, storage, improvement of hydraulic capacity to meet existing and future domestic and fire flow demands, transmission and/or distribution water mains, level of service improvement, pumping or booster stations.

Project Priority Category
Identification of project priority and discussion (i.e. essential, necessary or discretionary type of project).

Location Mapping
Mapping depicting the general location of the project within the service territory.

Total Anticipated Construction Cost
Estimated statistical cost to implement the project in current dollars including construction, design and design related services, a twenty (20) percent contingency and a four (4) percent annual compound escalation factor for inflation. The design services include costs associated with conceptual, preliminary and final design, surveying permitting and geotechnical services.

In order to update budgeting costs for construction moving forward the ENR (Engineering News Record) published Construction Cost Index (CCI) should be utilized.

Project 1 – Mishnock Water Main Improvements – Mishnock Water Treatment Plant to Hopkins Hill Road

Project Description

In October 2011, the Authority broke ground on the new Mishnock Water Treatment Plant located of Nooseneck Hill Road in Coventry Rhode Island. The facility will provide treatment to groundwater wells for removal of aesthetic complaints, iron and manganese and future EPA requirements for radon reduction in water supply. The treatment plant will provide for membrane filtration to remove iron and manganese, aeration to remove radon, disinfection and pH adjustment of the groundwater supply to meet all Rhode Island Department of Health and EPA requirements for drinking water quality. The completed plant will provide additional capacity of 2.4 million gallons per day and will significantly improve the Authority's ability to meet the growing demand in this portion of the water distribution system. It is anticipated that the treatment facility will be fully operational by 2013.

In order to convey water from the treatment plant to the existing High Service Gradient it will be necessary to install a new 16 inch water main from the water treatment plant south along Nooseneck Hill Road for approximately 1,700 feet; a new 16 inch transmission main along Mishnock Road from the intersection with Nooseneck Hill Road to the intersection with Hopkins Hill Road for approximately 10,000 feet. The 16 inch water main would then be tied into the existing High Service Gradient water mains in Hopkins Hill Road.

Fiscal Year

Anticipated – 2012

Type of Project

This project is considered an improvement related to water transmission and overall supply capacity to the distribution system.

Category

Project is deemed *essential* and will require coordination with construction of the Mishnock Water Treatment Plant for convenience of water to the High Service Gradient.

Location and Mapping

See Figure 1

Anticipated Construction Cost

The estimated cost of construction for this project is $2,640,000.

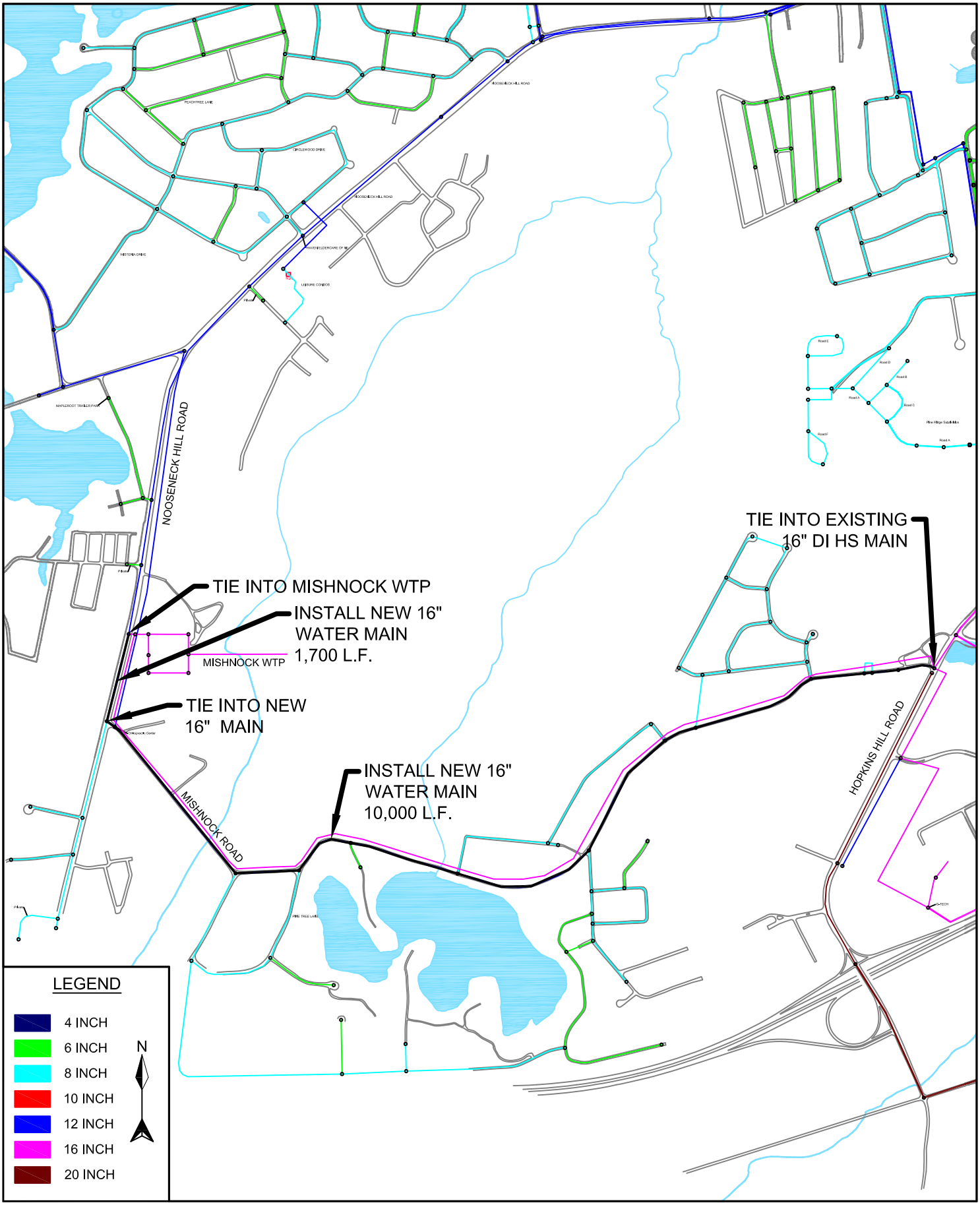

FIGURE NO. 1	KCWA Kent County Water Authority	PROJECT 1 MISHNOCK WATER MAIN - WTP TO HOPKINS HILL ROAD	C&E ENGINEERING CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

Project 2 – Bald Hill Road / New London Avenue Water Main Loop Connection

Project Description
This project consists of installing a new 8 inch loop water main connection along an from an existing dead end 8 inch water main located in proximity to a commercial retail complex in vicinity to Bald Hill Road (RI Route 2). This is located with the District's Oaklawn pressure gradient that services the Oaklawn section of Cranston and the extreme northeastern portion of Warwick. This pressure area receives water from Providence Water via the Oaklawn Avenue wholesale interconnection.

This project would include the installation of approximately 1,200 feet of new 8 inch water main from the terminus of the dead end near the interchange of Bald Hill Road and New London Avenue in Cranston and extending the 8 inch water main to the existing 12 inch water main in new London Avenue.

Fiscal Year
Anticipated - 2013

Type of Project
This project is considered an improvement to water quality, distribution water main "looping" and level of customer service and is consistent with the long term goal of the Authority to identify and improve overall water service.

Category
Project is deemed *necessary* in order to optimize and maintain both water quantity (flow) and water quality by increasing the hydraulic flow capacity to the general service area of the system for both domestic and fire flow demands.

Location and Mapping
See Figure 2

Anticipated Construction Cost
The estimated cost of construction for this project is $210,000.

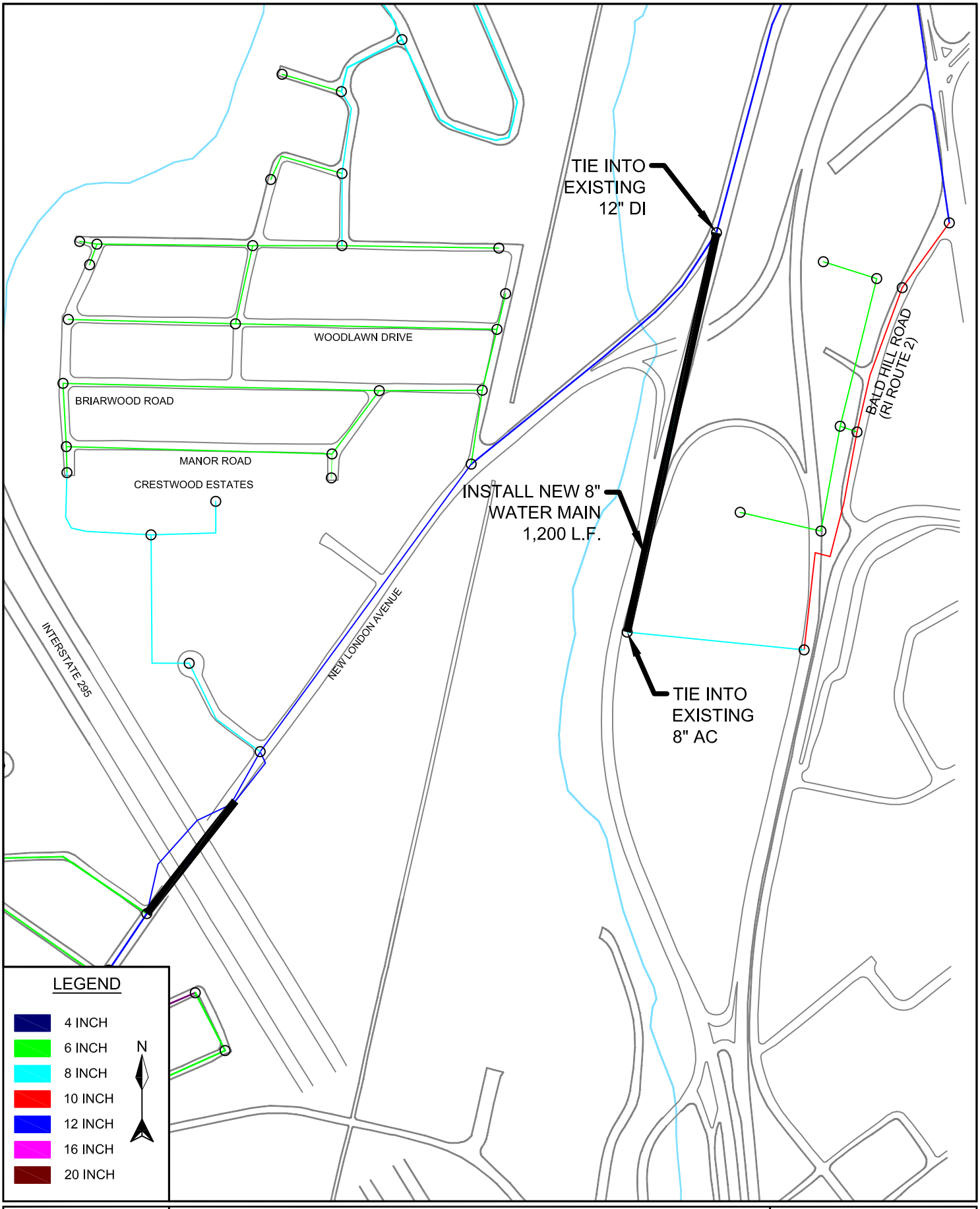

FIGURE NO.
2

KCWA
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PROJECT 2
BALD HILL ROAD/NEW LONDON AVE.
LOOP CONNECTION

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Project 3 - Wakefield Street Storage Tank - Water Main Upgrades

Project Description

Located in the Low Service Pressure Gradient on Carrie Ann Drive (off Wakefield Street) in West Warwick, this tank is of standpipe style construction, 2,000,000 gallon capacity, constructed in 1990 of concrete. The operation of the Clinton Avenue Pump Station during non peak demand conditions creates a system hydraulic grade in the proximity to this tank such that the facility will normally remain at or near the overflow elevation. It is desirable to have the water level in this tank fluctuate on a daily basis to maintain water quality however it is also recognized that maintaining the water level in this tank at or close to the overflow is critical to providing minimally adequate pressures to service customers in the general area surrounding the tank. Also, it is anticipated that future water main rehabilitation projects located between this storage facility and the Clinton Avenue Pump Station may further serve to exacerbate the period of lock up condition experienced in the tank.

Previously, the older cast iron mains in these areas provide greater friction losses and decreased flow capacity, which permitted increased tank cycling. The newly installed distribution water mains from Main Street to Wakefield Street (i.e. Harding, Phoenix, Harris, Potter, etc.) along with the new transmission mains on Main, Ames and across the Pawtuxet River allow for increased flow capacity to this storage tank consequently increasing the occurrence of prolonged locked up conditions in this tank.

This project includes consideration for increasing transmission flow capacity to the east along Wakefield Street and reinforcing water service to the Providence Street area of the distribution system. Currently, there is a length of roadway approximately 2,100 feet on Wakefield Street between Wilson Street and Governor's Hill Road that requires water main installation to complete the looped connection. It is likely that significant ledge/rock will be encountered along this routing. This is clearly evident from visual rock and ledge outcrops along the side of the roadway.

Project 3 - Wakefield Street

Install 2,100 feet of new 12 inch water main from Lombardi Lane to Wilson Street and connect to the existing 12 inch PVC water main and the existing 8 inch ductile iron water main on Wakefield Street.

Fiscal Year

Anticipated - 2013

Type of Project

This project is considered an improvement to water quality, storage, transmission water main and level of customer service and is consistent with the long term goal of the Authority to identify and improve overall water service.

Category

Project is deemed *necessary* in order to optimize function of this storage facility as well as maintain water quality in the tank and increasing the hydraulic flow capacity to areas of the system for both domestic and fire flow demands.

Location and Mapping
See Figure 3.

Anticipated Construction Cost
The estimated cost of construction for this project is as follows:

Project 3 - Wakefield Street $ 610,000.

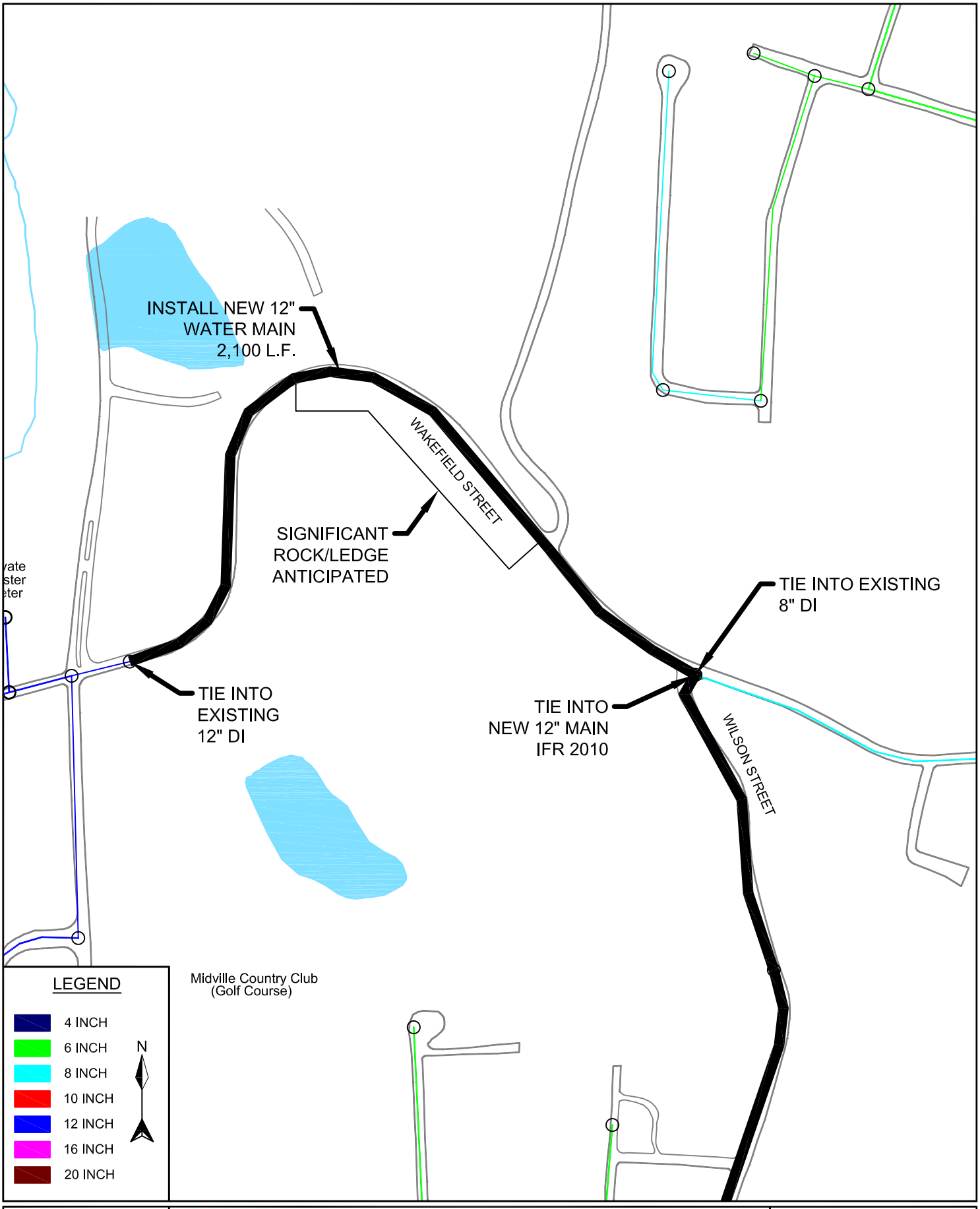

FIGURE NO.
3

KCWA
Kent County Water Authority

PROJECT 3
WAKEFIELD STREET

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

Project 4 - East Greenwich Well and Water Treatment Plant Upgrade

Project Description

Similar to the project requirements for upgrading the Mishnock Wellfield, the Authority must upgrade its existing East Greenwich well in order to improve water quantity and quality. This includes refurbishing the well (redevelop) in order to increase the yield to 2.1 MGD, providing necessary raw water treatment and upgrade of facility components. The East Greenwich well currently supplies water to the southeastern section of the Authority system including the Low Service Pressure Gradient, the Reduced Low Service Pressure Gradient and indirectly to the Potowamut section of Warwick. This well is also an intrinsic component to emergency supply capacity should a casualty or malevolent event occur with the Providence Water supply source. This well source represents a critical component to the Authority's supply and emergency strategies.

The Authority has experienced esthetic water quality problems in this area of the distribution system. Water quality problems have been mainly attributed to the levels of manganese and to a lesser extent iron in the groundwater. These elements precipitate out and cause staining of customer plumbing fixtures which manifest into customer complaints within the distribution reaches of this supply. The Authority currently uses sequestering and a proactive flushing program to help mitigate the staining affect and customer concerns about water quality the staining creates.

In 2004, the Authority commissioned a study to address water quality concerns at this well supply facility. This included raw water quality sampling along with treatment assessment and pilot testing. The treatment pilot consisted of utilizing a sequestering agent to stabilize the soluble manganese and iron thus preventing it from quickly precipitating out of solution. The pilot study proved to be generally effective in sequestering the iron and manganese but did not totally solve the problem. As a result any future treatment techniques must consider manganese and iron reduction/removal from the raw water supply to be effective.

A preliminary design study that included investigating suitable methods of treatment was conducted in fall of 2009. During the preliminary design study phase for treatment, current Safe Drinking Water Act Regulations must be considered to ensure that all EPA drinking water requirements would be met. This project also considered mitigation of customer water quality complaints associated with color, taste and odor. Based on the March 2011 final Draft Treatment System Report the recommended treatment methods and protocol for the East Greenwich Well will be different than the Mishnock Water Treatment Plant technology. The most cost effective treatment technique for iron and manganese removal at the East Greenwich Well includes chemical oxidation, pressure filtration, draft aeration, pH adjustment, fluoride addition and disinfection.

A summary of the general scope of this rehabilitation follows:

- Size new pumps and motors for the production well to achieve more efficient operation at the well yield of 2.1 MGD.

- Provide surge control.
- Provide instrumentation for control and operation of the facility using SCADA system.
- Replace the existing flow meter.
- Provide a stand-by generator (propane or natural gas) and remove existing stand-by drive and diesel fuel tank.
- Modify the building to house new well pump and controls; construct an adjacent building to contain chemical feed equipment for chlorination, pH adjustment by potassium hydroxide, fluoridation, draft aeration, pressure filtration, clear wells and variable frequency drive pump systems.
- Bring all existing facilities up to current building code requirements (mechanical, electrical, plumbing, HVAC, fire and life safety), install a new motor control center and connect to Authority SCADA system. Install emergency generator to ensure uninterrupted operation of the facility and to maximize system reliability.

Fiscal Year
Anticipated - 2014

Type of Project
This project is considered an improvement related to water quality (treatment), overall supply capacity (maximize existing well yield) and emergency supply in the event of a loss of supply from wholesale supplier Providence Water.

Category
Project is deemed *essential* to enhance water quality, to meet regulatory requirements and maximize supply capabilities for both normal and emergency supply situations.

Location and Mapping
See Figure 4

Anticipated Construction Cost
The estimated cost of construction for this project is $6,720,000.

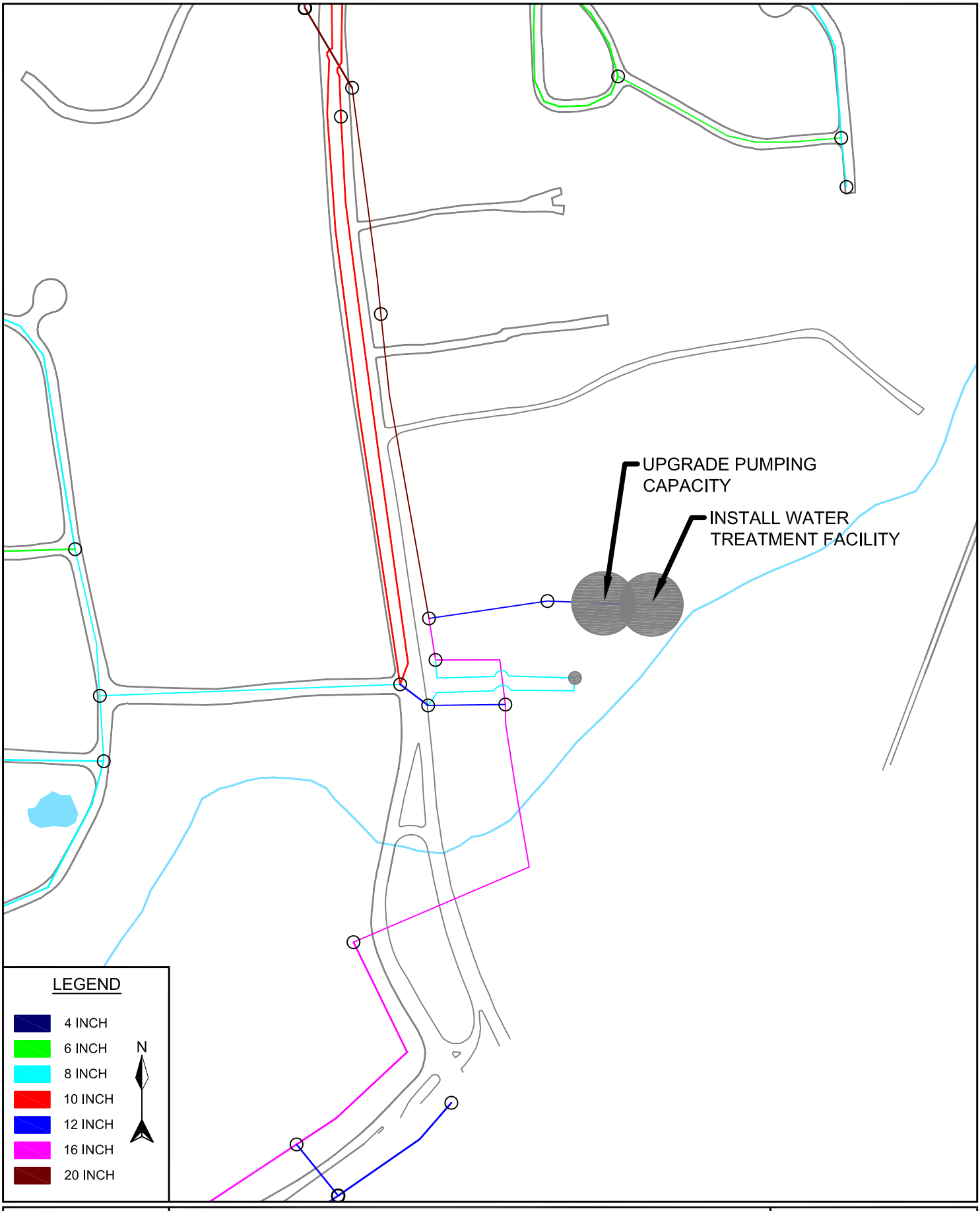

FIGURE NO. 4

KCWA Kent County Water Authority

PROJECT 4
EAST GREENWICH WELL
UPGRADE AND TREATMENT

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

Project 5 - Spring Lake Well and Water Treatment Plant Upgrade

Project Description

Similar to the Mishnock and East Greenwich Wells, the Authority must rehabilitate the existing Spring Lake Well facility. This includes installation of a replacement supply well in proximity to the existing well, provide necessary raw water treatment and upgrade of facility infrastructure components. The Spring Lake Well supply is situated in the western section of the Low Service Pressure Gradient but is currently off line due to concerns related mainly to esthetic water quality and reduced yield.

The existing well has been redeveloped several times and effective capacity can no longer be recovered through the redevelopment process. A replacement well is therefore warranted. Water quality concerns within this area of the distribution system consist of increased levels of iron and manganese which have been attributed to the groundwater source. It is anticipated that any replacement well facility will require treatment for iron and manganese reduction/removal, radon removal, pH adjustment and disinfection.

During the preliminary design phase for treatment, current Safe Drinking Water Act Regulations must be considered to ensure that all known EPA requirements for drinking water are met. This project will also mitigate tenets of historic water quality complaints from service customers. It is anticipated that the recommended treatment methods and protocol for the Spring Lake Well will include a treatment technique similar to the technology that is proposed for both the Mishnock WTP and East Greenwich Well. The selected treatment technique for iron and manganese removal at the Mishnock WTP includes membrane filtration.

A summary of the scope of this rehabilitation follows:

- Conduct raw water quality and treatment train pilot studies.
- Conduct a preliminary design investigation.
- Install a replacement well and decommission the existing well.
- Size new pump and motor for the production well, as required, in order to achieve the most efficient operation and maximize yield.
- Provide surge control.
- Provide instrumentation for automated control and operation of the facility using SCADA system.
- Replace the existing flow meter.
- Provide a stand-by generator (propane or natural gas) and remove existing stand-by drive and gasoline fuel tank.

- Construct building to house WTP infrastructure and equipment for aeration, clearwell, chemical feed equipment for chlorination, pH adjustment by potassium hydroxide, and fluoridation.

- Provide cost effective treatment as determined during the preliminary design phase for iron and manganese removal and radon mitigation.

- Construct the new facilities to comply with current building code requirements (mechanical, electrical, plumbing, HVAC, fire and life safety) and install new motor control center. Install emergency generator to ensure uninterrupted operation of the facility and to maximize system reliability.

Fiscal Year
Anticipated - 2015

Type of Project
This project is considered an improvement related to water quality (treatment) and overall supply capacity (maximize well yield).

Category
Project is deemed *essential* to enhance water quality and maximize supply capabilities from this area of the distribution system.

Location and Mapping
See Figure 5.

Anticipated Construction Cost
The estimated cost of construction for this project is $ 5,830,000.

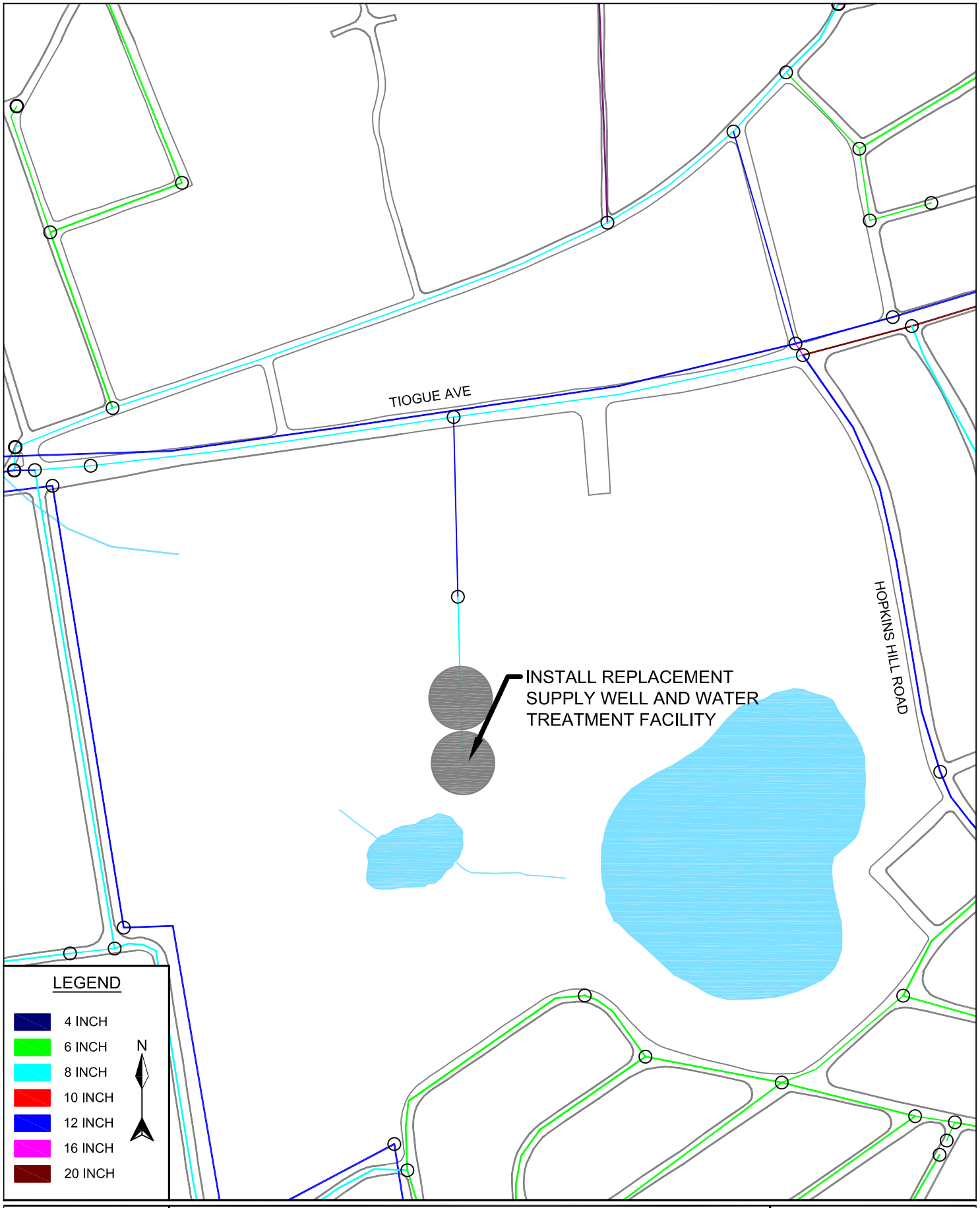

FIGURE NO.
5

KCWA
Kent County Water Authority

PROJECT 5
SPRING LAKE WELL
UPGRADE AND TREATMENT

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

Project 6 - Replacement of Authority Headquarters and Maintenance Facility

Project Description

The Authority currently operates out of a circa 1900 building renovated over 50 years ago from a defunct skating rink to its current occupancy as the Kent County Water Authority Headquarters located at 1072 Main Street in West Warwick, Rhode Island. Additional unheated garage and parts storage building facilities were subsequently added to the original structure at time of the renovation. The administration and general maintenance share heated and unheated space in the building that faces Main Street, while vehicles and large equipment storage is housed in an unheated storage building to the rear of the site. Yard storage, employee and service truck parking occupy the space between both buildings and extend laterally on both sides to the limits of the site, which are bounded by chain link fences. Personnel estimate the age of the main building to be in excess of 100 years.

In 1997, the Authority commissioned a management and operation study to evaluate its Administration/Maintenance building. This evaluation concluded that the structure requires major improvements in both the short and long-term. The property is too confined to allow for onsite improvements intrinsically necessary to continue operations at this location. The facility is grossly antiquated and considered too small to satisfy the Authority's current and future operational needs. Given the extreme age of the facility, this study concluded that the building has exceeded its original life expectancy and primary concerns are related to:

- Building code violations
- Lead paint and asbestos concerns
- Fire code violations
- Structural deficiencies
- Floor arrangements which are based on available space and not on user needs
- Security issues
- Inadequate yard space and concomitant inefficiencies
- No public parking in proximity to customer entrances
- Insufficient materials, equipment and vehicle storage/parking area

A 1999 evaluation and analysis of new Office and Maintenance Facilities considered potential sites for a new Kent County Water Authority facility. The evaluation included a selection of sites within the Authority's service area and a schematic building design based upon the Authority's needs at that time. A number of available sites were identified in the Coventry and West Greenwich areas, many of which are no longer available due to development.

A site plan based on business needs and available sites was developed. A concept floor plan layout was developed based on the anticipated needs and future business requirements for the Authority. This provided for a facility footprint requiring 6,500 square feet and 6 – 10 acres of required land area for the facility.

The Authority struggles to maintain operational activities at the marginal facility in West Warwick as materials storage has expanded to offsite locations that are designated as wellhead protection and tank storage properties. There have been no significant projects involving rehabilitation of the existing facility in the past 50 years as this current location is too confined to allow for a suitable renovation project to meet the Authority's needs. Consequently there continues to be a major deficiency in both office and field efficiency due to the dire need for facility replacement.

The initial phase of design must include a comprehensive management and operations study to include a needs assessment that considers both the short and long-term requirements of the Authority and to review and revise conclusions and recommendations from previous evaluations accordingly.

Fiscal Year
Anticipated - 2016

Type of Project
This project is considered new property acquisition and facility construction that will replace a previously identified obsolete and functionally deficient existing facility housed within a building and property structure that has well exceeded its original occupancy for this type of business plan given the strong growth in the service area of this public water supply organization.

Category
Project is deemed *essential* to provide the expected level of service goals required by State Regulatory Requirements and the Authority's strategic plan.

Location and Mapping
See Figure 6 which identifies the existing facility. The location of the new facility will be dependent upon further study and availability of land. The current down turn in the real estate market affords ample opportunity to acquire property at reasonable market prices.

Anticipated Construction Cost

Facility with site preparation is estimated at $8,880,000. The cost of land purchase which is estimated at approximately 10 acres is anticipated to be in the range of $500,000 - $750,000 and will be dependent upon final location and market conditions.

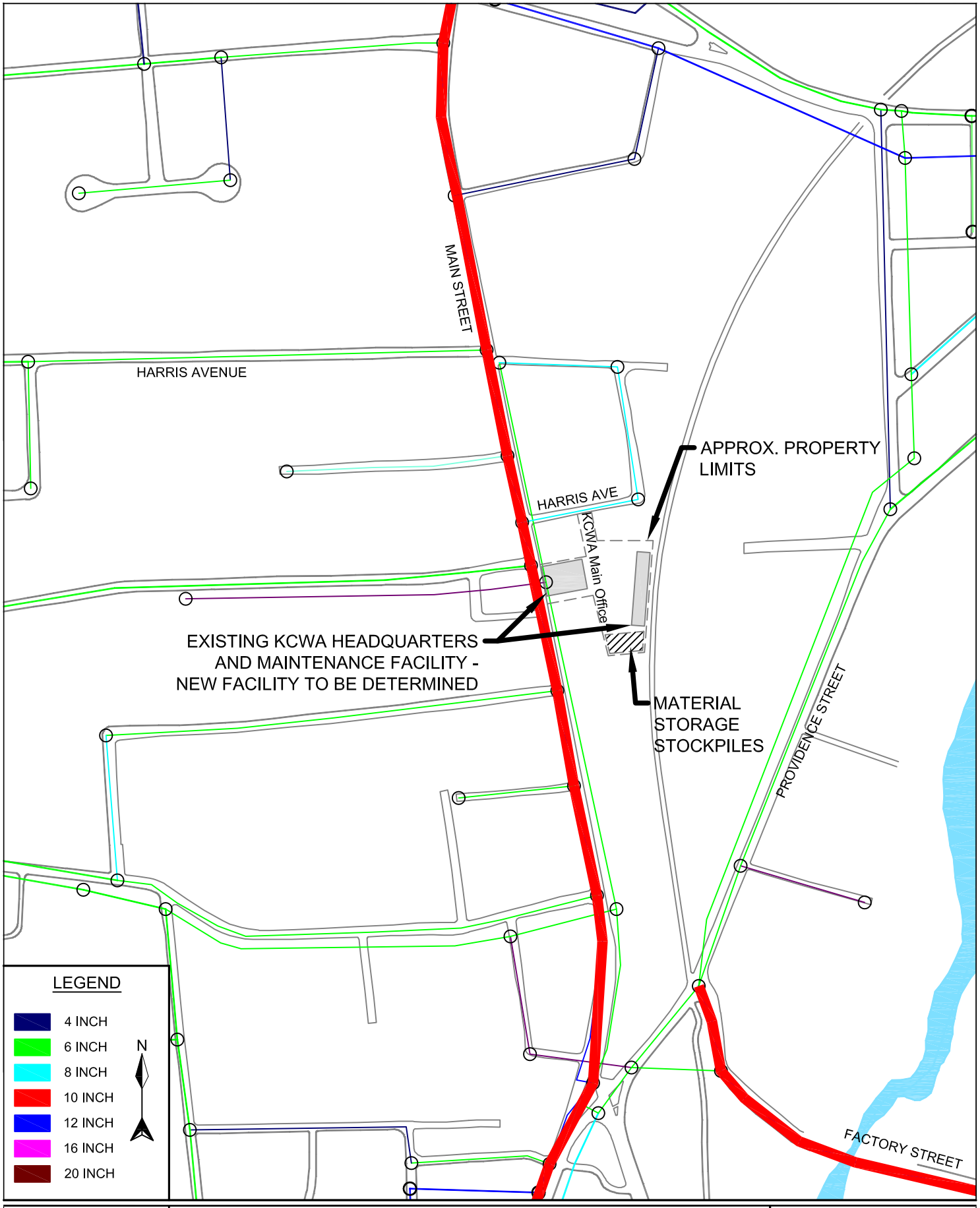

FIGURE NO. 6

KCWA Kent County Water Authority

PROJECT 6
REPLACEMENT OF AUTHORITY
HEADQUARTERS AND MAINTENANCE FACILITY

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

Project 7 – Oaklawn Avenue Service Gradient – Emergency PRV Connection to Low Service Gradient

Project Description

The Oaklawn pressure gradient services the Oaklawn section of Cranston and the extreme northeastern portion of West Warwick. This pressure area receives water directly from Providence Water via the Oaklawn Avenue wholesale interconnection. An 8-inch master meter records the flow through the interconnection supplying this portion of the KCWA system at a hydraulic grade of approximately 231 feet MSL. There is currently only one water supply connection to this portion of the water system and there are no water storage facilities operating within the pressure gradient to provide continued service in the event of a casualty with the Providence Water wholesale connection.

This project involves the construction of an emergency Pressure Reducing Valve (PRV) supply facility that would provide the ability to transfer water from the Authority's existing Low Service Gradient that operates at a hydraulic gradient of 334 feet MSL to the Oaklawn Gradient that operates at a hydraulic gradient of 231 feet MSL during an emergency such as a contamination event or failure of the wholesale connection to Providence Water. The PRV facility would be located in vicinity to Crossland Drive in West Warwick just north of Wakefield Street. It will also be necessary to provide approximately 750 feet on new 8 inch diameter water main to loop several dead ends and connect the two service gradients.

It should be noted that the Authority currently maintains locations of physical water main connections with closed valves that isolate these two pressure gradients. These valves are in the middle of the public right of way and cannot effectively be utilized to control flow and pressure to the downstream gradient. Without the PRV station the Low Service gradient would supply the area with pressures in the range of 120 psi which are deemed excessive. This PRV station will however provide a more reliable and stable pressure interconnection between the two gradients without concern for potential over pressurizing the Oaklawn Gradient from the Low Service Gradient.

Fiscal Year

Anticipated - 2014

Type of Project

This project is considered an improvement to the level of customer service associated with additional supply redundancy and is consistent with the long term goal of the Authority to identify and improve overall water distribution hydraulics.

Category

Project is deemed *essential* in order to provide for an alternative water supply to this area of the distribution system in the event of an emergency. The ultimate objective is providing a supply methodology to maintain public safety and benefit in the event of an emergency at the Providence Water primary connection or failure in the distribution system.

Location and Mapping
See Figure 7

Anticipated Construction Cost
The estimated cost of construction for this project is $450,000.

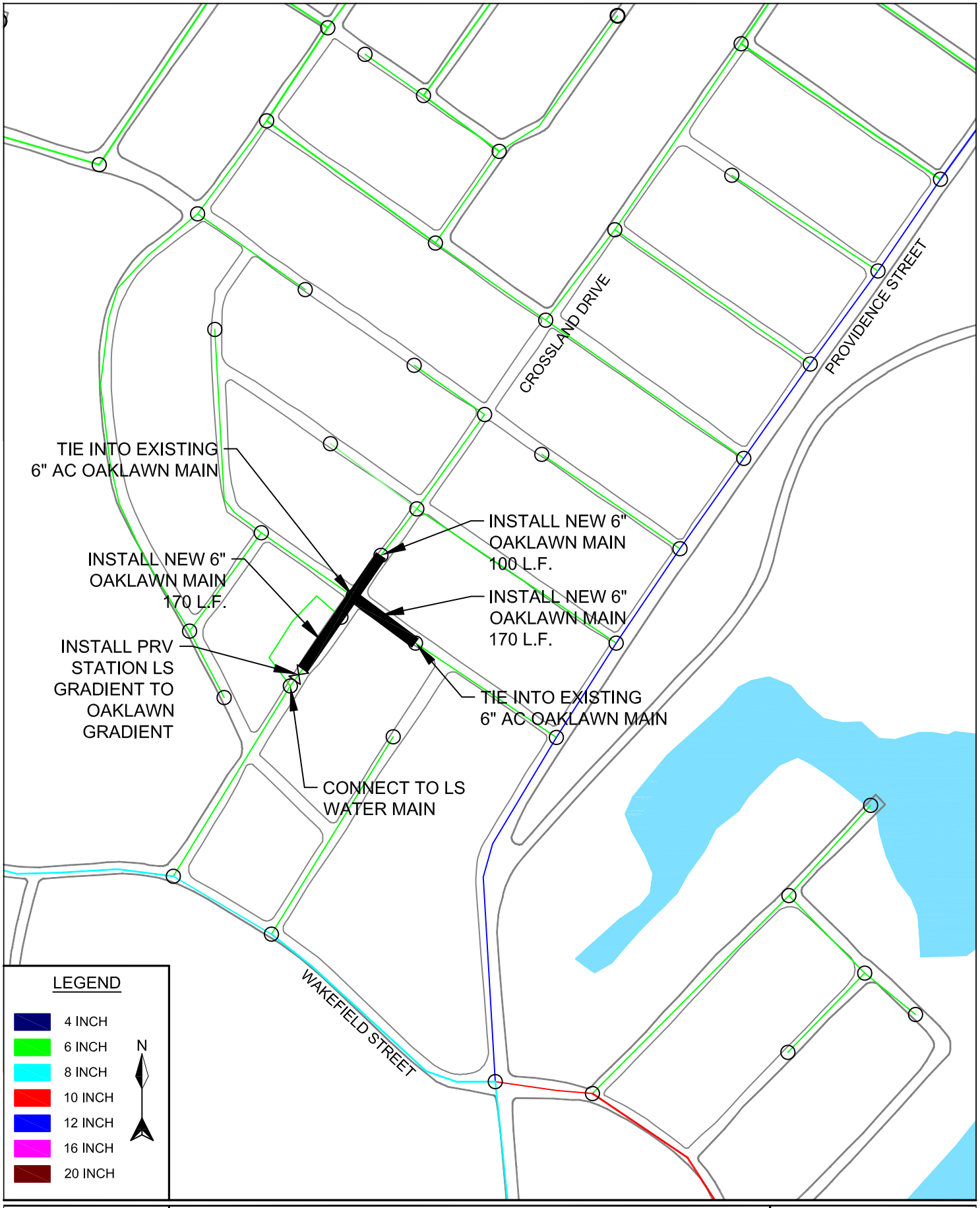

FIGURE NO.
7

KCWA
Kent County Water Authority

PROJECT 7
OAKLAWN SERVICE GRADIENT
EMERGENCY PRV

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

Project 8 – Interstate 295 (I-295) Water Main Bridge Crossing at Providence Street

Project Description

The Oaklawn pressure gradient services the Oaklawn section of Cranston and the extreme northeastern portion of West Warwick. This distribution area receives water directly from Providence Water via the Oaklawn Avenue wholesale interconnection. An 8-inch master meter records the flow through the interconnection supplying this portion of the KCWA system at a hydraulic grade of approximately 231 feet MSL. There is currently only one primary water supply connection to this portion of the water system and there are no water storage facilities operating within the pressure gradient.

The 12 inch transmission main to West Warwick runs along Providence Street and crosses under Interstate 295 at the New London Avenue bridge overpass. A break or leak within this section of water main would be a major undertaking to repair and replace. Closing a valve on either side of the overpass to isolate a leak would interrupt domestic water and fire flow supply to all of the West Warwick customers between the overpass and Wakefield Street. This project includes installing a parallel 12 inch water main approximately 480 feet attached to the bridge overpass across Interstate 295. The new water main would be interconnected to existing 12 inch diameter water mains on either side of the bridge and provide redundant supply infrastructure crossing over a significant construction obstacle and eliminating the potential for customers to be without potable water service for an extended period of time.

Fiscal Year

Anticipated - 2015

Type of Project

This project is considered an improvement to the level of customer service associated with additional transmission and distribution system redundancy and is consistent with the long term goal of the Authority to identify and improve overall potable water and fire service distribution to its service customers.

Category

Project is deemed *essential* in order to provide for a parallel water main that traverses a significant construction obstacle on a dead end transmission main in the event of an emergency.

Location and Mapping

See Figure 8

Anticipated Construction Cost

The estimated cost of construction for this project is $450,000.

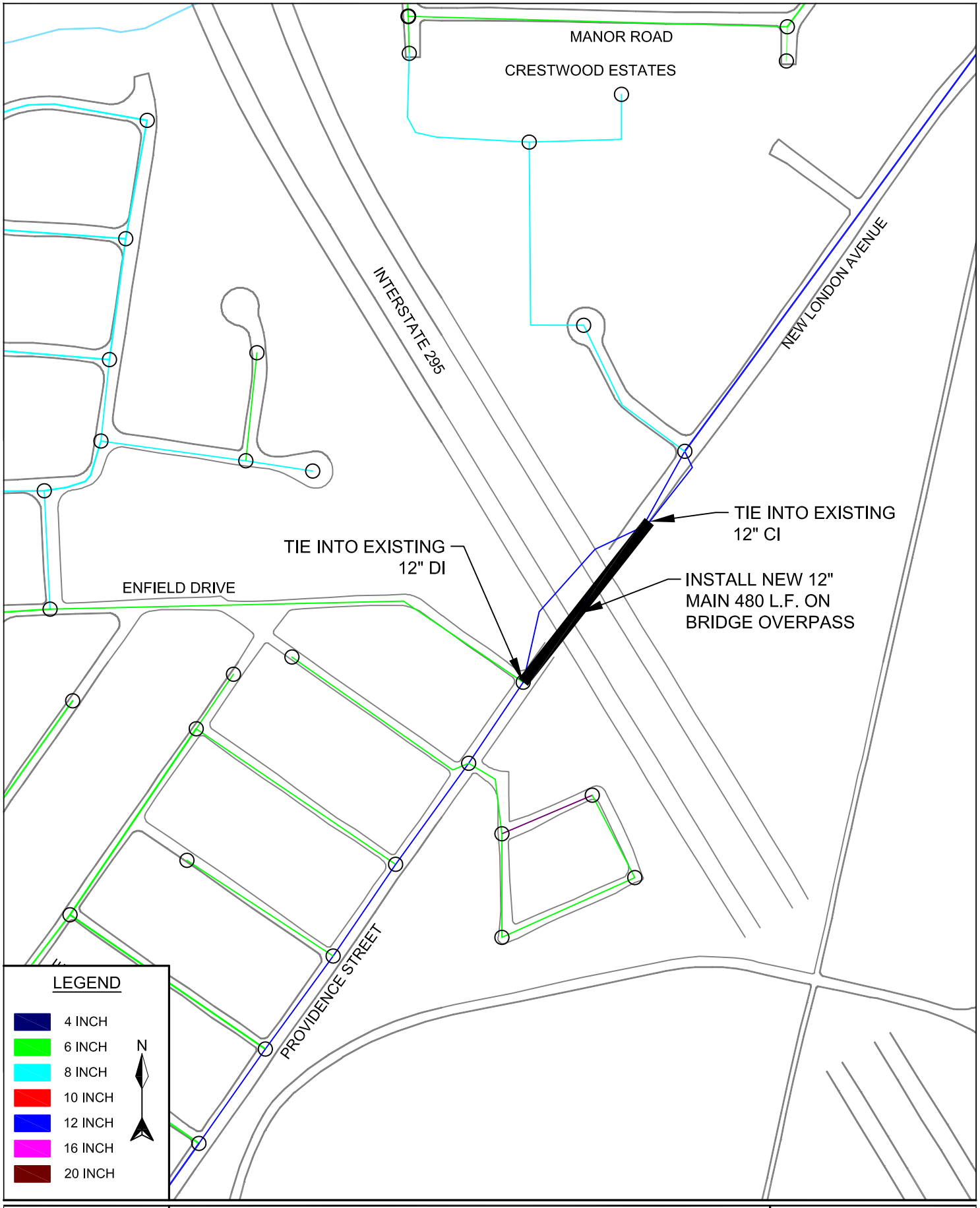

FIGURE NO.
8

KCWA
Kent County Water Authority

PROJECT 8
I-295 BRIDGE CROSSING AT
PROVIDENCE STREET

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

Project 9 – East Greenwich Transmission Mains – High Service Reinforcement / Expansion

Project Description

Previous Authority capital improvement projects have provided for partial expansion and reinforcement of the southern High Service Pressure Gradient. This project will expand on reinforcement of this pressure Gradient as well as extend the High Service Pressure Gradient to areas east along Division and Middle Road including Signal Ridge which is currently above the serviceable elevations identified in the 2007 hydraulic study for the Low Service Pressure Gradient. This expansion will also extend service to areas which are currently not served with public water and include loop connection sections along Division Road and Shippetown Road. The new High Service water main extension on Middle Road will also tie into the existing Low Service water main at the intersection with Tillinghast. A pressure reducing valve and normally closed gate valve will be installed at this location of tie in for use in emergency situations.

The following water main improvements necessary to reinforce the High Service Pressure Gradient in East Greenwich and to expand the Pressure Gradient east are as follows:

Project 9A - Division Road

Install 7,600 feet of new 16 inch water main from Shippetown Road to the approximate intersection of Old Quaker Lane and South County Trail (new England Tech.) and connect to existing 16 inch High Service water main at this location. It is likely that significant ledge/rock will be encountered along this routing. This is evidenced from visual rock and ledge outcrops along the side of the roadway.

Once this High Service water main is in place, connect to the existing 12 inch Low Service Main at Signal Ridge Way which will be reserviced from the High Service Gradient. The following streets will be converted from Low to High Service Gradient: Signal Ridge Way, Watch Hill Drive and Fox Run. The 20 inch Low Service transmission main that runs through Signal way will remain as is. Consideration should be given by homeowners for installation of pressure reducing devices in residences with resulting pressures over 80 psi.

Project 9B - Shippetown Road

Install 1,200 feet of new 12 inch water main from Hidden lane to Middle Road and connect to existing High Service water mains.

Project 9C - Middle Road

Install 1,700 feet of new 16 inch water main from McPartland Way to Moosehorn Road and connect to High Service water mains.

Project 9D - Middle Road

Install 900 feet of new 12 inch water main from end of existing 12 inch high service main to intersection with Tillinghast Road and connect to Low Service. This connection will include a normally closed valve and pressure reducing valve station for use in the event of an emergency.

Fiscal Year
Anticipated – 2016 - 2017

Type of Project
This project is considered an improvement to overall system redundancy including supply and transmission capacity and is consistent with the long term goal of the Authority to identify and improve overall water service.

Category
Project is deemed *necessary* in order to reinforce the gradient, expansion of the service territory and to re-service areas of the distribution system with higher pressure.

Location and Mapping
See Figure 9A – 9D.

Anticipated Construction Cost
The estimated cost of construction for this project is as follows.

Project 9A - Division Road	$2,780,000
Project 9B - Shippetown Road	$390,000
Project 9C - Middle Road	$650,000
Project 9D - Middle Road	$310,000

INSTALL NEW 16" HIGH SERVICE MAIN 7,600 L.F.

CONNECT TO 12" LOW SERVICE MAIN

INSTALL NEW 16" HIGH SERVICE MAIN 7,600 L.F.

CONNECT TO HIGH SERVICE WATER MAIN

CONNECT TO HIGH SERVICE WATER MAIN

CONVERT THESE AREAS TO HIGH SERVICE

CLOSE ISOLATION VALVE

20" LOW SERVICE MAIN TO REMAIN

DIVISION STREET

SHIPPEE TOWN ROAD

SIGNAL RIDGE WAY

WATCH HILL DRIVE

FOX RUN

BOULDER WAY

BLUEBERRY HILL

HIDDEN RIDGE

M.M.

M.M.

Master Meter & Backflow Preventer

Master Meter Assembly

AMTROL INC.

3 Story Office

Restaurant

Brooks Pharmacy Headquarters

Brooks Pharmacy Low Service (NOT APPROVED)

120 Room Hotel

PMP-34

Restaurant

Fire Service

Domestic Service

4 Story Office

2 Story Bank

3 Story Office

SOUTH COUNTY TRAIL

Rocky Hill Fairgrounds

3 1/2 Story Apartments

Condos

Condos

Condos

Master Meter and Backflow Preventor

Condos

Condos

EAST GREENWICH MEDICAL CENTER & OFFICE PHASES I, II, & III

Master Meter Assembly

PMP-2

BUILDING 1
47,250 SF

BUILDING 2
47,250 SF

SOUTH COUNTY T

LEGEND

- 4 INCH
- 6 INCH
- 8 INCH
- 10 INCH
- 12 INCH
- 16 INCH
- 20 INCH

N

FIGURE NO.
9A

KCWA
Kent County Water Authority

PROJECT 9A
DIVISION ROAD

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CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

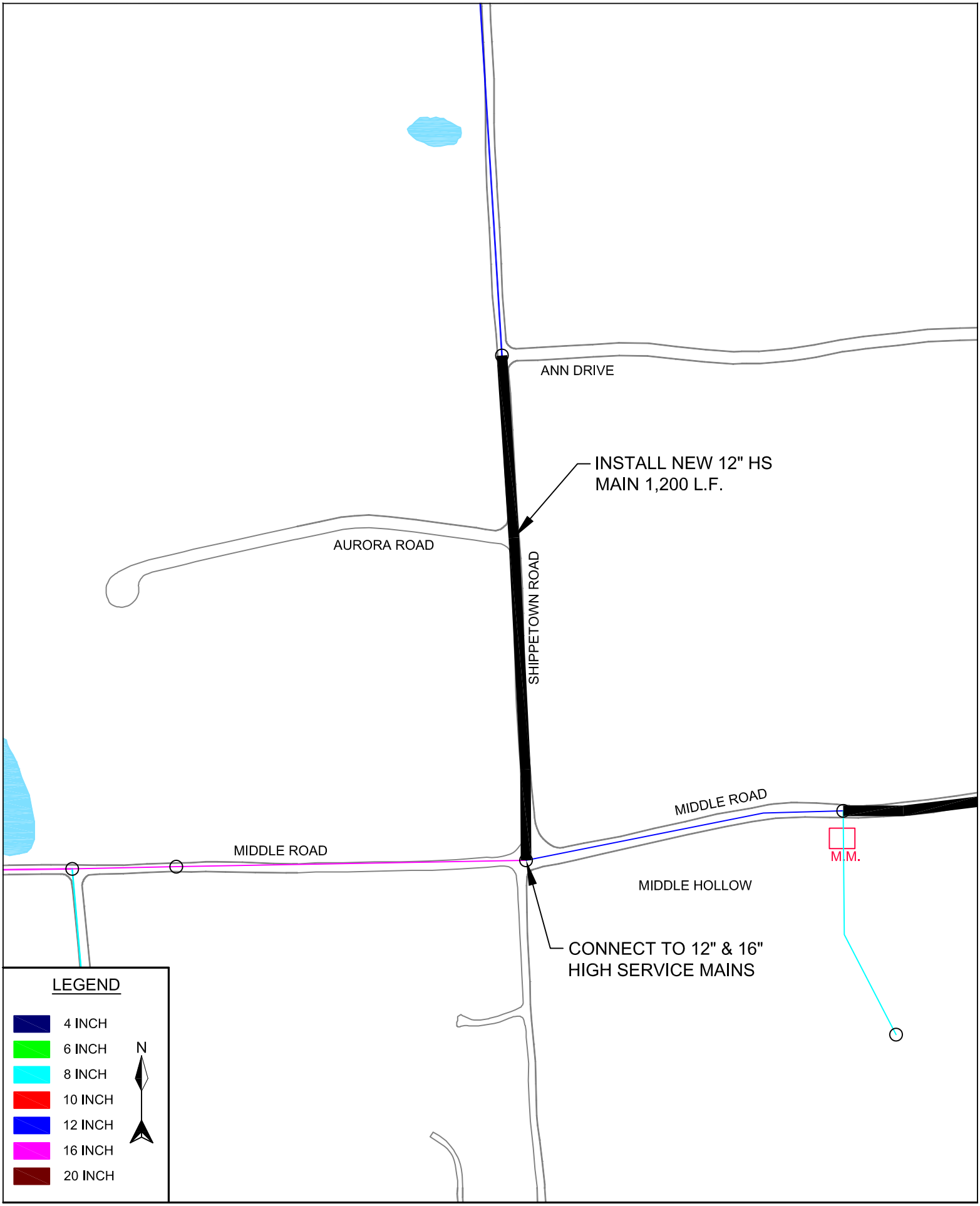

FIGURE NO.
9B

KCWA
Kent County Water Authority

PROJECT 9B
SHIPPETOWN ROAD

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

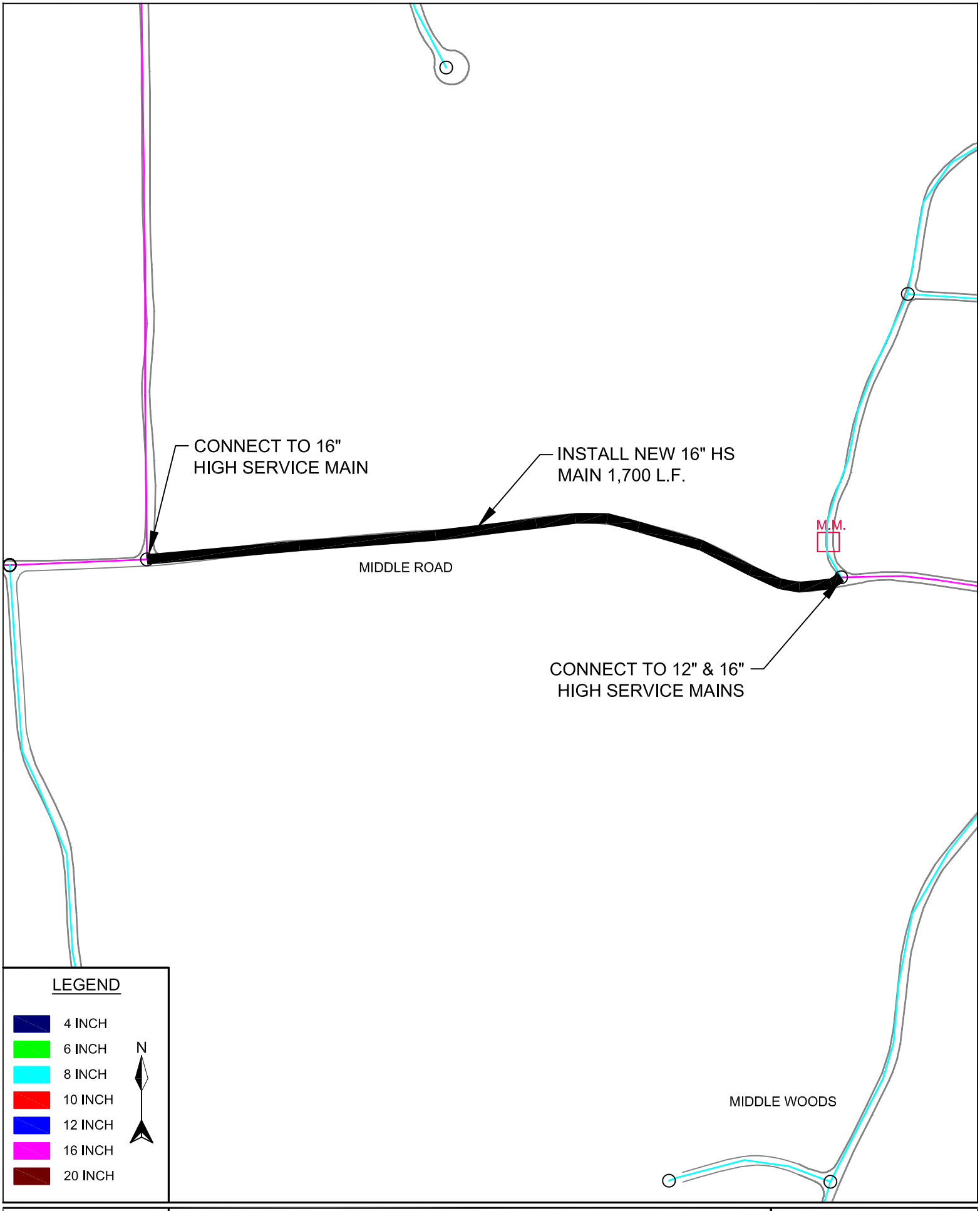

FIGURE NO.
9C

KCWA
Kent County Water Authority

PROJECT 9C
MIDDLE ROAD

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

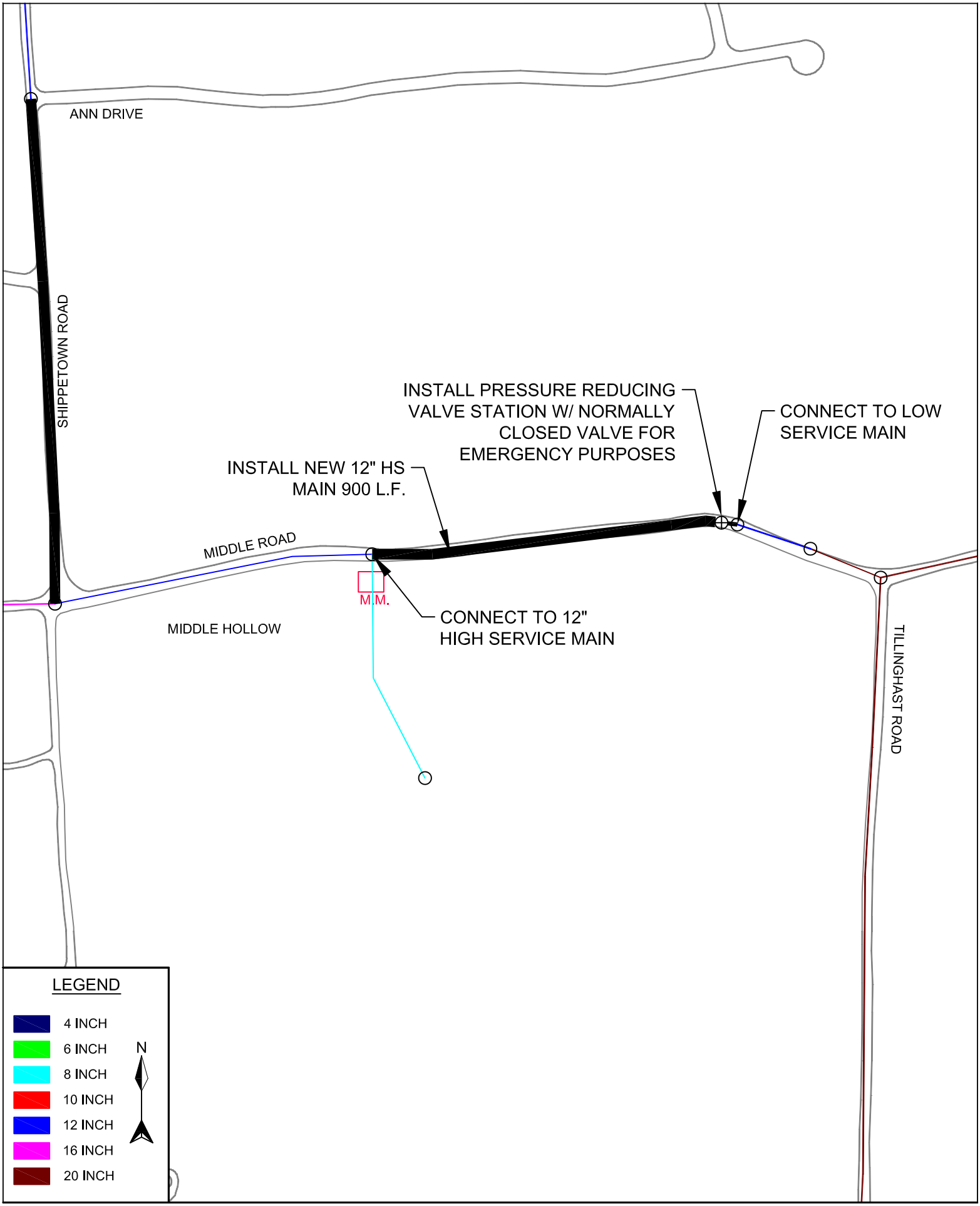

FIGURE NO.
9D

KCWA
Kent County Water Authority

PROJECT 9D
MIDDLE ROAD

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

Project 10A – Quaker Lane Pump Station - High Service Pumps

Project Description
The Authority will be completing a project in 2012/2013 that includes upgrading the existing Quaker Lane Booster Pump Station with the ability to pump directly into the High Service Pressure Gradient. The High Service pumps will not initially be installed as part of the rehabilitation project but accommodations will be provided in the rehabilitation for the addition of these pumps in the future. This will require the installation of approximately 12,000 feet of 16 inch water main to tie the pump station into the High Service Pressure Gradient water mains as described in Project 10B.

Fiscal Year
Anticipated - 2013

Type of Project
This project is considered an improvement to overall system redundancy including supply and transmission capacity and is consistent with the long term goal of the Authority to identify and improve overall water service.

Category
Project is deemed *necessary* in order to reinforce the gradient and for expansion of the service territory.

Location and Mapping
See Figure 10A.

Anticipated Construction Cost
The estimated cost of construction for this project is $290,000.

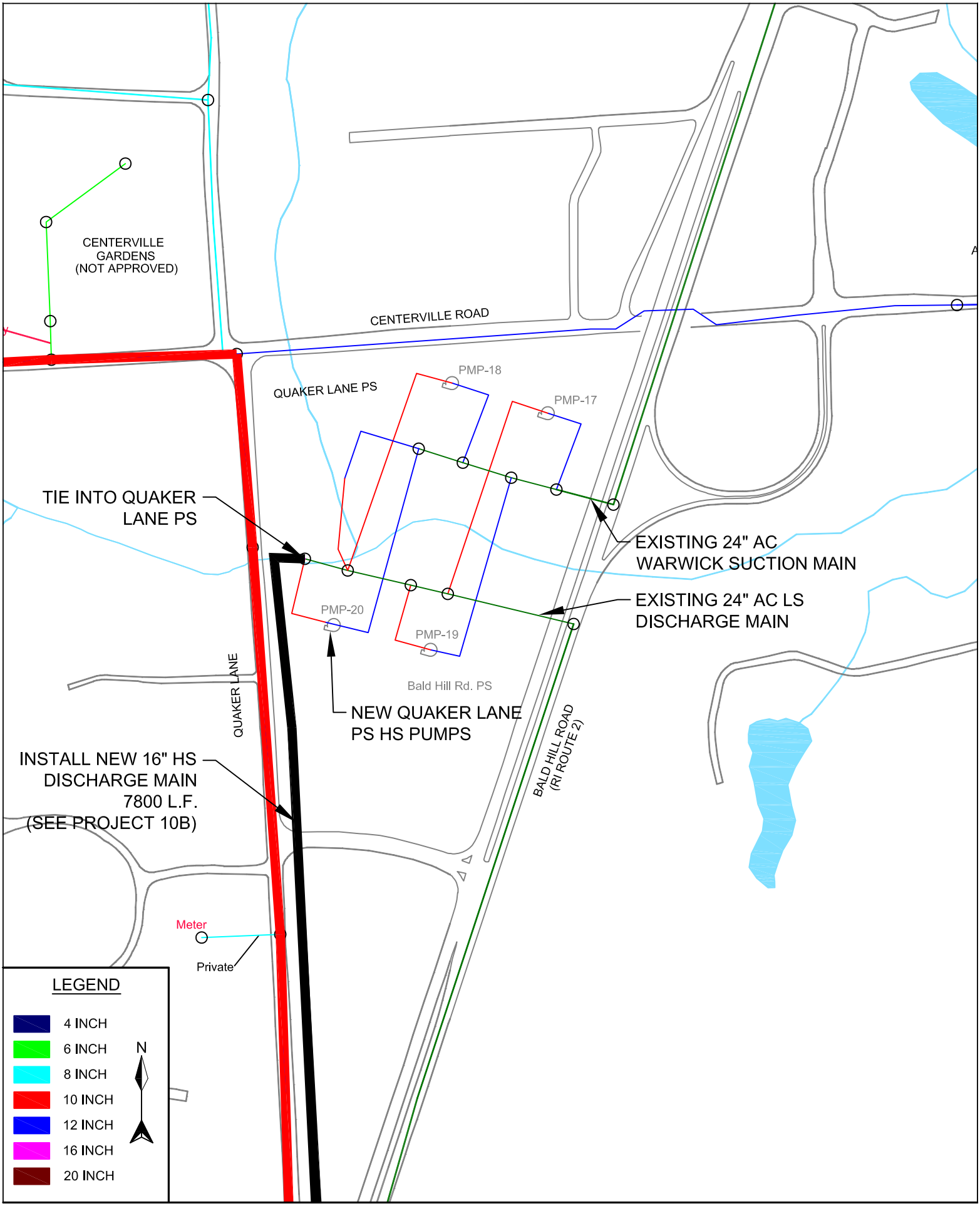

FIGURE NO. 10A

KCWA Kent County Water Authority

PROJEC10A
QUAKER LANE PUMP STATION - HIGH SERVICE PUMPS

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

Project 10B – High Service Transmission Mains - Quaker Lane Pump Station and High Service Expansion

Project Description

A project was previously completed by the Authority which increased service pressure in the Crompton storage tank area and also included expansion of the High Service Gradient. This included an extension of a 16 inch transmission main from Crompton Road along New London Turnpike and East Greenwich Avenue to the Crompton Storage Tank area. These improvements resulted in valve closures to isolate the Low and High Service Pressure Gradients. These valve closures resulted in dead end water main sections along roadways on the High Service Pressure Gradient that extend away from the Crompton Low Service storage tank toward Bald Hill Road and Cowesett Avenue.

The Authority is in the process of upgrading the existing Quaker Lane Booster Pump Station to provide the ability to pump directly to the High Service Pressure Gradient. This upgrade is scheduled for completion by late 2012. The High Service pumps will not initially be installed as part of the rehabilitation project but accommodations will be provided for addition of these pumps in the future. Reference Project 10A. This will require the installation of approximately 12,000 feet of 12 and 16 inch water main to tie the pump station into the High Service Pressure Gradient water mains as follows.

- 16 inch - Quaker Lane Pump Station out to the State right of way of Route 2 (Bald Hill Road).
- 12 inch - South to the intersection with Cowesett Avenue, west on Cowesett Avenue with tie in at Kulas Road, Monterey Drive and Quaker Drive. Convert to High Service mains.
- 16 inch - Continued south on Route 2 (Quaker Lane) to East Greenwich Avenue / Major Potter Road. Tie into 12 inch stub
- 16 inch - Tie in at intersection of Quaker Lane and East Greenwich Avenue (west) and Major Potter Road (east).
- Continued south on Quaker Lane to intersection with James P. Murphy Industrial Highway and tie in at existing High Service water main located at discharge to West Warwick Industrial Park Booster Pump Station (WWBP) and tie into existing High Service water main.

This new High Service water main will in part provide the required elimination of dead ends and strengthening of the High Service Gradient in this area.

It is recommended that the 12 inch transmission main be extended along Cowesett Avenue from the intersection with Quaker Lane west to Kulas Road for 2,700 feet that will tie into the High Service Gradient and increase the hydraulic capacity in this area of the system.

There exists a localized area within the Low Service Pressure Gradient to the north of Cowesett Avenue between Freemont Street and Narragansett Avenue that experiences substandard pressures (i.e. below 20 psi under certain demand conditions). It is recommended that the 12 inch transmission main along Cowesett be extended west from Kulas Road (see above) to Lonsdale Street for an additional 1,900 feet. This would include tying into the Low Service

Main on Lonsdale and converting this to High Service thereby eliminating the dead end at this location. Water services with substandard pressures to the north of Cowesett could then be converted to the High Service gradient.

Fiscal Year
Anticipated - 2013

Type of Project
This project is considered an improvement to overall system redundancy including supply and transmission capacity and is consistent with the long term goal of the Authority to identify and improve overall water service.

Category
Project is deemed *necessary* in order to reinforce the gradient and for expansion of the service territory.

Location and Mapping
See Figure 10B.

Anticipated Construction Cost
The estimated cost of construction for this project is $4,290,000.

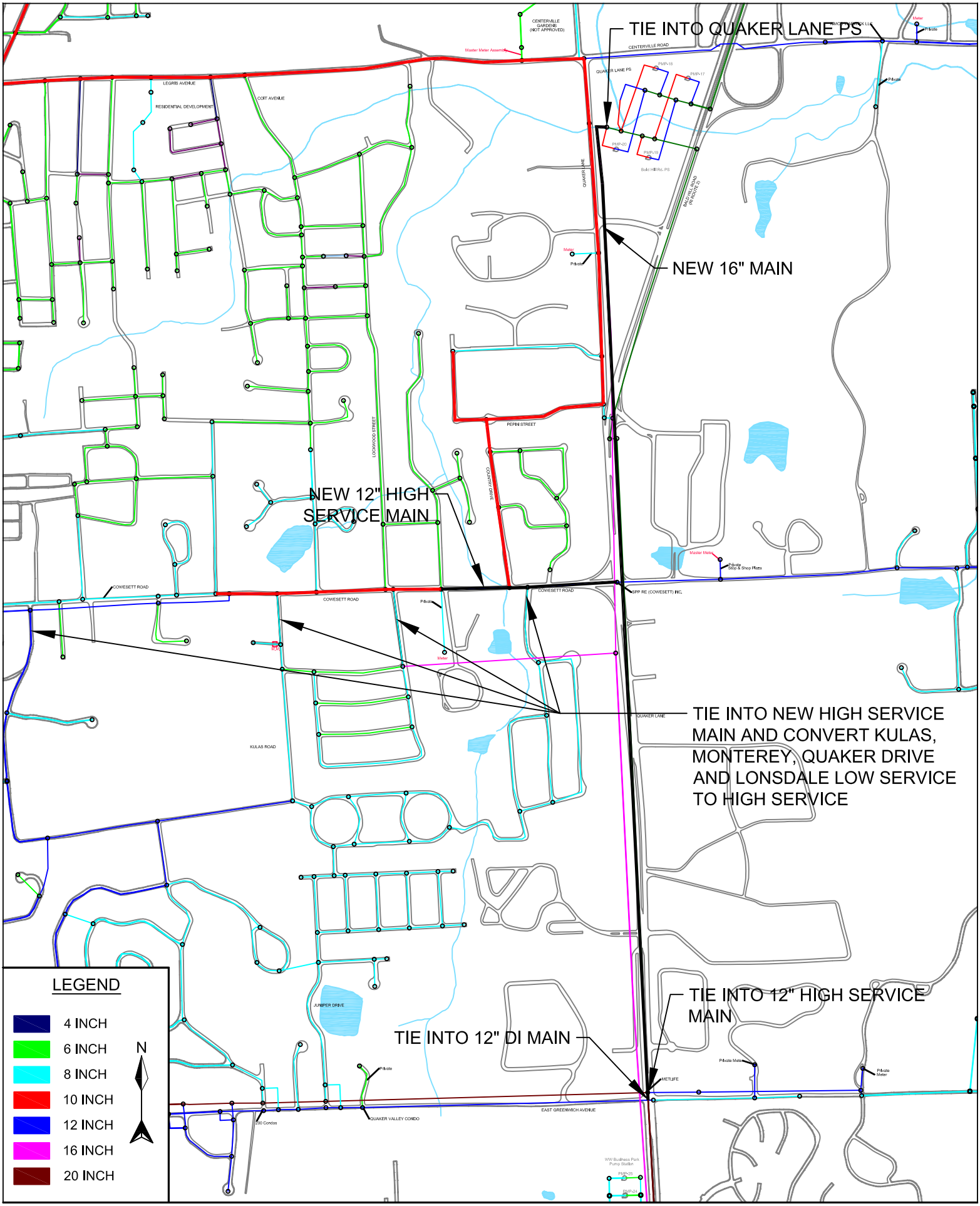

FIGURE NO. 10B

KCWA Kent County Water Authority

PROJEC10B
HS TRANSMISSION MAIN - QUAKER LANE PUMP STATION

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Infrastructure Replacement Projects 11 through 27

Infrastructure Replacement of Low Service Pressure Gradient Transmission Mains – Reinforcement / Expansion / Hydraulic Capacity Improvement

Project Description

The primary goal was to identify Low Service Pressure Gradient water mains that are related to the conveyance of water from supply sources and storage facilities to areas within the distribution system which are limited in hydraulic flow capacity due to size, age or combination of both. This is typically evidenced in transmission water mains that exhibit "high" head losses during normal (average day) and peak (maximum day and peak hour) system demand conditions.

These transmission water main segments are critical in that they convey flow from supply sources (i.e. Clinton Avenue and Bald Hill Road Pump Stations and groundwater well stations) to distribution system booster stations, storage facilities and customer demand areas throughout the distribution system. These transmission water mains are also critical for conveying fire flows from the storage facilities to areas throughout the distribution system.

The Authority's computer hydraulic model was utilized to locate those water main segments that exhibit high head loss under the various demand conditions. This included performance of steady state model simulations under average day and maximum day demand scenarios for projected future demands.

Infrastructure Replacement Program

As required by legislative mandate the Authority maintains an ongoing Infrastructure Replacement Program (IFR) which is intended to upgrade and reinforce the water distribution system by replacing old, deteriorated and undersized water mains and other infrastructure (tanks, pump stations, reservoirs, etc.) This program is intended to improve and maintain an adequate level of customer service and fire flow throughout the distribution system. The funding mechanism for the IFR program is independent of the capital program and relies upon the rate structure for customer service billing. The projects identified in this section will be funded under the Authority's IFR program.

The benefit of identifying an IFR project herein is to potentially accelerate the projects listing within the IFR program in conjunction with Capital Projects. For example, based on the pipeline ranking system a particular water main within the system may not be scheduled for rehabilitation within the timeline necessary to facilitate use of a programmed capital project. The identification of this pipeline in this capital program could provide the necessary justification to consider an earlier rehabilitation through the IFR program. The Authority must weigh the relative merit of these identified infrastructure rehabilitations against other infrastructure projects identified within the IFR program.

The identification of these projects include a description and anticipated benefit, location mapping, description of interrelationship with capital projects and estimate of cost. No priority rank was developed for these infrastructure projects as this would be performed under the process of IFR program assessment. The intent is to use this additional justification in the IFR evaluation process.

Projects 11 – Remove Fiskeville Storage Tanks From Service

The Fiskeville Underground Storage Reservoirs are located off of Seven Mile Road in Cranston adjacent to the John L. Curran Public Fishing Access Area as established by the State of Rhode Island. These underground storage reservoirs have a total combined storage volume of 1,500,000 gallons and an overflow elevation of 334.6 feet. The Fiskeville Underground Storage Reservoirs were constructed in 1944 and 1960 of reinforced concrete and are located entirely below grade.

It is recommended that the two (2) existing Fiskeville Underground Storage Reservoirs be removed from operational service in conjunction with completion of the recent project involving the re-servicing of the Low Service Pressure Gradient infrastructure. Currently these reservoirs remain in a continuously "locked up" condition due to their close proximity to the Clinton Avenue Booster Pump Station. The pumps create a pressure head condition greater than the overflow elevation of the reservoirs. This results in water quality concerns as the large volume of water storage does not cycle in and out of the tanks and cannot be made available for customer use to the distribution system.

Due to the inability of the tanks to routinely complete the fill and drain cycle, water quality in the reservoirs can easily become compromised. The increase in water age further exacerbates the threat for water quality degradation issues to occur. This includes reduction and loss of chlorine residual and increases in color, odor and turbidity which are all associated with customer taste and odor complaints. This condition also promotes an increase in the occurrence of disinfection by products in the form of carcinogens TTHMs and HAA5s. Once physically disconnected from the distribution system, the reservoir structures and associated altitude vaults should be filled with gravel.

The ineffectiveness and removal of these reservoirs from operational service is supported in the findings and recommendations of the Authority's 2007 Hydraulic Tank Study.

Project 12A - West Street Storage Tank Modifications

Located within the Low Service 334 Foot Pressure Gradient on West Street in West Warwick, this is a standpipe style tank construction, 1,000,000 gallon capacity, constructed in 1956 of welded steel. The tank was completely rehabilitated in 2004 which included complete coatings rehabilitation, an EFI underground altitude valve vault and SCADA controls. This tank is currently out of service and is isolated from the distribution system due to its propensity to "lock up" during normal system operation. The primary factor related to this condition is the pump head condition influence of the Clinton Avenue Pump Station in conjunction with increased transmission capacity resultant from Blackrock Road and Knotty Oak Road transmission main projects and the corresponding increase in the system hydraulic grade from the new Clinton Avenue pump head in proximity to this tank that is currently above the tank overflow elevation of 331 feet.

Computerized hydraulic modeling and system operations reflect that the hydraulic grade at this storage tank does not repeatedly cycle below the tank overflow elevation thereby precluding this tank from effectively operating in a desirable drain and fill condition. Clinton Avenue Pump Station is the main supply station for the Authority. The probability of cyclic shutting down the Clinton Avenue Pump Station for any "significant" time span during any 24 hour period is not likely for the foreseeable future due to its critical nature as the primary water supply to the distribution system. However, this tank also provides a certain measure of fire reserve storage for the general surrounding area and must be retrofitted in order to ensure adequate water turn over to preserve water quality in the tank.

A booster pump assembly is proposed to be installed at the base of the tank to periodically pump water back into the distribution system during off peak demand hours and during the occurrence of Clinton Avenue Pump Station shutdown. The tank would then be allowed to refill and the process of filling and pumping back into the distribution system would be routinely repeated at a rate that complies with AWWA standards. The pump station would also be equipped with a bypass control valve set to open if the system hydraulic grade were to drop below the overflow elevation of the tank. This control valve would then permit water from the tank to flow by gravity into the system. It is anticipated that this would most likely occur during a fire flow condition.

The re-servicing of the Tiogue Tank Pressure Gradient from the High Service Pressure Gradient from the south makes the temporary booster pump station at the Tiogue Tank no longer required. This existing pump station is a prefabricated (package) below grade facility that is fitted with two electric pumps designed to operate at 400 gpm at 42 feet of head. The pump station is less than ten years in age and can be retrofit for installation at the West Street tank site.

Preliminary indications suggest that the pump characteristics of 400 gpm at 42 feet of head will be adequate to pump water from the storage tank back into the distribution system. Operation of this pump station will permit the Clinton Avenue Pump Station to be periodically taken off line during low flow periods (i.e. early morning hours). It will be desirable that the pump station replicate the head conditions produced by Clinton Avenue Pump Station in order to stabilize service pressure to customers at higher service elevations that normally rely on the pump head from Clinton Avenue Pump Station would still maintain adequate pressure. The control for operation of this station would need to be sequenced through the Authority's SCADA system.

The Authority has removed the Knotty Oak Booster Pump Station from operational service since the new Read School House Road Tank 500 Foot Gradient was placed into service. This pump station was no longer required as the high service pumps at Clinton Avenue Pump Station will supply the new Read School House Road tank. It is recommended that the emergency generator set at this pump station be considered for utilization (depending on size) at the West Street tank pump station site. This emergency generator is reportedly in good condition and will be able to provide electrical power for operation of the pumps under prolonged periods of power outages.

The retrofit of the West Street tank facility was recommended in the Authority's 2007 Hydraulic Tank Study.

Project 12B – Read School House Road Storage Tank Demolition
Now that the new 500 foot gradient Read School House Road Storage tank facility has been placed into operational service as of 2009 the existing Read School House Road tank and related facilities can be removed from service and demolished. This tank facility is of steel standpipe construction with 1,500,000 gallon capacity.

Project 12C – Tiogue Storage Tank Demolition
The project involving reservicing of the Tiogue storage tank area from the south High Service Pressure Gradient is complete and the pressure reducing valve station has been placed into operational service. The existing Tiogue storage tank facility and its associated facilities can now be removed from service and demolished. This tank facility is of steel standpipe construction with 771,000 gallon capacity.

General Project Description 13
The connection between the Read School House Road (northern 500-foot gradient) and the Technology Park High Service Gradient (southern 500-foot gradient) is required in order to increase overall system supply redundancy and to permit greater flexibility in system operations. Most notably, this includes added redundancy in both storage and supply facilities for the Read School House Pressure Gradient which currently operates with a single tank and supply source. Connection with the High Service Pressure Gradient to the south will provide the Read School House Road Pressure Gradient with increased redundancy in storage and supply. The benefit to the south gradient includes added source of supply.

The water main improvements needed to interconnect the north and south High Service Pressure Gradients are as follows:

Project 13A - Tiogue Avenue
Install 2,400 feet of new 12 inch water main from Elton Avenue and connect to 12 inch High Service water main in proximity to Tiogue Pressure Reducing valve station and extend to Pilgrim Avenue. There also exists a 12 asbestos cement Low Service Gradient water main along this routing. This water main does not require replacement.

Project 13B - Pilgrim Avenue
Install 5,800 feet of new 12 inch water main from Tiogue Avenue to Laurel Avenue. There exist sections of 6 and 8 inch asbestos cement water main on the Low Service Gradient along this routing. These existing Low Service Gradient water mains should be considered for replacement with 5,800 feet of new 12 inch water main if curb to curb paving is included in the High Service water main project.

Project 13C - Laurel Avenue and Bridge Crossing
Install 400 feet of new 12 inch water main from Pilgrim Avenue to Washington Street (Route 33/117). There exists a section of 12 inch cast iron water main on the Low Service Gradient along this routing. This existing Low Service water main should be considered for replacement with 400 feet of new 12 inch water main and a bridge crossing attachment.

Project 13D - Washington Street
Install 5,300 feet of new 16 inch water main from Laurel Avenue to South Main Street. There exist sections of 12 and 16 inch cast iron water main on the Low Service Gradient along this routing. These existing Low Service water mains should be considered for replacement with 5,300 feet of new 16 inch water main if curb to curb paving is included in the High Service water main project. These Low Service mains are used for transmission mains in the Low Service Gradient.

Project 13E - Washington Street / Flat River Road
Install 6,100 feet of new 16 inch water main from Station Street and connect to existing 16 inch High Service Water Main at intersection of Flat River Road and Colvintown Road. This new 16 inch High Service water main will replace the existing High Service water mains as follows: 4,400 feet of 8 inch of asbestos cement; 500 feet of 8 inch cast iron; and 1,200 feet of 16 inch asbestos cement.

Project 14A - Old Main Street / Colvintown Road
Install 5,300 feet of new 16 inch water main from Flat River Road to Hunters Crossing Drive and connect to High Service water mains. This new 16 inch High Service water main will replace 5,300 feet of existing 8 inch asbestos cement High Service water main.

Project 14B - Boston Street
Install 4,500 feet of new 12 inch water main from Black Rock Road/Gervais Street to Washington Street and connect to High Service water mains. This new 12 inch High Service water main will replace the existing High Service water mains as follows: 1,100 feet of 6 inch ductile iron; 1,100 feet of 6 inch asbestos cement; and 2,300 feet of 6 inch cast iron.

Project 14C - Washington Street
Install 700 feet of new 16 inch water main from Boston Street (connect to high service 12 inch main) to Pilgrim (connect to 12 inch at Laurel/Pilgrim and 16 inch at Washington). There exists a section of 16 inch cast iron water main on the Low Service Gradient along this routing. This existing Low Service water main should be considered for replacement with 700 feet of new 16 inch water main if curb to curb paving is included in the High Service water main project.

Project 15 - Centerville Road in Warwick
Replace 1,800 feet of 8-inch diameter asbestos cement water main and 1,200 feet of cast iron water main with 3,000 feet of 12-inch diameter water main on Centerville Road between I 95 ramp and Toll Gate Road. Provide tie in of water mains on all cross streets.

Project 16 - Sandy Bottom Road in Coventry
Replace 100 feet of 8-inch diameter ductile iron water main with 16-inch ductile iron, 2,200 feet of 8-inch diameter asbestos cement water main with 16-inch ductile iron and 300 feet of 16-inch diameter cast iron water main on Sandy Bottom Road with 16-inch diameter water main from Washington Street to Tiogue Avenue / Bridge. Provide tie in of water mains on all cross streets.

Project 17 - Arnold Road in Coventry
Replace 6,100 feet of 16-inch diameter cast iron water main with 6,100 feet of 16-inch diameter water main on Arnold Road from Crestwood Road to Tiogue Avenue. Provide tie in of water mains on all cross streets.

Project 18 - Country Drive/Pepin Street in West Warwick
Replace 1,100 feet of 8-inch diameter asbestos cement water main on Country Drive with 1,100 feet of 12-inch diameter water main from Pepin Street to Cowesett Road. Replace 1,700 feet of 8-inch diameter asbestos cement water main on Pepin Street with 1,700 feet of 12-inch diameter water main from Quaker Lane to Old Carriage Road. Note that this project will require an easement for water main installation from the end of Country Drive to Pepin Street (approximately 200 feet).

In the event that this easement cannot be obtained or the cost and logistics to install the water main through this area is impractical and not viable then the project would need to be reconsidered.

Project 19 - Quaker Lane in Warwick and West Warwick
Replace 1,500 feet of 8-inch diameter asbestos cement water main and 1,100 feet of 8-inch diameter PVC water main with 2,600 feet of 12-inch diameter water main on Quaker Lane from Pepin Street to Centerville Road. Provide tie in of water mains on all cross streets.

Project 20 - Washington Street in Coventry
Replace 6,100 feet of 12-inch diameter cast iron water main with 6,100 feet of 16-inch diameter water main on Washington Street from Read Avenue to Contentment Drive. Provide tie in of water mains on all cross streets. This project should be coordinated with Capital Improvement Projects group 7 and 8.

Project 21 - New London Avenue/Factory Street in West Warwick
Replace 1,100 feet of 6-inch diameter cast iron water main on Factory Street, 2,300 feet of 8-inch asbestos cement water main on Factory Street and New London Avenue, 1,800 feet of 4-inch diameter cast iron water main on New London Avenue and 500 feet of 6-inch cast iron water main on New London Avenue.

Install 3,100 feet of 12-inch diameter water main on New London Avenue from Legris Avenue to Factory Street. Install 2,600 feet of 12-inch diameter water main on Factory Street from New London Avenue to Providence Street. Provide tie in of water mains on all cross streets. This project presents a significant obstacle which involves the bridge crossing on Factory Street.

Project 22 – Cowesett Road in West Warwick
Replace 1,800 feet of 8-inch diameter asbestos cement water main with 1,800 feet of 12-inch Low Service diameter water main on Cowesett Road from Narragansett Avenue to Cochran Street. This project will require close coordination with CIP 10 which includes extending High Service water mains west on Cowesett Avenue from Quaker Lane with ties at Kulas Road, Monterey Drive and Quaker Drive to eliminate dead ends at these locations and loop High Service. Provide tie in of water mains on all cross streets. Upon completion of both projects there will be parallel High and Low water service water mains in this section of Cowesett Road.

Project 23 – Providence Street in West Warwick
Replace 2,000 feet of 8-inch diameter asbestos cement water main and 2,000 feet of 8-inch diameter cast iron water main with 4,000 feet of 12-inch diameter water main in Providence Street from Penta Street to Tollgate Road. Provide tie in of water mains on all cross streets.

Project 24 – Legris Avenue/West Warwick Avenue in West Warwick
Replace 400 feet of 6-inch diameter ductile iron water main, 500 feet of 6-inch diameter cast iron water main, 1,700 feet of 8-inch diameter cast iron water main and 3,000 feet of 8-inch diameter asbestos cement water main on Legris Avenue with 5,600 feet of 12-inch diameter water main from Main Street to Old Quaker Lane. Provide tie in of water mains on all cross streets. This project presents a significant obstacle which involves the bridge crossing on Legris Avenue.

Replace 3,000 feet of 6-inch diameter cast iron water main and 300 feet of 8-inch diameter cast iron water main on West Warwick Avenue with 3,300 feet of 12-inch diameter water main from Main Street to Washington Street. Provide tie in of water mains on all cross streets.

Project 25 – East Avenue in Warwick
Replace 1,900 feet of 10-inch diameter cast iron water main with 1,900 feet of 12-inch diameter water main on East Avenue from River Street to Commonwealth Avenue. Provide tie in of water mains on all cross streets.

This project also presents a significant obstacle which involves the bridge crossing on East Avenue. There are tentative plans to rehabilitate this bridge structure in the near future by RIDOT. This project should be coordinated with any consideration for improving / replacing the existing structure.

Project 26 – Main Street in West Warwick
Replace 800 feet of 10-inch diameter cast iron water main, 2,500 feet of 6-inch diameter cast iron water main, 100 feet of 10-inch ductile iron water main and 1,300 feet of 8-inch diameter cast iron water main on Main Street with 4,700 feet of 12-inch diameter water main from St. Mary Street to Clyde Street. Provide tie in of water mains on all cross streets.

Project 27 – New London Turnpike in West Warwick
Replace 400 feet of 8-inch diameter asbestos cement water main, 600 feet of 12-inch diameter ductile iron water main, 600 feet of 12-inch PVC water main, 5,700 feet of 12-inch diameter asbestos cement water main and 2,300 feet of 8-inch cast iron water main on New London Turnpike with 9,600 feet of 16-inch diameter water main from Cowesett Road to Arnold Road. Provide tie in of water mains on all cross streets.

Fiscal Year
To be determined under the infrastructure replacement program.

Type of Project
This project is considered an improvement to overall system transmission capacity and is consistent with the long term goal of the Authority to identify and improve overall water service.

Category
This project is deemed essential in keeping with the goals of the Infrastructure Replacement Program and will serve to increase the hydraulic flow capacity throughout the Low Service Pressure Gradient in order to meet existing and future consumer system demands and fire flow requirements.

Location and Mapping
See Figure 11 – 27.

Anticipated Construction Cost
These projects are to be funded through the Authority's IFR program. The estimated cost of construction for this project is as follows.

Project Description	Cost	Anticipated Year
Project 11 – Remove Fiskeville Storage Tanks From Service	$ 420,000	2012
Project 12A – West Street Storage Tank Modifications	$ 320,000	2012
Project 12B – Read School House Road Storage Tank Demolition	$ 320,000	2012
Project 12C – Tiogue Storage Tank Demolition	$ 260,000	2012
Project 13A – Tiogue Avenue	$ 690,000	2013
Project 13B – Pilgrim Avenue	$ 1,670,000	2013
Project 13C – Laurel Avenue and Bridge Crossing	$ 120,000	2013
Project 13D – Washington Street	$ 1,780,000	2014
Project 13E – Washington St./Flat River Rd.	$ 2,050,000	2014
Project 14A – Old Main Street / Colvintown Road	$ 1,780,000	2014
Project 14B – Boston Street	$ 1,350,000	2014
Project 14C – Washington Street	$ 250,000	2015
Project 15 – Centerville Road in Warwick	$ 940,000	2015
Project 16 – Sandy Bottom Road in Coventry	$ 910,000	2015
Project 17 – Arnold Road in Coventry	$ 2,140,000	2015
Project 18 – Country Drive/Pepin Street in West Warwick	$ 870,000	2015
Project 19 – Quaker Lane in Warwick and West Warwick	$ 840,000	2016
Project 20 – Washington Street in Coventry	$ 2,220,000	2016
Project 21 – New London Ave./Factory St. in West Warwick	$ 1,850,000	2016
Project 22 – Cowesett Road in West Warwick	$ 590,000	2016
Project 23 – Providence Street in West Warwick	$ 1,300,000	2016
Project 24 – Legris Ave./W. Warwick Avenue in West Warwick	$ 2,990,000	2017
Project 25 – East Avenue in Warwick	$ 640,000	2017
Project 26 – Main Street in West Warwick	$ 1,580,000	2017
Project 27 – New London Turnpike in West Warwick	$ 3,630,000	2017

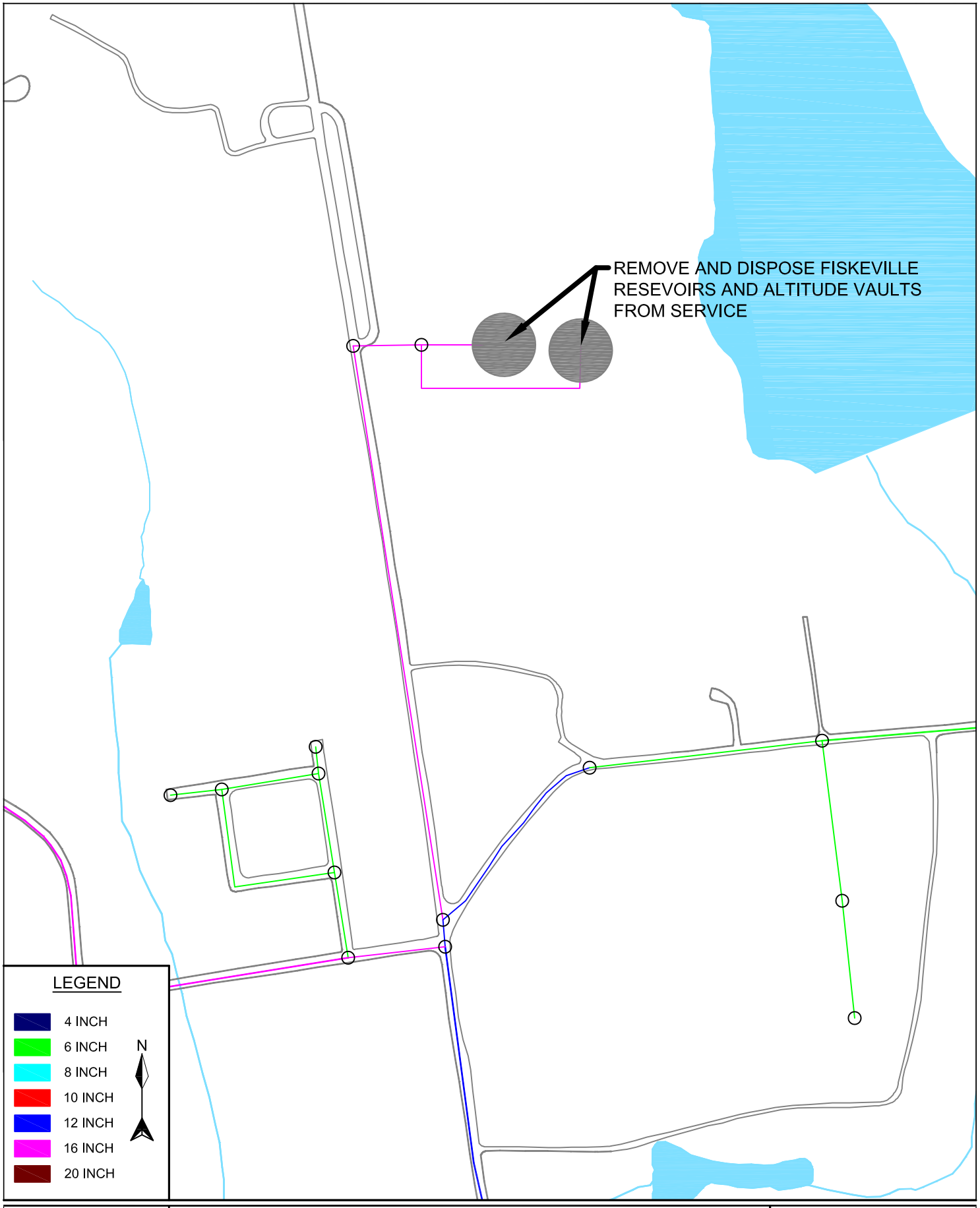

FIGURE NO.
11

KCWA
Kent County Water Authority

PROJECT 11
REMOVE FISKEVILLE TANKS
FROM SERVICE

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CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

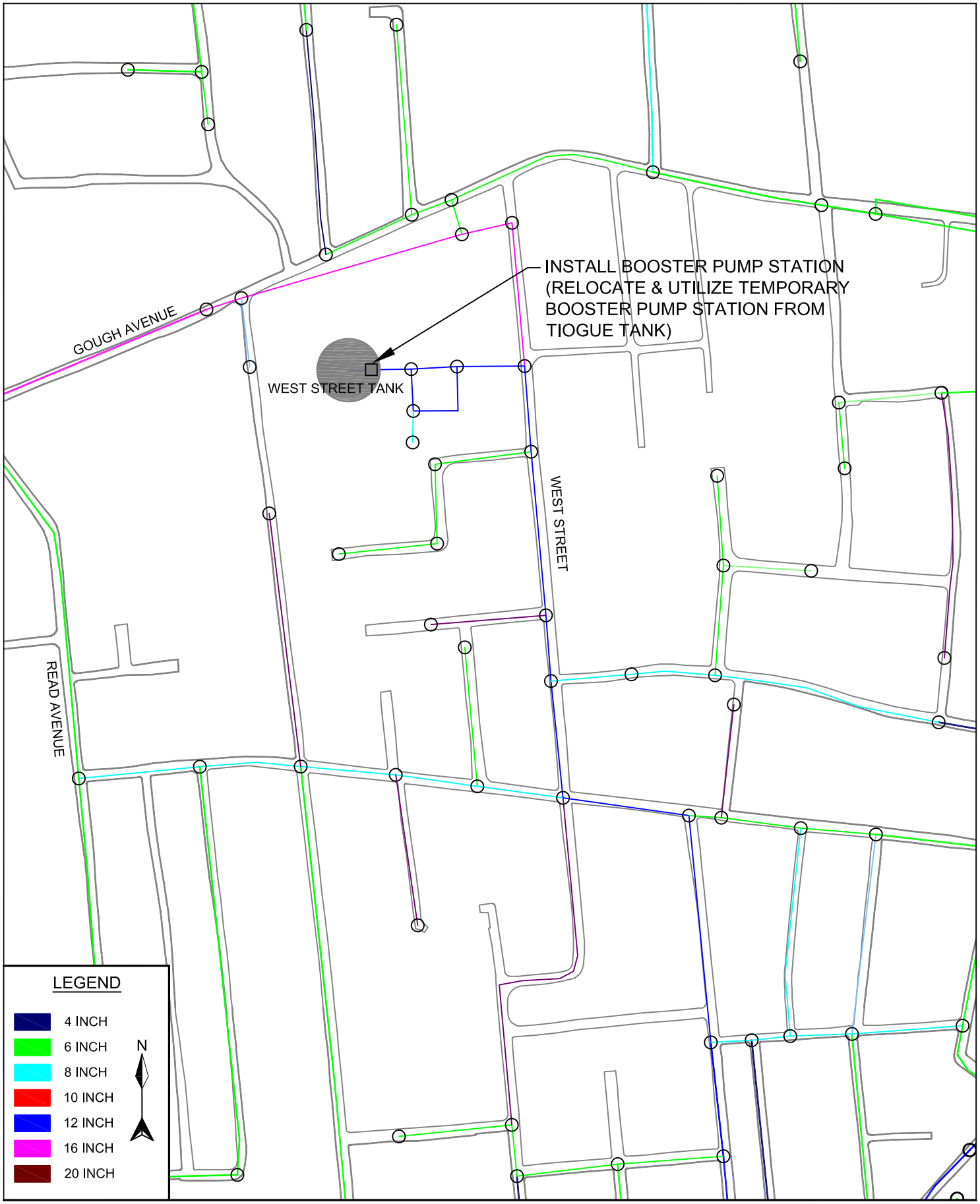

FIGURE NO.
12A

KCWA
Kent County Water Authority

PROJECT 12A
WEST STREET STORAGE
TANK MODIFICATIONS

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

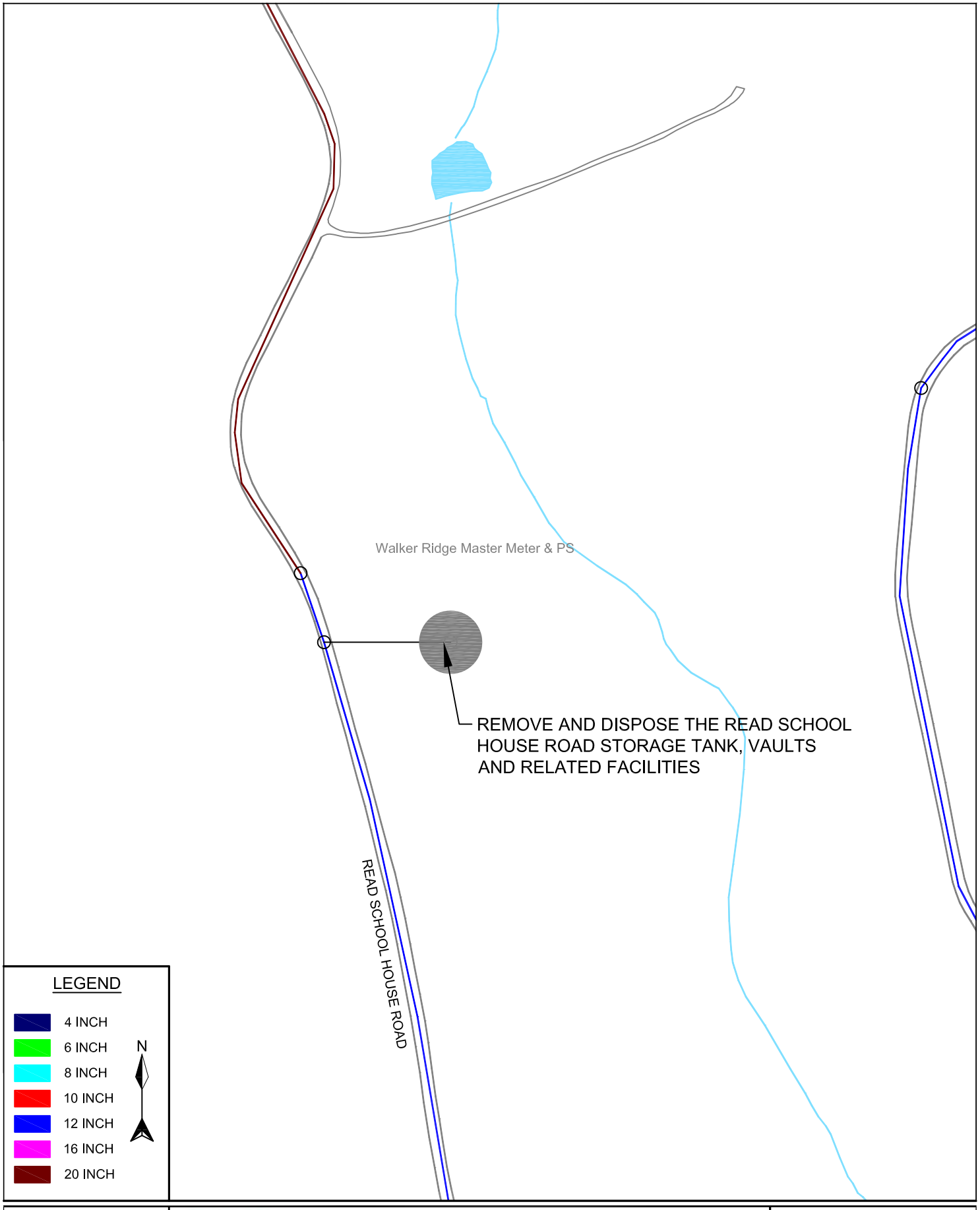

FIGURE NO. 12B

KCWA Kent County Water Authority

PROJECT 12B
READ SCHOOL HOUSE ROAD
STORAGE TANK DEMOLITION

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

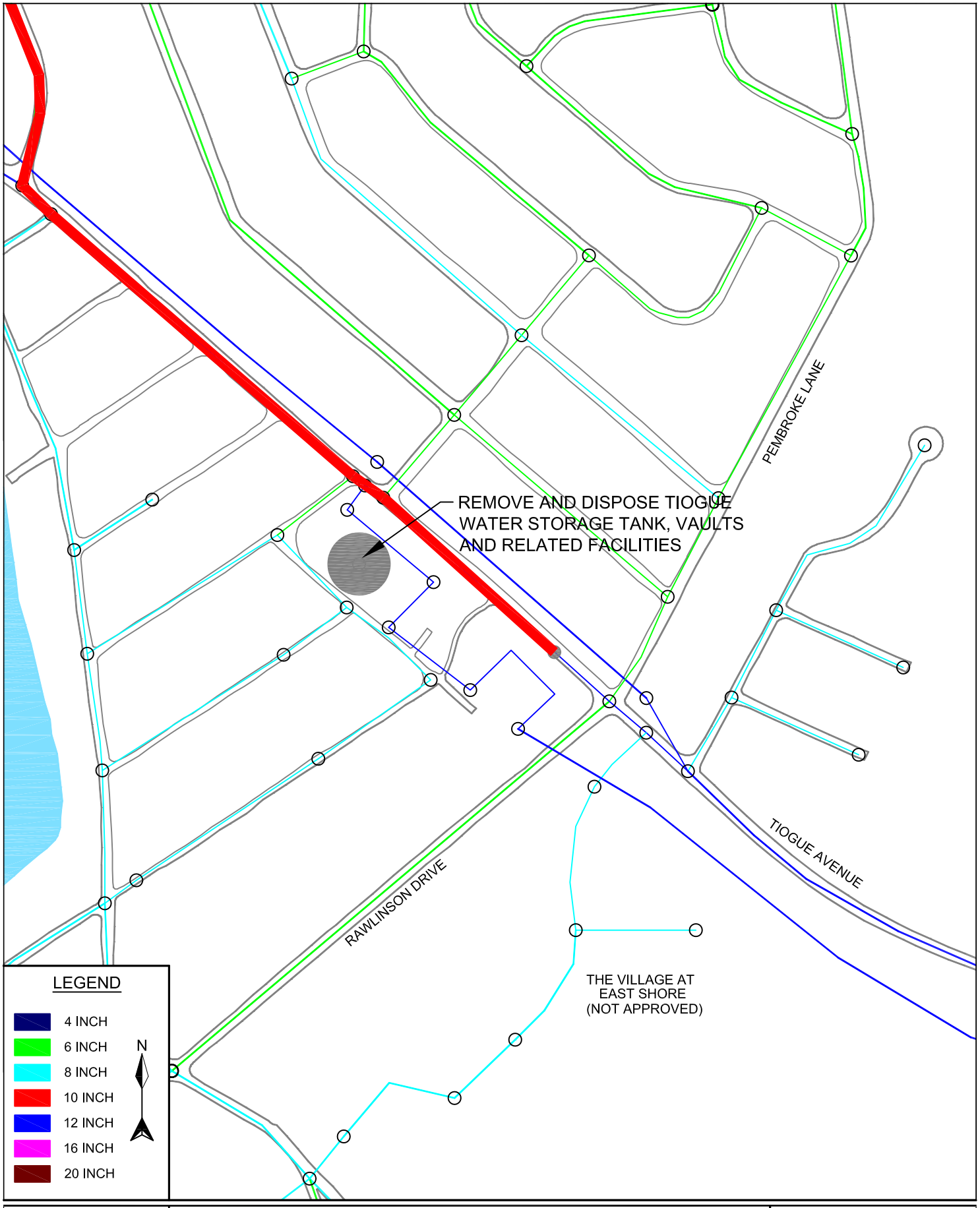

FIGURE NO. 12C

KCWA Kent County Water Authority

PROJECT 12C
TIOGUE WATER STORAGE TANK DEMOLITION

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

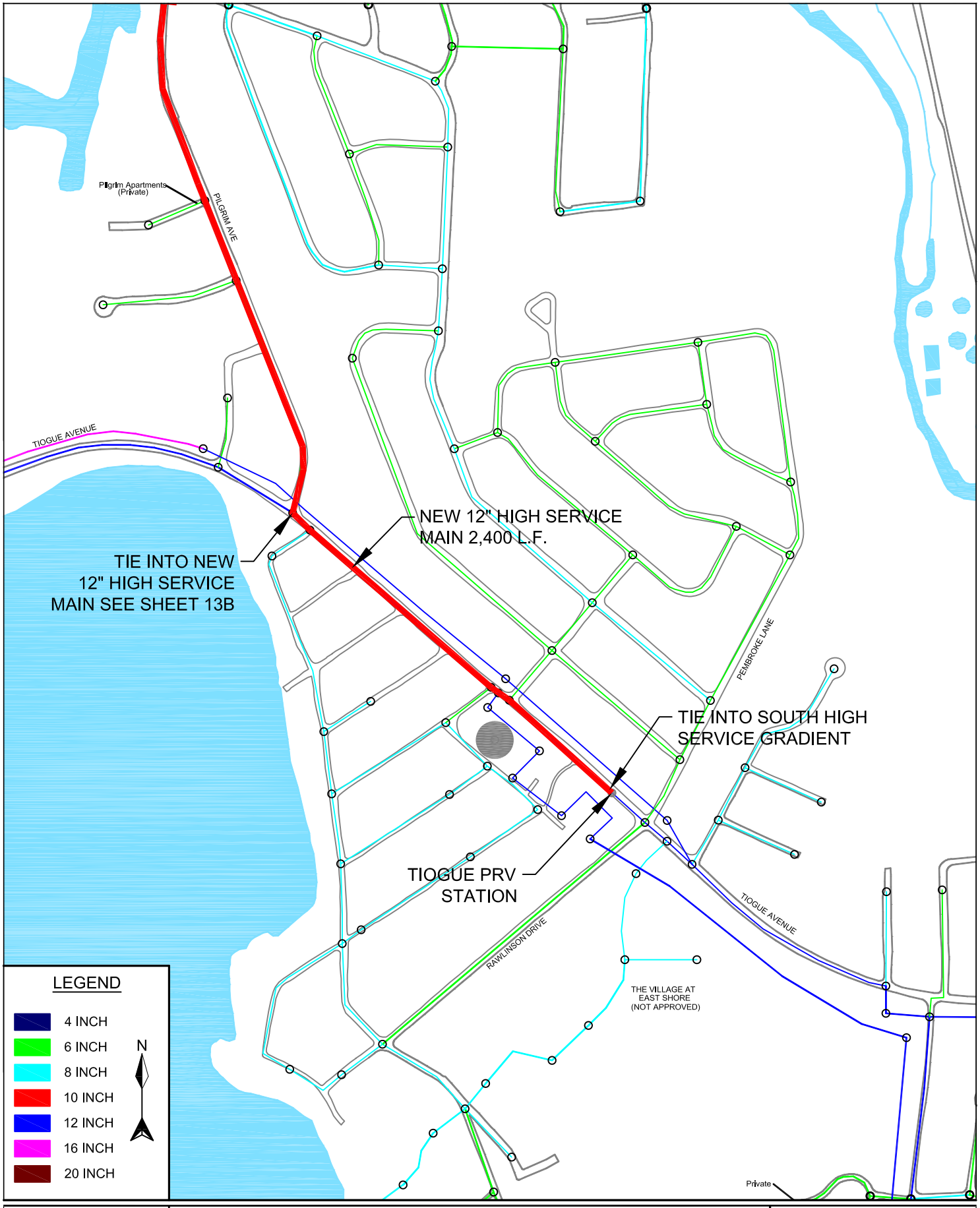

FIGURE NO. 13A

KCWA Kent County Water Authority

PROJECT 13A
TIOGUE AVENUE

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

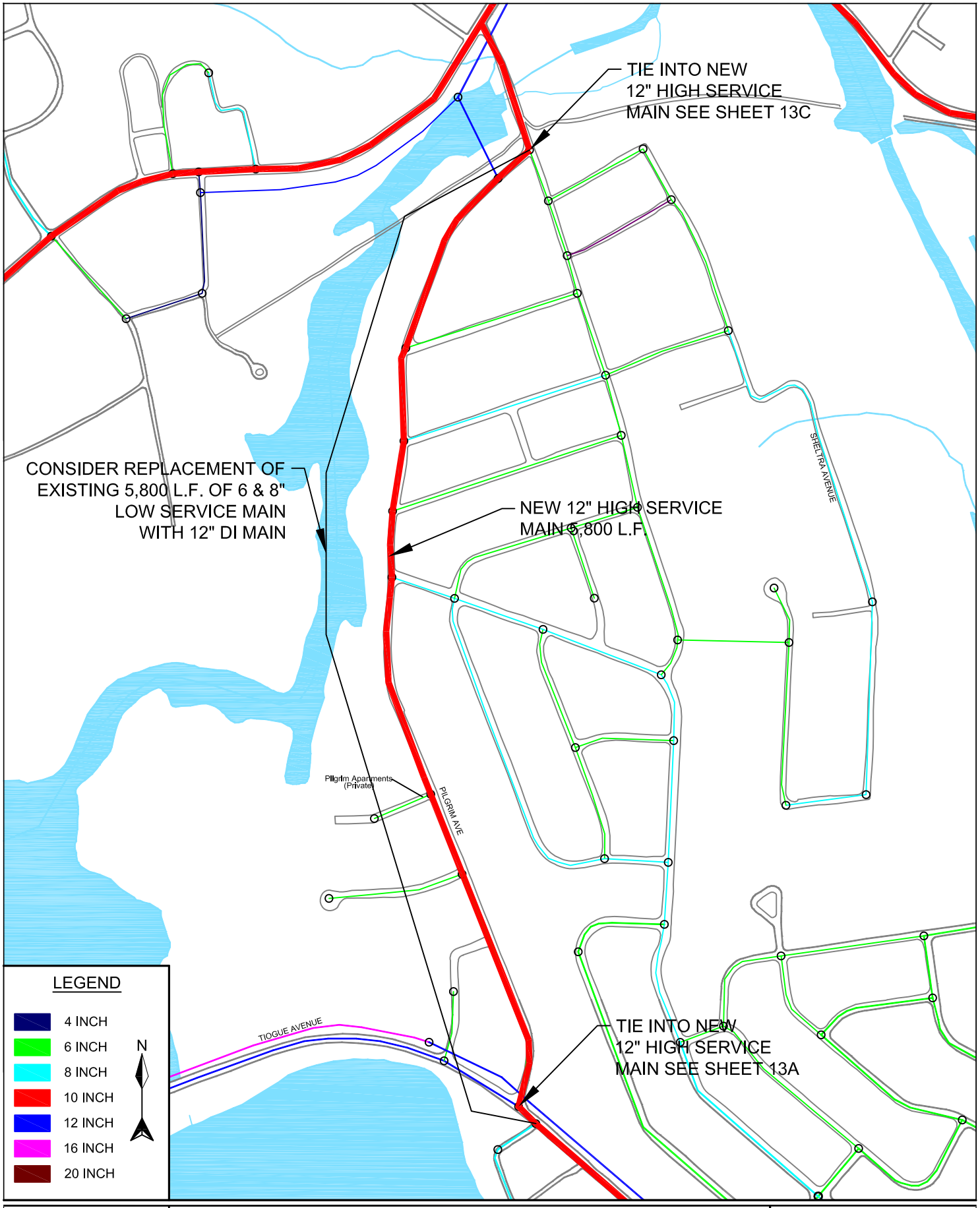

FIGURE NO.
13B

KCWA
Kent County Water Authority

PROJECT 13B
PILGRIM AVENUE

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

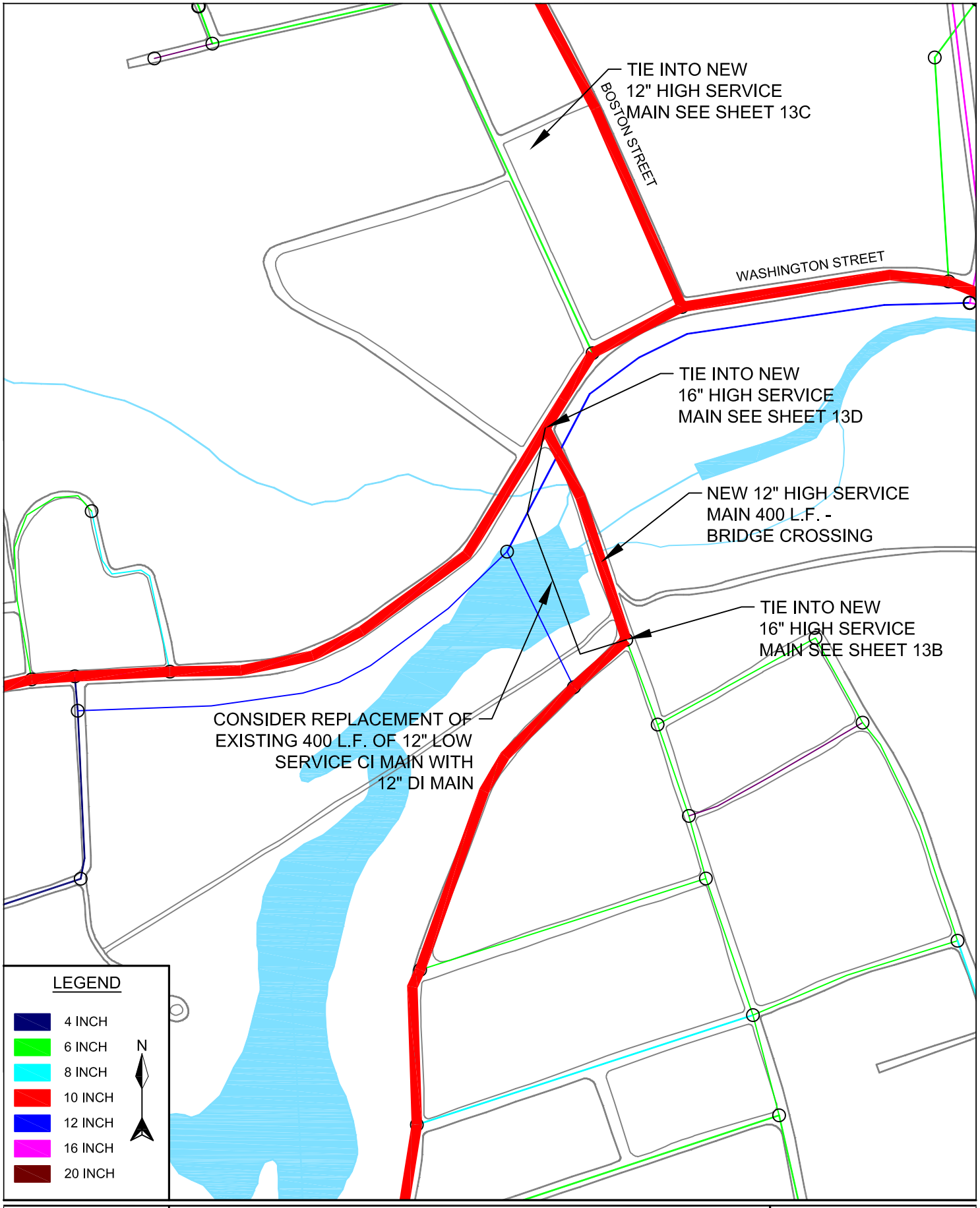

FIGURE NO.
13C

KCWA
Kent County Water Authority

PROJECT 13C
LAUREL AVENUE

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

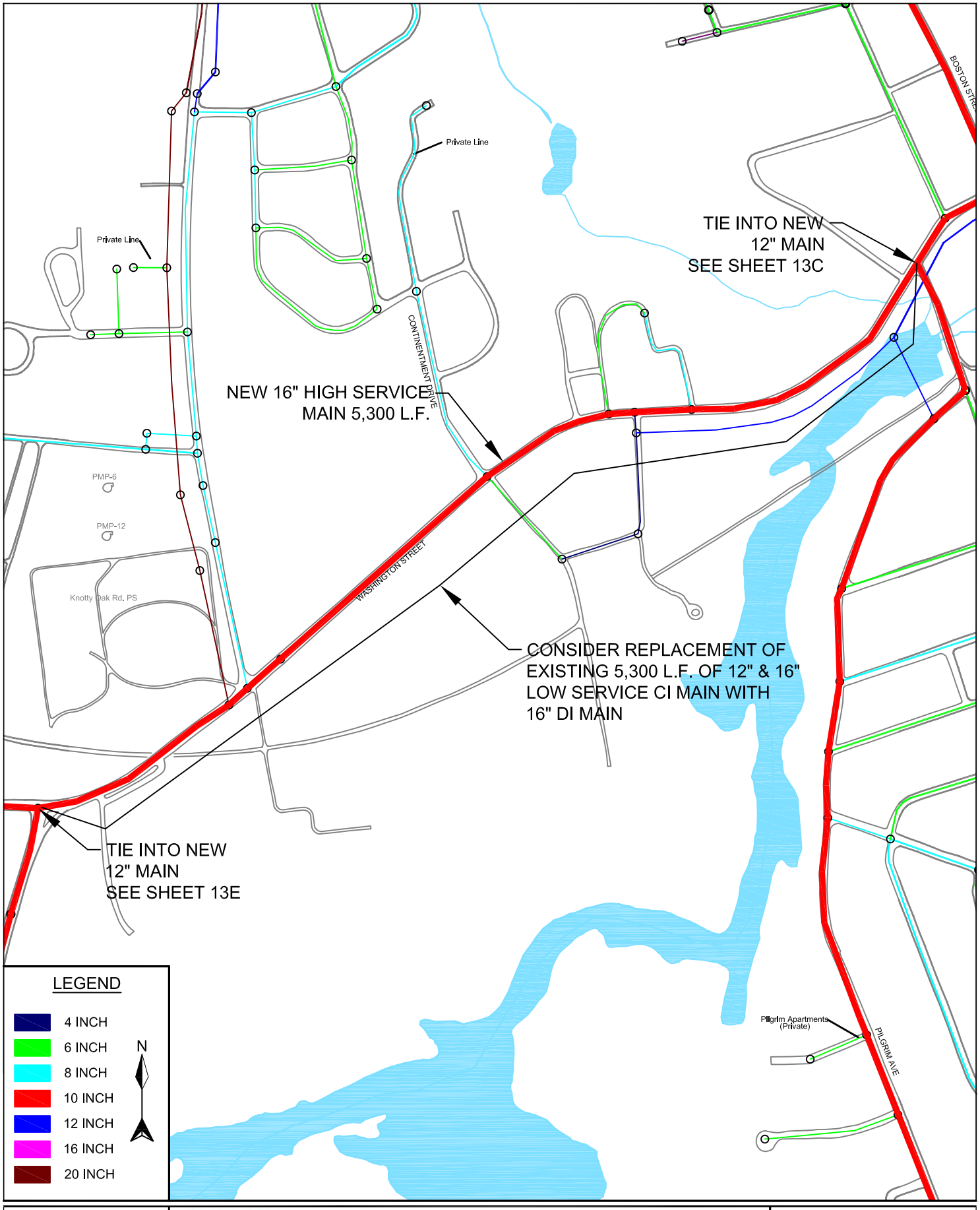

FIGURE NO.
13D

KCWA
Kent County Water Authority

PROJECT 13D
WASHINGTON STREET

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

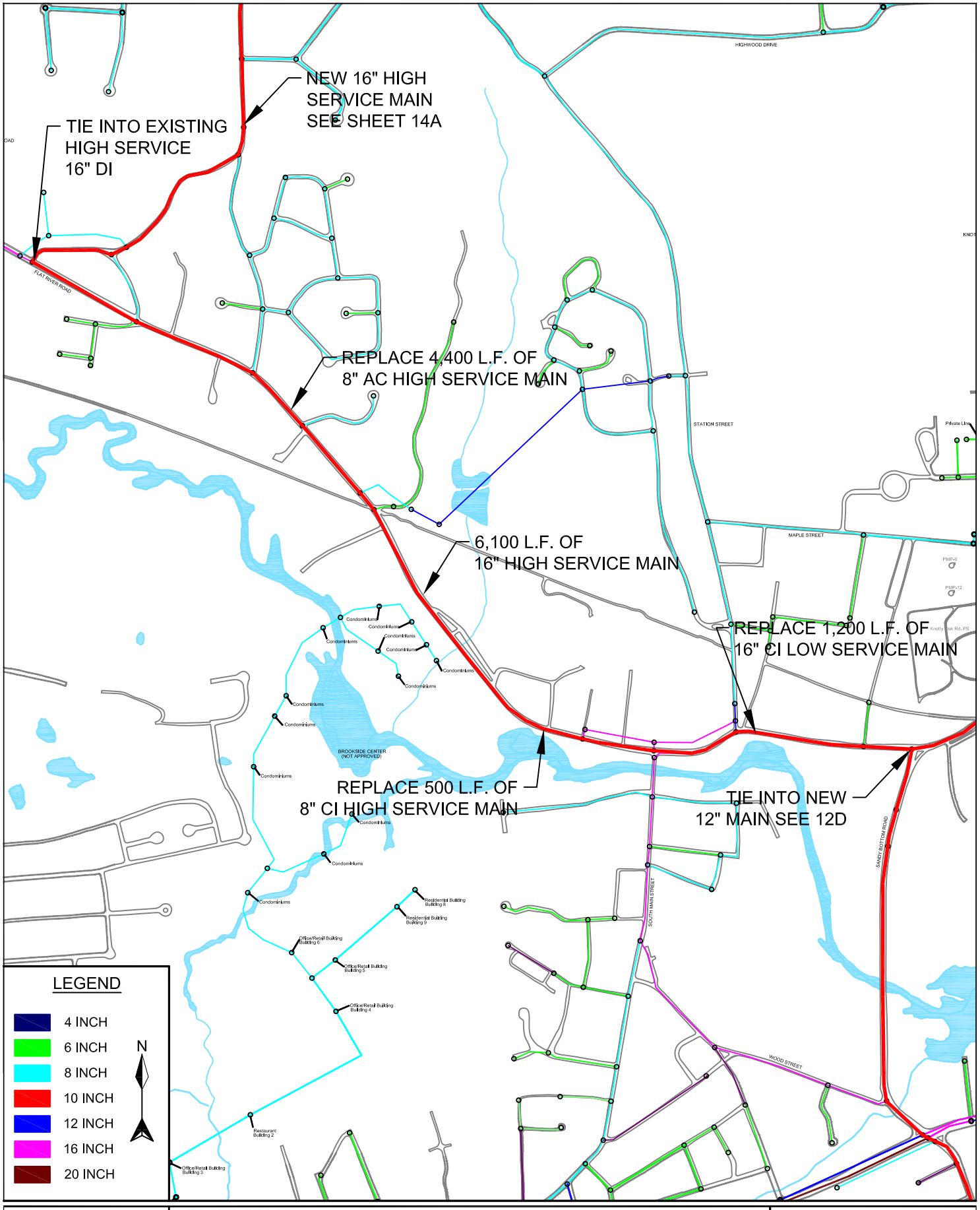

FIGURE NO. 13E

KCWA Kent County Water Authority

PROJECT 13E
WASHINGTON STREET/
FLAT RIVER ROAD

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

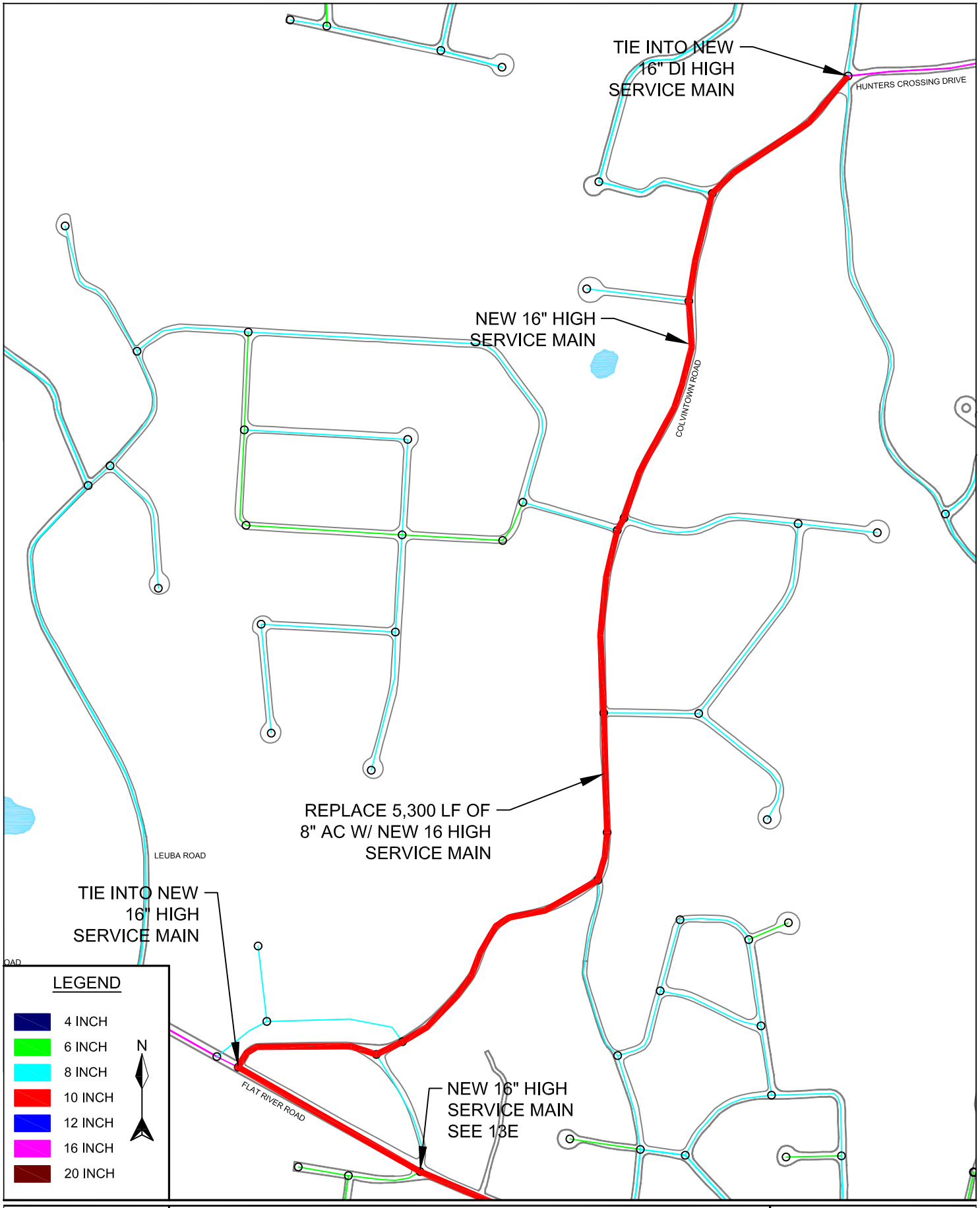

FIGURE NO.
14A

KCWA
Kent County Water Authority

PROJECT 14A
OLD MAIN STREET -
COLVINTOWN ROAD

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

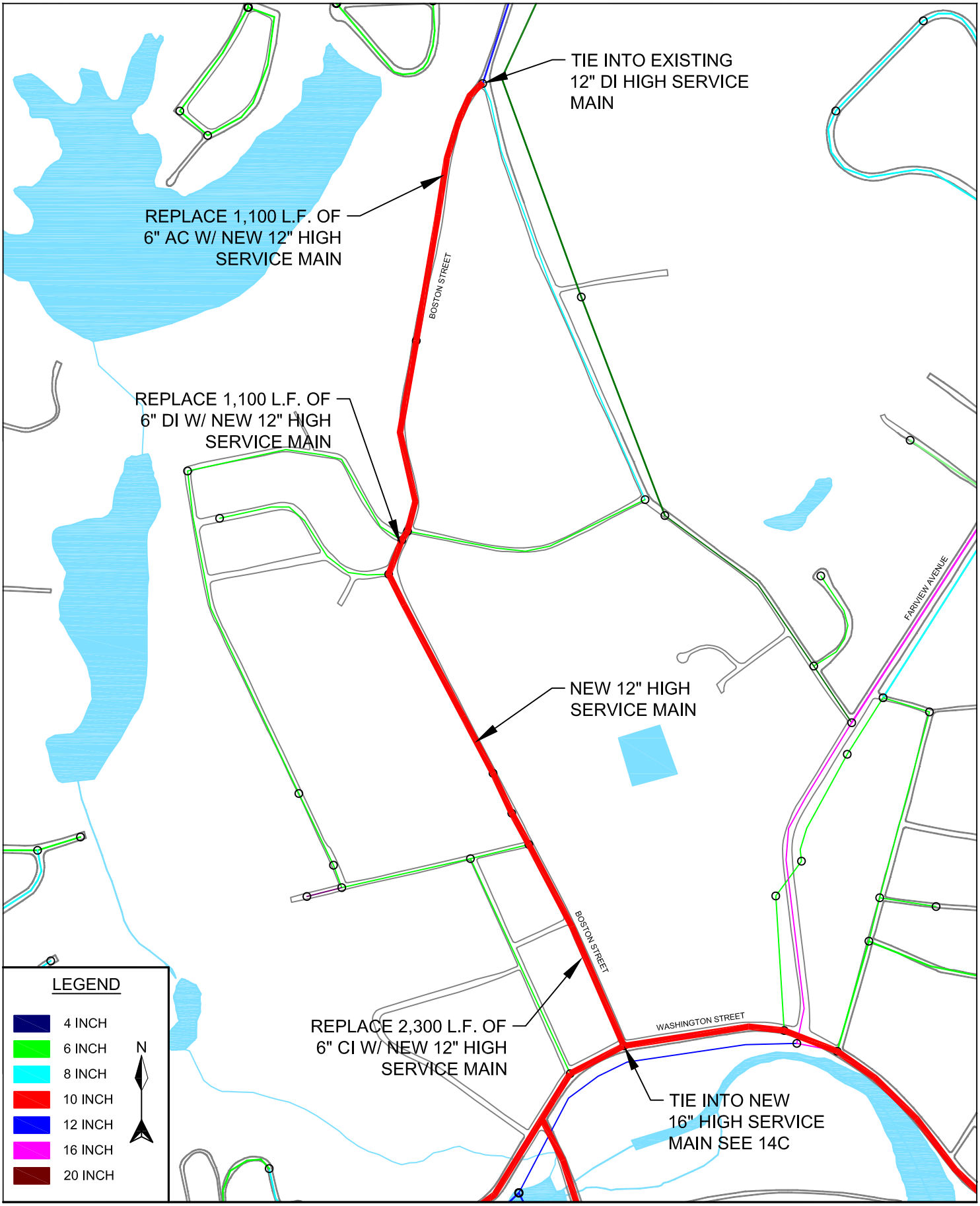

FIGURE NO.
14B

KCWA
Kent County Water Authority

PROJECT 14B
BOSTON STREET

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

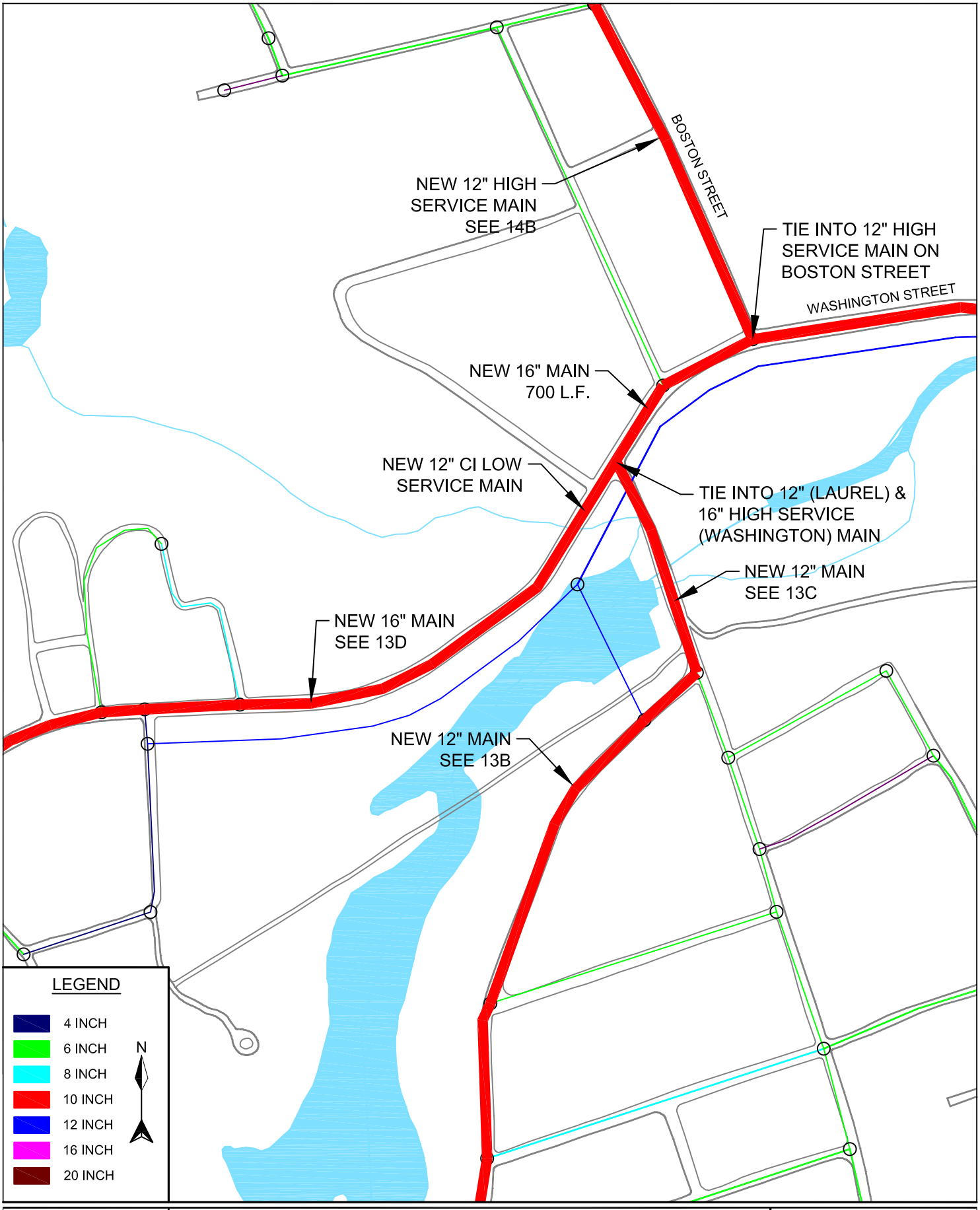

FIGURE NO. 14C

KCWA Kent County Water Authority

PROJECT 14C
WASHINGTON STREET

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

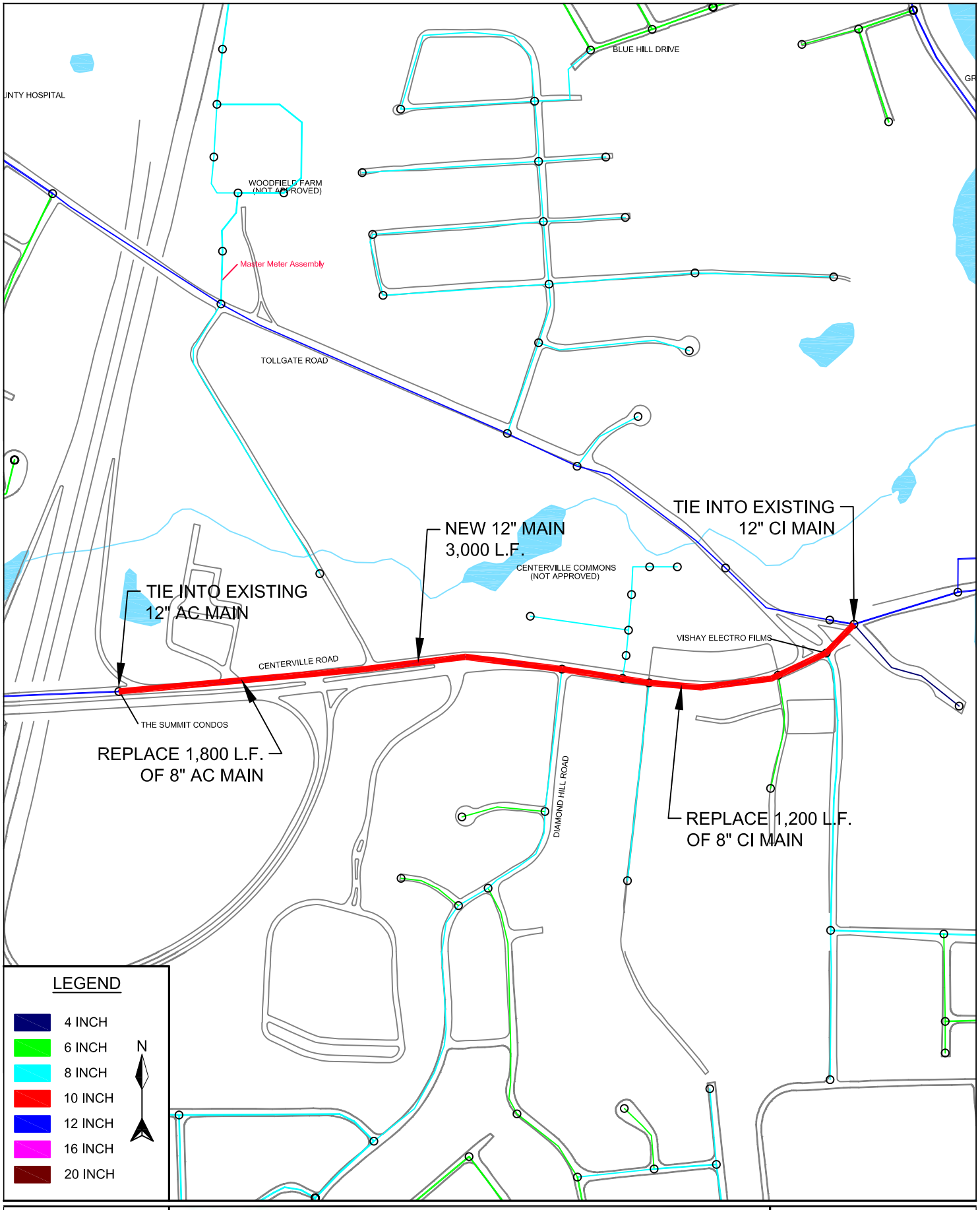

FIGURE NO.
15

KCWA
Kent County Water Authority

PROJECT 15
CENTERVILLE ROAD

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

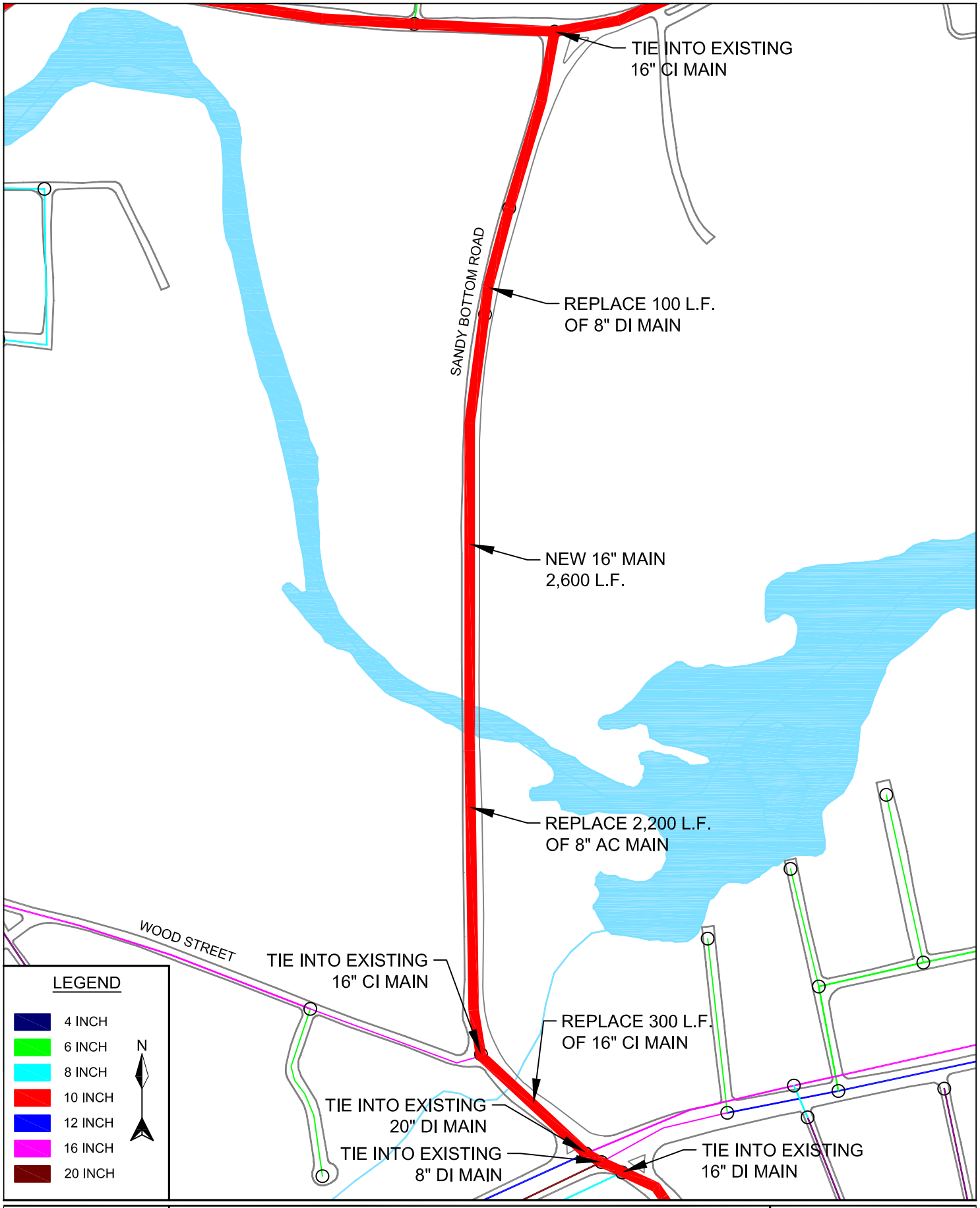

FIGURE NO.
16

KCWA
Kent County Water Authority

PROJECT 16
SANDY BOTTOM ROAD

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

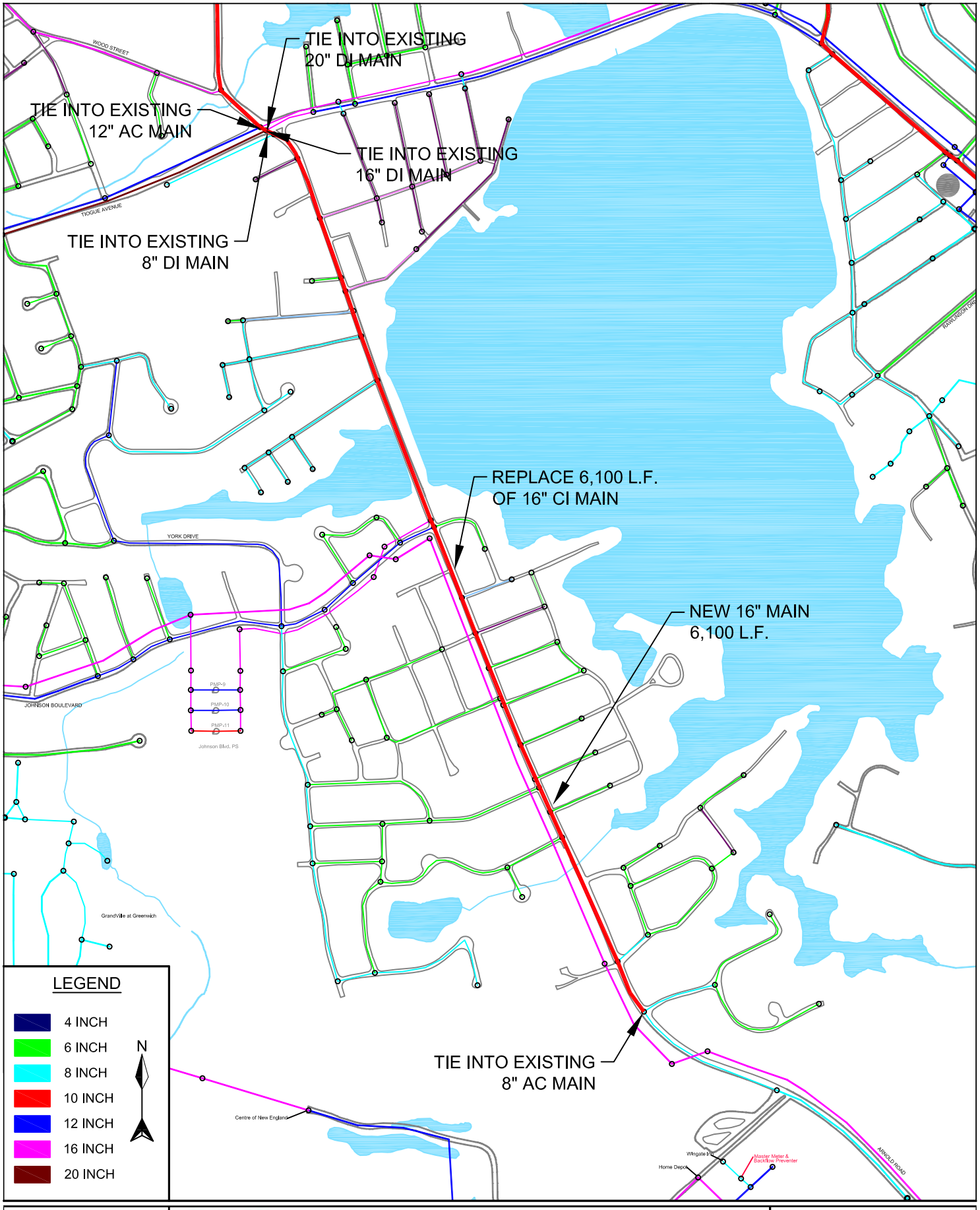

FIGURE NO.
17

KCWA
Kent County Water Authority

PROJECT 17
ARNOLD ROAD

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

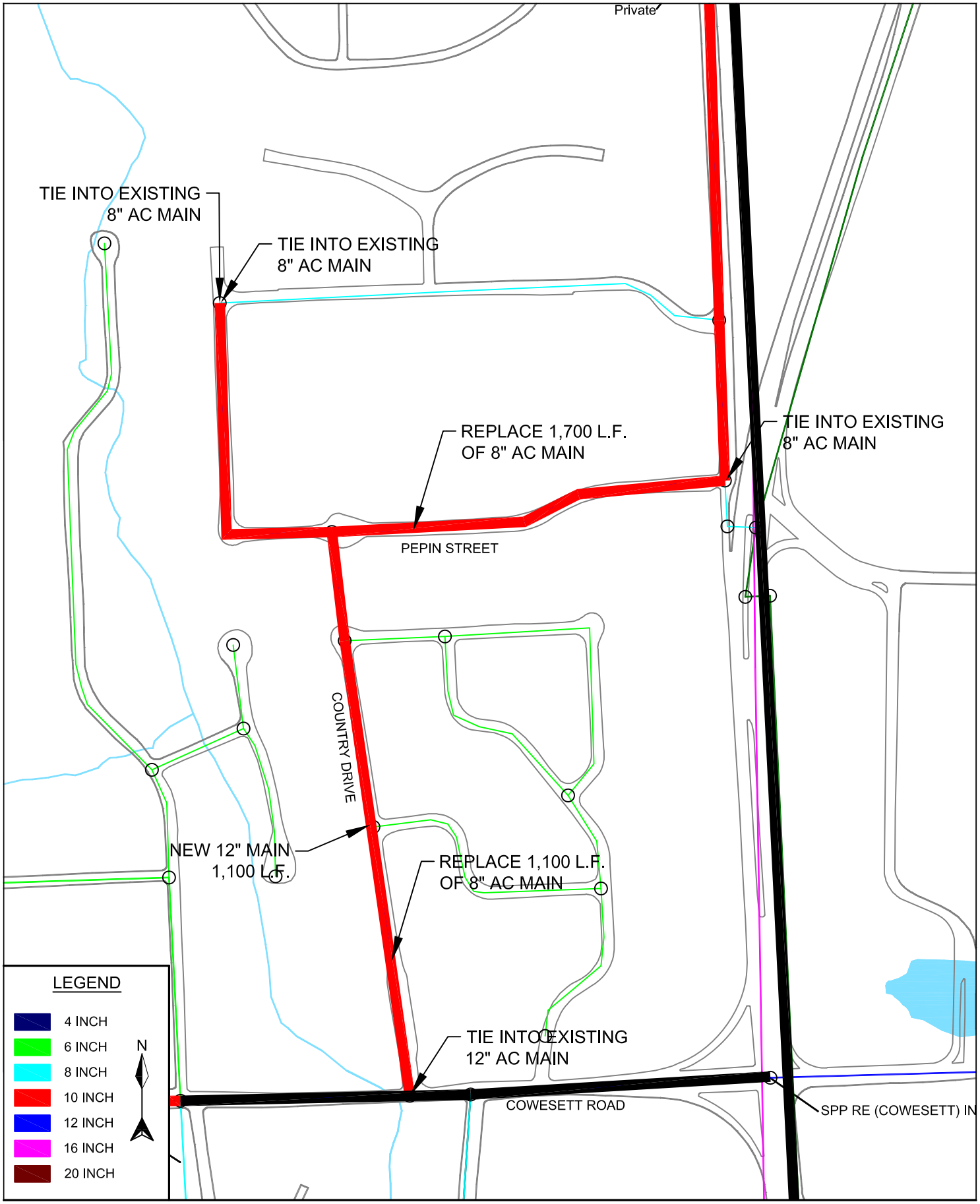

FIGURE NO.
18

KCWA
Kent County Water Authority

PROJECT 18
COUNTRY DRIVE AND
PEPIN STREET

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

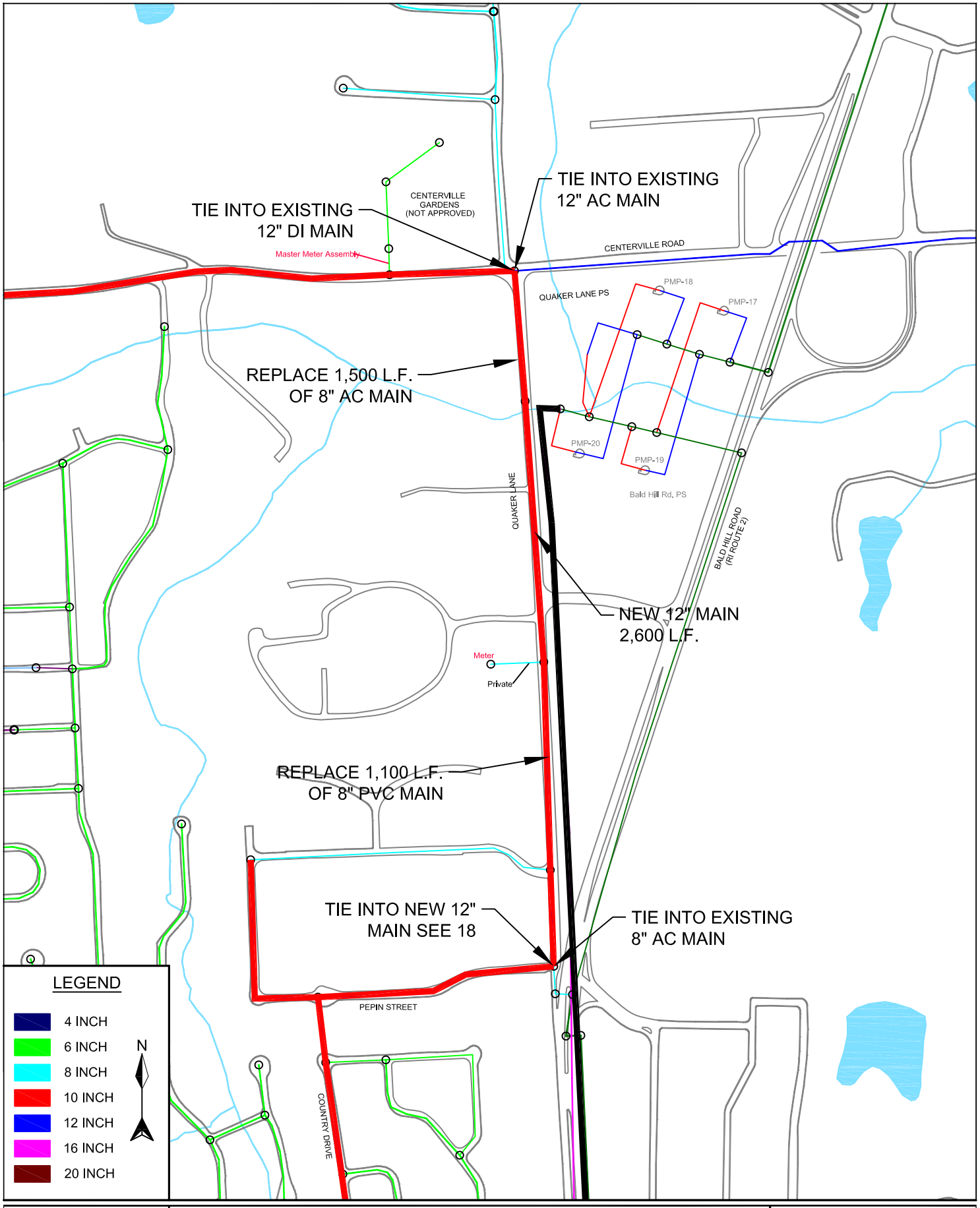

FIGURE NO.
19

KCWA
Kent County Water Authority

PROJECT 19
QUAKER LANE

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

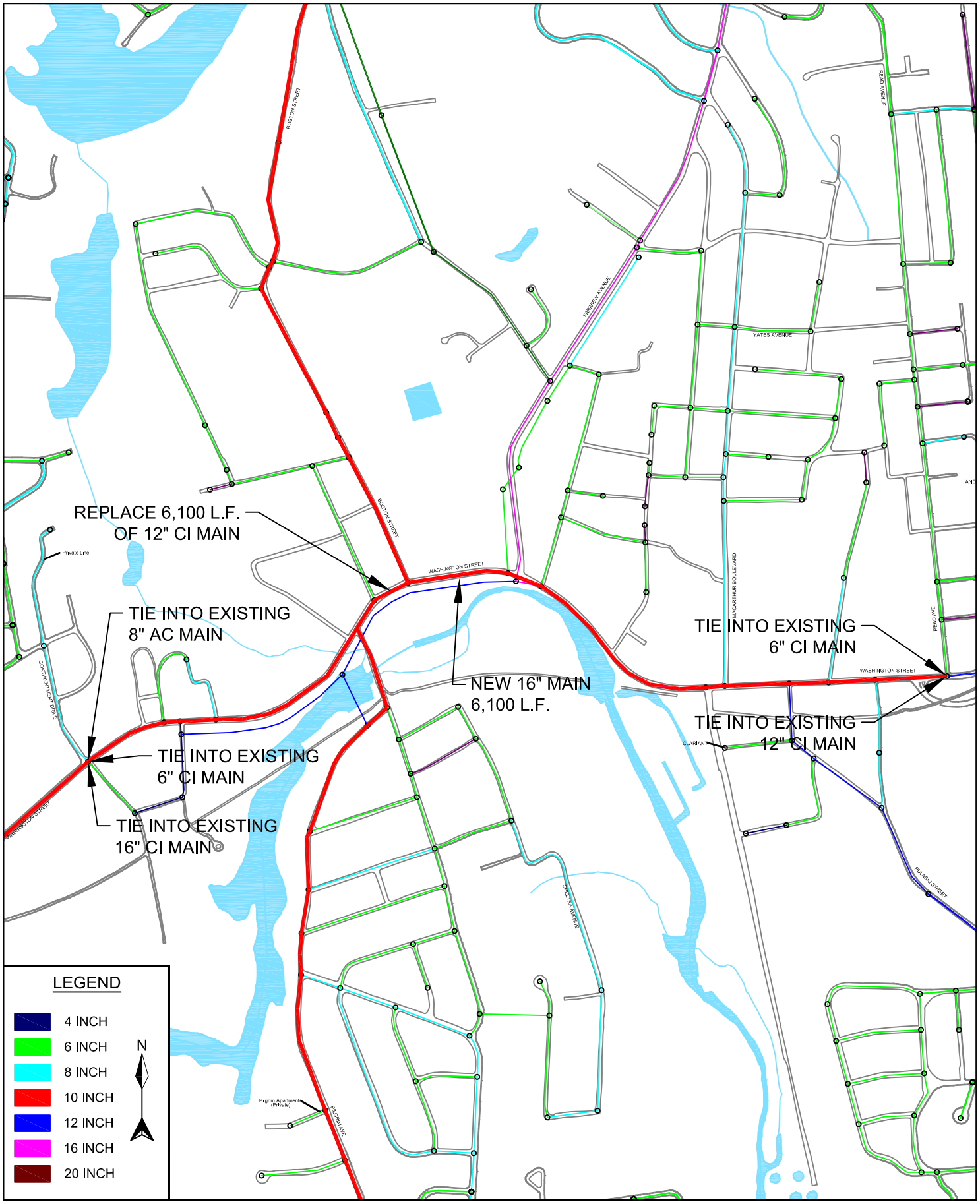

FIGURE NO.
20

KCWA
Kent County Water Authority

PROJECT 20
WASHINGTON STREET

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

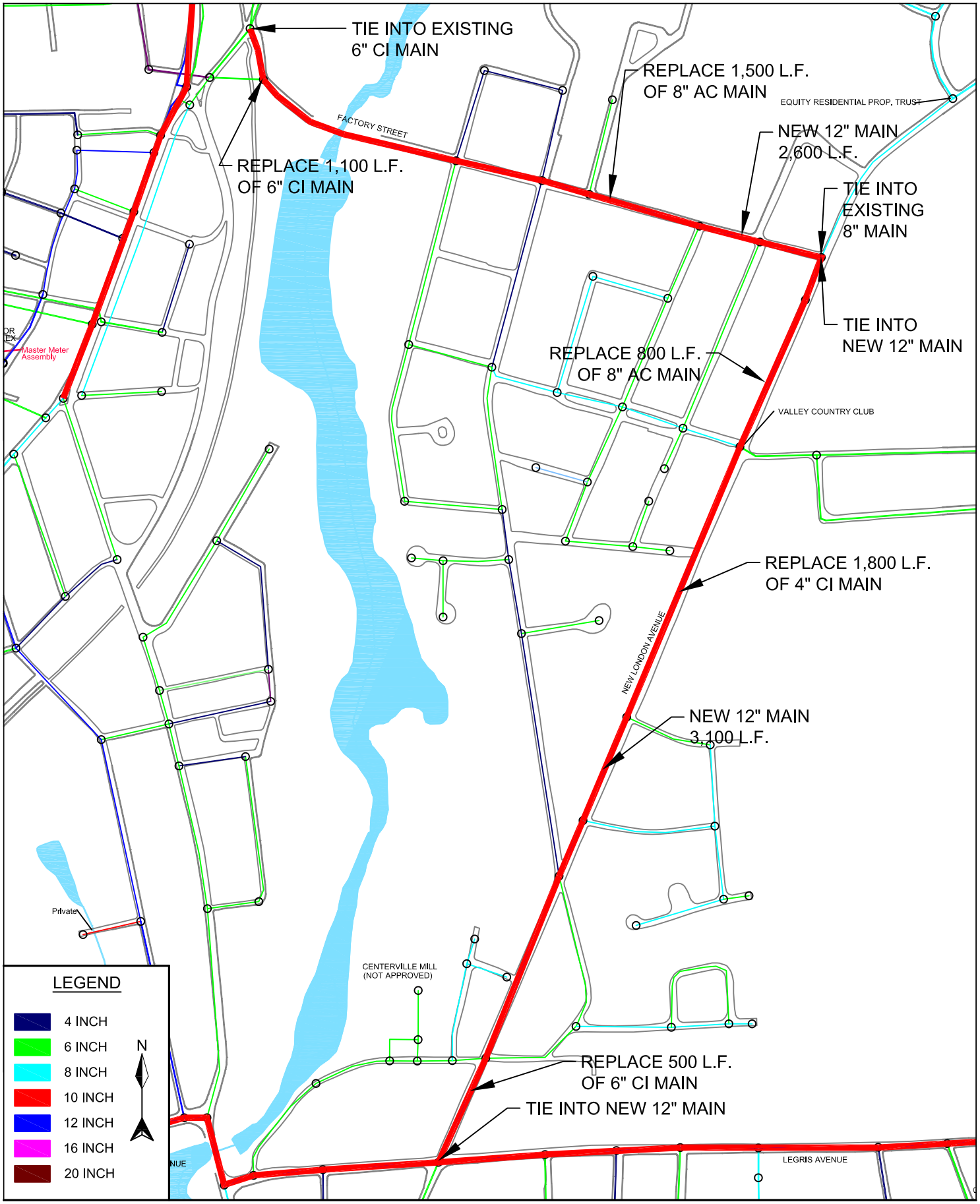

FIGURE NO.
21

KCWA
Kent County Water Authority

PROJECT 21
NEW LONDON AVENUE
AND FOCTORY STREET

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

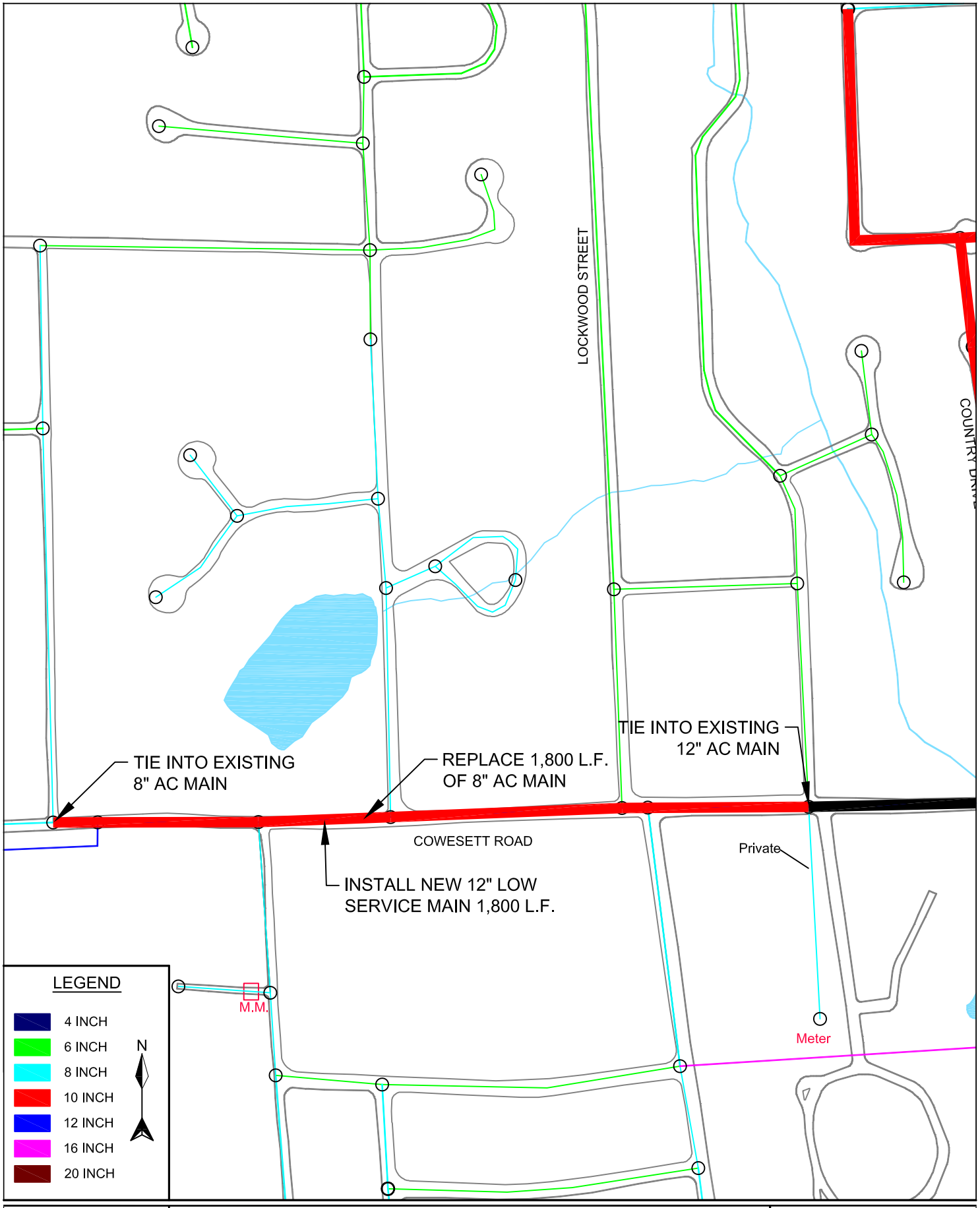

FIGURE NO.
22

KCWA
Kent County Water Authority

PROJECT 22
COWESETT ROAD

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

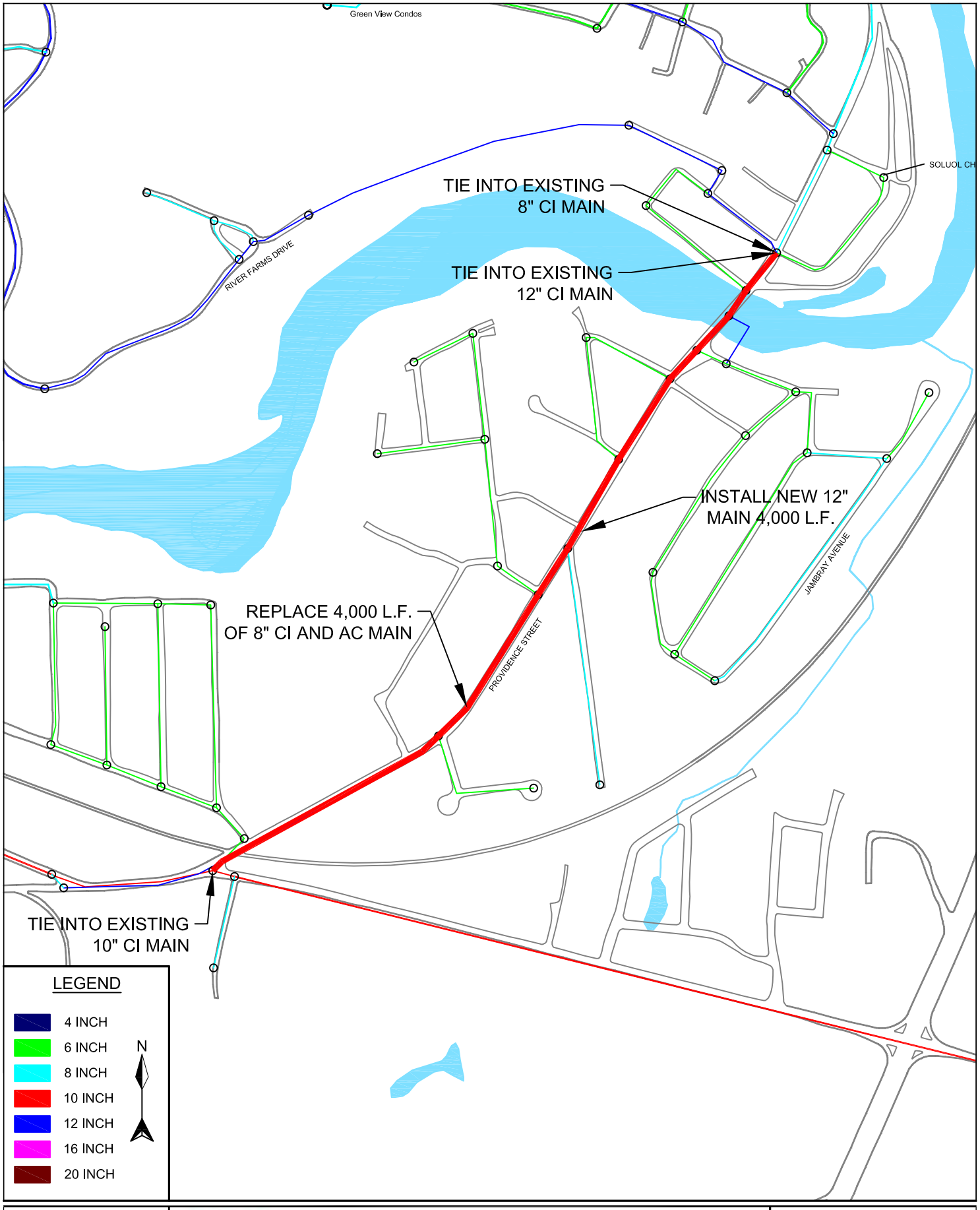

FIGURE NO.
23

KCWA
Kent County Water Authority

PROJECT 23
PROVIDENCE STREET

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

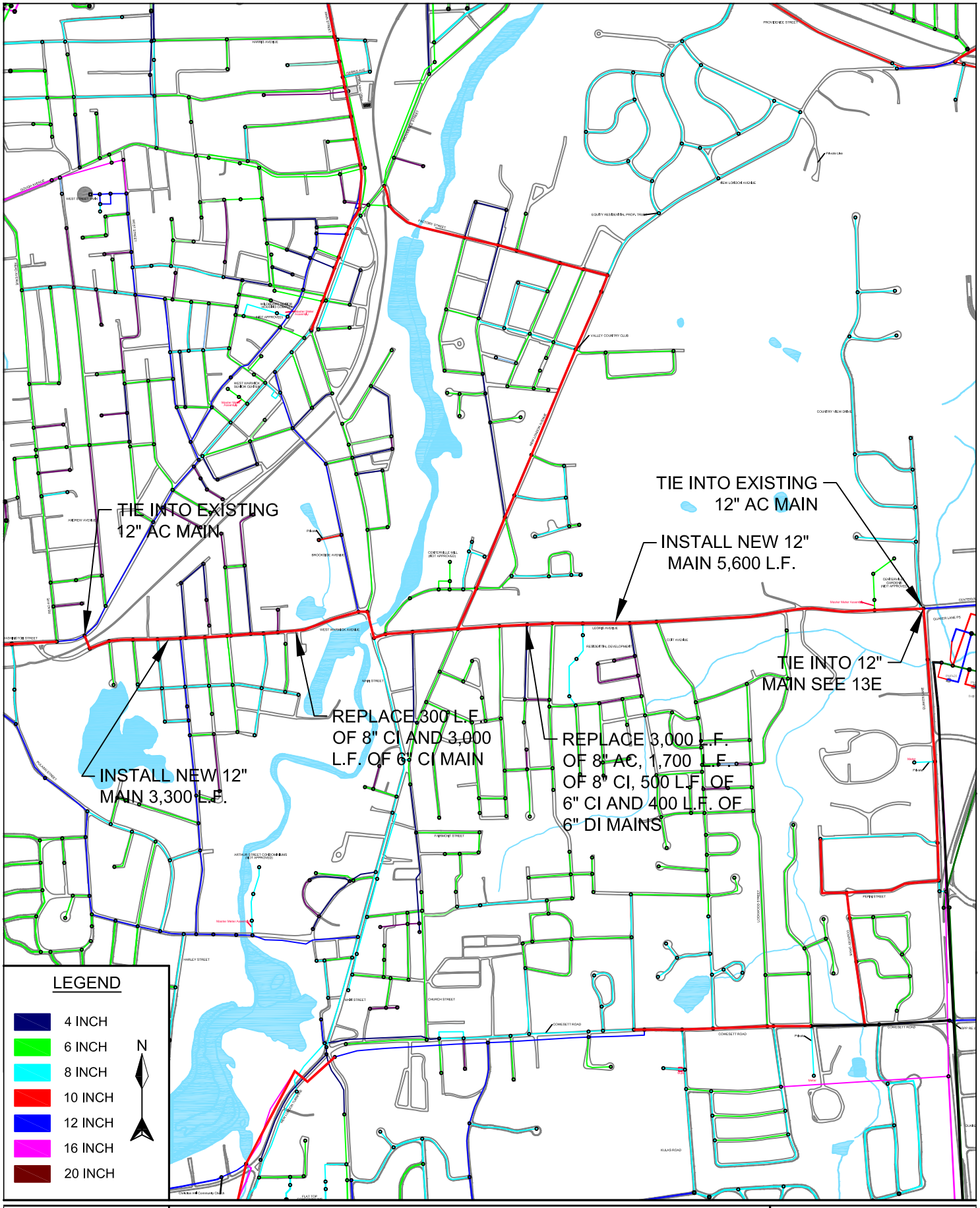

FIGURE NO.
24

KCWA
Kent County Water Authority

PROJECT 24
LEGRIS AVENUE AND
WEST WARWICK AVENUE

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

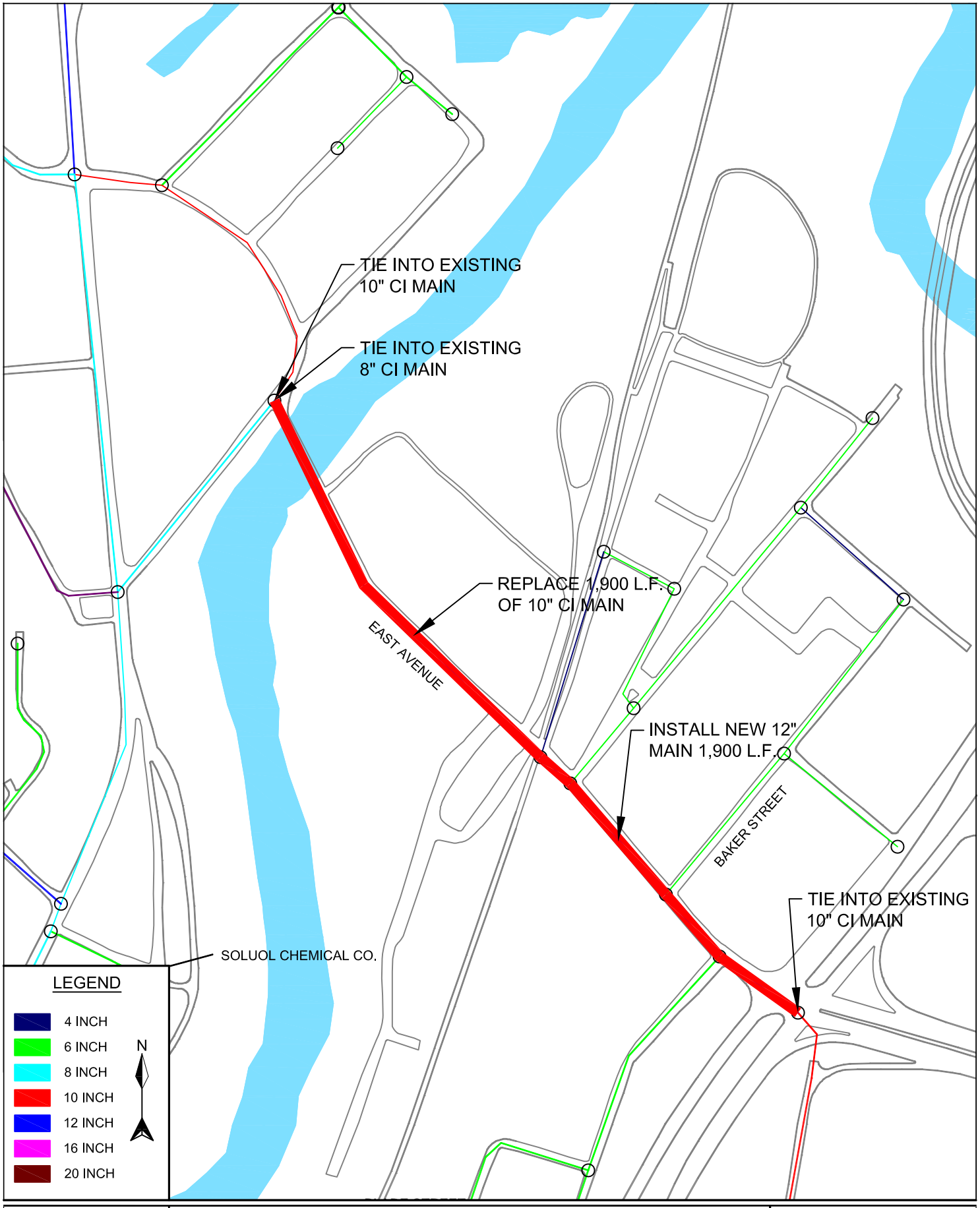

FIGURE NO.
25

KCWA
Kent County Water Authority

PROJECT 25
EAST AVENUE

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

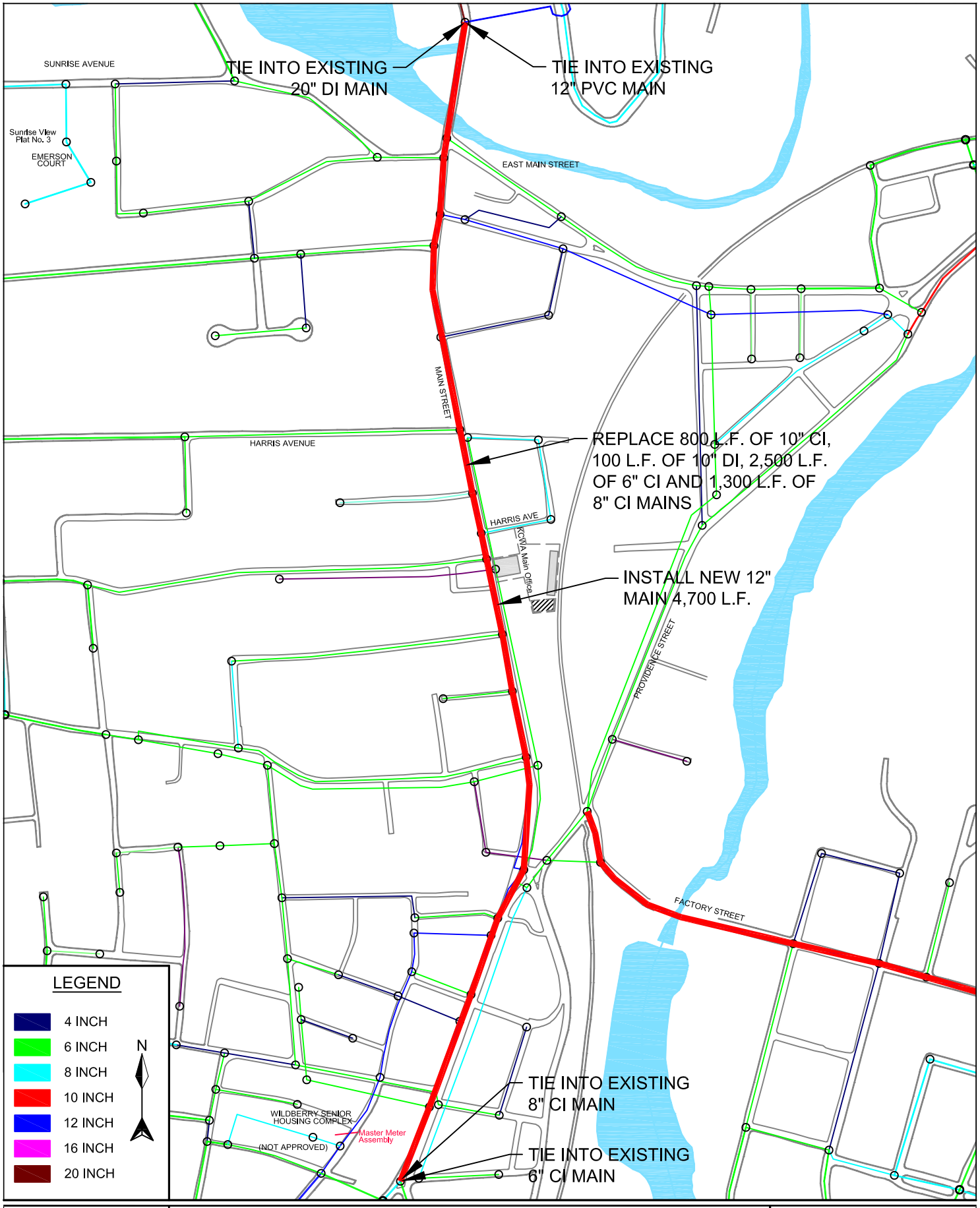

FIGURE NO.
26

KCWA
Kent County Water Authority

PROJECT 26
MAIN STREET

C&E ENGINEERING
CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

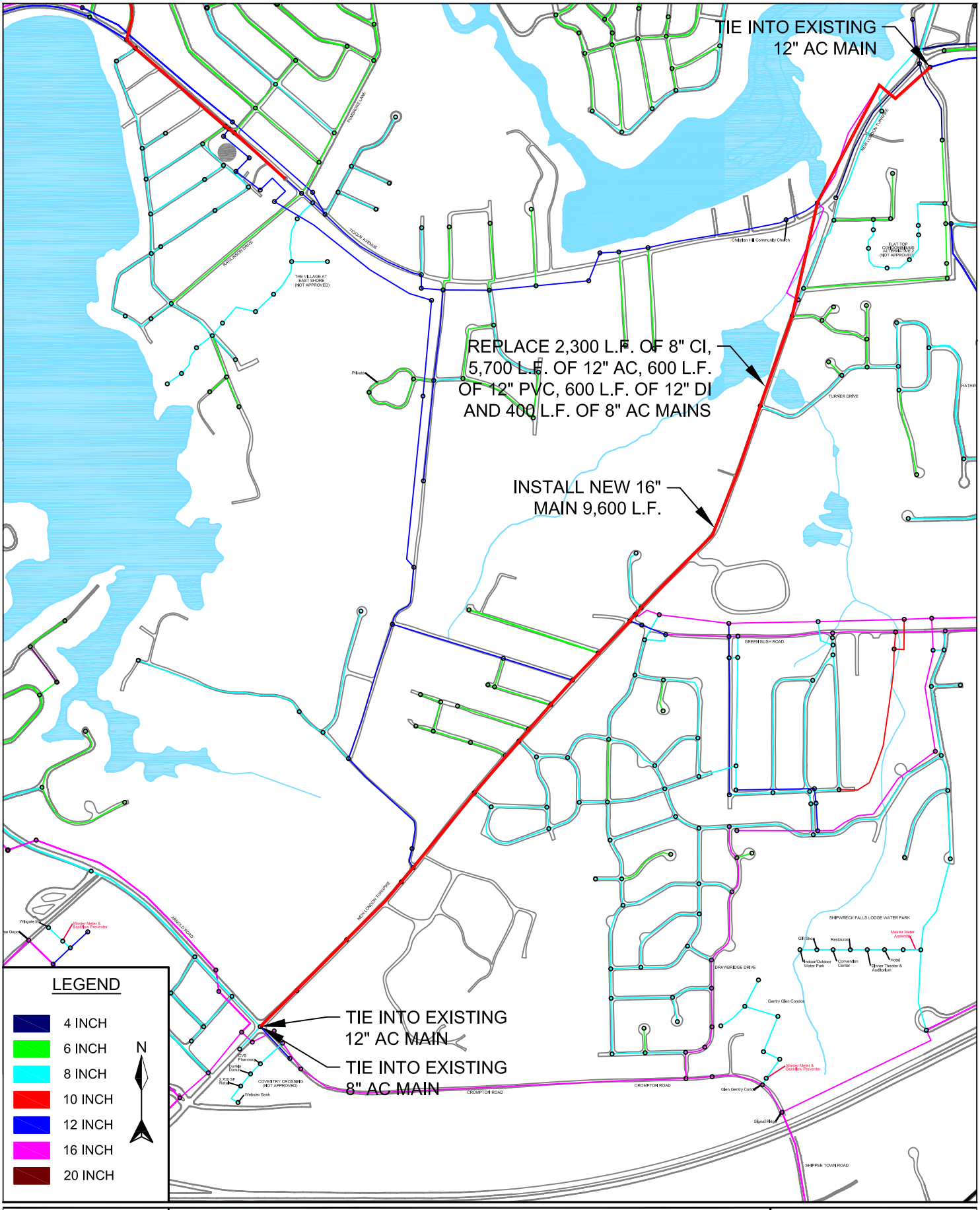

FIGURE NO.
27

KCWA
Kent County Water Authority

PROJECT 27
NEW LONDON TURNPIKE

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CIVIL ENGINEERS. ENVIRONMENTAL PROJECTS.

SECTION 3.0
MAPPING AND COST SUMMARY TABLES

The capital improvement projects are identified on a system map of the Authority's transmission and distribution system which is provided as an attachment. Additionally, those projects identified as primarily related to infrastructure replacements (Projects 11 – 26) have been identified on the map.

Table 1 includes a cost summary for each of the capital projects 1Athrough 10B. This includes a cost summary for each project including bare construction cost, design and related services cost, contingency allowance and an inflation escalation factor for each project. The table also includes the fiscal year of project performance and assigned priority category for each project.

Table 2 includes a cost summary for each of the projects identified herein that are related to infrastructure replacement and that require consideration under the Authority's Infrastructure Replacement Program. This table includes bare construction cost, design and related services cost, contingency allowance and an inflation adjustment factor for each project. Scheduling of these projects would necessarily be performed under the IFR program.

Table 3 categorizes the capital projects by fiscal year from 2012 through 2017. Projects for each fiscal year are further listed by highest to lowest priority which includes the rating category for projects as either mandatory, necessary or discretionary.

Table 1
Capital Improvement Program
Project Cost Summary Table

Table 1
Kent County Water Authority
Capital Improvement Program
Project Cost Summary Table

Fiscal Year	Project Number	Priority Category	Description	Construction Costs	Design and Related Service Costs	Sub Total Cost	Contingency at 20%	Project Cost	Inflation Escalation Factor - 4%	Total Project Cost *	Cumulative Total Project Cost
2012	1	E	Mishnock Water Main - WTP to Hopkins Hill Road	$2,632,000	$394,800	$3,026,800	$605,360	$3,632,160	$0	$2,640,000	$2,640,000
2013	2	N	Bald Hill Road/New London Ave. Loop Connection	$144,000	$21,600	$165,600	$33,120	$198,720	$7,949	$210,000	$2,850,000
2013	3	N	Wakefield Street	$420,000	$63,000	$483,000	$96,600	$579,600	$23,184	$610,000	$3,460,000
2014	4	E	East Greenwich Well Upgrade & Treatment	$4,500,000	$675,000	$5,175,000	$1,035,000	$6,210,000	$506,736	$6,720,000	$10,180,000
2015	5	E	Spring Lake Well Upgrade & Treatment	$3,750,000	$562,500	$4,312,500	$862,500	$5,175,000	$646,171	$5,830,000	$16,010,000
2016	6	E	Replace KCWA Facility	$5,500,000	$825,000	$6,325,000	$1,265,000	$7,590,000	$1,289,227	$8,880,000	$24,890,000
2014	7	E	Oaklawn Service Gradient Emergency PRV	$300,000	$45,000	$345,000	$69,000	$414,000	$33,782	$450,000	$25,340,000
2015	8	E	I-295 Bridge Crossing at Providence Street	$288,000	$43,200	$331,200	$66,240	$397,440	$49,626	$450,000	$25,790,000
2016	9A	N	Division Road	$1,717,000	$257,550	$1,974,550	$394,910	$2,369,460	$402,473	$2,780,000	
2016	9B	N	Shippetown Road	$240,000	$36,000	$276,000	$55,200	$331,200	$56,257	$390,000	
2017	9C	N	Middle Road	$382,500	$57,375	$439,875	$87,975	$527,850	$114,360	$650,000	
2017	9D	N	Middle Road	$180,000	$27,000	$207,000	$41,400	$248,400	$53,817	$310,000	$29,920,000
2013	10A	N	Quaker Lane Pump Station - High Service Pumps	$200,000	$30,000	$230,000	$46,000	$276,000	$11,040	$290,000	
2013	10B	N	HS Transmission Mains - Quaker Lane PS	$2,988,000	$448,200	$3,436,200	$687,240	$4,123,440	$164,938	$4,290,000	$34,500,000
			Sub Totals:	$23,241,500	$3,486,225	$26,727,725	$5,345,545	$32,073,270	$3,359,560	$34,500,000	

Project Category
N = Necessary
D = Discretionary
E = Essential

* Rounded to $10,000.00

Table 2
Capital Improvement Program – Identified Infrastructure Replacement Projects
Project Cost Summary Table

Table 2
Kent County Water Authority
Capital Improvement Program - Identified Infrastructure Replacement Projects
Project Cost Summary Table

Project Number	Fiscal Year	Description	Construction Costs	Design and Related Service Costs	Sub Total Cost	Contingency at 20%	Project Cost	Inflation Escalation Factor - 4%	Total Project Cost
11	2012	Remove Fiskeville Storage Tanks from Service	$300,000	$45,000	$345,000	$69,000	$414,000	$0	$420,000
12A	2012	West Street Storage Tank Modifications	$225,000	$33,750	$258,750	$51,750	$310,500	$0	$320,000
12B	2012	RSHR Storage Tank Demolition	$225,000	$33,750	$258,750	$51,750	$310,500	$0	$320,000
12C	2012	Tiogue Storage Tank Demolition	$185,000	$27,750	$212,750	$42,550	$255,300	$0	$260,000
13A	2013	Tiogue Avenue	$480,000	$72,000	$552,000	$110,400	$662,400	$26,496	$690,000
13B	2013	Pilgrim Avenue	$1,160,000	$174,000	$1,334,000	$266,800	$1,600,800	$64,032	$1,670,000
13C	2013	Laurel Avenue and Bridge Crossing	$80,000	$12,000	$92,000	$18,400	$110,400	$4,416	$120,000
13D	2014	Washington Street	$1,192,500	$178,875	$1,371,375	$274,275	$1,645,650	$134,285	$1,780,000
13E	2014	Washington Street/Flat River Road	$1,372,500	$205,875	$1,578,375	$315,675	$1,894,050	$154,554	$2,050,000
14A	2014	Old Main Street/Colvintown Road	$1,192,500	$178,875	$1,371,375	$274,275	$1,645,650	$134,285	$1,780,000
14B	2014	Boston Street	$900,000	$135,000	$1,035,000	$207,000	$1,242,000	$101,347	$1,350,000
14C	2015	Washington Street	$157,500	$23,625	$181,125	$36,225	$217,350	$27,139	$250,000
15	2015	Centerville Road	$600,000	$90,000	$690,000	$138,000	$828,000	$103,387	$940,000
16	2015	Sandy Bottom Road	$585,000	$87,750	$672,750	$134,550	$807,300	$100,803	$910,000
17	2015	Arnold Road	$1,372,500	$205,875	$1,578,375	$315,675	$1,894,050	$236,499	$2,140,000
18	2015	Country Drive/Pepin Street	$560,000	$84,000	$644,000	$128,800	$772,800	$96,495	$870,000
19	2016	Quaker Lane	$520,000	$78,000	$598,000	$119,600	$717,600	$121,891	$840,000
20	2016	Washington Street	$1,372,500	$205,875	$1,578,375	$315,675	$1,894,050	$321,721	$2,220,000
21	2016	New London Avenue/Factory Street	$1,140,000	$171,000	$1,311,000	$262,200	$1,573,200	$267,222	$1,850,000
22	2016	Cowesett Road	$360,000	$54,000	$414,000	$82,800	$496,800	$84,386	$590,000
23	2016	Providence Street	$800,000	$120,000	$920,000	$184,000	$1,104,000	$187,524	$1,300,000
24	2017	Legris Avenue/West Warwick Avenue	$1,780,000	$267,000	$2,047,000	$409,400	$2,456,400	$532,186	$2,990,000
25	2017	East Avenue	$380,000	$57,000	$437,000	$87,400	$524,400	$113,613	$640,000
26	2017	Main Street	$940,000	$141,000	$1,081,000	$216,200	$1,297,200	$281,042	$1,580,000
27	2017	New London Turnpike	$2,160,000	$324,000	$2,484,000	$496,800	$2,980,800	$645,799	$3,630,000
		Sub Totals:	$12,570,000	$1,885,500	$14,455,500	$2,891,100	$17,346,600	$3,739,121	$31,510,000

Table 3
Capital Improvement Program
Fiscal Year Cost Summary Table

Table 3
Kent County Water Authority
Capital Improvement Program
Fiscal Year Cost Summary Table

Fiscal Year	Project Number	Priority Category	Description	Construction Costs	Design and Related Service Costs	Sub Total Cost	Contingency	Total Project Cost	Inflation Escalation Factor - 4%	Total Fiscal Year Cost *
2012	1	E	Mishnock Water Main - WTP to Hopkins Hill Road	$2,632,500	$394,875	$3,027,375	$605,475	$3,632,850	$0	$2,640,000
										$2,640,000
2013	2	N	Bald Hill Road/New London Ave. Loop Connection	$144,000	$21,600	$165,600	$33,120	$198,720	$7,949	$210,000
2013	3	N	Wakefield Street	$420,000	$63,000	$483,000	$96,600	$579,600	$23,184	$610,000
2013	10A	N	Quaker Lane Pump Station - High Service Pumps	$200,000	$30,000	$230,000	$46,000	$276,000	$11,040	$290,000
2013	10B	N	HS Transmission Mains - Quaker Lane PS	$2,988,000	$448,200	$3,436,200	$687,240	$4,123,440	$164,938	$4,290,000
										$5,400,000
2014	4	E	East Greenwich Well Upgrade & Treatment	$4,500,000	$675,000	$5,175,000	$1,035,000	$6,210,000	$506,736	$6,720,000
2014	7	E	Oaklawn Service Gradient Emergency PRV	$300,000	$45,000	$345,000	$69,000	$414,000	$33,782	$450,000
										$7,170,000
2015	5	E	Spring Lake Well Upgrade & Treatment	$3,750,000	$562,500	$4,312,500	$862,500	$5,175,000	$646,171	$5,830,000
2015	8	E	I-295 Bridge Crossing at Providence Street	$288,000	$43,200	$331,200	$66,240	$397,440	$49,626	$450,000
										$6,280,000
2016	6	E	Replace KCWA Facility	$5,500,000	$825,000	$6,325,000	$1,265,000	$7,590,000	$1,289,227	$8,880,000
2016	9A	N	Division Road	$1,717,000	$257,550	$1,974,550	$394,910	$2,369,460	$402,473	$2,780,000
2016	9B	N	Shippetown Road	$240,000	$36,000	$276,000	$55,200	$331,200	$56,257	$390,000
										$12,050,000
2017	9C	N	Middle Road	$382,500	$57,375	$439,875	$87,975	$527,850	$114,360	$650,000
2017	9D	N	Middle Road	$180,000	$27,000	$207,000	$41,400	$248,400	$53,817	$310,000
										$960,000

Project Category

N = Necessary
D = Discretionary
E = Essential

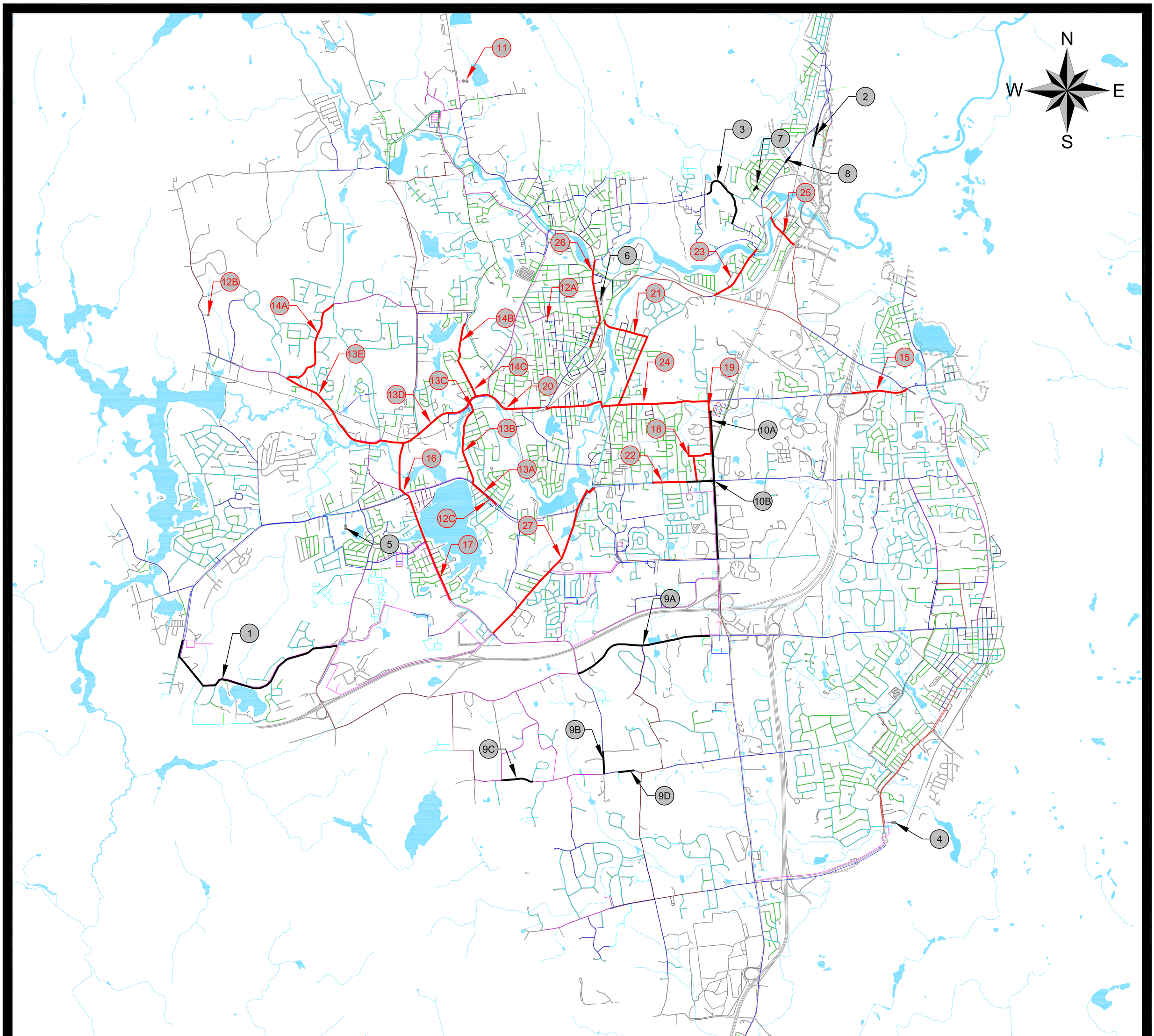
Total Cost - All Fiscal Years: $34,500,000

*Rounded to nearest $10,000

KCWA Water Supply System Map

KENT COUNTY WATER AUTHORITY

WATER SUPPLY SYSTEM MAP



INDEX TO 2012 - 2017 CIP PROJECTS

1 - MISHNOCK WATER MAIN - WTP TO HOPKINS HILL ROAD
2 - BALD HILL ROAD/NEW LONDON AVE. LOOP CONNECTION
3 - WAKEFIELD STREET
4 - EAST GREENWICH WELL UPGRADE & TREATMENT
5 - SPRING LAKE WELL UPGRADE & TREATMENT
6 - REPLACE KCWA FACILITY
7 - OAKLAWN SERVICE GRADIENT EMERGENCY PRV
8 - I-295 BRIDGE CROSSING AT PROVIDENCE STREET
9A - DIVISION ROAD
9B - SHIPPETOWN ROAD
9C - MIDDLE ROAD
9D - MIDDLE ROAD
10A - QUAKER LANE PUMP STATION - HIGH SERVICE PUMPS
10B - HS TRANSMISSION MAINS - QUAKER LANE PUMP STATION

INDEX TO 2012 - 2017 IFR PROJECTS

11 - REMOVE FISKEVILLE TANKS FROM SERVICE
12A - WEST STREET STORAGE TANK MODIFICATIONS
12B - RSHR STORAGE TANK DEMOLITION
12C - TIOGUE STORAGE TANK DEMOLITION
13A - TIOGUE AVENUE
13B - PILGRIM AVENUE
13C - LAUREL AVENUE AND BRIDGE CROSSING
13D - WASHINGTON STREET
13E - WASHINGTON STREET/FLAT RIVER ROAD
14A - OLD MAIN STREET/COLVINTOWN ROAD
14B - BOSTON STREET
14C - WASHINGTON STREET
15 - CENTERVILLE ROAD
16 - SANDY BOTTOM ROAD
17 - ARNOLD ROAD
18 - COUNTRY DRIVE/PEPIN STREET
19 - QUAKER LANE
20 - WASHINGTON STREET
21 - NEW LONDON TURNPIKE/FACTORY STREET
22 - COWESETT ROAD
23 - PROVIDENCE STREET
24 - LEGRIS AVENUE/WEST WARWICK AVENUE
25 - EAST AVENUE
26 - MAIN STREET
27 - NEW LONDON TURNPIKE

WATER MAINS

- 4 INCH
- 6 INCH
- 8 INCH
- 10 INCH
- 12 INCH
- 16 INCH
- 20 INCH

LEGEND

- CIP IMPROVEMENTS
- IFR IMPROVEMENTS
- ROADS
- WATER BODIES

2012 - 2017 CIP AND IFR PROJECTS

FEBRUARY 2012

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REVISIONS:

SCALE: 1"=1750'