Petitioner's Exhibit No. 2

THE CITY OF EAST CHICAGO, INDIANA

INDIANA UTILITY REGULATORY COMMISSION

CAUSE NO. 45827

DIRECT TESTIMONY

OF

JOHN CARUSO

SPONSORING ATTACHMENTS JC-1 through JC-11

CITY OF EAST CHICAGO, INDIANA

CAUSE NO. 45827

DIRECT TESTIMONY OF JOHN CARUSO

Q. Please state your name, occupation, and business address.

A. My name is John Caruso. I am an engineer, and my business address is 9575 W. Higgins Road Suite 600 Rosemont, IL 60018.

BACKGROUND

Q. Please describe your formal education.

A. I have a bachelor's degree in Mechanical Engineering from University of Illinois at Chicago (1988).

Q. Are you a registered Professional Engineer in the State of Indiana?

A. Yes, I am. Additionally, I am a Professional Engineer in Illinois and Colorado.

Q. What are your roles with the City of East Chicago?

A. I serve as an engineering consultant at the direction of three boards: the Board of Water Works, the Sanitary Board, and the Stormwater Board.

Q. What is your role specifically with the Board of Water Works?

A. I coordinate with all related engineering disciplines on various water supply and distribution system projects. I help identify infrastructure needs and provide planning and coordination for large infrastructure projects. I typically meet with engineers, consultants, legal advisors, and vendors to discuss different project elements and issues.

Q. Who are you employed by?

A. I am employed by the engineering firm, Christopher B. Burke Engineering, Ltd. ("CBBEL").

Q. What is the arrangement between the City of East Chicago and CBBEL?

A. CBBEL is contracted by the City to perform the services I provide. Contracts related to my work for the East Chicago Waterworks Department ("Water Department") are attached to my testimony as JC-1 and JC-2.

Q. When did you begin working with the Water Department specifically?

A. I began working with the Water Department in June 2020. I was asked to provide some engineering consulting services at that time.

Q. What is the purpose of your direct testimony in this proceeding?

A. The main purpose of my testimony is to describe the Water Department's engineering and construction needs for the upcoming rate cycle and the Water Department's plans for various infrastructure improvements. I will also discuss the cost estimates for these projects.

Q. Are you sponsoring any exhibits?

A. Yes. Attachment JC-1 is CBBEL's 2020 contract with the Water Department. Attachment JC-12 is CBBEL's 2022 contract with the Water Department. Attachment JC-3 is a copy of my current resume. Attachment JC-4 reflects the Amended Preliminary Engineering Report: Water Distribution System Improvements ("PER") on behalf of the Water Department filed with the Indiana Finance Authority ("IFA"), which addresses certain necessary capital improvement plan projects and their anticipated costs over the next five years. I refer in my testimony to these projects collectively as East Chicago's "CIP." Attachment JC-5 is the State Revolving Fund ("SRF") Application that the Water Department has submitted related to the non-lead service line CIP projects. Attachment JC-6 is the SRF Application that the Water Department has submitted for the overall Lead Service Line Replacement ("LSLR") Program. Attachment JC-7 and JC-8 are price quotes related to two of the CIP projects for the

Membrane Plant. Attachment JC-9 is CBBEL's report on the water storage options. Attachment JC-10 and JC-11 are letters from September and October 2022 to the SRF providing clarifying information with respect to the LSLR Program and other CIP projects.

Q. Have you previously testified before the IURC?

A. No, I have not.

CLOSURE OF THE CONVENTIONAL PLANT

Q. Are you familiar with the City's water treatment facilities?

A. Yes, I am familiar with both the newer membrane treatment and filtration plant ("Membrane Plant") and the older conventional plant ("Conventional Plant").

Q. Have you assessed the Conventional Plant and the Membrane Plant?

A. Yes. In 2021, the Water Department asked my engineering firm to do a walk-through assessment of both plants. It is my opinion that the Membrane Plant is capable of taking on the full water treatment load immediately, and the Conventional Plant is deteriorating beyond its useful life and should be retired. As of today, the Membrane Plant is capable of providing all of the water for East Chicago and the Water Department is in fact using it to filter and treat virtually all of the City's water. The 1965 Conventional Plant is only being operated for a short time each week to maintain operational and redundant status.

Q. Why is the Water Department continuing to run the Conventional Plant instead of demolishing it?

A. Per my suggestion, the Water Department is currently "mothballing" the Conventional Plant for future sale, use, or demolition. By the term "mothballing," I mean that the plant is being run only as required to keep equipment maintained for adequate operating condition. As a practical matter, less funds are required to maintain the Conventional

Plant in this way than to demolish it. As shown in Mr. Riley's cost of service study ("COSS"), the Conventional Plant requires approximately $100,000 a year for maintenance as compared to preliminary estimated costs of around $2 to $3 million to demolish it. The economics have therefore delayed demolition of the Conventional Plant. But eventually, after the Membrane Plant has adequate redundancy and there are sufficient funds for demolition, the Conventional Plant should be fully decommissioned because it is in excess of its useful life.

EAST CHICAGO'S CAPITAL IMPROVEMENTS PLAN ("CIP")

Q. Please describe East Chicago's CIP.

A. East Chicago's CIP involves both filtration and distribution system capital projects. Attachment JC-4 is the Amended PER which details the proposed CIP projects, including: 1) replacement of membranes and the addition of new membrane filtration skids at the Membrane Plant; 2) construction of a new, elevated water storage tank to provide emergency water storage capacity and provide surge relief; 3) a new water distribution main along Roxana to provide reliability and redundancy to the neighborhood; and 4) implementation of a lead service line replacement program to improve water quality at customer service taps. Attachment JC-5 and JC-6 are the SRF Applications related to these projects that were submitted in March 2022.

Q. Are the costs specified in the SRF application for the various CIP projects final costs?

A. No. The costs set forth are generally estimates, but they are based on actual historical bids prices from projects of a similar scope.

Q. Has the Water Department developed additional cost information for certain projects?

A. Yes, the Water Department has met with vendors for the filtration projects, and those estimated costs are reinforced by the quotes received.

Q. Please describe the water filtration projects that the Water Department is planning?

A. The Water Department is proposing to install two new, additional membrane filtration skids for the Membrane Plant. The additional filtration skids will add needed redundancy and resiliency during normal backwash/cleaning cycles. The Water Department is also proposing to replace the existing membrane filters. The existing membrane filters have now been in service for approximately 10 years, are approaching the end of the normal life cycle, and are in need of replacement.

Q. How much do you estimate the filtration projects will cost and how did you arrive at that number?

A. I estimate that the filtration projects will cost approximately $6 million. The membrane filtration skids were estimated to cost $3,618,000 in a December 16, 2021 proposal provided by the membrane vendor Filmtec Corporation, a division of Dupont. This expansion proposal is attached as Attachment JC-7. The replacement filters proposal also received from Filmtec totaled approximately $586,000 in a June 2022 proposal, attached as Attachment JC-8. That proposal covers two skids of replacement filters; full replacement would require three units of two skids, for a total of six skids and a total estimate of $1,758,000. While these proposals are technically expired, we are using them as a cost guide for the materials. Additional costs are estimated based on inflationary pressures, estimated engineering, construction, and installation costs.

Q. Please describe East Chicago's current storage facilities.

A. East Chicago currently utilizes three 4 MG ground storage tanks and one 1.5 MG elevated storage tank. Specifically, there is a 4 MG aboveground storage tank and booster pump station located at Tod Avenue. There are two 4 MG above-ground storage tanks located at the Pennsylvania Avenue Membrane Plant. (There is also an approximately 1 MG underground storage tank that was built in 1964 located at the Aldis Avenue Conventional Plant, which will be demolished, along with the rest of the facility, after that plant is decommissioned.)

Q. Please describe the elevated storage tank.

The Water Department's 1.5 MG elevated storage tank was built in 1949, last painted in 1998, and received a replacement cathodic protection system in 2015. That tank is too low to effectively act as a surge tank or provide adequate sustained system pressure within the City. Current system operating pressure is approximately 60 psi. The system pressure must be reduced to 45 psi to allow water from the tank to feed the system. Typically, pressures are maintained, not fluctuated, in a standard distribution system. Fluctuating pressures can cause issues with the piping, including water main breaks, and are not good for the overall system operation. Therefore, it is detrimental to the system to keep operating as is. A replacement elevated storage tank needs to be higher to match pressure in the system.

Q. Is the Water Department planning a new elevated storage tank?

A. Yes. The Water Department plans to replace the 1.5 MG tank with an approximately 2 MG new elevated storage tank. This new elevated storage tank will provide a portion of the City's Average Day Demand from a gravity-fed supply condition and will also provide a means for pressure spikes to dissipate within a properly sized tank with overflow elevation higher than current system operating pressures.

Q. How much do you estimate the elevated tank project will cost and how did you arrive at that number?

A. We estimate that the elevated tank project will cost approximately $5,000,000. The elevated tank project estimate is based on budget estimates from Chicago Bridge and Iron for a standpipe-type elevated tank, which is one of the options CBBEL summarized in a memo to the City dated September 22, 2021. This memo is attached as Attachment JC-9. The memo noted that pricing did not include expected demolition costs of approximately $250,000 associated with removal of the old tank, and other additional costs not reflected in the memo are being estimated based on inflationary pressures, estimated engineering, construction, and installation costs.

Q. What other infrastructure needs does the Water Department have?

A. The Water Department needs certain improvements in the distribution and transmission system due to aging infrastructure.

Q. What distribution and transmission projects does the Water Department have planned?

A. The Water Department intends to construct a new 12" diameter water main along N. Roxana Drive to provide redundancy and resiliency of the current water distribution system. Additionally, the Water Department plans to replace lead service lines in known lead service line locations identified by the City.

Q. Describe the need for Roxana water main project and describe the timeline.

A. Water modeling efforts have shown that a looped watermain on N. Roxana will improve static/residual pressures in the Roxana residential area. This will also increase the fire flow capacity for this area. The Water Department anticipates beginning construction on the water main in February 2024 and completing the work in September 2024.

Q. How much do you estimate the Roxana watermain project will cost and how did you arrive at that number?

A. I expect the Roxana water main project to cost approximately $1,500,000. This estimate is based on current/historical bid prices received on similar projects.

Q. Does the City expect to publicly bid these projects?

A. Yes. It is my understanding that the projects will generally be publicly bid. However, certain components such as the filter skids and replacements filters will need to be supplied by the proprietary vendor.

Q. Does the City have other significant expenses related to its aging infrastructure?

A. Yes. I have consulted with the Water Department to identify the projects discussed above as priorities for capital needs, but it is certainly true as addressed in Ms. Guzman's testimony, that the City has other substantial and recurring maintenance and repair expenses as it works to address water loss and maintain the aging infrastructure, particularly, addressing main breaks as they occur and attempting to keep equipment in good operating condition. The Water Department's leak detection efforts reflect one proactive practice that could also lead to identified capital needs.

LSLR PROJECT

Q. Please describe the Water Department's LSLR Project.

A. As discussed in Ms. Winna Guzman's testimony, the Water Department has already been engaged for a number of years in replacing lead service lines and intends to continue that program to do additional LSLR, subject to receipt of favorable funding.

Q. What funding is Petitioner applying for related to lead service line replacement?

A. Petitioner is applying for funding through the IFA, which is responsible for the receipt and distribution of low interest and/or grant funds for the State of Indiana. IFA oversees

the State's debt issuance in support of state, local, and business investments, including the SRF and the State Water Infrastructure Fund ("SWIF"). SRF funds are eligible to support drinking water infrastructure improvements at low interest rates to promote public health and the environment. SRF loans will help reduce costs in the short term and support increased levels of lead service line replacements and would spread the cost of the project over a longer term. SWIF funds provide grant funding to Indiana utilities for wastewater, drinking water and stormwater projects that either protect or improve public health or water quality. The Water Department is in the process of applying for both SRF low-interest loans and SWIF grants. I have submitted a PER to SRF in support of the LSLR Project, see Attachment JC-4, and have been working with the City and SRF to address related questions. With respect to State Fiscal Year 2023, the Water Department was in a favorable position on the priority funding list for LSLR, but it was determined that necessary approval from the Commission for long-term financing could not be received in time to access the funding and close by the SRF's deadline for the current fiscal year. Petitioner is therefore continuing to work with SRF to qualify for priority funding for the following fiscal year.

Q. If Petitioner is able to obtain grants, how will those grants be used?

A. I understand that the Water Department will use any grants to offset costs.

Q. What is the estimated cost for the LSLR Project?

A. After consultation with the City, I have projected approximately $10 million in 2022 dollars. This cost estimate is based on CBBEL experience from replacing LSLs in several communities. From this, we are able to ascertain current pricing to compare and budget. These costs are reflected in the SRF LSLR Application and the PER. See Attachment JC-4, Appendix B-2, and JC-6.

Q. Please provide a range for the number of lead service lines that Petitioner estimates will be replaced annually.

A. There are believed to be approximately 1,175 LSLs throughout the City that are proposed to be replaced in their entirety. East Chicago anticipates replacements occurring over a period of multiple years, including replacement in both the right-of-way and on private property. Based on experience, the number of replacements will vary each year, but I would expect at least several hundred per year could be replaced.

Q. Did your original PER propose to cover the customer-owned portion of the lead service lines?

A. No, it did not, but the SRF clarified that the Water Department would need to cover those costs to be eligible for the potentially available funding, and the PER has been amended to reflect the replacement of the entire lead service line. *See* Attachment JC-9. The SRF comments continue to emphasize that eligibility for funding will require replacement to the premises. *See* Attachment JC-10, Comment 2 and Comment 4(c).

Q. Will it be more cost effective for Petitioner to replace lead service lines than for property owners to replace the portion of the lead service lines owned by them?

A. Yes. Petitioner anticipates that its average cost of replacing a single service line will be approximately $8,500. That cost includes the following activities: planning and scheduling efforts for the water service line replacement; installing a new water service line and retiring the lead service line; coordinating the flushing and sampling of the property owner's water after construction; restoring the construction site; and general coordination and administration. Petitioner anticipates that its performance of the work will result in a savings of up to 30% as compared with the property owner managing the work. This estimated savings amount was determined based on estimates for Petitioner's

maintenance crews to perform the work, as well as based on discussions with contractors having extensive experience with conducting lead service line replacements in other communities. Savings can be realized through bulk material purchasing, crew efficiencies in completing replacements, and administrative efficiencies.

Q. Is Petitioner's LSLR Project in the public interest?

A. Yes. There are a number of customer-owned lead service lines in Petitioner's Water System. The goal is to eliminate lead service lines in the Water System, thereby reducing any potential risks that they present. The Water Department will be able to utilize economies of scale and its professional expertise to replace lead service lines more cost effectively and efficiently than if property owners were to replace them, which will also avoid interference with water main construction and replacement activities.

Q. Does this conclude your testimony?

A. Yes, it does.

VERIFICATION

I, John Caruso, affirm under penalties of perjury that the foregoing representations are true and correct to the best of my knowledge, information, and belief.

John Caruso

Date: Dec 9, 2022

JC-1

CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 W Higgins Road, Suite 600 Rosemont, Illinois 60018-4920 Tel (847) 823-0500 Fax (847) 823-0520

May 5, 2020

City of East Chicago
Water Department
400 E. Chicago Avenue
East Chicago, IN 46312

Attention: Mr. Ed Santen
Distribution Supervisor

Subject: Proposal for Professional Engineering Services
Water Distribution System Review and Consultation
City of East Chicago, IN

Dear Mr. Santen:

As requested, Christopher B. Burke Engineering, Ltd. (CBBEL) is pleased to submit this proposal for professional engineering services related to the review of the City of East Chicago, IN (City) water distribution system. Below is our Understanding of Assignment, Scope of Services and Estimate of Fee.

UNDERSTANDING OF ASSIGNMENT

CBBEL understands the City would like CBBEL to review current water distribution system with respect to flow and pressure from an operations perspective. The City would like CBBEL to review the condition and operation of the City's existing water works facilities. CBBEL will review water usage records and compare with water pumping facilities flow meters.

SCOPE OF SERVICES

Task 1 – Data Collection and Review: CBBEL will review the following information provided by the City:

a. Water Main Atlas Information
b. High Service and Booster Pumps (City to provide pump curves)

c. Elevated Water Tank (CBBEL will request information from Chicago Bridge & Iron)
d. Water Usage Data from 100 Largest Water Customers

Task 2 – Water Model: CBBEL will prepare a skeletonized water model of the City's primary distribution water mains. The water model will be used along with water usage data to determine calculated pressure and flow in the water distribution system. CBBEL will witness (or conduct with City staff present) fire hydrant flow tests to calibrate the water model to refine its accuracy of predicting system pressure and flow.

Task 3 – Prepare Technical Memorandum: Based on findings from Tasks 1 and 2, CBBEL will prepare a Technical Memorandum of findings and recommendations to review with City staff.

Task 4 – Water Audit: CBBEL will conduct a water audit in accordance with the guidance and recommendations as set forth in AWWA M36 Manual of Water Supply Practices, Water Audits and Loss Control Programs. The scope would include but no be limited to a reconciliation of water supply meters with customer water meters, quantify authorized consumption from hydrant flushing, firefighting and training, construction, street cleaning and landscape use, consumption in public buildings, calculate real and apparent water losses, and calculate quantity of non-revenue water.

Task 5 – On Call Consultation: CBBEL will respond to on-call requests for consultation and/or site visits as requested on a time and materials basis.

ESTIMATE OF FEE

TASK	FEE
Task 1 – Data Collection and Review	$9,500
Task 2 – Water Model	$16,000
Task 3 – Prepare Technical Memorandum	$7,500
Task 4 – Water Audit	$9,500
Task 5 – On Call Consultation	Time & Materials
Direct Costs	$500
TOTAL	$43,000

We will bill you at the hourly rates specified on the attached Schedule of Charges. We will establish our contract in accordance with the attached General Term and Conditions. These General Terms and Conditions are expressly incorporated into and are an integral part of this contract for professional services. Direct costs for blueprints, photocopying, mailing, mileage, overnight delivery, messenger services and report binding are included in the Fee Estimate. Please note that meetings and additional services performed by CBBEL that are not included as part of this proposal will be billed on a time and materials basis and at the attached hourly rates.

Please sign and return one copy of this agreement as an indication of acceptance and notice to proceed. Please feel free to contact us anytime.

Sincerely,

Michael E. Kerr, PE
President

JPC/pjb

Encl. Schedule of Charges
General Terms and Conditions

THIS PROPOSAL, SCHEDULE OF CHARGES & GENERAL TERMS AND CONDITIONS ACCEPTED FOR CITY OF EAST CHICAGO, IN:

BY: _____

TITLE: _____

DATE: _____

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CHRISTOPHER B. BURKE ENGINEERING, LTD.
STANDARD CHARGES FOR PROFESSIONAL SERVICES
APRIL,2020

Personnel	Charges* ($/Hr)
Principal	275
Engineer VI	251
Engineer V	208
Engineer IV	170
Engineer III	152
Engineer I/II	121
Survey V	229
Survey IV	196
Survey III	172
Survey II	126
Survey I	100
Engineering Technician V	198
Engineering Technician IV	161
Engineering Technician III	146
Engineering Technician I/II	68
CAD Manager	177
Assistant CAD Manager	153
CAD II	135
GIS Specialist III	148
GIS Specialist I/II	94
Landscape Architect	170
Landscape Designer I/II	94
Environmental Resource Specialist V	216
Environmental Resource Specialist IV	170
Environmental Resource Specialist III	139
Environmental Resource Specialist I/II	94
Environmental Resource Technician	114
Administrative	104
Engineering Intern	63
Information Technician III	130
Information Technician I/II	116

Direct Costs	
Outside Copies, Blueprints, Messenger, Delivery Services, Mileage	Cost + 12%

*Charges include overhead and profit

Christopher B. Burke Engineering, Ltd. reserves the right to increase these rates and costs by 5% after December 31, 2020.

CHRISTOPHER B. BURKE ENGINEERING, LTD.
GENERAL TERMS AND CONDITIONS

1. Relationship Between Engineer and Client: Christopher B. Burke Engineering, Ltd. (Engineer) shall serve as Client's professional engineer consultant in those phases of the Project to which this Agreement applies. This relationship is that of a buyer and seller of professional services and as such the Engineer is an independent contractor in the performance of this Agreement and it is understood that the parties have not entered into any joint venture or partnership with the other. The Engineer shall not be considered to be the agent of the Client. Nothing contained in this Agreement shall create a contractual relationship with a cause of action in favor of a third party against either the Client or Engineer.

   Furthermore, causes of action between the parties to this Agreement pertaining to acts of failures to act shall be deemed to have accrued and the applicable statute of limitations shall commence to run not later than the date of substantial completion.

2. Responsibility of the Engineer: Engineer will strive to perform services under this Agreement in accordance with generally accepted and currently recognized engineering practices and principles, and in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, express or implied, and no warranty or guarantee is included or intended in this Agreement, or in any report, opinion, document, or otherwise.

   Notwithstanding anything to the contrary which may be contained in this Agreement or any other material incorporated herein by reference, or in any Agreement between the Client and any other party concerning the Project, the Engineer shall not have control or be in charge of and shall not be responsible for the means, methods, techniques, sequences or procedures of construction, or the safety, safety precautions or programs of the Client, the construction contractor, other contractors or subcontractors performing any of the work or providing any of the services on the Project. Nor shall the Engineer be responsible for the acts or omissions of the Client, or for the failure of the Client, any architect, engineer, consultant, contractor or subcontractor to carry out their respective responsibilities in accordance with the Project documents, this Agreement or any other agreement concerning the Project. Any provision which purports to amend this provision shall be without effect unless it contains a reference that the content of this condition is expressly amended for the purposes described in such amendment and is signed by the Engineer.

3. Changes: Client reserves the right by written change order or amendment to make changes in requirements, amount of work, or engineering time schedule adjustments, and Engineer and Client shall negotiate appropriate adjustments acceptable to both parties to accommodate any changes, if commercially possible.

4. Suspension of Services: Client may, at any time, by written order to Engineer (Suspension of Services Order) require Engineer to stop all, or any part, of the services required by this Agreement. Upon receipt of such an order, Engineer shall immediately comply with its terms and take all reasonable steps to minimize the costs associated with the services affected by such order. Client, however, shall pay all costs incurred by the suspension, including all costs necessary to maintain continuity and for the

resumptions of the services upon expiration of the Suspension of Services Order. Engineer will not be obligated to provide the same personnel employed prior to suspension, when the services are resumed, in the event that the period of suspension is greater than thirty (30) days.

5. Termination: This Agreement may be terminated by either party upon thirty (30) days written notice in the event of substantial failure by the other party to perform in accordance with the terms hereof through no fault of the terminating party. This Agreement may be terminated by Client, under the same terms, whenever Client shall determine that termination is in its best interests. Cost of termination, including salaries, overhead and fee, incurred by Engineer either before or after the termination date shall be reimbursed by Client.

6. Documents Delivered to Client: Drawings, specifications, reports, and any other Project Documents prepared by Engineer in connection with any or all of the services furnished hereunder shall be delivered to the Client for the use of the Client. Engineer shall have the right to retain originals of all Project Documents and drawings for its files. Furthermore, it is understood and agreed that the Project Documents such as, but not limited to reports, calculations, drawings, and specifications prepared for the Project, whether in hard copy or machine readable form, are instruments of professional service intended for one-time use in the construction of this Project. These Project Documents are and shall remain the property of the Engineer. The Client may retain copies, including copies stored on magnetic tape or disk, for information and reference in connection with the occupancy and use of the Project.

   When and if record drawings are to be provided by the Engineer, Client understands that information used in the preparation of record drawings is provided by others and Engineer is not responsible for accuracy, completeness, nor sufficiency of such information. Client also understands that the level of detail illustrated by record drawings will generally be the same as the level of detail illustrated by the design drawing used for project construction. If additional detail is requested by the Client to be included on the record drawings, then the Client understands and agrees that the Engineer will be due additional compensation for additional services.

   It is also understood and agreed that because of the possibility that information and data delivered in machine readable form may be altered, whether inadvertently or otherwise, the Engineer reserves the right to retain the original tapes/disks and to remove from copies provided to the Client all identification reflecting the involvement of the Engineer in their preparation. The Engineer also reserves the right to retain hard copy originals of all Project Documentation delivered to the Client in machine readable form, which originals shall be referred to and shall govern in the event of any inconsistency between the two.

   The Client understands that the automated conversion of information and data from the system and format used by the Engineer to an alternate system or format cannot be accomplished without the introduction of inexactitudes, anomalies, and errors. In the event Project Documentation provided to the Client in machine readable form is so converted, the Client agrees to assume all risks associated therewith and, to the fullest

extent permitted by law, to hold harmless and indemnify the Engineer from and against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees, arising therefrom or in connection therewith.

The Client recognizes that changes or modifications to the Engineer's instruments of professional service introduced by anyone other than the Engineer may result in adverse consequences which the Engineer can neither predict nor control. Therefore, and in consideration of the Engineer's agreement to deliver its instruments of professional service in machine readable form, the Client agrees, to the fullest extent permitted by law, to hold harmless and indemnify the Engineer from and against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees, arising out of or in any way connected with the modification, misinterpretation, misuse, or reuse by others of the machine readable information and data provided by the Engineer under this Agreement. The foregoing indemnification applies, without limitation, to any use of the Project Documentation on other projects, for additions to this Project, or for completion of this Project by others, excepting only such use as may be authorized, in writing, by the Engineer.

7. Reuse of Documents: All Project Documents including but not limited to reports, opinions of probable costs, drawings and specifications furnished by Engineer pursuant to this Agreement are intended for use on the Project only. They cannot be used by Client or others on extensions of the Project or any other project. Any reuse, without specific written verification or adaptation by Engineer, shall be at Client's sole risk, and Client shall indemnify and hold harmless Engineer from all claims, damages, losses, and expenses including attorney's fees arising out of or resulting therefrom.

   The Engineer shall have the right to include representations of the design of the Project, including photographs of the exterior and interior, among the Engineer's promotional and professional materials. The Engineer's materials shall not include the Client's confidential and proprietary information if the Client has previously advised the Engineer in writing of the specific information considered by the Client to be confidential and proprietary.

8. Standard of Practice: The Engineer will strive to conduct services under this agreement in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as of the date of this Agreement.

9. Compliance With Laws: The Engineer will strive to exercise usual and customary professional care in his/her efforts to comply with those laws, codes, ordinance and regulations which are in effect as of the date of this Agreement.

   With specific respect to prescribed requirements of the Americans with Disabilities Act of 1990 or certified state or local accessibility regulations (ADA), Client understands ADA is a civil rights legislation and that interpretation of ADA is a legal issue and not a design issue and, accordingly, retention of legal counsel (by Client) for purposes of interpretation is advisable. As such and with respect to ADA, Client agrees to waive any action against Engineer, and to indemnify and defend Engineer against any claim arising from Engineer's alleged failure to meet ADA requirements prescribed.

Further to the law and code compliance, the Client understands that the Engineer will strive to provide designs in accordance with the prevailing Standards of Practice as previously set forth, but that the Engineer does not warrant that any reviewing agency having jurisdiction will not for its own purposes comment, request changes and/or additions to such designs. In the event such design requests are made by a reviewing agency, but which do not exist in the form of a written regulation, ordinance or other similar document as published by the reviewing agency, then such design changes (at substantial variance from the intended design developed by the Engineer), if effected and incorporated into the project documents by the Engineer, shall be considered as Supplementary Task(s) to the Engineer's Scope of Service and compensated for accordingly.

10. Indemnification: Engineer shall indemnify and hold harmless Client up to the amount of this contract fee (for services) from loss or expense, including reasonable attorney's fees for claims for personal injury (including death) or property damage to the extent caused by the sole negligent act, error or omission of Engineer.

    Client shall indemnify and hold harmless Engineer under this Agreement, from loss or expense, including reasonable attorney's fees, for claims for personal injuries (including death) or property damage arising out of the sole negligent act, error omission of Client.

    In the event of joint or concurrent negligence of Engineer and Client, each shall bear that portion of the loss or expense that its share of the joint or concurrent negligence bears to the total negligence (including that of third parties), which caused the personal injury or property damage.

    Engineer shall not be liable for special, incidental or consequential damages, including, but not limited to loss of profits, revenue, use of capital, claims of customers, cost of purchased or replacement power, or for any other loss of any nature, whether based on contract, tort, negligence, strict liability or otherwise, by reasons of the services rendered under this Agreement.

11. Opinions of Probable Cost: Since Engineer has no control over the cost of labor, materials or equipment, or over the Contractor(s) method of determining process, or over competitive bidding or market conditions, his/her opinions of probable Project Construction Cost provided for herein are to be made on the basis of his/her experience and qualifications and represent his/her judgement as a design professional familiar with the construction industry, but Engineer cannot and does not guarantee that proposal, bids or the Construction Cost will not vary from opinions of probable construction cost prepared by him/her. If prior to the Bidding or Negotiating Phase, Client wishes greater accuracy as to the Construction Cost, the Client shall employ an independent cost estimator Consultant for the purpose of obtaining a second construction cost opinion independent from Engineer.

12. Governing Law & Dispute Resolutions: This Agreement shall be governed by and construed in accordance with Articles previously set forth by (Item 9 of) this Agreement, together with the laws of the **State of Illinois**.

Any claim, dispute or other matter in question arising out of or related to this Agreement, which can not be mutually resolved by the parties of this Agreement, shall be subject to mediation as a condition precedent to arbitration (if arbitration is agreed upon by the parties of this Agreement) or the institution of legal or equitable proceedings by either party. If such matter relates to or is the subject of a lien arising out of the Engineer's services, the Engineer may proceed in accordance with applicable law to comply with the lien notice or filing deadlines prior to resolution of the matter by mediation or by arbitration.

The Client and Engineer shall endeavor to resolve claims, disputes and other matters in question between them by mediation which, unless the parties mutually agree otherwise, shall be in accordance with the Construction Industry Mediation Rules of the American Arbitration Association currently in effect. Requests for mediation shall be filed in writing with the other party to this Agreement and with the American Arbitration Association. The request may be made concurrently with the filing of a demand for arbitration but, in such event, mediation shall proceed in advance of arbitration or legal or equitable proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order.

The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

13. Successors and Assigns: The terms of this Agreement shall be binding upon and inure to the benefit of the parties and their respective successors and assigns: provided, however, that neither party shall assign this Agreement in whole or in part without the prior written approval of the other.

14. Waiver of Contract Breach: The waiver of one party of any breach of this Agreement or the failure of one party to enforce at any time, or for any period of time, any of the provisions hereof, shall be limited to the particular instance, shall not operate or be deemed to waive any future breaches of this Agreement and shall not be construed to be a waiver of any provision, except for the particular instance.

15. Entire Understanding of Agreement: This Agreement represents and incorporates the entire understanding of the parties hereto, and each party acknowledges that there are no warranties, representations, covenants or understandings of any kind, matter or description whatsoever, made by either party to the other except as expressly set forth herein. Client and the Engineer hereby agree that any purchase orders, invoices, confirmations, acknowledgments or other similar documents executed or delivered with respect to the subject matter hereof that conflict with the terms of the Agreement shall be null, void & without effect to the extent they conflict with the terms of this Agreement.

16. Amendment: This Agreement shall not be subject to amendment unless another instrument is duly executed by duly authorized representatives of each of the parties and entitled "Amendment of Agreement".

17. Severability of Invalid Provisions: If any provision of the Agreement shall be held to contravene or to be invalid under the laws of any particular state, county or jurisdiction where used, such contravention shall not invalidate the entire Agreement, but it shall be construed as if not containing the particular provisions held to be invalid in the particular state, country or jurisdiction and the rights or obligations of the parties hereto shall be construed and enforced accordingly.

18. Force Majeure: Neither Client nor Engineer shall be liable for any fault or delay caused by any contingency beyond their control including but not limited to acts of God, wars, strikes, walkouts, fires, natural calamities, or demands or requirements of governmental agencies.

19. Subcontracts: Engineer may subcontract portions of the work, but each subcontractor must be approved by Client in writing.

20. Access and Permits: Client shall arrange for Engineer to enter upon public and private property and obtain all necessary approvals and permits required from all governmental authorities having jurisdiction over the Project. Client shall pay costs (including Engineer's employee salaries, overhead and fee) incident to any effort by Engineer toward assisting Client in such access, permits or approvals, if Engineer perform such services.

21. Designation of Authorized Representative: Each party (to this Agreement) shall designate one or more persons to act with authority in its behalf in respect to appropriate aspects of the Project. The persons designated shall review and respond promptly to all communications received from the other party.

22. Notices: Any notice or designation required to be given to either party hereto shall be in writing, and unless receipt of such notice is expressly required by the terms hereof shall be deemed to be effectively served when deposited in the mail with sufficient first class postage affixed, and addressed to the party to whom such notice is directed at such party's place of business or such other address as either party shall hereafter furnish to the other party by written notice as herein provided.

23. Limit of Liability: The Client and the Engineer have discussed the risks, rewards, and benefits of the project and the Engineer's total fee for services. In recognition of the relative risks and benefits of the Project to both the Client and the Engineer, the risks have been allocated such that the Client agrees that to the fullest extent permitted by law, the Engineer's total aggregate liability to the Client for any and all injuries, claims, costs, losses, expenses, damages of any nature whatsoever or claim expenses arising out of this Agreement from any cause or causes, including attorney's fees and costs, and expert witness fees and costs, shall not exceed the total Engineer's fee for professional engineering services rendered on this project as made part of this Agreement. Such causes included but are not limited to the Engineer's negligence, errors, omissions, strict liability or breach of contract. It is intended that this limitation apply to any and all liability or cause of action however alleged or arising, unless otherwise prohibited by law.

24. Client's Responsibilities: The Client agrees to provide full information regarding requirements for and about the Project, including a program which shall set forth the Client's objectives, schedule, constraints, criteria, special equipment, systems and site requirements.

The Client agrees to furnish and pay for all legal, accounting and insurance counseling services as may be necessary at any time for the Project, including auditing services which the Client may require to verify the Contractor's Application for Payment or to ascertain how or for what purpose the Contractor has used the money paid by or on behalf of the Client.

The Client agrees to require the Contractor, to the fullest extent permitted by law, to indemnify, hold harmless, and defend the Engineer, its consultants, and the employees and agents of any of them from and against any and all claims, suits, demands, liabilities, losses, damages, and costs ("Losses"), including but not limited to costs of defense, arising in whole or in part out of the negligence of the Contractor, its subcontractors, the officers, employees, agents, and subcontractors of any of them, or anyone for whose acts any of them may be liable, regardless of whether or not such Losses are caused in part by a party indemnified hereunder. Specifically excluded from the foregoing are Losses arising out of the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs, or specifications, and the giving of or failure to give directions by the Engineer, its consultants, and the agents and employees of any of them, provided such giving or failure to give is the primary cause of Loss. The Client also agrees to require the Contractor to provide to the Engineer the required certificate of insurance.

The Client further agrees to require the Contractor to name the Engineer, its agents and consultants as additional insureds on the Contractor's policy or policies of comprehensive or commercial general liability insurance. Such insurance shall include products and completed operations and contractual liability coverages, shall be primary and noncontributing with any insurance maintained by the Engineer or its agents and consultants, and shall provide that the Engineer be given thirty days, unqualified written notice prior to any cancellation thereof.

In the event the foregoing requirements, or any of them, are not established by the Client and met by the Contractor, the Client agrees to indemnify and hold harmless the Engineer, its employees, agents, and consultants from and against any and all Losses which would have been indemnified and insured against by the Contractor, but were not.

When Contract Documents prepared under the Scope of Services of this contract require insurance(s) to be provided, obtained and/or otherwise maintained by the Contractor, the Client agrees to be wholly responsible for setting forth any and all such insurance requirements. Furthermore, any document provided for Client review by the Engineer under this Contract related to such insurance(s) shall be considered as sample insurance requirements and not the recommendation of the Engineer. Client agrees to have their own risk management department review any and all insurance requirements for adequacy and to determine specific types of insurance(s) required for the project. Client further agrees that decisions concerning types and amounts of insurance are

specific to the project and shall be the product of the Client. As such, any and all insurance requirements made part of Contract Documents prepared by the Engineer are not to be considered the Engineer's recommendation, and the Client shall make the final decision regarding insurance requirements.

25. Information Provided by Others: The Engineer shall indicate to the Client the information needed for rendering of the services of this Agreement. The Client shall provide to the Engineer such information as is available to the Client and the Client's consultants and contractors, and the Engineer shall be entitled to rely upon the accuracy and completeness thereof. The Client recognizes that it is impossible for the Engineer to assure the accuracy, completeness and sufficiency of such information, either because it is impossible to verify, or because of errors or omissions which may have occurred in assembling the information the Client is providing. Accordingly, the Client agrees, to the fullest extent permitted by law, to indemnify and hold the Engineer and the Engineer's subconsultants harmless from any claim, liability or cost (including reasonable attorneys' fees and cost of defense) for injury or loss arising or allegedly arising from errors, omissions or inaccuracies in documents or other information provided by the Client to the Engineer.

26. Payment: Client shall be invoiced once each month for work performed during the preceding period. Client agrees to pay each invoice within thirty (30) days of its receipt. The client further agrees to pay interest on all amounts invoiced and not paid or objected to for valid cause within said thirty (30) day period at the rate of eighteen (18) percent per annum (or the maximum interest rate permitted under applicable law, whichever is the lesser) until paid. Client further agrees to pay Engineer's cost of collection of all amounts due and unpaid after sixty (60) days, including court costs and reasonable attorney's fees, as well as costs attributed to suspension of services accordingly and as follows:

    Collection Costs. In the event legal action is necessary to enforce the payment provisions of this Agreement, the Engineer shall be entitled to collect from the Client any judgement or settlement sums due, reasonable attorneys' fees, court costs and expenses incurred by the Engineer in connection therewith and, in addition, the reasonable value of the Engineer's time and expenses spent in connection with such collection action, computed at the Engineer's prevailing fee schedule and expense policies.

    Suspension of Services. If the Client fails to make payments when due or otherwise is in breach of this Agreement, the Engineer may suspend performance of services upon five (5) calendar days' notice to the Client. The Engineer shall have no liability whatsoever to the Client for any costs or damages as a result of such suspension caused by any breach of this Agreement by the Client. Client will reimburse Engineer for all associated costs as previously set forth in (Item 4 of) this Agreement.

27. When construction observation tasks are part of the service to be performed by the Engineer under this Agreement, the Client will include the following clause in the construction contract documents and Client agrees not to modify or delete it:

Kotecki Waiver. Contractor (and any subcontractor into whose subcontract this clause is incorporated) agrees to assume the entire liability for all personal injury claims suffered by its own employees, including without limitation claims under the **Illinois** Structural Work Act, asserted by persons allegedly injured on the Project; waives any limitation of liability defense based upon the Worker's Compensation Act, court interpretations of said Act or otherwise; and to the fullest extent permitted by law, agrees to indemnify and hold harmless and defend Owner and Engineer and their agents, employees and consultants (the "Indemnitees") from and against all such loss, expense, damage or injury, including reasonable attorneys' fees, that the Indemnitees may sustain as a result of such claims, except to the extent that **Illinois** law prohibits indemnity for the Indemnitees' own negligence. The Owner and Engineer are designated and recognized as explicit third party beneficiaries of the Kotecki Waiver within the general contract and all subcontracts entered into in furtherance of the general contract.

28. Job Site Safety/Supervision & Construction Observation: The Engineer shall neither have control over or charge of, nor be responsible for, the construction means, methods, techniques, sequences of procedures, or for safety precautions and programs in connection with the Work since they are solely the Contractor's rights and responsibilities. The Client agrees that the Contractor shall supervise and direct the work efficiently with his/her best skill and attention; and that the Contractor shall be solely responsible for the means, methods, techniques, sequences and procedures of construction and safety at the job site. The Client agrees and warrants that this intent shall be carried out in the Client's contract with the Contractor. The Client further agrees that the Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the work; and that the Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to all employees on the subject site and all other persons who may be affected thereby. The Engineer shall have no authority to stop the work of the Contractor or the work of any subcontractor on the project.

When construction observation services are included in the Scope of Services, the Engineer shall visit the site at intervals appropriate to the stage of the Contractor's operation, or as otherwise agreed to by the Client and the Engineer to: 1) become generally familiar with and to keep the Client informed about the progress and quality of the Work; 2) to strive to bring to the Client's attention defects and deficiencies in the Work and; 3) to determine in general if the Work is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Engineer shall not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. If the Client desires more extensive project observation, the Client shall request that such services be provided by the Engineer as Additional and Supplemental Construction Observation Services in accordance with the terms of this Agreement.

The Engineer shall not be responsible for any acts or omissions of the Contractor, subcontractor, any entity performing any portions of the Work, or any agents or employees of any of them. The Engineer does not guarantee the performance of the

Contractor and shall not be responsible for the Contractor's failure to perform its Work in accordance with the Contract Documents or any applicable laws, codes, rules or regulations.

When municipal review services are included in the Scope of Services, the Engineer (acting on behalf of the municipality), when acting in good faith in the discharge of its duties, shall not thereby render itself liable personally and is, to the maximum extent permitted by law, relieved from all liability for any damage that may accrue to persons or property by reason of any act or omission in the discharge of its duties. Any suit brought against the Engineer which involve the acts or omissions performed by it in the enforcement of any provisions of the Client's rules, regulation and/or ordinance shall be defended by the Client until final termination of the proceedings. The Engineer shall be entitled to all defenses and municipal immunities that are, or would be, available to the Client.

29. Insurance and Indemnification: The Engineer and the Client understand and agree that the Client will contractually require the Contractor to defend and indemnify the Engineer and/or any subconsultants from any claims arising from the Work. The Engineer and the Client further understand and agree that the Client will contractually require the Contractor to procure commercial general liability insurance naming the Engineer as an additional named insured with respect to the work. The Contractor shall provide to the Client certificates of insurance evidencing that the contractually required insurance coverage has been procured. However, the Contractor’s failure to provide the Client with the requisite certificates of insurance shall not constitute a waiver of this provision by the Engineer.

The Client and Engineer waive all rights against each other and against the Contractor and consultants, agents and employees of each of them for damages to the extent covered by property insurance during construction. The Client and Engineer each shall require similar waivers from the Contractor, consultants, agents and persons or entities awarded separate contracts administered under the Client's own forces.

30. Hazardous Materials/Pollutants: Unless otherwise provided by this Agreement, the Engineer and Engineer's consultants shall have no responsibility for the discovery, presence, handling, removal or disposal of or exposure of persons to hazardous materials/pollutants in any form at the Project site, including but not limited to mold/mildew, asbestos, asbestos products, polychlorinated biphenyl (PCB) or other toxic/hazardous/pollutant type substances.

Furthermore, Client understands that the presence of mold/mildew and the like are results of prolonged or repeated exposure to moisture and the lack of corrective action. Client also understands that corrective action is a operation, maintenance and repair activity for which the Engineer is not responsible.

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CHRISTOPHER B. BURKE ENGINEERING, LTD.
9575 West Higgins Road Suite 600 Rosemont, Illinois 60018 TEL (847) 823-0500 FAX (847) 823-0520

March 30, 2022

City of East Chicago
Water Department
400 E. Chicago Avenue
East Chicago, IN 46312

Attention: Ms. Winna Guzman
Director Water Department

Subject: Proposal for Professional Engineering Services
Various Tasks Related to Water Distribution System
City of East Chicago, IN

Dear Ms. Guzman:

As requested, Christopher B. Burke Engineering, Ltd. (CBBEL) is pleased to submit this proposal for professional engineering services related to performing various tasks related to the City of East Chicago, IN (City) water distribution system. Below is our Understanding of Assignment, Scope of Services and Estimate of Fee.

UNDERSTANDING OF ASSIGNMENT

CBBEL understands the City would like CBBEL to assist the City with the following tasks:

1. Asset Management Report
2. Professional Engineering Report
3. Feasibility Design Study of Elevated Tank
4. Meter Pit and Service Line Replacement Contract Documents
5. Expansion of Membrane Plant Filtration Capacity
6. Decommission Plan for Conventional Plant
7. Capacity Factor Review
8. Expert Witness Testimony for Indiana Utility Rate Case (IURC)
9. Roxana Water Main Design

SCOPE OF SERVICES

Task 1 – Asset Management Report: CBBEL will review existing GIS, water atlases and perform site visits of the City's water facilities to complete an asset management report of the City's water distribution system facilities. A report will be prepared and asset management software tools will be suggested/recommended for implementation by the City. CBBEL will follow the guidelines set forth in the Asset Management Program Guidance for the Indiana State Revolving Fund Loan Program. CBBEL will prepare the report as it related to the technical portion of the Guidance Manual only.

Task 2 – Professional Engineering Report (PER): CBBEL will prepare a PER in accordance with the Drinking Water State Revolving Fund (DWSRF) Loan Program Preliminary Engineering Report Requirements. CBBEL will submit the PER to the City for review and submit to the SRF Loan Program Administrator for SRF loans. CBBEL will prepare exhibits as required and include information as required by the DWSRF requirements. CBBEL assumes the preparation of one PER to cover the following proposed projects that the City is requesting SRF loans:

a. Meter Pit and Lead Service Line Replacements
b. Elevated Water Tank Replacement
c. Expansion of Membrane Plant Filtration Capacity
d. Roxana Water Main

Task 3 – Feasibility Design Study of New Elevated Tank: CBBEL will prepare a feasibility design study for a new elevated tank or standpipe to replace the existing 1.5 MG elevated tank on Chicago Avenue. The report will provide an Engineer's Opinion of Probable Construction Cost, recommend tank capacity, site plan, demolition of existing tank and details of construction.

Task 4 – Meter Pit and Service Line Replacement Contract Documents: CBBEL will prepare plans, specifications and bidding documents for residential meter and service line replacement for 615 residential services. Locations provided by City. Typical details and site plans prepared by CBBEL. Survey is not included. Allowance for interior construction will be assumed.

Task 5 – Expansion of Membrane Plant Filtration Capacity: CBBEL will assist the City with expansion of Membrane Filter Plant capacity. Proposal has been submitted by membrane filter manufacturer to furnish and install new membrane skids for $3,618,000. CBBEL will assist in review of this work and/or prepare contract bid documents for the installation of proprietary filtration skids.

Task 6 – Decommission Plan for Conventional Plant: CBBEL will assist the City to prepare a decommission plan and estimate of costs for decommissioning the conventional filtration plant.

Task 7 – Capacity Factor Review: CBBEL will review the capacity factors prepared by Baker Tilly Municipal Advisors, LLC as they relate to the water usage within East Chicago, IN based on AWWA guidance for water systems.

Task 8 – Expert Witness Testimony for Indiana Utility Rate Case (IURC): CBBEL will provide expert witness testimony for the IURC that will be presented to the State of Indiana on behalf of East Chicago, IN. CBBEL will coordinate with Baker Tilly to prepare testimony in support of the proposed water infrastructure improvements being funded by the State Revolving Loan.

Task 9 – Roxana Drive Water Main Design: CBBEL will topographic survey approximately 3,000 LF of N. Roxana Drive from Indianapolis Boulevard to Walsh Avenue and prepare base sheets for water main design. CBBEL will design approximately 3,000 feet of new 12" water main from Indianapolis Boulevard to Walsh Avenue and abandon in place existing 10" water main on Roxana Drive. CBBEL will prepare plans, specifications and bidding documents for public bid and include required documentation for Indiana Revolving Loan Fund if applicable.

ESTIMATE OF FEE

TASK	FEE
Task 1 – Asset Management Report	$46,000
Task 2 – Professional Engineering Report (PER)	$26,000
Task 3 – Feasibility Design Study of Elevated Tank	$37,000
Task 4 – Meter Pit and Service Line Replacement Contract Documents	$64,000
Task 5 – Expansion of Membrane Plant Filtration Capacity	$220,000
Task 6 – Decommission Plan for Conventional Plant	$34,000
Task 7 – Capacity Factor Review	$16,000
Task 8 – Expert Witness Testimony for Indiana Utility Rate Case (IURC)	T&M
Task 9 – Roxana Drive Water Main Design	$73,000

We will bill you at the hourly rates specified on the attached Schedule of Charges. We will establish our contract in accordance with the attached General Term and Conditions. These General Terms and Conditions are expressly incorporated into and are an integral part of this contract for professional services. Direct costs for blueprints, photocopying, mailing, mileage, overnight delivery, messenger services and report binding are included in the Fee Estimate. Please note that meetings and additional services performed by CBBEL that are not included as part of this proposal will be billed on a time and materials basis and at the attached hourly rates.

Please sign and return one copy of this agreement as an indication of acceptance and notice to proceed. Please feel free to contact us anytime.

Sincerely,

Michael E. Kerr, PE
President

JPC/pjb

Encl. Schedule of Charges
General Terms and Conditions

THIS PROPOSAL, SCHEDULE OF CHARGES & GENERAL TERMS & CONDITIONS ACCEPTED FOR CITY OF EAST CHICAGO, IN:

BY: John Bobish

TITLE: Vice-President

DATE: 5/2/2022

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John Caruso, PE

Vice President, Head, Mechanical/Electrical Engineering Department

YEARS EXPERIENCE: 34
YEARS WITH CBBEL: 34

EDUCATION
Bachelor of Science, 1988
Mechanical Engineering
University of Illinois at Chicago

PROFESSIONAL REGISTRATION
Professional Engineer, IL, 062.048356, 1993

Professional Engineer, WI, 43186-6, 2013

Professional Engineer, IN, PE11012145, 2010

Professional Engineer, CO, PE.0059191, 2021

PROFESSIONAL DEVELOPMENT
Ethics in City Government, Ethics Training for CDA/OMP Contractors, Vendors and Employees

PROFESSIONAL AFFILIATIONS
American Society of Mechanical Engineers

Engineers Without Borders

Illuminating Engineers Society

Professional Engineer experienced in design of mechanical/electrical engineering projects. Experience includes pump station design, water model studies, roadway and site lighting design, SCADA system design and irrigation design. Participated and/or acted as Resident Engineer on various potable water and sewage related pumping station projects, roadway lighting, and stormwater management projects. Responsibilities include design coordination with all related engineering disciplines on various projects with an emphasis on pumping applications including storm, sewage and potable water pump stations, as well as roadway lighting design and electrical design. Duties include preparation of design memorandum and preliminary engineering reports; acquisition of permits from state, county, and local agencies; preparation of contract specifications and construction plans; review of drawings and specifications for code compliance; providing RE services; design of standby engine generators and electric services; design of lighting systems for roadway, parking lot, landscape, and interior applications; and design of SCADA systems for sanitary, storm and potable water applications. Performs water model analyses using WaterGems, Infowater, WaterCAD and EPANET.

PUMP STATIONS

Southwest Storm Mitigation Phase I, Elmhurst: Project Manager for the design of an 17-acre-foot storm water detention reservoir with a 5 cfs duplex dewatering pump station including SCADA, fiber optic network communications and video surveillance of the facility. The pumps are housed in a 10 foot x 8 foot precast concrete wet well and discharge through a 1,600 foot, 12" diameter PVC forcemain. Remote telemetry is used to determine when pumping/dewatering can occur into the storm sewers after surcharging recedes. Construction cost $7,200,000.

Lansing Pump Station Improvements, Chicago Heights: Project Manager/Design Engineer for replacement of (3) 7,000 gpm horizontal split case potable water pumping units including associated isolation butterfly valves, globe check valves, pipe fittings, insertion flow meter, SCADA improvements to the City of Chicago Heights potable water pumping station. Construction Cost $300,000.

Meter Vault at Lansing Pump Station, Chicago Heights: Project Manager/Design Engineer for installation of 10' x 10' poured in place concrete, below grade meter vault over existing 36" water transmission main, including the installation of an insertion meter, electric and communication conduit and cable, connection to and modifications to existing SCADA system. Construction Cost $200,000.

Potable Water Booster Station, New Lenox: Project Manager/Design Engineer for construction of booster pump station at existing Village stand pipe and pump station. Improvements include modification to existing building adding approximately 400 SF of floor space including new standing metal seam roof, roof trusses, brick and CMW block wall construction for 2 new 750 gpm potable water booster pumps to create new pressure zone in remote, elevated area of the Village currently experiencing low water pressure. New standby diesel generator, modifications to existing motor control center, pressure reducing valves, and remote pressure monitor station reporting back to SCADA via radio is included in scope. Construction Cost $1,000,000.

East Main Pump Station, Lake County Public Works Department: Performed QA/QC for the $2.4 million rehabilitation Lake County's Regional East Main Pump Station originally placed in service in 1980. The East Main Pump Station has an average daily flow of 4 million gallons per day (MGD) with peak flow rates over 20 MGD. The project included replacing 2 of the vertical style non-clog pumps with 125 horsepower submersible style pumps that will allow the station to continue operations should the dry well ever flood in the future. The mechanical bar screens were replaced with mechanical shredders, thereby eliminating disposal of the screenings and significantly reducing odors and gases created in the screen room, which are treated by an existing forced air carbon scrubber. Two new stainless steel slide gates and new stainless steel grates and plates were added to the screen channels. The 1200 amp main electrical service entrances (2 ComEd feeds) were replaced with new switchgear which includes an automatic transfer switch between the ComEd feeds. A Kirk key operated generator receptacle was added to allow the County to power the station with one of two 500 kW portable generators. New variable frequency drives (VFD's) were added for each pump and the existing cone valves were modified to utilize individual REXA hydraulic units in lieu of the original Parco compressed air/hydraulic system. New PLC based controls and new level and flow instrumentation were included as well as new station LED lighting, a fresh coat of paint and new TPO roof.

IL Route 53 Storm Water Pump Station, Lombard: Project Manager for the design of a 170 cfs storm water pump station including 5 axial flow submersible propeller pumps, 2 submersible centrifugal pumps, a 650 kW diesel fuel standby generator, a 30' x 12' precast concrete electrical controls building, a below grade structural concrete wet well, discharge chamber and junction chamber, on site storm water detention, landscaping, pavement, water main, sanitary sewer, storm sewer, handrails, electric service, culvert lining and existing pump station modifications.

Flood Mitigation Project, Elmwood Park: Project Manager/Lead Designer for 150 cfs stormwater pump station, including four 250 Hp pumps, 1,600A motor control center, 1,000 kW engine generator, 30'x12' control building, SCADA, CCTV and 1,000' of twin 36" HDPE forcemains. Construction cost $3.6 million.

Storm Water Pump Station Rehabilitation, Winnetka: Project Manager/Design Engineer for the rehabilitation design of an existing storm water pump station. Improvements consisted of the removal of existing intake structures, removal of 4 existing 7,500 gpm pumps, installation of new 9' x 6' box culvert, intake structures with motor operated trash rake mechanism, 4 new 10,000 gpm submersible pumps, motor control center (MCC), modifications in below grade pump controls vault, new 1,000 amp CT cabinet, electric service and trash raker controls panel.

Cummins Technical Center Flood Risk Reduction, Columbus, IN: Project Manager responsible for design of flood control pumping stations. Project was a flood wall design to protect the Technical Center building. Included 45 cfs pump station, 5 cfs pump station, and over 500' of concrete flood wall.

Wastewater Treatment Plant Modifications, Rochester, IN: Modifications included replacement of 6 electric motors with inverter duty rated motors, installation of 6 variable frequency drives for trickling filter effluent pumps. Construction cost of $200,000.

Old Plank Park, Naperville: Design of approx. 7 cfs stormwater dewatering pump station for approx. 80 ac-ft stormwater detention facility. Required coordination and modifications to existing Country Commons pumping facility.

Graff Drive Stormwater Pump Station, Rosemont: Design of 20 cfs stormwater pump station including SCADA and 100kw standby generator to alleviate local flooding in residential area. Construction cost $586,000.

Country Commons, Naperville: Design of 2 cfs stormwater pump station to dewater 49 acre-feet stormwater reservoir underdrain system. Construction cost $550,000.

Well No. 9, Shorewood: Design of brick Well House for electrical, variable frequency drive and SCADA controls for 400 Hp, 1,200 gpm deep well pump. Packaged meter vault, manual transfer switch, and 2400 volt step up transformer included.

Well Nos. 6 & 8, Sycamore: Project Manager/Lead Designer for rehabilitation of two existing well houses. Upgrades included building additions to accommodate future radium treatment/removal equipment; electrical upgrades to existing well pumps; new diesel stand-by generator; underground piping revisions; well house piping revisions.

Wood Dale-Itasca Reservoir and Pump Station, DCDEC: Multi-phased stormwater management project along Salt Creek. Project included excavation of over 500,000 cy of material; construction of an earthen embankment approx. 0.5 mile long; 25 cfs pump station, 45' deep with two 75 hp pumps; 5 hp dewatering well, and SCADA telemetry system with a 75' tall radio antenna. Construction cost $5 million.

Westwood Creek Dam and Pump Station, Addison: Assisted in preparation of construction drawings for stormwater dam and pump station consisting of three 300hp submersible tube type propeller pumps, three 6'x8' motor operated sluice gates, and associated level sensing and control devices. Pump station rated at 500cfs and provided with 800kw diesel-electric generator for standby power. Responsibilities included RE for 2 years during construction, contract administration, and preparation of O&M manual. Performed annual dam inspection report for submission. CECI 1995 Engineering Excellence Achievement Award Winning Project. Construction cost $2 million.

Finley/Crescent Pond, Lombard: Design and resident engineering of 3 acre foot stormwater detention reservoir and 6cfs pump station. Construction cost $800,000.

Well No. 9, Sycamore: Designed a 250 hp 1350 gpm well pump for potable water deep well and a well house including provisions for radium treatment equipment. Design included a 350kw standby power generator, SCADA controls and chemical treatment facilities. Construction cost $827,000.

William Street Reservoir and Pump Station, Rosemont: Assisted in design and preparation of construction documents for below grade, poured-in-place concrete 5MG reservoir and 6,000gpm potable water pumping station. Responsibilities included sizing diesel electric generator; lighting, electrical power, piping layouts & CAD implementation to prepare contract drawings. Major equipment items included four 1,500gpm vertical turbine pumps driven by variable frequency drives; standby diesel electric generator; HVAC system for cooling main water pumps & heating pump station; chlorination equipment; control & alarm telemetry; & excavation support system. CECI 1995 Engineering Excellence Achievement Award Winning Project.

LIFT STATIONS

Seil Road Lift Station, Shorewood: Project Manager/Design Engineer for regional lift station rehabilitation including three 85 Hp, 1600 gpm sewage pumps, 250 kw diesel standby generator, new pump controller with three variable frequency drives and exterior cooling unit, SCADA upgrades, weather station, new check valves and site fencing. Converted project to Design-Build.

Edgebrook Lift Station, Wood Dale: Project Manager/Design Engineer for duplex sewage lift station rehabilitation including 350 gpm submersible sewage pumps, 40 kw natural gas standby generator, pump control panel, flow meter, check and isolation valves in valve vault, and waterproof hatches. Station was within floodplain elevation so area was raised above. DuPage County stormwater permit, recycled plastic site fencing, site grading and landscaping along with concrete access drive and raised stair/platform for access to pump control panel. Station was converted from dry pit can station to wet well submersible pumps.

Woods Lift Station, Flossmoor: Design and construction services and conversion to Design-Build for regional sewage lift station. Replaced dry pit can type station with submersible chopper style sewage pumps. MWRDGC permit. Reused existing pump controls with VFDs. Furnished new natural gas 50 kw standby generator, valve vult with new check and isolation valves.

Fairview Lift Station, Lombard: Rehabilitation of regional sewage lift station including new duplex high flow pump (1500 gpm) and duplex low flow (500 gpm) pumps, new pump controls, 250 kw natural gas standby generator, SCADA integration, reuse/recondition existing concrete wet well, new flow meter, check and isolation valves and new air/vacuum valve on existing 9000 ft. PVC forcemain.

Menards Lift Station, Glendale Heights: Project Manager for rehabilitation of existing sewage lift station along IL Route 64. Improvements include reuse of existing wet well with concrete rehabilitation, 3 new 1150 gpm submersible pumping units and associated valves and discharge piping, aluminum access hatches, expansion of existing precast concrete control building including new roof and three wall additions, pump controls including VFDs, valve vault, meter vault with in-line meter, reuse of existing forcemain, modifications to SCADA. Construction Cost $630,000.

Lake Park Estates Lift Station, Palatine: Project Manager for the rehabilitation of existing sewage lift station including converting dry well-wet well type station to submersible type station. Reuse of existing wet well, new valve vault and associated piping and valves, submersible pumping units, pump control panel and automatic transfer switch for 2 ComEd services. MWRDGC permit acquired. Construction Cost $170,000.

Elm and Blanchard Lift Station, Wheaton: Project Manager for the design and construction of sewage lift station rehabilitation including new submersible 85 hp pumping units, pump controls with variable frequency drive (VFDs), connection to existing standby generator, new electric service, protective structural barrier wall. Construction Cost $300,000.

Regency Drive Lift Station, Glendale Heights: Project Manager for design of 400 gpm sewage lift station modifications to convert from a can lift station to submersible pumps. Project also included a 50 kW natural gas generator.

VFW Lift Station, Rochester, IN: Design of sanitary lift station modifications for rehabilitation of existing lift station including pumps, controls, valves, hatches and bypass pumping. Construction cost of $140,000.

Klefstad Lift Station, Wood Dale: Project Manager for rehabilitation of duplex submersible sewage lift station conversion from dry pit station. Included 60kw natural gas standby generator. Construction cost $450,000.

Peck Farm Park, Geneva: Design of a lift station, distribution watermain and electrical service to 50,000 SF recreational building. Construction cost $800,000.

Blacksmith Drive Lift Station Improvements, Wheaton: Design and construction upgrades to existing sewage lift station including natural gas stand-by generation housed in pre-cast concrete building. New pump control panel and pump controls via transducer and backup floats.

Lorraine Blockhouse Improvements, Wheaton: Design and construction of upgrades to an existing sewage lift station including: demolition of existing 12'x12' brick building housing submersible pump controls, installation of a 10'x16' pre-cast concrete building with faux brick finish, new 60kw natural gas fueled generator, pump control panel, transducer and back-up floats. Overhead electrical service was replaced with below ground conduit and cables, along with new ComEd pad mounted transformers. New hatches provided on existing concrete pad and new pump guide-rail system and wet well piping was installed.

Geneva Water Quality Subdivision: Design and part-time construction observation services for sewage lift station and parking lot lighting. Lift station received backwash from future city water treatment plant filter tanks.

Lift Station Upgrades Phases I & II, Lombard: Project Manager/Design Engineer/Resident Engineer for the design and construction observation of 8 sanitary lift stations and 2 stormwater pump stations including demolition of existing dry-type stations. Construction cost $4.5 million.

WATER STORAGE TANKS

Four Flaggs Tank Rehabilitation, Painting and Tower Facilities Lightning Protection/Oriole Tower Lightning Protection, Niles: Project Manager for the painting and rehabilitation of the Four Flaggs Standpipe including the painting of the interior and exterior of standpipe, removal and replacement of pilasters, new cathodic protection system, water destratification system, grounding system, SCADA modifications, valving and piping modifications.

Rehabilitation of the 1,000,000 Gallon Legged High Tank and 2,000,000 Gallon Ground Storage Reservoir, Chicago Heights: Project Manager for the painting and rehabilitation of two water storage tanks in the City of Chicago Heights.

Ridge Drive 1,000,000 Gallon Legged High Tank Rehabilitation, Chicago Ridge: Project Manager for the painting and rehabilitation of the high tank including ROV inspections, cellular equipment removal and replacement, Preliminary Design Memo, contract documents, bidding, construction observation, project documentation and closeout.

1,500,000 Gallon Spheroid Water Tower, Shorewood: Project Manager for the design, permitting and construction of a new 112' tall spheroid water tank including SCADA system, altitude valve in vault, emergency standby generator, utility coordination, site grading and antenna mounting brackets.

Glenwood School for Boys & Girls Painting of 150,000 Gallon High Tank, St. Charles: Project Manager for painting 150,000 gallon elevated water tank. Coordinated use of temporary hydropneumatic tanks for water supply during time tank was out of service.

500,000 Gallon Elevated Water Storage Tank Painting, Rosemont: Assisted in preparation of contract documents and administration of bid process. This tank was awarded the 2006 Tank of the Year by the Tnemec Paint Company.

Painting of 2 Million Gallon Standpipe, Darien: Assisted in preparation of bidding plans and contract documents.

SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA) SYSTEM DESIGN

Village of Forest Park SCADA System: Design and project management of SCADA system including 2 elevated tanks, 2 pump stations, meter station, emergency interconnection and lift station. Construction cost $100,000.

Village of Chicago Ridge SCADA System: Design, contract document preparation and contract administration of a SCADA system incorporating a main potable water pump station, booster pump station, 1MG elevated water storage tank and three sanitary lift station sites. Construction cost $100,000.

Village of Willowbrook SCADA System: Design, contract document preparation and contract administration of a SCADA system. System included 2 elevated storage tanks and a 3MG standpipe and booster pump station. Construction cost $70,000.

WATER MODEL STUDIES

Water Distribution Study, Bensenville: Developed & calibrated a water distribution model (MWH Soft Info Water) and established user demands for water distribution system. Identified impacts on system from the removal of the existing piping and water supply demand within the O'Hare Modernization Program expansion area.

Residences at the Grove, Downers Grove: Water model constructed for a proposed 15 acre development to determine available fire flows for multi-family development.

Apple Creek Estates, Woodstock: Constructed water model for proposed 540 acre development, including single family, multi-family, commercial & a school. Fire flows, resultant pressures were analyzed along with sizing watermains and future elevated tank.

Oak Grove Business Park, Waukegan: Performed water model for industrial park including five flow demands for most distant building and sizing watermain. Model was basis for construction of 16" watermain extension to supplement park's watermain.

Village of Palos Park: Three, million dollar construction contracts for more than 10 miles of watermain and sanitary sewer. Through the use of CYBERNET, AutoCAD and KYPIPE, a water model was constructed and analyzed to size booster pump stations and watermain throughout selected portions of the Village.

DuPage Technology Park, West Chicago: Analyzed fire flow and water demands of Technology Park being connected to existing City of West Chicago water supply system.

City of Rolling Meadows: Review of an existing water model to determine effects of potable water pump station upgrades and pump selection.

ROADWAY LIGHTING DESIGN

Roadway and Bridge Reconstruction (I-294) Mile Long Bridge, Willow Springs/Hodgkins/Countryside: Project included approximately 11,000' of interstate widening (5000' of which were on a bridge). Project consisted of removal 81 light poles, 114 temporary wood light poles, 131 proposed light poles, 24 underpass luminaires, 3 lighting controllers and waterway navigation lighting. Also included was coordination with pole manufacture for design of 21 custom temporary 60' steel poles attached to bridge pier caps. Project was permitted thru IDOT and the US Coast Guard. Project was Tollway let. Duties included master plan design options, photometric calculations, electrical design, creation of contract drawings and specifications, summary of quantities, engineer's cost estimate, and new electric service coordination.

Uptown Redevelopment, Park Ridge: Project Manager for $1.5 million roadway lighting project near Northwest Highway and Touhy Avenue. Project included both City and IDOT roadways. Roadway lighting submittals and permit applications were submitted to IDOT for approval. Coordination with 7 intersections including traffic signal replacement at all intersections. Electrical included tree lighting, electrical feeds for kiosks and convenience receptacles.

I-294 at IL Route 137, Lake County: Project consisted of design of 5,500 LF of a new continuous freeway lighting system in each direction for widening I-294 and intersection lighting design for 4 signalized exit and entrance ramps. The project utilized approx. 75 lighting units with 400W HPS roadway luminaries mounted on 50' mounting height aluminum poles on 15' truss mast arms along with 150W HPS Wall Pak Type Lighting Units for Underpass Lighting. The Main Line lighting is controlled by centrally located Radio Controlled Lighting controller and the intersection transition lighting is controlled out of the traffic signal controller Transfer Cabinets. Project also included design and installation of 1,500 LF of duct bank for the installation of fiber optic network cable for Illinois Tollway Communications, Surveillance and Lighting Control.

88th Avenue Street Lighting Design, Palos Hills: Project Manager/ Resident Engineer for 1 mile of roadway lighting design using ornamental type street lighting. Construction cost $700,000. Project was redesigned using standard cobra head type luminaries and spun aluminum poles.

Congdon Avenue Roadway Lighting, Elgin: Project Manager for roadway lighting design of 1.2 miles. Coordination with CCHD plans for reconstruction of Congdon Avenue.

McLean Boulevard Roadway Lighting, Elgin: Project Manager/ Resident Engineer for 1 mile of roadway lighting on 4 lane collector road in Elgin. Additional 7 'mid-block' sites at various residential streets also included. Construction cost $220,000.

71 South Lower Wacker Lighting, Chicago: Design of intersection roadway lighting at proposed signalized intersection on Lower Wacker Drive for existing building loading dock. Reviewed & Permitted by City of Chicago and IDOT.

Balmoral Avenue Extension, Rosemont: Design of $600,000 roadway lighting improvements. Incorporated the use of over 140 lighting units in the design of multiple lighting systems. The project's close proximity to O'Hare Airport restricted overall mounting height to 17'. Temporary lighting was installed on Mannheim Road for construction operations. Other entities consisted of bridge lighting mounted to parapet walls, underpass lighting, and upgrades to existing Village, City of Chicago and IDOT lighting systems. Construction cost $10 million.

Randall Road Intersection/Transition Lighting, MCDOT: Design of lighting at 4 intersections using 61 light poles and 3 new lighting controllers. Upgraded existing lighting controllers and expanded the system. Incorporated existing luminaries on combination lighting/ traffic signal poles into new lighting system.

DuPage Technology Park Phase I, West Chicago: Designed lighting using 42-40' light poles and 2 lighting controllers which illuminated approx. 4,400' of roadway including 2 roundabouts. Also aerated 7 ponds using air compressors and diffusers regulated by 2 aeration electric controllers. Duties included photometric design, plan design, and cost estimate.

Meijer Store #182, St. Charles: Design of roadway lighting for intersection and transition lighting along IL 38, Randall Rd and Bricher Rd. Project included 67 new light standards and removal of 18 existing light standards, lighting 3 intersections, installing 2 lighting controllers and modifying an existing controller. Coordination with Kane County, IDOT, St. Charles and Geneva was required.

SITE LIGHTING DESIGN

DuPage County Courtyard, Wheaton: Project Manager for installation of 11 ornamental roadway light poles, 35 ornamental walkway light poles, 8 ornamental parking lot light poles and a remote receptacle for events. Existing electrical panels were upgraded to accommodate new lighting. Designed a site irrigation system including a submersible pump drawing water from an adjacent pond via a concrete structure.

National Street Metra Station, Elgin: Project Manager for installation of 50 parking lot light standards in which 13 were located on the train platform deck. Also, included one lighting controller and 12 ornamental poles along the Fox River.

Prairie Crossing Site Lighting, Metra: Project Manager for installation of 80 ornamental parking lot lighting standards in which 15 were located on a train platform deck. Tasks included photometric design and preparation of plans.

ROADWAY LIGHTING STUDY

Elgin Street Lighting Inventory and Effectiveness Study: Survey of approx. 6,000 street lighting units with hand held GPS unit. Presented results to City in PowerPoint presentation including recommendations for additional lighting in residential areas.

Street Lighting Study, Lombard: Project Manager for locating, identifying, assessing, and organizing data for all street lighting within the Village. There were 2170 light poles controlled by 91 lighting controllers, and 81 light poles were directly connected to ComEd with 357 light poles owned by ComEd. The lighting ordinance was revised, street lighting atlases were revised, and a 10-year street lighting capital improvement plan was designed.

RECREATIONAL FACILITIES

Lincoln Park Zoo South Pond Renovation, Chicago: Project consisted of draining/dredging the existing pond and removing/replacing/upgrading all adjacent amenities, improvements including lighted boardwalk and path around pond, 2 waterside pavilions with lighting, electric and communication ports, ticket and toilet kiosks, receptacles throughout, a wind turbine, central electrical controller, pond aeration and an automated pond water refill system watermain.

Concessions/Washroom Building, St. Charles Park District: Designed a 2,100 SF restroom and concession building . Amenities included 3" water service from existing water well for domestic supply and fire protection, 480 volt electrical service, grinder sewage lift station and 1,200' of 2" force main, restrooms, concessions storage and picnic area.

Prairie Lakes Park Expansion, Des Plaines: Project Manager for lighting design for skate park and lighting/electrical for 6 batting cages. Also included were electrical provisions for a well and irrigation pump, a shelter building, vending machines and a tent for events.

Redmond Park, Bensenville: Design, contract documents, and construction observation of a multi-use recreational 70 acre site. Project included a 1,200 seat covered grandstand with press box, 1,200 SF washroom/concession building, 1,000 SF maintenance building, 2 lighted baseball fields with scoreboards, playground with play equipment and washrooms, soccer field, walking trails, 2 pedestrian bridges over concrete spillways, and irrigation in the ball fields. CECI 1998 Engineering Excellence Merit Award Winning Project. Construction cost $5 million.

Campton Hills Park District, St. Charles: Project Manager for design of upgrades to existing electrical well house building, electric for 2 scoreboards, a sanitary lift station, and irrigation of 7 soccer fields with provisions to irrigate 6 more.

The Morton Arboretum Children's Garden, Lisle: Project Manager for design of path/area lighting and receptacles. Power was provided for 5 water feature pumps including a granite ball rotating on a cushion of water.

East Side Sports Complex, St. Charles Park District: Designed site lighting and softball field lighting; including two 1,200 amp electrical systems for two cartwheel style quad softball fields, 2 soccer fields, tennis, basketball, skate park, and parking lot. Also, included was the site electrical for a providing shallow (30') well to the site and irrigation system, and maintenance of the building's electrical systems. Construction cost $4 million.

Veteran's Memorial Park, Glendale Heights: Project Manager for design of park lighting including 12 ornamental poles with receptacles, 11 recessed wall lights, 5 ingrade monument lights, 2 sign flood lights, 2 flag floodlights, and 4 low voltage ingrade lights for a 48" rotating granite ball. Also, there were 6 remote quad GFI receptacles and provisions for connecting portable power receptacles for events. Duties included photometric calculations, plan design and preparation, and cost estimate.

The Legends Golf Course, Bensenville: Design included architectural site lighting and sports lighting for golf course and driving range along with all related power and control.

Fredenhagen Park, Naperville: This $1.7 million project included a concession building, an illuminated water fountain controlled from a below grade vault, an illuminated ornamental clock tower, 13 ornamental light poles, ground mounted light fixtures, well pump and exterior site receptacles. Duties included fountain design, electrical design, and cost estimate.

Town Center Project, Carol Stream: Design and contract documents including construction cost estimates, acquisition of IEPA water and sewer permits, Health Department permits, and construction observation of 25 acre park. Project included 1,200 SF visitors center with restrooms, concession and storage area, 30' diameter gazebo/pavilion with stage, 100' diameter architectural concrete fountain, 65' pedestrian bridge, brick paver walkways, site lighting, site irrigation, 1,300' sanitary sewer, and 300' watermain. CECI 1999 Engineering Merit Award Winning Project. Construction cost $4 million.

RESIDENT ENGINEERING

DMS Replacement, Illinois Tollway: Replacement of 5 dynamic message signs for Tollway including LED DMS signs, CCTV camera installation, fiber optic cable communications, and digital communications network equipment. Construction cost $1.1 million.

Lift Station Upgrades, Lombard: Resident Engineer for upgrades to 8 sewage lift stations and 2 stormwater pump stations over a three year period. Construction cost $3,000,000.

Westwood Creek Dam and Pump Station, Addison: Resident Engineer for construction of a stormwater dam and pump station consisting of three 300hp submersible tube type propeller pumps, three 6'x8' motor operated sluice gates, and associated level sensing and control devices. Pump station rated at 500cfs and provided with 800kw diesel-electric generator for standby power. Responsibilities included RE for 2 years during construction, contract administration, and preparation of O&M manual. Performed annual dam inspection report for submission. CECI 1995 Engineering Excellence Achievement Award Winning Project. Construction cost $2 million.

MISCELLANEOUS PROJECTS

Ramp Plaza Widening at 63rd Street and Ogden Avenue, I-355, Illinois Tollway: Design and contract document preparation of ramp toll collection equipment, canopy lighting and alarm videotaping for Tollway ramps along I-355. Prepared contract plans and specifications using Tollway guide drawings and specifications.

Louis Reservoir, Addison: Coordinated with water resource engineers to design a method of dewatering a 200 acre-feet stormwater storage reservoir along Salt Creek. Implementation of check valves, level sensing transducers, control devices, motor operated gate valve, and electrical power supply to facilitated the dewatering process. Provided Resident Engineer services for 2 years during construction including construction observation, contract administration and preparation of O&M manual. Construction cost $3 million.

Booster Station #2 Building Upgrades and Generator Upgrades, Northlake: Project Manager for design and construction observation of a 400 SF building addition to a house; a new 230kw standby power generator, including upgraded ComEd transformer; installation of a new 400 amp ATS, variable frequency drive, heating and ventilation system and controls.

Electrical and Ventilation Upgrades, Forest Park Fire Station: Project Manager for a study of an existing fire station to provide a complete survey of total power consumption of the building and recommendations of ventilation needs.

Illinois Tollway: Project Manager for design and rehabilitation of electrical and camera surveillance systems for control buildings at the 63rd Street and Ogden Avenue toll plazas.

Elevated Water Storage Tank Evaluations: Assisted in review of water storage tank inspections and evaluations for tanks ranging from

100,000 gallons to 3,000,000 gallons for various municipalities such as Chicago Ridge, Elmwood Park, Northlake, and Willowbrook.

Review of Electrical, Mechanical, Plumbing and Fire Protection Drawings: Review of electrical, mechanical, plumbing and fire protection contract drawings for code compliance for commercial/ office/hotel developments in the municipalities of Chicago Ridge, Elmwood Park, Rolling Meadows, Rosemont, Wayne, and Willowbrook.

JC-4

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PRELIMINARY ENGINEERING REPORT
Water Distribution System Improvements

Prepared For:
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Ms. Winna Guzman, Director
East Chicago Department of Water Works

Submission Date	Revision No.
May 1, 2022	Rev. 0

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CHAPTER 1: PROJECT LOCATION

The City of East Chicago is located in North Township in Lake County, Indiana. It is located on the Whiting and Highland Quadrangle Maps in Township 37 North, Range 9 West, Sections 9-11, 14-17, 20-22, 27-29, and 32-34.

The scope of work for the project includes installation and replacement of customer meters and precast concrete meter vaults, replacement of lead service lines, installation of new elevated water storage tank to replace an existing tank located at 399 E. Chicago Avenue, installation of new membrane filter skids at the existing Water Treatment Plant located at 3455 Pennsylvania Avenue, and installation of new 12" water main to provide looping/redundancy and increase pressure and fire flow capacity to the Roxanna residential neighborhood on the City's south side along N. Roxanna Drive between Indianapolis Boulevard and Walsh Avenue.

All work activities related to the distribution system improvements will be done within the City's previously disturbed right-of-ways and easements or on City-owned property.

CHAPTER 2: CURRENT NEEDS

2.1 Current Water System

a. Water Supply

Water is supplied from Lake Michigan for each of the City's two existing filtration plants. Point-of-Entry One (POE1) is the Aldis Avenue conventional filtration plant, originally built in 1929 and upgraded in 1964. Point-of-Entry Two (POE2) is the Pennsylvania Avenue membrane filtration plant which was built in 2011. Water is conveyed to each of the treatment plants via an existing 54-inch diameter cast iron raw water intake pipe that was built in 1929 and extends 8,250 feet into the lake with four intake heads, or "cribs" at the pipe entrance. The pipe intake is at a water depth of approximately 30 feet. The configuration of the intake structure consists of 42-inch diameter piping from each individual crib structure connecting to two 48-inch diameter pipes which branch into the 54-inch line forming a "Y". Wooden screen structures at each intake reduce the potential for large objects to enter the intake manifold and piping. The pipe and cribs are cleaned annually by divers due to build-up of sediment and zebra mussels.

The 54-inch diameter water intake pipe connects to the intake wet well of the Aldis Avenue filtration plant raw water pump station that was originally constructed in 1929 and later remodeled during a 1964 plant renovation project.

In 2011, an extension of the raw water conveyance pipe was installed to enable raw water to be delivered to POE2. The raw water conveyance pipe extension is a 48-inch diameter pipe concentric to a 72-inch diameter steel casing pipe, which was installed by microtunneling under the Cline Avenue and railroad corridors. The conveyance pipe is approximately 1,100 feet in length, extending from upstream of the Aldis Avenue filtration plant raw water pump station and connecting to the Pennsylvania Avenue membrane plant raw water pump station.

East Chicago is registered with the Indiana Department of Natural Resources as a Significant Water Withdrawal Facility with the right to draw 27.999 million gallons per day from Lake Michigan. The Aldis Avenue filtration plant has a design capacity of 24 MGD, and the existing design capacity of the Pennsylvania Avenue membrane filtration plant is 16 MGD. Although the combined total rated output of both plants is 40 MGD, the City has never pumped any water volumes in excess of the authorized withdrawal limit. Recent historical water demand data indicates that peak and average daily water demand are currently much less than the authorized withdrawal amount.

The water supplied from Lake Michigan is generally of a high quality. It has moderate hardness ranging from 120-130 ppm and moderate alkalinity ranging from 110-120 ppm as $CaCO_3$. The pH typically ranges from 7.8 to 8.3. There is generally low turbidity with

occasional spikes, typically related to seasonal changes in weather patterns or storm events. Lake Michigan is a source of *Giardia* cysts and *Cryptosporidium* oocysts, but microbial quality is otherwise good. Lake Michigan is on Indiana's Section 303(d) list of impaired waters for E. coli, indicating levels above applicable water quality standards. During the summer months, moderate to serious algae-related taste and odor episodes are possible, but algae levels have overall decreased since the 1960s with increased pollution control measures. There are low levels of natural organic matter (NOM) which corresponds to low coagulant demand and disinfection by-product formation. The primary treatment concerns of the water supply are particulate removal and pathogen control.

b. Treatment

The City currently owns and operates two water treatment plants: 1) the Aldis Avenue conventional filtration plant, and 2) the Pennsylvania Avenue membrane filtration plant. The design configuration for the Aldis Avenue plant upgrade in 1964 anticipated an expansion of the plant operating capacity to 32 MGD. However, the treatment plant was eventually constructed with a design pumping capacity of 24 MGD. Due to equipment obsolescence and the increasing cost of maintenance of the facility, the City decided to construct a new treatment plant in 2011 and is considering decommissioning the Aldis Avenue plant.

The Pennsylvania Avenue membrane filtration plant is a state-of-the-art treatment facility that was constructed in 2011 to replace the existing Aldis Avenue filtration plant. The existing design capacity of the membrane plant is 16 MGD; however, there is additional floor space at the facility to enable an expansion of plant operations to a full build-out capacity of 30 MGD.

Drinking water produced by both plants is disinfected with chlorine for pathogen control. In 1992, in response to the 1991 U.S. EPA Lead and Copper Rule, East Chicago began feeding Sodium Polyphosphate powder at the Aldis Avenue treatment plant for corrosion control within the distribution system. During construction of the Pennsylvania Avenue membrane plant in 2011, IDEM approved the use of Sodium Hexametaphosphate acid solution as a corrosion inhibitor. Under recent guidance from IDEM in September 2016, the City switched to an orthophosphate-polyphosphate blend that is currently being fed at both plants to further improve the control of lead leaching in customer service lines.

c. Storage

East Chicago currently utilizes three 4 MG ground storage tanks and one 1.5 MG elevated storage tank for a total storage capacity of 13.5 MG. There is also a 4 MG

underground storage tank that was built in 1964 and is located at the Aldis Avenue treatment plant that will be decommissioned soon. There are two 4 MG above-ground storage tanks located at the Pennsylvania Avenue membrane filtration plant. The storage tank at the Aldis Avenue treatment plant is expected to be demolished, along with the rest of the facility, after the plant is decommissioned. There is a 4 MG above-ground storage tank and booster pump station located at Tod Avenue.

Built in 1949, the City's 1.5 MG elevated storage tank was last painted in 1998 and received a replacement cathodic protection system in 2015. Historical data indicates that the average daily demand is approximately 12 MGD therefore the City has a 24-hour storage capacity.

d. Distribution System

East Chicago's distribution system is made up of approximately 89 miles of piping, with water mains ranging in size from 4 inches to 48 inches in diameter. The majority of the mains are constructed of cast iron or ductile iron, and many are 60+ years old. A map of the existing distribution system is shown in **Appendix A**.

Customer services lines are of a similar age and condition as the water mains. However, many of these service lines are comprised of lead pipe. City records indicate that there are an estimated 4,000 lead service lines throughout the City. The City owns and maintains the public-portion of the service line from the water main to the curb stop. Beyond this point, the service line is the responsibility of the customer. In compliance with the 1991 USEPA Lead and Copper Rule, the City samples for lead and copper a minimum of every 3 years per federal and state reporting requirements. After the introduction in 1992 (and continued use) of corrosion inhibitor to the finished water supply, 90^{th} percentile lead and copper sampling results have historically been below USEPA action levels. The City would like to continue to proactively implement a lead service line and meter replacement program to reduce or eliminate the quantity of lead service lines within the City.

Fire protection for residents and businesses is supported by 567 fire hydrants located throughout the City. Many hydrants throughout the distribution system are inoperable or incapable of meeting the fire-fighting needs of the city.

There are 7,067 customer meters in use throughout the distribution system. Meter installations in customer service lines range in size from 5/8-inch to 10-inches in diameter. Many of the existing installed meters, especially pit meters, are 20+ years old. Having exceeded the product's useful life, most of the meters are showing signs of deterioration. Beginning in summer 2011, the East Chicago Water Department implemented a meter replacement program to address these issues. To date, more than

one-third of all residential and commercial meter installations, 5/8-inch to 1-inch in size, have been updated to radio frequency meters for use with an AMR system. The City initially read these meters with walk-by technology, then implemented drive-by meter reading in fall 2016.

2.2 Current Population

According to the 2020 U.S. Census, East Chicago has a population of 26,370 residents. This is a 12% decrease from the 2010 U.S. Census population of 29,698 residents.

2.3 Current Water Consumption

a. Pumped vs. Sold

For the calendar year 2019, the total amount of water pumped from the City's treatment plants totaled 3784.1 MG, and the total amount of water consumed was 3604.9 MG.

b. Public Water Use

In the City's 2019 AWWA Water Audit, unbilled unmetered consumption was 47.3 MG.

c. Water Loss

In 2019, non-revenue water, as a percent of water supplied, was 32%. East Chicago's AWWA Water Loss Audit Report is included in **Appendix C**.

d. Water Consumption by Customer Type

East Chicago separates customers into four categories: residential, commercial, public, and industrial. In addition to businesses, commercial customers include hospitals, churches, and multi-tenant apartment complexes. Public customers represent municipal facilities, the local school district, and the public housing authority.

East Chicago is a heavily industrialized area, with the majority of water consumed by industrial customers. For calendar year 2019, a profile of water consumption by customer category indicated that approximately 62% of supplied water was consumed by industrial customers, 12% by residential customers, 8% by commercial customers, and 2% by public customers. The remaining 15% of water was sold through an existing wholesale water purchase agreement to Indiana-American Water. The existing wholesale water supply contract with Indiana-American Water expired in fall 2019 and it is not expected to be renewed.

e. Average Design Flow

Historical average daily demand flow is 12.1 MGD. At a design capacity of 16 MGD, the Pennsylvania Avenue membrane filtration plant is currently sized to meet existing average daily demand flows.

f. Peak Design Flow

The Pennsylvania Avenue membrane filtration plant was designed based on an evaluation of distribution system demand flows for calendar years 1999 through 2007. From this data, the peak daily design flow of 16.0 MGD was calculated. Historical average daily demand flow for the subsequent calendar years of 2007 - 2015 is 15.5 MGD. The trend indicates a slight decline in average daily demand of 0.5 MGD. At a design capacity of 16 MGD, the membrane filtration plant is currently sized to meet peak daily demand flows.

2.4 Significant Water Consumers

East Chicago is a heavily industrialized city. Of the twenty (20) largest water consumers in the City, eleven (11) are industrial customers. In aggregate, the twenty (20) largest water consumers purchased approximately 2.59 billion gallons of water in 2019, which is approximately 81% of all revenue water sold during the calendar year.

a. Industrial and Commercial

Overall, industrial and commercial customers account for approximately 65% of all revenue water. In 2019, the ten (10) largest industrial water customers accounted for approximately 1.91 billion gallons, or 60.3% of revenue water. The top ten industrial water customers are:

1. ArcelorMittal
2. Praxair, Inc.
3. W.R. Grace & Co.
4. Safety-Kleen Systems
5. U.S. Gypsum Co.
6. Electric Coating Technologies
7. National Precision Blanking
8. Lakeshore Railcar Services
9. Pollution Control/Tradebe Treatment
10. 425 W. 151st Holdings LLC

b. Wholesale

Currently, East Chicago does not have any wholesale customers.

CHAPTER 3: FUTURE NEEDS

3.1 Future Customers

Census data indicates a steady population decline in East Chicago. From 2010 to 2020, there was a 12% decrease in population, which is a consistent trend since the 1960s. East Chicago's limited footprint for new residential development makes it unlikely that its population will increase in the near future.

Nonetheless, East Chicago actively is pursuing efforts to stimulate residential, commercial and industrial development in the area. The City has earmarked certain parcels for future residential and commercial development and has been performing streetscape and lakefront improvement projects to make the City more attractive for developers. Additionally, there are several former industrial brownfield sites that are optimally positioned for industrial development with close proximity to Chicago and Gary for airport access, railroads throughout the City, and port access on Lake Michigan.

In addition to potential new commercial and industrial customers, the City is positioned to provide wholesale water to surrounding communities. Many Northwest Indiana communities in close proximity to the City do not have facilities to produce drinking water. Therefore, these communities purchase water from other nearby water utilities. The largest water wholesalers in Northwest Indiana currently are Indiana American Water and the Hammond Water Department. Due to its proximity to the Illinois border, Hammond also sells water to many communities in the south suburbs of Chicago. Increasing numbers of communities in Illinois are interested in purchasing water from the City of Hammond due to its significantly lower prices, compared to higher wholesale prices offered by the City of Chicago. The low cost of high quality water in East Chicago could potentially make future wholesale agreements viable. East Chicago would certainly have to consider an expansion of plant capacity to become a viable player in a competitive wholesale marketplace.

3.2 Future Design Flows

The current population trend indicates a population decline for the near future. Undeterred, the City's efforts to stimulate commercial growth could increase commercial usage in the near future. Yet, the lack of residential growth could dampen this impact. The public sector will also likely see limited growth for similar reasons.

In 2008, East Chicago developed a comprehensive plan for future economic planning activities. During that time frame, six (6) areas in the City with large concentrations of vacant or underutilized industrial parcels were identified as targets for redevelopment. The vacant and underutilized areas provide an opportunity for future industrial growth within the City.

Additionally, the City is considering opportunities to supply water to other nearby utilities. Although the wholesale water purchase agreement with Indiana-American Water has expired, reducing demand by 1 MGD, there may be interest from other nearby utilities to purchase wholesale water from East Chicago. Regional demand for high-quality, low-cost water indicates there is a potential for future growth of wholesale water beyond the current usage in the next 20 years.

3.3 Future System Needs

To assess the technical, managerial, and financial capacity of the City, the "Indiana Department of Environmental Management (IDEM) Capacity Development Self-Assessment" was completed and is attached in **Appendix D**.

East Chicago currently has sufficient water withdrawal rights to meet current demand and anticipated future development. In order to allow for commercial, industrial, and wholesale expansion, the Pennsylvania Avenue membrane treatment plant will likely need a capacity expansion from the current capacity of 16 MGD to 20 MGD within the next 20 years. Currently, the capacity of the Pennsylvania Avenue membrane treatment plant is 16 MGD, with the limiting factor being the filtration capacity of the existing membranes. The existing raw water and high service pumps and process equipment are currently sized for a 20 MGD plant capacity. Additional membrane trains and pumping equipment will be needed to increase the output capacity beyond 20 MGD.

Many of the water mains in the water distribution system are more than 60 years old and will eventually need maintenance and/or replacement. The valves and hydrants in the system will continue to require regular maintenance and testing. Routine maintenance of treatment plant and distribution system assets will be very important to assure system reliability, to reduce operating costs, and to extend the service life of equipment.

Replacement of the 1.5 MG elevated water storage tank is vital to system operation as currently the system operating pressure or operating hydraulic grade line (HGL) is higher than the overflow elevation of the existing tank thus requiring large fluctuations in system operating pressure to allow water turnover in the tank. Therefore, a new tank with a higher HGL is being proposed.

CHAPTER 4: EVALUATION OF ALTERNATIVES

4.1 Storage Tanks

a. No Action

With the No Action alternative, the City will continue with its current storage capacity of 13.5 MG, which is sufficient to meet 24 hours of emergency water demand. However, the existing 1.5 MG elevated water storage tank is too low to effectively act as a surge tank or provide adequate sustained system pressure within the City, therefore it is detrimental to the system to keep operating the system as is. Current system operating pressure is approximately 60 psi. The system pressure must be reduced to 45 psi to allow water from the tank to feed the system.

b. New Approximate 2 MG Elevated Storage Tank

A new elevated storage tank will provide a portion of the City's Average Day Demand from a gravity fed supply condition and will also provide a means for pressure spikes to dissipate within a properly sized tank with overflow elevation higher than current system operating pressures.

4.2 Meter Replacement Program

a. No Action

The No Action alternative is not a practical solution for the City. Many of the meters in the system are more than 20 years old and past the product's useful life. If they are not replaced, the older installed meters will continue to deteriorate, leading to continued meter inaccuracies and revenue loss. On a separate note, this alternative does not address the existing meter reading challenges of the City. Due to the Water Department's currently lean workforce and the high volume of pit meters that must be manually read, it is very challenging for the City to remain on a consistent 30-day meter reading and billing cycle. Additionally, pit meter readings are estimated during winter months, especially when snow accumulates on pit lids, preventing staff access to the meters.

b. Automatic Meter Reading (AMR) System

The City has been implementing an AMR system since 2011, and to-date, approximately one-third of customer meters have been replaced with RF meters. Continuation with an AMR meter replacement program will address several needs: 1) Aging water meters will be replaced and meter inaccuracies will be reduced; 2) Meter read times will also decrease, especially for pit meters, since pits will not have to be opened; 3) Bills will be consistently sent to customers on a 30-day billing cycle, which has not been recently

possible due to the currently long length of time it takes to read existing meters; and 4) Meters will no longer be estimated in the winter months, even if there is significant snow accumulation.

This alternative will allow the utility to more easily collect one meter read per customer billing cycle. The RF meters are capable of storing 3 months of hourly meter reads. However, the process of collecting this data using an AMR system is time intensive and cumbersome.

c. Advanced Metering Infrastructure (AMI) System

With the AMI alternative, existing obsolete meters will continue to be replaced with RF meters, reducing meter inaccuracies. Also, hourly meter readings will be available to the Water Department throughout the entire year, so the billing cycle could be easily controlled and reduced to 30 days. As a result, meter readers will have more time available to perform service calls, shut offs, and other distribution system maintenance. Additionally, detailed water usage data will be made available to both the Water Department and its customers. This data will improve customer service, help detect water leaks more quickly, and allow water usage to be tracked for optimizing distribution system improvements.

4.3 Water Main Improvements: Roxanna

a. No Action

With the No Action alternative, existing low pressure and low available fire flow will persist.

b. New Water Main

New water main provides increased water pressure, reliability, redundancy and increased fire flow capacity.

4.4 Lead Service Lines

a. No Action

In compliance with the 1991 U.S. EPA Lead and Copper Rule, the City samples for lead and copper at least every 3 years per federal and state reporting requirements. The samples from summer 2014, indicated a 90th percentile measurement for lead of 0.0078 mg/L; this level was lower than the U.S. EPA action level of 0.015 mg/L. The City recently sampled again in summer 2016 and the results indicated a 90^{th} percentile measurement of 0.0084 mg/L. Therefore, the City is not required to take action to replace lead service lines. As a result, any resident desiring to replace a lead service line would have to absorb the associated expense. The high cost of this replacement is prohibitive for many residents in the City.

b. Lead Service Line Replacement Program

This project involves funding the cost of replacing the City-owned (i.e., public) portion of lead service lines for eligible residents. Eligible properties will be targeted for participation in the program based on the City's 2014 and 2016 Lead and Copper Rule sampling results, along with additional water sampling results from across the City. Residents will coordinate the replacement of the entire service line with Water Department staff and licensed City contractors, and the City will provide reimbursement to residents for the cost of replacement of the City-owned (i.e., public) portion only of the customer service line. This alternative reduces the financial burden for residents who desire to replace existing lead service lines.

CHAPTER 5: EVALUATION OF ENVIRONMENTAL IMPACTS

5.1 Disturbed and Undisturbed Land

Construction and maintenance in the distribution system will occur in and adjacent to previously disturbed land. No undisturbed areas or farmland will be adversely impacted. All work areas have been previously disturbed.

- Lead service line replacement will occur on residential properties and within City owned right of ways. These areas are currently grassy or paved based on the location of the service line.

5.2 Historical and Architectural Resources

There are no known historical, architectural, or archaeological sites that will be significantly impacted by this project. Distribution system work activities will be performed in previously disturbed easements and rights of way.

5.3 Wetlands

Wetlands will not be affected by construction or operation of the project.

5.4 Hydrology

a. Surface Water

There are no river crossings in the project area. The project will not adversely affect waters of high quality listed in 327 IAC 2-1-2(3), exceptional use streams listed in 327 IAC 2-1-11(b), Natural, Scenic, and Recreational Rivers and Streams listed in 312 IAC 7-(2), Salmonid Streams listed in 327 IAC 201.5-5(a)(3), or waters on the Outstanding Rivers list (Natural Resources Commission Non-rule Policy Document).

b. 100-Year Floodplains and Floodways

No floodplain or floodway will be impacted by the construction or operation of the project.

c. Groundwater

According to the Lake County Soil Survey, the primary soil type in East Chicago is Urban land. The original surface layer and subsoil layer of this soil have been disturbed so much that the original soil type can no longer be identified. The majority of other soils in the City are Oakville-Adrian and Adrian soils. The high seasonal groundwater level for Oakville-Adrian soil found in the project area ranges from 2 to 6 feet. The high seasonal groundwater level for Adrian soil found in the project area ranges from 0 to 3 feet. These groundwater levels vary within the City and are heavily influenced by the water level of Lake Michigan. If necessary, dewatering will be employed during construction

with the flow directed toward a sedimentation basin prior to being discharged to surrounding surface waters. There are no known sole source aquifers in the area. This project will not impact the drinking water supply.

5.5 Plants and Animals

The construction and operation of the project will not negatively impact state-listed or federal-listed endangered species and their habitats.

The project will be implemented to minimize impact to non-endangered species and their habitat.

5.6 Prime Farmland and Geology

No farmland will be impacted by the proposed projects.

5.7 Air Quality

Construction activities may generate noise, fumes, and dust normally resulting from such activities. To reduce noise impacts, construction activities can be limited to normal daytime hours. No fumes are anticipated in this project. To reduce the adverse impacts from dust, periodic watering of soil can be performed to reduce suspension of particles. The noise, fumes, and dust are short-term impacts, lasting only during the construction phase.

Construction activities should not impact ozone, airborne pollutants, or other current or future air quality concerns.

5.8 Open Space and Recreational Opportunities

The construction and operation of the proposed project will neither create nor destroy open space and recreational opportunities.

5.9 Lake Michigan Coastal Program

This project is located within the Lake Michigan Coastal Zone; however, this project will not impact the Lake Michigan Coastal Zone. All project work will be conducted in a manner consistent with Indiana's approved coastal management program.

5.10 Natural National Landmarks

The construction and operation of the proposed project will not affect Natural National Landmarks.

5.11 Secondary Impacts

East Chicago, through the authority of its Council, planning commission, or other means will ensure that future development, as well as future supply, storage, distribution, or treatment works projects connecting to SRF-funded facilities will not adversely affect

wetlands, wooded areas, steep slopes, archeological/historical/structural resources or other sensitive environmental resources. The City will require any new development and treatment works projects to be constructed within the guidelines of the U.S. Fish and Wildlife Service, INDR, IDEM, and other environmental review authorities.

5.12 Mitigation Measures

To the extent required by the construction of this project, the following practices and measures will be incorporated into the project. Additionally, any further mitigation measured mandated by authorized reviewing agencies will be implemented.

a. Erosion and Siltation Control

- Erosion and sediment control measures in the project specification will require contractors to provide a schedule for clearing, grading, excavating, and restoring disturbed areas and a description of appropriate soil erosion control measures to be implemented during construction. This program shall meet all applicable federal, state and local requirements.
- Natural vegetation will be retained wherever feasible.
- Land grading and excavating will be kept to right-of-ways and to a minimum wherever possible.
- Appropriate structural and agronomic practices, including sedimentation basins, seeding, mulching, liming, and fertilizing, will be provided during and after construction to control runoff.
- Surface and subsurface drainage systems will be stabilized to avoid sedimentation problems as soon as possible, if disturbed.
- Construction entrances, roadways, and parking lots will be stabilized during construction to the extent possible.
- Construction activities will be scheduled to avoid excessively wet conditions whenever possible.
- Areas of exposed soil will be periodically wetted to reduce dust. No chemicals will be used for dust control.
- The existing topsoil will be reused during the restoration process. Excess material resulting from soil displacement will be used elsewhere in the project whenever feasible.
- Discharge from dewatering will be directed to sedimentation basins prior to discharging into surrounding surface waters, if necessary.

b. Air Quality Impacts

- Exposed soils and unpaved roadways will be periodically wetted to reduce the suspension of dust and airborne contaminants, particularly in the U.S. EPA USS

Lead Superfund site. All work activities at this site will follow applicable standards, including OSHA Regulations and NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985).

- The number and size of construction equipment and vehicles will be minimized whenever possible to reduce emissions.

c. Noise Impacts

- Construction activities will be limited to normal daytime hours.
- Construction equipment and water system machinery will be dampened and enclosed, wherever possible, to reduce noise pollution.

d. Traffic Impacts

- Construction in or adjacent to roadways will be scheduled to avoid peak rush- hours.
- Traffic will be rerouted to alternative roadways if necessary.

CHAPTER 6: PROPOSED PROJECTS

6.1 Project Scope

The selected project scope includes replacement of lead service lines, additional membrane filter skids, replacement of existing membrane filters, a new elevated water storage tank, and a new watermain. Many customer meters, particularly pit meters, have exceeded the product's useful life expectancy and are showing increasing signs of deterioration. Many customer service lines throughout the City are comprised of lead and/or lead solder, and residential customers experiencing elevated lead levels would like to have their service lines replaced. The Pennsylvania Avenue membrane filtration plant will add new membrane filter skids to add redundancy and resilience and replace existing membranes that are due for replacement.

The proposed project scope includes: 1) construction of new elevated water storage tank to provide emergency water storage capacity for the City and provide surge relief; 2) replacement of membranes and add new membrane filtration skids at the water treatment plant; 3) implementation of a lead line replacement program to improve water quality at customer service taps; and 4) new water distribution main to serve Roxanna neighborhood.

Work related to the distribution system will occur in previously disturbed rights of way.

6.2 Project Components

a. Storage

1. A proposed approximately 2 MG elevated storage tank is proposed to be constructed in place of the existing 1.5 MG elevated tank.
2. The existing elevated tank was constructed in 1949 and the current overflow elevation is too low to provide surge relief within the current operating pressures of the membrane filtration plant high service pumps.
3. The proposed elevated tank will be constructed on existing City owned property.

b. Distribution/Transmission

1. A new 12" diameter watermain is proposed to be constructed along N. Roxanna Drive to provide looping/redundancy and resiliency of the current water distribution system. Water modeling efforts have shown that a looped watermain on N. Roxanna will improve static/residual pressures in the Roxanna residential area.
2. Lead Service Lines and meter pits will be replaced in known lead service line locations identified by the City.

c. Water Treatment

1. New additional membrane filtration skids are proposed for the Pennsylvania Avenue membrane filtration plant. The additional filtration skids will add needed redundancy and resiliency during normal backwash/cleaning cycles.
2. Replacement of existing membrane filters. The existing membrane filters are at the end of the normal life cycle and are in need of replacement. The existing filters have been in service for approximately 10 years and are due for replacement.

6.3 Project Costs

An itemized cost estimate for the various projects is shown in **Appendix B2**.

6.4 Project Schedule

DATE	PROJECT ACTION
May 2022	Submit PER to IDEM
August 2022	Anticipated IDEM Approval of PER
December 2022	Plans and Specs Submitted to IDEM
February 2023	Anticipated IDEM Approval of Plans and Specs
August 2023	Loan Closing
September 2023	Bid Authorization and Advertisement
November 2023	Bid Award
February 2024	Initiation of Construction
September 2024	Completion of Construction (LSL Replacement, Watermain Project)
November 2024	Completion of Construction (Membrane Projects)
September 2025	Completion of Construction (Elevated Tank Project)

6.5 Green Project Reserve Sustainability Incentive

The Green Project Reserve Sustainability Incentive will be achieved through water efficiency. Replacing the existing outdated and obsolete water meters with Advanced Metering Infrastructure (AMI) will allow for accurate flow measurement. The construction of a new elevated water storage reservoir at an appropriate overflow height will provide needed pressure surge suppression and will thus reduce the number of incidences of watermain breaks due to pressure surges and reduce non-revenue water use and water loss due to main breaks.

CHAPTER 7: LEGAL, FINANCIAL, AND MANAGERIAL CAPABILITIES

7.1 Resolutions

The Signatory Authorization Resolution is included in **Appendix G**.

The PER Acceptance Resolution will be prepared and approved by the East Chicago Department of Waterworks Board of Commissioners in summer 2022 after final PER is completed.

7.2 SRF Financial Information

The preliminary analysis of the financial capabilities of the City will be provided in the SRF Financial Information Form in **Appendix H**. This information reflects the best available estimates for the proposed project costs. The estimated post-project customer rate reflects the new rate schedule proposed by the City in its petition to the Indiana Utility Regulatory Commission for a rate increase. The petition has not yet been filed at the time of submittal of this report.

7.3 Land Acquisition

The City will attempt to use City-owned property for all proposed projects. If it is practical and necessary to acquire land for additional storage capacity, the City will submit proof that the acquired land has been secured prior to SRF Loan Closing.

CHAPTER 8: PUBLIC PARTICIPATION

8.1 Public Hearing Information

A public hearing will be held in summer 2022 in the East Chicago City Council Chambers located in City Hall to discuss the recommendation of upgrades to the East Chicago Water Department drinking water infrastructure proposed in the PER, and to solicit questions and concerns from interested parties. The meeting will be advertised in *The Times of Northwest Indiana*, in compliance with the minimum public notice requirement of ten days. A copy of the publisher's affidavit, including the public notice statement, will be provided. The PER will be available for review at the public hearing.

APPENDIX A

Location Maps

400 200 0 400 800 1,200 1,600 Feet

1 inch = 800 feet

Diameter

- 4"
- 6"
- 8"
- 10"
- 12"
- 14"
- 16"
- 18"
- 20"
- 24"
- 30"
- 36"
- 48
- 54

MEMBRANE FILTRATION PLANT WITH (2) 4 MG ABOVE GROUND STORAGE TANKS HIGH SERVICE PUMP STATION

EXISTING CONVENTIONAL FILTRATION PLANT SITE

EXISTING RAW WATER PUMP STATION

TOD AVE. PUMP STATION AND 4 MG ABOVE GROUND STORAGE TANK

EXISTING 1.5 MG ELEVATED STORAGE TANK

PROPOSED ROXANNA 12" WATER MAIN IMPROVEMENT

CHRISTOPHER B. BURKE ENGINEERING LTD. 9575 West Higgins Road, Suite 600 Rosemont, Illinois 60018 (847) 823-0500	CLIENT: CITY OF EAST CHICAGO 4525 Indianapolis Blvd. East Chicago, IN 219.391.8300	DSN.		TITLE: EXISTING CITY WATER DISTRIBUTION SYSTEM PIPE DIAMETERS	PROJ. NO. 20-0198
		CHKD.			SHEET OF
		SCALE			DRAWING NO. EXHIBIT A1
		GIS USER			
No. DATE	NATURE OF REVISION	MODEL	ArcGIS 10.0		
FILE NAME:	N:\INDIANA\200198\Mech\Exhibits\IEPA-SRF\200198_EastChicago_1.mxd				
DATE:	3/19/2021				

CHRISTOPHER B. BURKE ENGINEERING LTD.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
(847) 823-0500

CLIENT:
CITY OF EAST CHICAGO
4525 Indianapolis Blvd.
East Chicago, IN
219.391.8300

No.	DATE	NATURE OF REVISION	DSN.	CHKD.	SCALE	GIS USER	MODEL	ArcGIS 10.0

FILE NAME: \\tbg.net\CBBEL\CBBELDFT\INDIANA\200198\Mech\Exhibits\EPA-SRF\200198_EastChicago_OverallFacilities1.mxd
DATE: 3/19/2021

TITLE:
OVERALL DISTRIBUTION FACILITIES LOCATION MAP

PROJ. NO. 20-0198
SHEET OF
DRAWING NO. EXHIBIT A2

CHRISTOPHER B. BURKE ENGINEERING LTD.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
(847) 823-0500

CLIENT:
CITY OF EAST CHICAGO
4525 Indianapolis Blvd.
East Chicago, IN
219.391.8300

No.	DATE	NATURE OF REVISION	DSN.	CHKD.	SCALE	GIS USER	MODEL
							ArcGIS 10.0

FILE NAME: N:\INDIANA\20019\Mech\Exhibits\IEPA-SRF\20019_EastChicago_FiltrationPlant Site.mxd
DATE: 3/19/2021

TITLE:
FILTRATION PLANTS SITE MAP

PROJ. NO. 20-0198
SHEET OF
DRAWING NO.
EXHIBIT A3

CHRISTOPHER B. BURKE ENGINEERING LTD.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
(847) 823-0500

CLIENT:
CITY OF EAST CHICAGO
4525 Indianapolis Blvd.
East Chicago, IN
219.391.8300

No.	DATE	NATURE OF REVISION

DSN.
CHKD.
SCALE
GIS USER
MODEL: ArcGIS 10.0
FILE NAME: N:\INDIANA\200198\Mech\Exhibits\IEPA-SRF\200198_EastChicago_TankSiteMap3.mxd
DATE: 3/19/2021

TITLE: ELEVATED TANK SITE MAP

PROJ. NO. 20-0198
SHEET OF
DRAWING NO. EXHIBIT A4

CHRISTOPHER B. BURKE ENGINEERING LTD.
9575 West Higgins Road, Suite 600
Rosemont, Illinois 60018
(847) 823-0500

CLIENT:
CITY OF EAST CHICAGO
4525 Indianapolis Blvd.
East Chicago, IN
219.391.8300

No.	DATE	NATURE OF REVISION

DSN.
CHKD.
SCALE
GIS USER
MODEL ArcGIS 10.0
FILE NAME: N:\INDIANA\200198\Mech\Exhibits\IEPA-SRF\200198_EastChicago_Roxanna.mxd
DATE: 3/19/2021

TITLE:
ROXANNA PROPOSED WATER MAIN

PROJ. NO. 20-0198
SHEET OF
DRAWING NO.
EXHIBIT A5

City of East Chicago Water Meters 3/31/2022

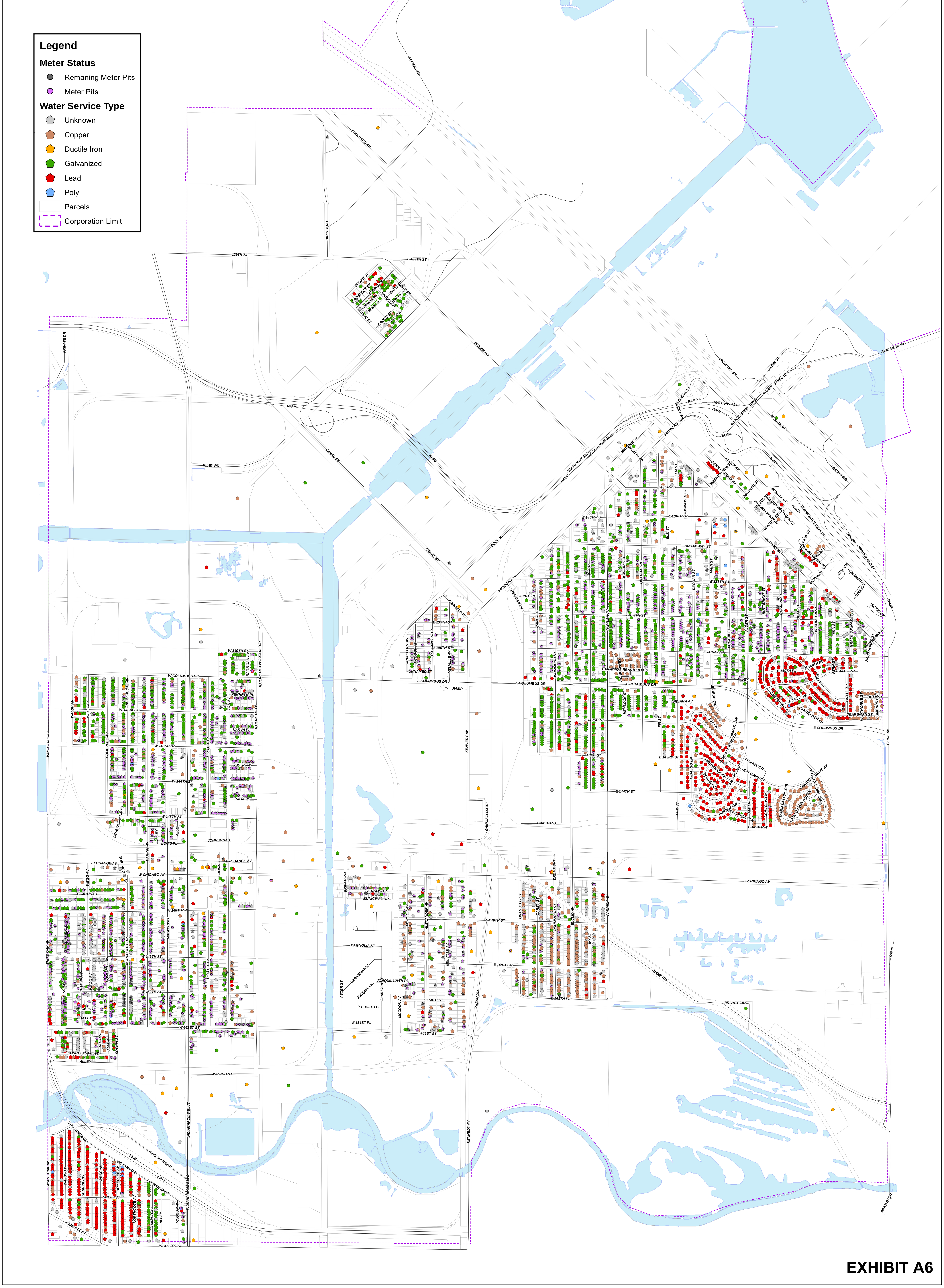


EXHIBIT A6

APPENDIX B

Construction Costs

PROJECT 2

LEAD SERVICE LINE AND METER PIT REPLACEMENTS - VARIOUS NEIGHBORHOODS
PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COST
(ESTIMATED YEAR 2022 DOLLARS)

ITEM DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	AMOUNT
Mobilization / Demobilization	1	LS	$ 381,875.00	$ 381,875.00
Lead Service / Meter Pit Replacements - EC Side	808	EA	$ 6,500.00	$ 5,252,000.00
Lead Service / Meter Pit Replacements - Harbor Side	367	EA	$ 6,500.00	$ 2,385,500.00
			Construction Total without Contingency	$ 8,019,375.00
			20% Construction Contingency	$ 1,603,875.00
			Total with 20% Contingency	$ 9,623,250.00

APPENDIX C

AWWA Water Loss Audit 2019

INTRODUCTION

A Water Loss Control Audit program was utilized to be able to help the City of East Chicago, Indiana Water Works Department locate, understand and control the water losses in the distribution system. This was accomplished by using the standard AWWA Water Audit Spreadsheet (version 5) and Water Balance through distinct tasks as outlined. The Audit was able to help determine probable areas of water loss and allowed for a review of water department practices for water accounting. It is especially important to be able to locate areas of water loss in the system including potential leakage, potential inaccurate meters, as well as potential issues with the accounting and billing departments by utilizing an audit.

WATER LOSS CONTROL SURVEY-AUDIT APPROACH

The **Water Loss Control Survey/Audit** program is a multi-phase plan encompassing a selected group of services designed to assist the *Utility* in improving water accountability and optimizing the distribution system's operational performance. The program was structured around the utility's specific needs so that the results can help optimize a structured water loss reduction program.

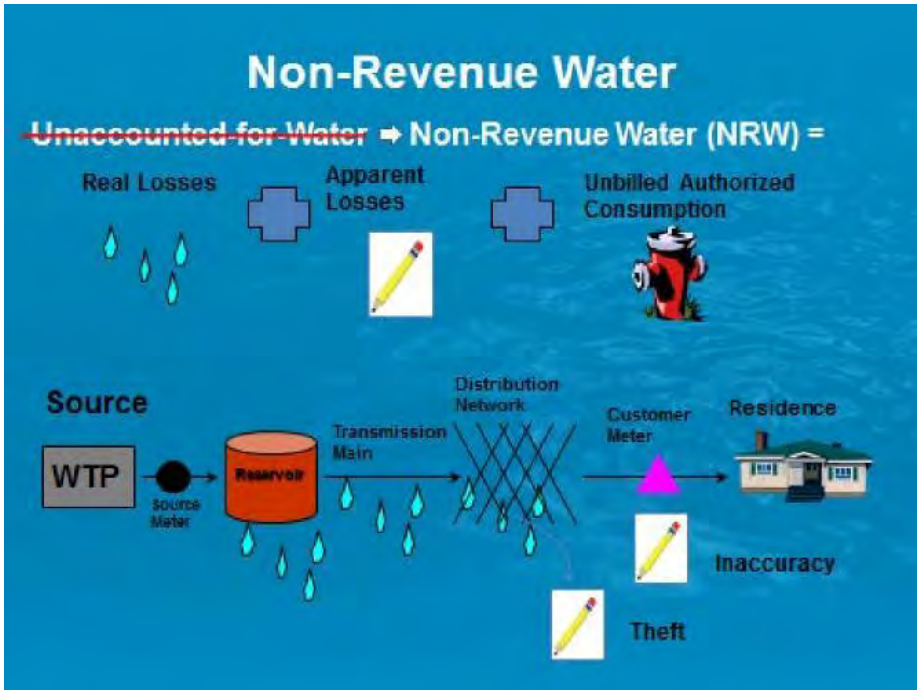
The AWWA Water Audit Format was used to track the finished water amounts from the purchased water source through the uses of water, metered, unmetered, and potential leakage in the distribution system, into the customer properties. This component analysis allowed for the various segments of water use to be examined based on available data supplied by the utility. The desired end results were to uncover potential areas of water loss that can be mitigated in the short term but also provide some long range planning goals to be set for sustainability. In simple terms, water loss occurs in two ways. It is either not measured correctly via the metering and billing process, (hence the water is not really lost, it simply was not correctly accounted for), or it leaked out of the system somewhere between the source of entry into the distribution system, to the customer's meter or service.

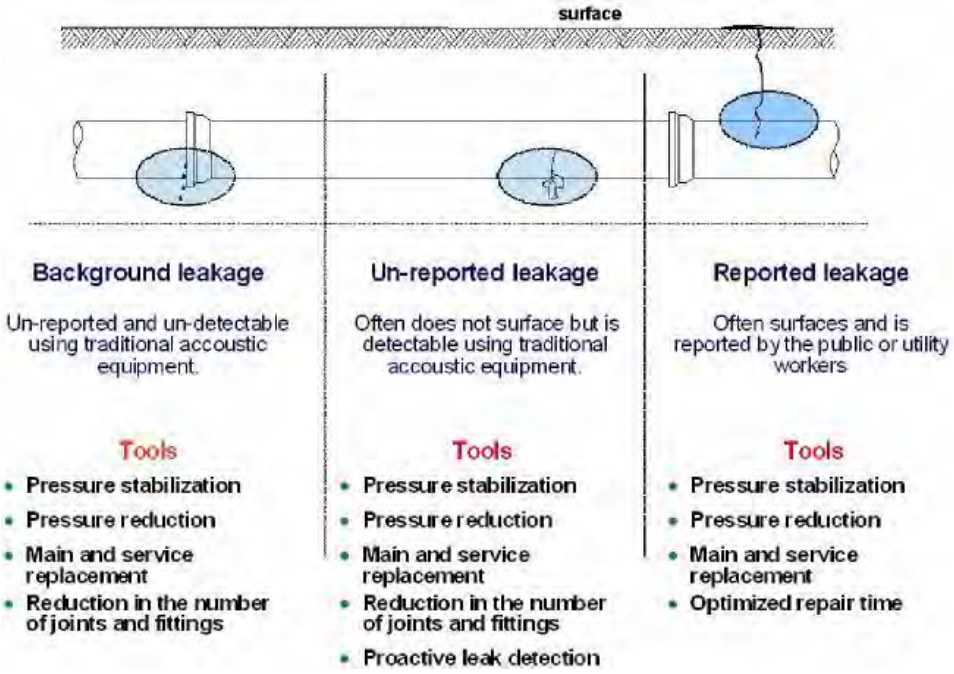
As shown in the IWA/AWWA Water Balance below, all water entering a water distribution system can be accounted for as it flows through the distribution system to customers. The most meaningful information developed from a water audit is quantity (gallons) of water loss components (apparent and real) shown in the Water Balance and the monetary value of these components. Consequently, water systems can assess the effectiveness of existing water loss management efforts, evaluate the potential for improved performance, and prioritize activities specifically designed to address deficiencies.

Water from Own Sources (corrected for known errors)	System Input Volume	Water Exported	Authorized Consumption	Billed Authorized Consumption	Billed Water Exported	Revenue Water
		Water Supplied			Billed Metered Consumption	
					Billed Unmetered Consumption	
				Unbilled Authorized Consumption	Unbilled Metered Consumption (3.2.2.1)	Non-Revenue Water (NRW)
					Unbilled Unmetered Consumption (3.2.2.2)	
			Water Losses	Apparent Losses	Unauthorized Consumption	
					Customer Metering Inaccuracies	
					Systematic Data Handling Errors	
				Real Losses	Leakage on Transmission and Distribution Mains	
					Leakage and Overflows at Utility's Storage Tanks	
Water Imported					Leakage on Service Connections up to point of Customer metering	

The idea is to move from **left to right** as one progresses through the audit process. As shown by the water balance, all water can be accounted for, even the loses. Once the losses are identified, steps can be taken to mitigate those losses.

SOURCES OF WATER LOSSES





OUTLINE OF WORK

The following tasks were conducted.

- **Gather data and information about the system**
- **Determine System Input**
- **Determine Authorized Consumption**
- **Determination of Apparent Loss**
- **Determination of Real Losses**
- **Calculate Operational Indicators**
  - -Conclusions
- **Provide Recommendations for Water Loss Control Initiatives**

In the course of performing the audit, data was input into the Water Audit Spreadsheet (Version 5) in a specific order similar to the outline above. As the spreadsheet was filled out, data was then analyzed segment by segment. Initially the spreadsheet was filled out using data supplied by the City of East Chicago. As the data was researched and validated, the spreadsheet was amended. Once the data had been input and verified, grading scores were applied to each data entry based on the integrity of the data per the Grading Matrix contained in the AWWA audit software. Those grading scores were then added, using a weighted scale, to create what is known as the Validity Score.

Data Validity Grades are a way of providing a check on how robust the data used in the audit is. The grade provides a way to check particular conditions of individual data entries and in the end helps provide a basis for suggested improvements. At each data entry point this score is input based on scaling, *defined for each individual component* of the Audit Spreadsheet. An example is illustrated below. Each data input has its own Grading criteria on a scale of 1-10.

Volume from own sources:	+	?	n/a		MG/Yr
Water imported:	+	?	7	2,829.205	MG/Yr
Water exported:	+	?	n/a		MG/Yr

n/a (not applicable). Select n/a if the water utility's supply is exclusively from its own water resources (no bulk purchased/ imported water)
1. Less than 25% of imported water sources are metered, remaining sources are estimated. No regular meter accuracy testing.
2. 25% - 50% of imported water sources are metered; other sources estimated. No regular meter accuracy testing.
3. Conditions between 2 and 4
4. 50% - 75% of imported water sources are metered, other sources estimated. Occasional meter accuracy testing conducted.
5. Conditions between 4 and 6
6. At least 75% of imported water sources are metered, meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually for all meter installations. Less than 25% of tested meters are found outside of +/- 6% accuracy.
7. Conditions between 6 and 8
8. 100% of imported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted annually, less than 10% of meters are found outside of +/- 6% accuracy.
9. Conditions between 8 and 10
10. 100% of imported water sources are metered, meter accuracy testing and electronic calibration of related instrumentation is conducted semi-annually for all meter installations, with less than 10% of accuracy tests found outside of +/- 3% accuracy.

GATHER DATA AND SYSTEM INFORMATION

Audit Questionnaire

At the start of the audit, a questionnaire was submitted to the Utility to collect and determine various points of data. Total water produced, amounts of water sold to all the water customers including; metered water, unmetered water, billed water and unbilled water, physical information on the water system such as miles of water main, numbers of water connections, operating costs of the water utility, etc. were collected. The goal was to get a feel for what information was available from the Utility and to get an idea of how water is recorded and eventually billed out to the water customers. This data was needed to determine how and where water was being used, if it was being accounted for, and/or billed for at each step of the way from production to consumption.

The questionnaire submitted by the audit team was returned from East Chicago in an Excel sheet and it had addressed the vast majority of information requested. However, there were a few follow up questions that got asked and answered in order to get all the materials and information needed to complete the audit. In addition, the utility supplied past data from some previous years on water production, metered consumption, and other water uses. This data was used to check past trends and used as a type of “barometer” for the operations of the utility. In the end, the information gathered allowed for an overall analysis of how the utility was tracking water. The Audit spreadsheet was filled out according to the information provided. Information was cross checked from report to report, and spreadsheet to spreadsheet as a way to verify and test the information. Meter data was supplied in PDF files from reports.

**If there are discrepancies that may be discovered at a future date, the Audit Spreadsheet can be updated and calculations will be automatically adjusted. Small adjustments will probably not have any major impact on the overall Performance Indicators for water losses, or the conclusions and recommendations for water loss reduction efforts. The audit is a “living document” and should be continuously updated annually.

DETERMINE SYSTEM INPUT

The first phase of the Water Loss Control Audit was to evaluate water production through the master water meters at each of the water treatment facilities to insure the input into the system has been accurately measured and documented. All water audits have to start with verification of the distribution system input to insure reliable water production amounts.

East Chicago surface water supply comes from Lake Michigan. The City does not export any water to other cities. East Chicago receives meter reads each day and the data is reviewed regularly.

Water Supply data for the selected audit period of January 1, 2019-December 31, 2019 were taken from the 2019 Indiana Utility Regulatory Commission (IURC) report supplied by East Chicago which contained combined monthly water produced at its two treatment facilities. This amount was included in the calculation of total Water Supplied (WS). East Chicago does not “export” water to other utilities so the exported amounts (WE) in the audit spreadsheet will be zero. After looking at the water production data from 2019, it was concluded the data was reliable with no issues with the data. Master Meter test data for the audit period was also reviewed for the meters for the year 2019. The city has a third party test the accuracy of all meters at the treatment facilities and finished water reservoir. All of these meters

tested accurately. There will be no master meter error correction for the meter reads applied in the audit sheet. Minor adjustments for net tank level fluctuations for the storage tank during the audit year were tracked and overall there was a net increase of 170,000 gallons. This will not have any major impact on the overall audit results.

Water Input into the Distribution System

The audit period is 2019 (January to December). From the water production data supplied in the IURC report the total Volume from Own Sources (VOS) input was **3,784.422** million gallons.

Master Meter Accuracy for Imported Water

An important aspect of the water introduced into the distribution system includes whether or not the production meters and/or wholesale meters are accurate. This is especially important when attempting to calculate water loss in the water system. If the finished water meters are inaccurate, then that inaccuracy will cause the end result of the audit to be inaccurate. That inaccuracy can be "telescoped" through the entire audit. In simple terms, *how you finish the audit is dependent on how you start*.

It is rare that any production or wholesale meter is 100% accurate. In the audit spreadsheet there is an adjustment for meter accuracy that is applied to the total finished water produced. There are "acceptable" limits to the accuracy level of water meters (such as 98.5%-101.5%), and AWWA has a table of suggested accuracy limits in the M6 manual for water meters for specific types and sizes of water meters. This accuracy limit however, is intended for customer meters (residential and commercial accounts) and does not always apply to production meters and wholesale flow meters. Production flow meters have no real defined accuracy limits per AWWA or any other regulatory agency. Some states are currently looking at defining rules for master meter accuracy limits but as of this report, nothing has been defined. It cannot be overstated that it is in the best interest for utilities to make sure the production flow meters are accurate for several reasons; the primary reason is that the entire water audit is based on the assumption that the water supplied amounts are accurate and can be relied on. Another reason includes proper chemical feed rates for water treatment.

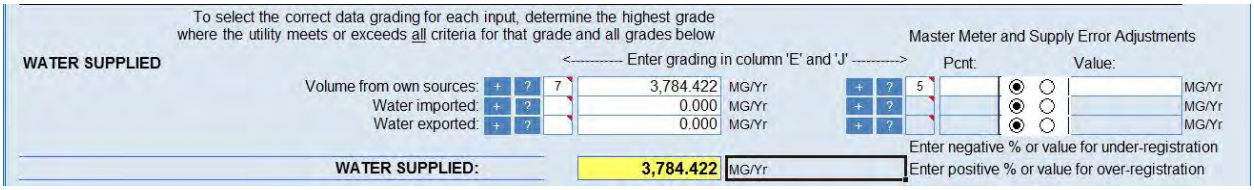
3,784.422 million gallons is the 2019 totalized water from the import meters as stated above.

Water Imported and Water Exported

The City of East Chicago treats all of its water at two treatment facilities. There is a conventional rapid sand filtration plant that currently operates two days a week and, a membrane filtration plant that operates seven days per week. Meter accuracy testing of the import meters are conducted annually (records provided).

Water Supplied

Below is a copy of the Water Supplied area of the Audit showing the data inputs.



To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below

WATER SUPPLIED	<---------- Enter grading in column 'E' and 'J' ---------->				Master Meter and Supply Error Adjustments		
					Pcnt:	Value:	
Volume from own sources:	7	3,784.422	MG/Yr	5			MG/Yr
Water imported:		0.000	MG/Yr				MG/Yr
Water exported:		0.000	MG/Yr				MG/Yr
WATER SUPPLIED:		3,784.422	MG/Yr				

Enter negative % or value for under-registration
Enter positive % or value for over-registration

In simple terms it is typical for a utility to look at water loss by of percentage losses.
Water pumped versus water sold equals water loss. This is an old way of looking at water loss. Unmetered water use in this "old" case is not usually considered in the old calculations by most utilities.

DETERMINE AUTHORIZED CONSUMPTION

Traditionally there are four areas where water has been authorized to be used. The following is how water is normally consumed in a utility. This is taken from the AWWA Water Audit Format.

- Billed Metered Water
- Billed Unmetered Water
- Unbilled Metered Water
- Unbilled Unmetered Water

Billed Metered water is just that; water is metered during consumption and billed according to an approved rate structure. Per questionnaire submitted to the water staff, East Chicago meters all water use except a small amount of uses. Bills are generated based on approximately (**6,873** meters) taken from the IURC report. There were 5,373 residential, 1,132 commercial, 137 industrial and 231 public authorities. The IURC report also identified 3,009 meters are read by radio read, 1,500 manual read and 2,408 by touch pad. It should be noted this total is **6,917**, a difference of 44 additional meters.

The total for the Billed Metered is **2,557.575 MG**. This is the totalized amount of water that was billed by East Chicago for the 2019 Audit period. This figure does not include an adjustment for "lag time" billing.

"Lag time" is the time period between the time the production meters are read and the customer billing meters are read. For the purposes of the audit, the time periods for meter readings need to be aligned at the beginning of the audit year and again, at the end of the audit year. The residential, commercial and public meters are read monthly on the 15th of the month and industrial meters are read on the 23rd of the month. East Chicago uses radio reading, touch pad and manual reading systems. Based on data in the IURC report 44% are radio reads, 34% are touch pad and 22% are manual reads. In order to complete the lag time analysis there would need to be the December 2018 billed metered use and the January 2020 billed metered use which were not included in the IURC data.

A detailed review of meter reading data indicated East Chicago does a good job of record keeping for metering. All in all, the meter data was in extremely good shape and found to be very useful.

Billed Unmetered (BMAC) water is water that is billed for but not metered. Examples of this might include such uses as bulk sales to unmetered hydrant uses such as a landscaper, or the water use is estimated based on house size, or building size. East Chicago does not use this type of billing. Therefore, there was no consumption total to enter.

Unbilled Metered (UBAC) water use might include such items as water used by municipality such as the parks, municipal pools, utility buildings, fire departments where water use is metered, etc. but not billed. In East Chicago case there were no unbilled metered accounts.

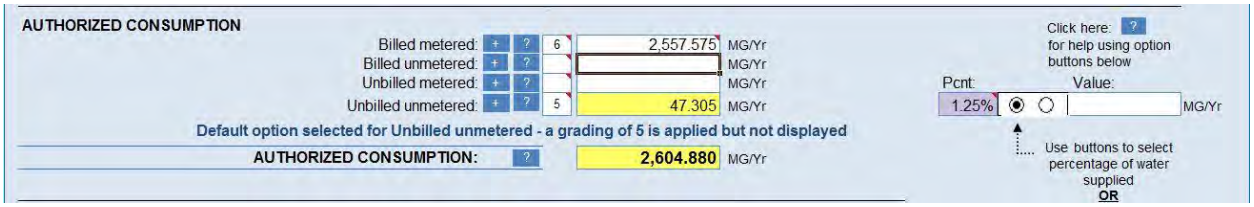
Unbilled, Unmetered (UUAC) water use is sometimes hard to get estimates. Usually this area of water use that can be attributed to water main flushing, hydrant flushing, firefighting, or a number of other uses where the water is not metered or billed, but the use is authorized. Water utilities can use the "default" value of 1.25% of the Water Supplied that is allowed for this data input for the Water Audit, simply because tracking Unbilled, Unmetered water uses by estimates is hard to confirm unless there is

a clear record of tracking by the utility. The default value is discussed below. The city did document estimated water use in this category at a slightly lower volume than the default value but the auditor chose to use the default.

Default Value Assignment

For the AWWA Water Audit, there is a default value that can be used for the area of Unbilled Unmetered water use. The default value percentage is 1.25% of the adjusted Water Supplied. The AWWA Water Audit Committee that composed the spreadsheet has set this particular default value based on input from data collected across the U.S. from several water utilities over several years. This estimated value comes to **47.305 MG** for 2019 for unmetered, unbilled use, other utility or municipal uses and other unmetered, unbilled but *authorized* activities.

Below is part of the Audit spreadsheet for the **Authorized Consumption** showing the categories where water was consumed.



DETERMINATION OF WATER LOSS

By taking the *Water Supplied* and *subtracting* the *Authorized Consumption*, the total Water Loss can be determined. The Audit Spreadsheet for total water loss calculation is below.

These losses can now be further defined as "*Apparent losses*" (accounting or billing errors, meter inaccuracy, etc.) and "*Real losses*" (water lost to leakage on service lines or water mains).

DETERMINING APPARENT LOSS

Apparent losses comprise of three areas; Unauthorized use, Meter Inaccuracies, and Systematic Data Handling errors.

Apparent losses were determined by examining the data provided by the utility on authorized uses, examining possible *meter inaccuracies*, and identification of potential *data handling errors* for the above task of record review.

Unauthorized Consumption is a tough area to determine and requires some estimates to be made. However, reviewing customer service requests and reporting of open hydrants, et al, can usually help validate this information.

The International Utility Revenue Protection Agency estimates that most utilities lose 1% to 2% of their revenue to theft of water (per Neptune Meter Co.). For the audit, the default value from the spreadsheet was used. It is set at **0.25% or 9.461 MG** for the audit year. This default value in the spreadsheet has been set up to be used when an actual estimate cannot be determined. The default

value was based on the AWWA Water Loss Committee studies performed on theft and other unauthorized uses when the spreadsheet was being developed in the early years of 2001-2006. Typically, theft of water from the water system is not a huge loss, in terms of both actual amounts of water or revenue, unless an illegal tap is located. The utility has a good policy for operations staff to monitor potential theft.

Meter Inaccuracies

Customer metering inaccuracies are a source of Apparent Loss. The water "lost" due to Apparent Loss is not really lost, just the ability to measure consumption properly has been compromised by inaccurate meters. East Chicago has about 6,873 active metered accounts per the meter inventory listed in the IURC report for 2019.

Meters are generally not 100% accurate throughout a water system. Given the acceptable ranges of meter accuracy for 5/8" displacement meters are 95%-101% for low flows (1/4 gpm), 98.5% - 101.5% for intermediate (2 gpm) and high flows (15 gpm), there is a strong likelihood of some water loss occurring as a result of meter inaccuracy. Other sizes will exhibit similar issues. The data East Chicago supplied for the metered customers did not include any install dates so water use by age of meter could not be evaluated.

Meter Testing Activity

Based on the data in the IURC report there were no meter accuracy tests completed for the 2019 audit period.

The audit team also reviewed the Water Research Foundation report "Accuracy of In-Service Water Meters at Low and High Rates" conducted by the Utah State University Water Research Laboratory that studied the decline of meter accuracy based on several factors. This research was completed on water meters 5/8-inch to 2-inch in size and included the brand and type of meters in the utility's system. The audit team considered the findings in this Utah State report to estimate the potential water lost to inaccuracy based on these meter sizes and age to determine a level of meter inaccuracy to apply to the overall meter population.

For meter inaccuracy, the auditor has the option to input a percentage of overall meter under-registration for the entire meter population or input a calculated volume figure. The results of our review and analysis of the percentage accuracy in the tested, repaired and replaced meters based on the average accuracy were reviewed and compared to other audits conducted in other utilities by the audit team showed similar traits in overall meter degradation by age.

Apparent Loss due to Meter Under-Registration

The audit team feels that it is likely that the overall meter accuracy may very well be in the 95% range or possibly lower, but we chose to use the **95% accuracy level** (5.0% under registration) in this audit. A continual testing and analysis of the accuracies of the meters will aid in tightening up the loss due to meter under-registration. A more in-depth analysis of the historical metered use of all 2-inch and larger commercial, industrial and municipal meters will aid in selection of annual meter accuracy testing.

In addition, consideration was given to the conclusions of the study by Utah State on displacement residential meter inaccuracies whereby the study suggests that lower flow registrations are compromised for mechanical meters, even with new meters, not to mention age degradation. An

analysis of the test results from any in-house meter testing could provide good data validation for this area for the residential meters.

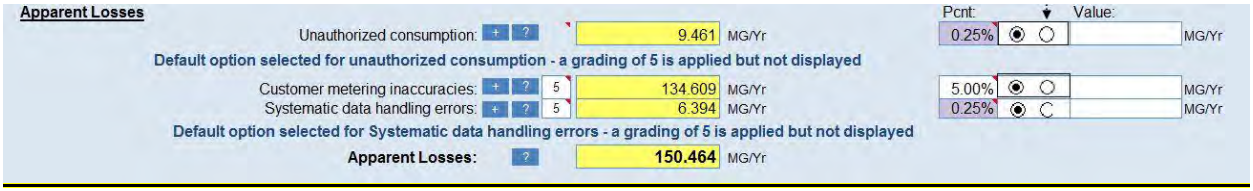
The validity scores for the customer metering inaccuracies and possible improvements were set at 5 based on the definitions for the grading scale for this area. The percentage of inaccuracy was set at 5**%.** The volume loss associated with this inaccuracy is **134.609 MG**

Systematic Data Handling Errors

The utility currently uses radio read, manual and touch pad read system with meters read by the utility and compiled for the billing office. Meter reading and usage reports are run and analyzed by utility personnel to catch any anomalies that may be occurring and addresses them when located.

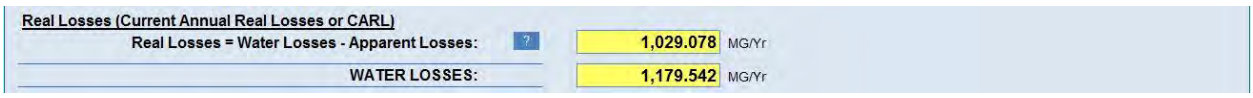
For the systematic data handling error area, the default value was assigned because in most billing and accounting systems that employ AMR/AMI systems, the systems cannot always detect and track errors quickly and get them fixed before the errors get transferred into the customer's bills. Usually AMR/AMI systems are trouble free to a certain degree but there has not been any major work done by the AWWA Water Loss Control Committee to define how the Systematic Data Errors can be tracked. Therefore the audit team chose to use the default value for this data entry. The default value is a value based on the experiences of the AWWA Water Loss Software Committee's where **¼ of 1% error** may occur in the reading/billing cycles. East Chicago may certainly be more/less than that but this is an area that would be difficult to document. The volume loss associated with systematic data handling errors is **6.394 MG**.

The total for the **Apparent Losses** are shown below. **150.464 MG** per year can be attributed to unauthorized uses, metering inaccuracies and systematic data handling issues using the default values and the metering inaccuracy levels.



DETERMINATION OF REAL LOSSES

The determination of Real losses (losses attributed to leakage) was attained by input of all the water supplied, consumption data, and estimated apparent losses into the water audit spreadsheet. The Real loss amounts are obtained by subtracting the Apparent Losses from the Total Losses to yield Real Losses. Real losses are defined as water lost to actual leakage.



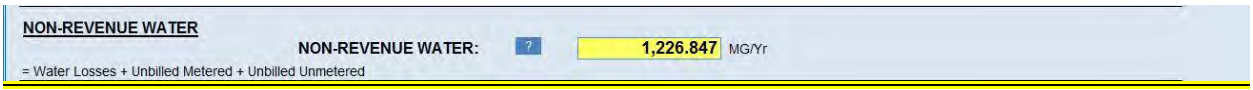
This Real loss calculation of **1,029.078 MG** per year can be averaged to a daily loss of 2**,819,392** gallons per day or about **1,958** gallons per minute over the entire distribution system.

It must be mentioned East Chicago filled a **4 MG** reservoir during the audit period and experienced a **10 MG** leak caused by a contractor in addition to **178 water leaks** reported in the data supplied.

DETERMINATION OF NON-REVENUE WATER

In a water system, the utility makes money on the water it supplies and sells to water customers but it does not make money on lost water, either Apparent losses and/or Real losses. Additionally, the Unmetered Unbilled and Unbilled Metered water uses, although classified as an Authorized use, does not generate revenue.

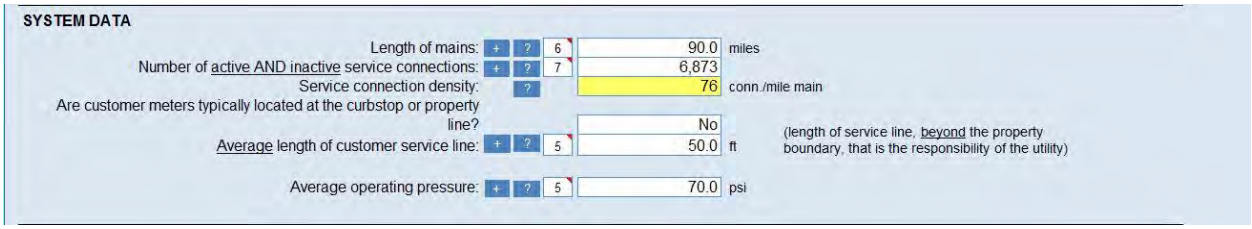
The total amount of Non-Revenue water was calculated based on *Total Water Loss* added to the *Unbilled Metered* and *Unbilled Unmetered* water and is **1,226.422 MG**.



SYSTEM DATA

Physical Parameters of the water system

In order to be able to calculate the *Performance Indicators* for the water system, certain key information is needed about the water distribution system. Such needed information includes miles of water main, average operating pressure of the system, average overall length of service connections (from the customer service valve to the water meter) and number of active and inactive connections. This information was part of the Audit questionnaire given to East Chicago at the beginning of the audit. The data was also cross checked with the data sheets and spreadsheets supplied. These figures were input into the Audit sheet. *The data provide was **very detailed** and complete.*



Length of Water Mains
The overall length of mains included hydrant leads and small mains totaling **90.0 miles**.

Number of Connections:
The number reported is **6,873**. Documetation for inactive accouts and unmetered fire lines could not be determined for this audit.

Average Service line lengths:
The length of the customer service line was an estimate by the utility. The figure of **50 feet** from the curb shut off to the meter was selected because that is what East Chicago staff estimates based on observations in the field, averaging the residential line lengths with the larger commercial line lengths

Average Operating Pressure (PSI) was asked for in the Audit Questionnaire. The average given **(70 psi)** was an average derived from discussions with the Engineer and the Audit Team.

Cost data was also input into the spreadsheet. The overall cost of operating the water system was derived for the audit year based on figures in the IURC report and entered into the data field, customer retail costs were as listed on the City website and input into the data field, along with the marginal cost of water (variable production costs, the figures East Chicago provided for electrical and chemical costs), were given and entered so Performance Indicators could be calculated.

Annual cost to operate the water system

The cost to operate the water system was obtained from the 2019 data provided by the utility and confirmed with the Annual Report. This amount represents the total cost to operate the water system. That amount was **$5,281,402** for the audit year.

Customer Retail Unit Cost of Water

The customer retail unit cost of $1.84 per 1,000 gallons was applied here. It was calculated by averaging the four rates in the declining rate structure listed on the City website.

Variable Production Costs

The variable Production Cost was taken from the Annual Report that East Chicago provided for Chemical, Electrical and other costs. That figure is **$1,395.56** per million gallons of water.

The purpose of putting these costs together is so that performance indicators can be derived showing the cost of the specific areas of loss.

Data Validity Grades were set according to the Grading Matrix from the audit software for all 20 of the data inputs, from the Water Supplied area, all the way to the Cost section. The criteria for assignment of the grading scores is set by definition so that the Utility can have the data "validated" with the end aim of using the grades as a tool for self-improvement.

DETERMINATION OF PERFORMANCE INDICATORS

System Attributes

The system attributes derived from the calculations of the data inputs provide a snapshot of performance for the water utility.

There are two performance indicator categories where specific performance indicators are calculated indicating the financial losses as well as calculation of overall water loss and system performance.

The first category is the **Financial Indicators.** These consist of the revenue losses attributed to Apparent losses and Real losses. This gives a breakdown of what metering issues may be costing the utility as well as what the overall leakage is costing as well.

Annual cost of Apparent Losses:	$276,854	
Annual cost of Real Losses:	$1,436,139	Valued at **Variable Production Cost**
		Return to Reporting Worksheet to change this assumpiton

Performance Indicators:			
Financial:	Non-revenue water as percent by volume of Water Supplied:	32.4%	
	Non-revenue water as percent by cost of operating system:	33.7%	Real Losses valued at Variable Production Cost

The above figures are based on *Variable Production costs* otherwise known as the cost to produce the next unit of water. It assumes that the "potential" value of the water is not realized at the retail rate. If the *Retail Rate* were used then the "Real Losses" would be worth quite a bit more (below). This checkbox option in the Audit Software Reporting Worksheet allows for the Utility to choose between the two different valuations.

Annual cost of Apparent Losses:	$276,854	
Annual cost of Real Losses:	$1,893,503	Valued at **Customer Retail Unit Cost**
		Return to Reporting Worksheet to change this assumpiton

Performance Indicators:			
Financial:	Non-revenue water as percent by volume of Water Supplied:	32.4%	
	Non-revenue water as percent by cost of operating system:	42.7%	Real Losses valued at Customer Retail Unit Cost

This specific breakdown of costs will help with targeting specific remediation measures that will be discussed further. However, a quick look indicates that Real Losses (leaks) are costing the utility **$1,436,139** annually (**Variable Costs**), and Apparent Losses (metering/accounting and billing issues) are costing the utility **$276,854** annually.

The **Operational Efficiency Indicators** offer a perspective of looking at the losses in terms of metrics. This is a way of "normalizing" the losses so that these metrics are equal for each water system that conducts an audit. The Apparent losses per connection per day indicate what level of metering and billing recovery is possible over the spectrum of the water system. The same can be applied to Real losses for leakage.

The Apparent and Real loss unit is based on the number of connections and not the number of meters.

Operational Efficiency:	Apparent Losses per service connection per day:	59.98	gallons/connection/day
	Real Losses per service connection per day:	410.21	gallons/connection/day
	Real Losses per length of main per day*:	N/A	
	Real Losses per service connection per day per psi pressure:	5.86	gallons/connection/day/psi

A calculation is then made based on the physical parameters of the system for the **Unavoidable leakage**. This unavoidable leakage will be leaks that every water system will have despite all efforts to stop the leaks. The **Unavoidable Annual Real Losses** (**UARL**) is a theoretical number defined as the technical low limit of leakage that could be achieved if all available leakage technology were to be applied to the distribution system to stop leakage, based on the baseline data of the system.

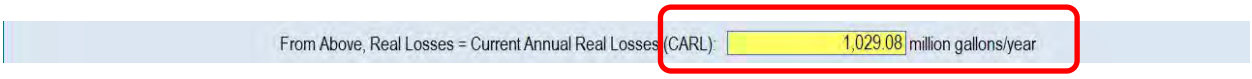
The math used to determine the UARL is indicted below.

UARL (gallons/day) = (5.41Lm + 0.15Nc + 7.5Lc) x P

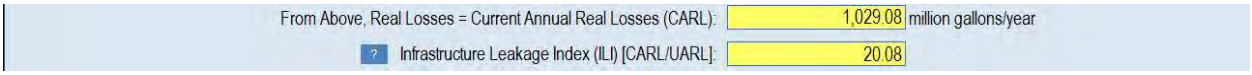
Where:

Lm = length of mains (miles)
Nc = number of service connections
Lc = total length of customer service lines (miles or km) or
= Nc multiplied by the average distance of customer service line, Lp (miles)
P = Pressure (psi)

By taking the calculated Real losses for the year (Current Annual Real Losses or CARL)



and dividing that by the Unavoidable Annual Real Losses (UARL), a ratio is calculated called the **Infrastructure Leakage Index** or **ILI**. The **ILI** is a Benchmarking indicator that indicates the performance of the Utility for water loss, taking into account all of the variables that need to be accounted for as stated above in the UARL math.



The ILI for East Chicago is 20.08.

The ILI can be used to help determine what Real losses the Utility has that are truly recoverable if an aggressive leak detection and leak prevention program were applied to the system.

CONCLUSIONS

Overall the audit was able to demonstrate that East Chicago does a good job on the vast majority of its record keeping and water loss control efforts. The important audit details were able to be considered based on the completeness of the data needed for the audit compiled by the utility. Since the Audit is a "living document", as new information is obtained, the utility stands to reap good results for the audit process.

The metered consumption data was detailed and allowed a fairly thorough overview of how East Chicago receives its metered consumption numbers. The distribution system data was taken from the Annual Reports and audit questionnaire answers generated from the water utility. The Audit team also made use of staff calls and data requests to confirm many of the characteristics of the system.

The age of the meters could not be determined based on the data supplied for the audit and may be worthwhile to conduct a deeper review of the 5/8-inch to 1-1/2-inch meters for accuracy. It should be noted that the City website lists a document that states the city was replacing approximately 6,936 meters with new radio frequency meters and install a new AMI system to automatically collect and transmit meter reading data. The estimated completion date was 2018. The IURC report for 2019 shows 1,500 meters read manually and 2,408 read with a touch pad. There were 3,009 meters that were shown as radio read.

System input

East Chicago imports all its water from Lake Michigan. The IURC report identified two water treatment facilities, one conventional rapid sand filtration and one membrane plant. The city stated the conventional plant only operates two days a week. This report also identifies four high service pumps. All pumps are vertical turbine pumps. East Chicago contracts with a third party meter testing company to performed flow tests for the meters annually.

The **VOS** meter accuracy used for the Meter Error adjustment (MMEA) was **0.00%** based on the combined pre-calibration flow tests. Based on the data provided for this task and the results of our analysis the Data Validity Score for this input was seven (7).

Authorized Consumption

Water purchased by water customer's account for **2,604.880 MG** per year as metered and billed.

Billed Metered Consumption

The figures for the billed metered consumption were obtained from the IURC 2019 report. East Chicago uses the MUNIS ERP meter reporting system to record, track and calculate the customer's water use. Numerous reports were sent to MESCO in PDF format from the MUNIS system for each class of user. The records appear to be in good order.

MESCO was not able to complete a meter reading lag analysis due to just 12 months of customer data being supplied. Since the residential, commercial and public authority meters are read generally on the 15th of the month and the industrial meters are read generally on the 23rd of the month there will be metered use in January 2019 that actually occurred in December 2018. The lag analysis calculates the water use that should be in the January 2019 summary and also the water use in December 2019 that is partially in the January 2020 summary. In order to complete this

analysis 14 months of water use data by customer class will need to be provided for next years audit

Based on the data provided for this task and the results of our analysis the Data Validity Score for this input was six (6).

Billed Unmetered
There are no accounts that are Billed Unmetered.

Unbilled Metered
There are no accounts that are Unbilled Unmetered.

Unbilled Unmetered (UUAC)
The amount entered was **47.305 MG/Yr.** because the default 1.25% value option was chosen. In the response from the Utility back to the audit team they mentioned fire hydrants are flushed each year but there was no documentation for flow rates and time of flushing were supplied. The Audit Team usually finds fire department uses not well documented.

The default Data Validity Score for this input was five (5).

Water Losses
The total losses calculated out to be **1,179.542 MG** for the year. This appears to account for **32.4%** of the total water produced.

We caution East Chicago that percentage indicators are often taken the wrong way as indicators of water loss, hence the breakout of Apparent and Real Losses by volumes and costs. Given that the Infrastructure leakage Index **(ILI) is a 20.08** there are some areas to tighten up for water loss; however there are constraints on the system that will limit what can be accomplished and will be discussed as part of the Performance Indicators.

Apparent Losses
Water purchased by water customers' account for **2,557.575 MG** per year. The volume of unrecorded water use based on a 5% under-registration of customer meters is **134.609 MG**. However there may be more apparent loss occurring than what is perceived. A customer meter accuracy testing program would aid in determining the level of under-registration occurring in the customer meters. The total volume of apparent loss is **150.464 MG.**

The Data Validity Score for this input was five (5).

Real losses were calculated to be **1,029.078 MG**. This can be further broken down to **2,819,392 GPD** or about **1,958 gpm** over the entire distribution system. The ratio of Current Annual Real Loss (CARL) to the Unavoidable Annual Real Loss (UARL) is Infrastructure Leakage Index (ILI). The ILI is **20.08** meaning the current level of leakage is approximately **20 times the UARL**. The calculated Unavoidable Annual Leakage Losses (UARL) are **51.25 MG**, that, in spite of a leak detection program, that **51.25 MG** will not easily be found, but the rest of the **977.828 MG** per year *could possibly be located* and recovered depending on the aggressiveness of the leak detection program.

Again, it must be noted the city filled a 4 MG reservoir during this audit period and experienced an estimated 10 MG leak on a 54 inch transmission main along with 178 other leaks in the system.

Not all infrastructures meet the stringent assumed data criteria in the UARL calculation. Different systems have varying characteristics including age, makeup of pipe material and fittings, and pressure variability. To address this there is a factor called the Infrastructure Correct Factor (ICF) that modifies the UARL to a more realistic figure for the East Chicago system, basically increasing the UARL figure which will also reduce the calculated ILI. This method is defined in the current AWWA M36 Manual of Water Audits and Loss Control Program.

Performance Indicators

The bottom line is that **32.4%** of the water is Non-Revenue Water accounting for **33.7%** of the total cost to operate the water system. Below identifies the cost breakdown for East Chicago.

Annual cost of Apparent Losses:	$276,854	
Annual cost of Real Losses:	$1,436,139	Valued at **Variable Production Cost**
		Return to Reporting Worksheet to change this assumpiton

With the Calculated ILI (Infrastructure Leakage Index) at 20.08, East Chicago is operating in what could be considered a workable position even with what appears to be the loss issues it faces from meter inaccuracies and leakage. There are several issues with some of the data that when clarified that will more than likely reduce the ILI once these data are refined.

The above statement may seem hard to grasp, given that about 32.4**%** of the water pumped is Non-Revenue Water. The Real loss (*leakage*) accounts for about 87***%*** of the total loss and the Apparent loss (*meter issues*) accounts for about 13***%*** of the total loss. Reviewing the Loss Control Planning tab in the AWWA Water Audit Software the three areas of consideration based in an ILI Range are shown below.

General Guidelines for Setting a Target ILI
(without doing a full economic analysis of leakage control options)

Target ILI Range	Financial Considerations	Operational Considerations	Water Resources Considerations
1.0 - 3.0	Water resources are costly to develop or purchase; ability to increase revenues via water rates is greatly limited because of regulation or low ratepayer affordability.	Operating with system leakage above this level would require expansion of existing infrastructure and/or additional water resources to meet the demand.	Available resources are greatly limited and are very difficult and/or environmentally unsound to develop.
>3.0 -5.0	Water resources can be developed or purchased at reasonable expense; periodic water rate increases can be feasibly imposed and are tolerated by the customer population.	Existing water supply infrastructure capability is sufficient to meet long-term demand as long as reasonable leakage management controls are in place.	Water resources are believed to be sufficient to meet long-term needs, but demand management interventions (leakage management, water conservation) are included in the long-term
>5.0 - 8.0	Cost to purchase or obtain/treat water is low, as are rates charged to customers.	Superior reliability, capacity and integrity of the water supply infrastructure make it relatively immune to supply shortages.	Water resources are plentiful, reliable, and easily extracted.
Greater than 8.0	Although operational and financial considerations may allow a long-term ILI greater than 8.0, such a level of leakage is not an effective utilization of water as a resource. Setting a target level greater than 8.0 - other than as an incremental goal to a smaller long-term target - is discouraged.		
Less than 1.0	If the calculated Infrastructure Leakage Index (ILI) value for your system is 1.0 or less, two possibilities exist. a) you are maintaining your leakage at low levels in a class with the top worldwide performers in leakage control. b) A portion of your data may be flawed, causing your losses to be greatly understated. This is likely if you calculate a low ILI value but do not employ extensive leakage control practices in your operations. In such cases it is beneficial to validate the data by performing field measurements to confirm the accuracy of production and customer meters, or to identify any other potential sources of error in the data.		

The Water Loss Control Planning Guide looks at two (2) performance indicators, the Audit Validly Score (DVS) and the Target ILI range that is economical for the utility to realistically achieve. Based on the DVS score of 66 East Chicago meets most if not all recommendations suggested. Based on an ILI of 20.08 and the Financial, Operational, and Water Resources suggestion for this ILI, East Chicago meets two of the three suggestions.

RECOVERABLE LOSSES

Apparent Loss Recovery

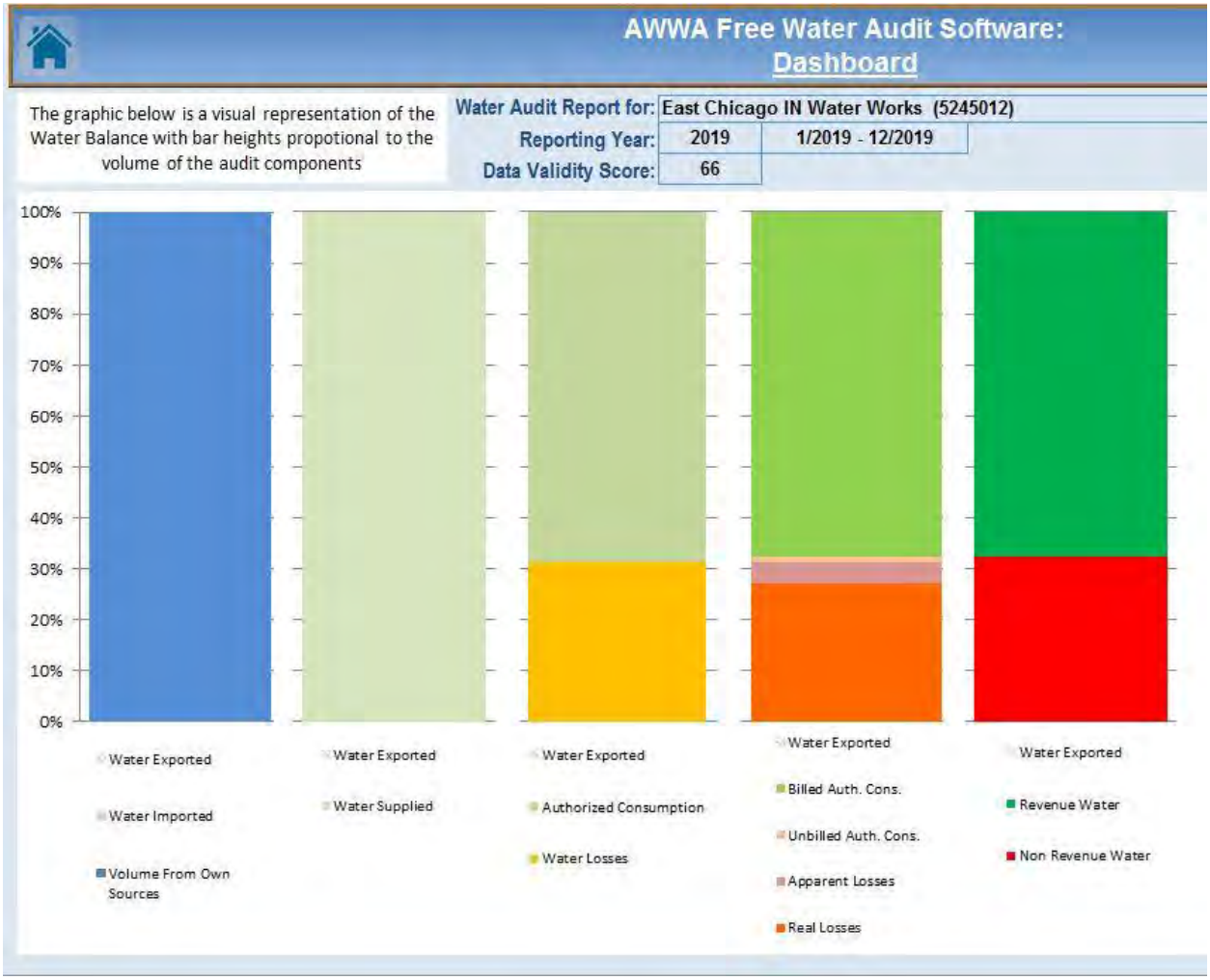
The current cost of loss for the metering inaccuracies, possible theft of water, and possible data handling errors is **$276,854**. There is no way to establish or calculate a level of Unavoidable Apparent Loss (Apparent Losses that exist despite any/all efforts to eradicate), as all water meters have accuracy thresholds that need to be met before water is accurately recorded as it is being used. In addition, no theoretical Unavoidable Annual Apparent Loss level has been established by the AWWA Water Loss Committee in a similar fashion as the Unavoidable Annual Real Loss level that has been set (per the audit software). However based on the observance of some of the meter testing reviews and discussions about the residential metering degradation from age and throughput, there may be areas that losses can be recovered. The volume and cost side of the potential recoverable Apparent Losses therefore, will be made based on the Audit team's observations with the data and analysis made. Suggestions for improvements in the metering system area will be made under "Recommendations".

Real Loss (Leakage) Recovery

The current leakage is costing the utility **$1,436,139** annually per the spreadsheet, based on Variable Production Costs (as stated earlier). If the Unavoidable Annual Real Losses (UARL) of 51.25 MG is subtracted from the Current Annual Real Losses (CARL) of 1,029.078 MG, then the potentially recoverable leakage losses are **977.828 MG annually** or **$700,671 annually**, based on Variable Production Costs as applied to leakage.

Is this realistic? Maybe not considering the cost to facilitate leakage repairs is not part of this figure. However, if the utility uses the **Retail Rate** applied to leakage, then the picture changes a bit. The Audit Team cautions East Chicago that this use of the Retail Rate applied to leakage is **not** a common practice because the return on investment is limited. The utility will need to weigh out the alternatives carefully.

The Dashboard part of the audit software gives a great view of the operational conditions of the water system per the audit

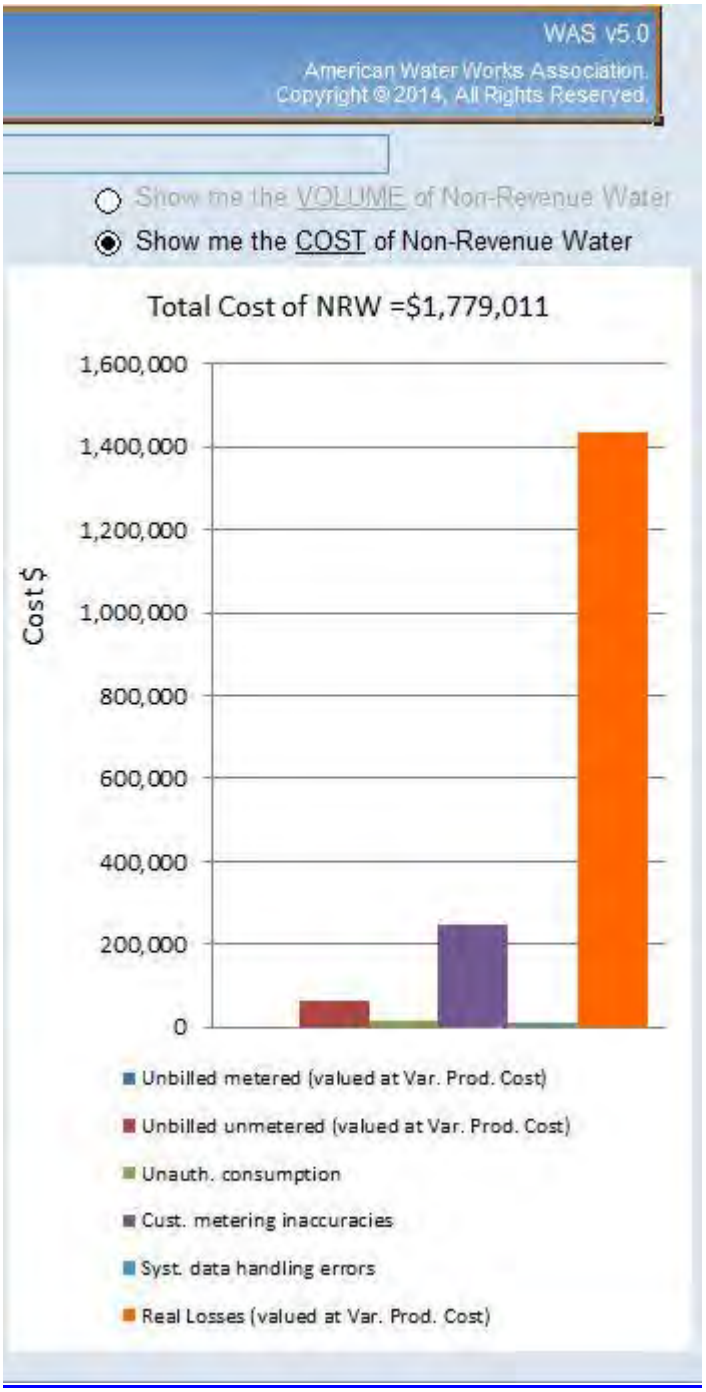

AWWA Free Water Audit Software:
Dashboard
The graphic below is a visual representation of the Water Balance with bar heights propotional to the volume of the audit components
Water Audit Report for: East Chicago IN Water Works (5245012)
Reporting Year: 2019 1/2019 - 12/2019
Data Validity Score: 66
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Water Exported
Water Imported
Volume From Own Sources
Water Exported
Water Supplied
Water Exported
Authorized Consumption
Water Losses
Water Exported
Billed Auth. Cons.
Unbilled Auth. Cons.
Apparent Losses
Real Losses
Water Exported
Revenue Water
Non Revenue Water

Non-Revenue Water Costs

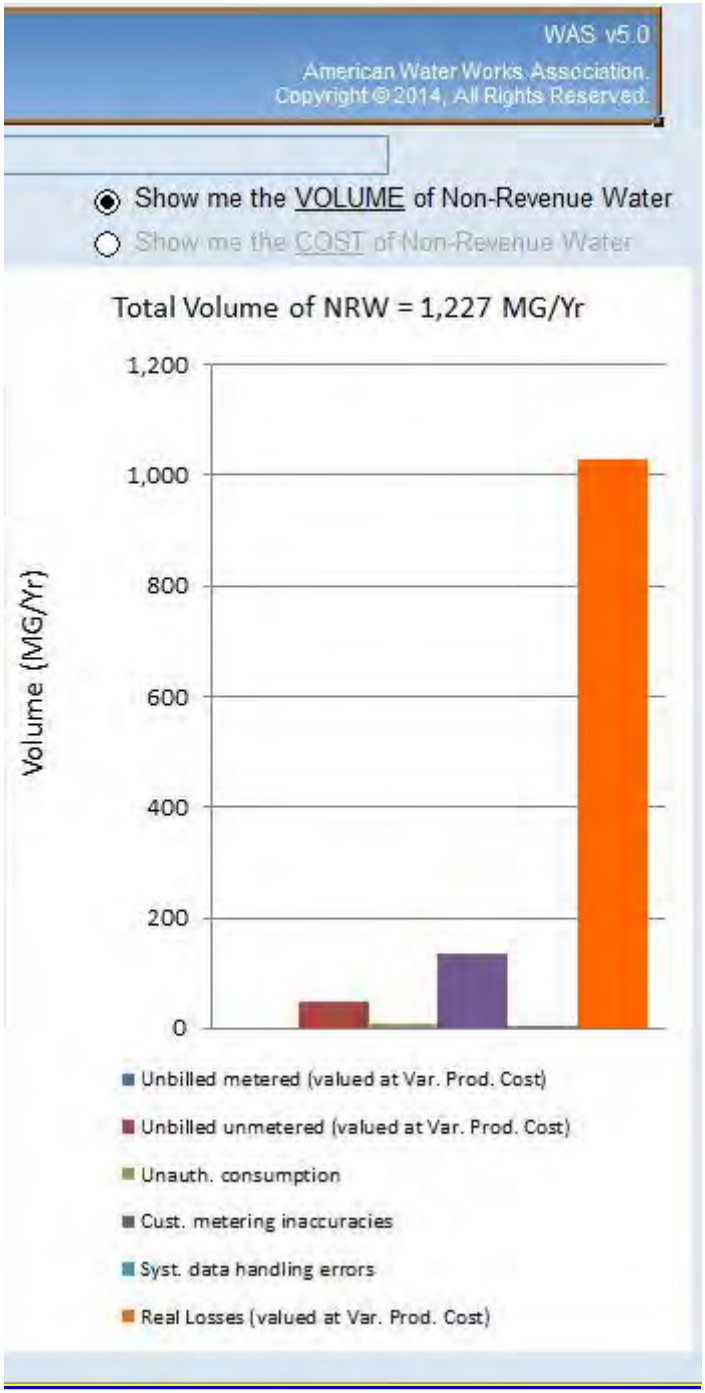
Unbilled Unmetered water (hydrant flushing and sprinkler uses) costs are estimated at slightly under $33,897 (Valued at Variable Production Costs)

Metering Inaccuracies costs estimated at $247,681 (valued at Retail Costs)

Real Losses (leakage) costs are at $1,436,139 (Valued at Variable Production Costs)



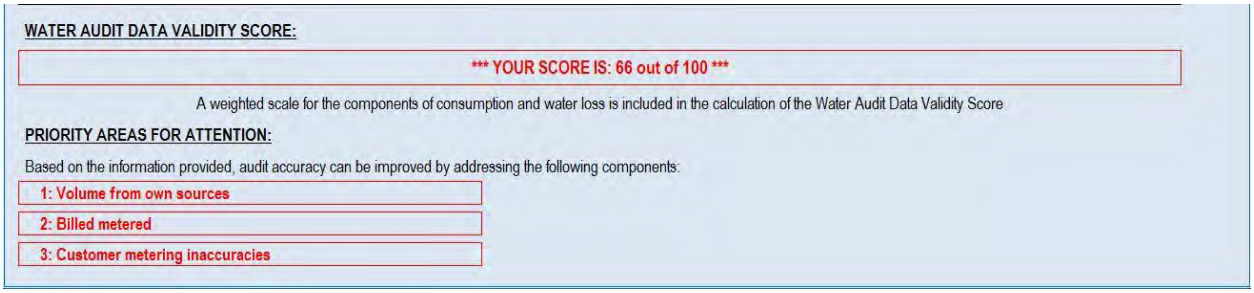
Non-Revenue Water Volumes



The volume chart clearly demonstrates the spread of the losses by volume.

VALIDATION SCORE

This score is the total of the scores assigned to each component of the audit to describe the confidence and accuracy of the data input into the system. The assignment of validity scores was based on experiences with other water systems and knowledge of how the Audit format works as well as using the guidelines set in the Audit format Grading Matrix. For each component, there is a corresponding listing in the Grading Matrix (supplied in the Excel Water Audit Software). For each component identified in red (see below), these are the areas where improvements are suggested to be made based on the spreadsheet inputs.



The Audit validation score is **66 out of 100**. From the AWWA Water Loss Control Committee individuals involved with the development of the Water Audit Software Spreadsheet, it is rare that a validity score of over 90 is ever achieved. In fact, one of the authors of the spreadsheet and of the M36 manual on Water Loss control commented at an AWWA Water Loss Committee meeting that if he were to see a score over 90 he would doubt the "validity" of the validity score. To get that high of a score, the water system would need to be up to date, robust, and qualify as a "world class water system" with all the latest technology applied for water loss control. The quality and depth of the data East Chicago supplied for this audit was very extensive which contributed to this high score. All the import meters had been tested for accuracy, the compound meters had comparative meter accuracy tests completed, and the City has completed a leak detection study for the entire distribution system.

WATER BALANCE

Below, is the completed Water Balance for the audit. This Balance sheet shows the components where water uses and losses can be traced through the system.

AWWA Free Water Audit Software: Water Balance

WAS v5.0

Water Audit Report for:	East Chicago IN Water Works (5245012)
Reporting Year:	2019 1/2019 - 12/2019
Data Validity Score:	66

Own Sources (Adjusted for known errors) 3,784.422	Water Exported 0.000	Billed Water Exported			
	Water Supplied 3,784.422	Authorized Consumption 2,604.880	Billed Authorized Consumption 2,557.575	Billed Metered Consumption (water exported is removed) 2,557.575	Revenue Water 2,557.575
				Billed Unmetered Consumption 0.000	
			Unbilled Authorized Consumption 47.305	Unbilled Metered Consumption 0.000	Non-Revenue Water (NRW) 1,226.847
				Unbilled Unmetered Consumption 47.305	
		Water Losses 1,179.542	Apparent Losses 150.464	Unauthorized Consumption 9.461	
				Customer Metering Inaccuracies 134.609	
				Systematic Data Handling Errors 6.394	
Water Imported 0.000			Real Losses 1,029.078	Leakage on Transmission and/or Distribution Mains Not broken down	
				Leakage and Overflows at Utility's Storage Tanks Not broken down	
				Leakage on Service Connections Not broken down	

Move from left to right to trace water through the system Water Balance.

RECOMMENDATIONS FOR ECONOMICALLY VIABLE WATER LOSS INTERVENTION PROGRAMS

The AWWA Audit Spreadsheet has "built in" generalized suggestions of system improvements based on the scoring system "ILI" or Infrastructure Leakage Indicator and confidence level of data used (Validity score) that can help direct long term programs. These are listed at the end of the Spreadsheet but are shown below as well.

The Water Audit Validity Level/Score range that East Chicago is in (see below) is reflected in some general recommendations made by the Audit Software.

AWWA Free Water Audit Software: Determining Water Loss Standing

Water Audit Report for: East Chicago IN Water Works (5245012)
Reporting Year: 2019 1/2019 - 12/2019
Data Validity Score: 66

Water Loss Control Planning Guide

	Water Audit Data Validity Level / Score				
Functional Focus Area	**Level I** (0-25)	**Level II** (26-50)	**Level III** (51-70)	**Level IV** (71-90)	**Level V** (91-100)
Audit Data Collection	Launch auditing and loss control team; address production metering deficiencies	Analyze business process for customer metering and billing functions and water supply operations. Identify data gaps.	Establish/revise policies and procedures for data collection	Refine data collection practices and establish as routine business process	Annual water audit is a reliable gauge of year-to-year water efficiency standing
Short-term loss control	Research information on leak detection programs. Begin flowcharting analysis of customer billing system	Conduct loss assessment investigations on a sample portion of the system: customer meter testing, leak survey, unauthorized consumption, etc.	Establish ongoing mechanisms for customer meter accuracy testing, active leakage control and infrastructure monitoring	Refine, enhance or expand ongoing programs based upon economic justification	Stay abreast of improvements in metering, meter reading, billing, leakage management and infrastructure rehabilitation
Long-term loss control		Begin to assess long-term needs requiring large expenditure: customer meter replacement, water main replacement program, new customer billing system or Automatic Meter Reading (AMR) system.	Begin to assemble economic business case for long-term needs based upon improved data becoming available through the water audit process.	Conduct detailed planning, budgeting and launch of comprehensive improvements for metering, billing or infrastructure management	Continue incremental improvements in short-term and long-term loss control interventions
Target-setting			Establish long-term apparent and real loss reduction goals (+10 year horizon)	Establish mid-range (5 year horizon) apparent and real loss reduction goals	Evaluate and refine loss control goals on a yearly basis
Benchmarking			Preliminary Comparisons - can begin to rely upon the Infrastructure Leakage Index (ILI) for performance comparisons for real losses (see below table)	Performance Benchmarking - ILI is meaningful in comparing real loss standing	Identify Best Practices/ Best in class - the ILI is very reliable as a real loss performance indicator for best in class service

For validity scores of 50 or below, the shaded blocks should not be focus areas until better data validity is achieved.

Audit Data Collection – Refine data collection practices…

Short Tem Controls – Refine, enhance or expand ongoing programs…

Long Term Controls – Conduct Detailed planning…

Target Setting – Establish mid-range goals for Real and Apparent loss reduction…

Benchmarking – Performance Benchmarking, ILI is a meaningful tool…

Since the ILI is a 20.08, per the above table, water resources are plentiful since East Chicago uses surface water from Lake Michigan. The ongoing program for large meter testing and repair and small meter replacement along with the annual leak detection program and main replacements should aid in lowering the current ILI.

Some of these recommendations are also part of Project Team's prioritized set of recommendations on cost effective ways to continue to identify and remediate Apparent and Real Losses. Please keep in mind these are generalized recommendations based on the DVG's for each data entry and the weighted total of the overall Validity score. The individual recommendations for East Chicago take into consideration the above recommendations, but also include the Audit Team's observations of audits from other water utilities that had similar issues.

Once data have been entered into the Reporting Worksheet, the performance indicators are automatically calculated. How does a water utility operator know how well his or her system is performing? The AWWA Water Loss Control Committee provided the following table to assist water utilities is gauging an approximate Infrastructure Leakage Index (ILI) that is appropriate for their water system and local conditions. The lower the amount of leakage and real losses that exist in the system, then the lower the ILI value will be.

Note: this table offers an approximate guideline for leakage reduction target-setting. The best means of setting such targets include performing an economic assessment of various loss control methods. However, this table is useful if such an assessment is not possible.

General Guidelines for Setting a Target ILI
(without doing a full economic analysis of leakage control options)

Target ILI Range	Financial Considerations	Operational Considerations	Water Resources Considerations
1.0 - 3.0	Water resources are costly to develop or purchase; ability to increase revenues via water rates is greatly limited because of regulation or low ratepayer affordability.	Operating with system leakage above this level would require expansion of existing infrastructure and/or additional water resources to meet the demand.	Available resources are greatly limited and are very difficult and/or environmentally unsound to develop.
>3.0 -5.0	Water resources can be developed or purchased at reasonable expense; periodic water rate increases can be feasibly imposed and are tolerated by the customer population.	Existing water supply infrastructure capability is sufficient to meet long-term demand as long as reasonable leakage management controls are in place.	Water resources are believed to be sufficient to meet long-term needs, but demand management interventions (leakage management, water conservation) are included in the long-term planning.
>5.0 - 8.0	Cost to purchase or obtain/treat water is low, as are rates charged to customers.	Superior reliability, capacity and integrity of the water supply infrastructure make it relatively immune to supply shortages.	Water resources are plentiful, reliable, and easily extracted.
Greater than 8.0	Although operational and financial considerations may allow a long-term ILI greater than 8.0, such a level of leakage is not an effective utilization of water as a resource. Setting a target level greater than 8.0 - other than as an incremental goal to a smaller long-term target - is discouraged.		
Less than 1.0	If the calculated Infrastructure Leakage Index (ILI) value for your system is 1.0 or less, two possibilities exist. a) you are maintaining your leakage at low levels in a class with the top worldwide performers in leakage control. b) A portion of your data may be flawed, causing your losses to be greatly understated. This is likely if you calculate a low ILI value but do not employ extensive leakage control practices in your operations. In such cases it is beneficial to validate the data by performing field measurements to confirm the accuracy of production and customer meters, or to identify any other potential sources of error in the data.		

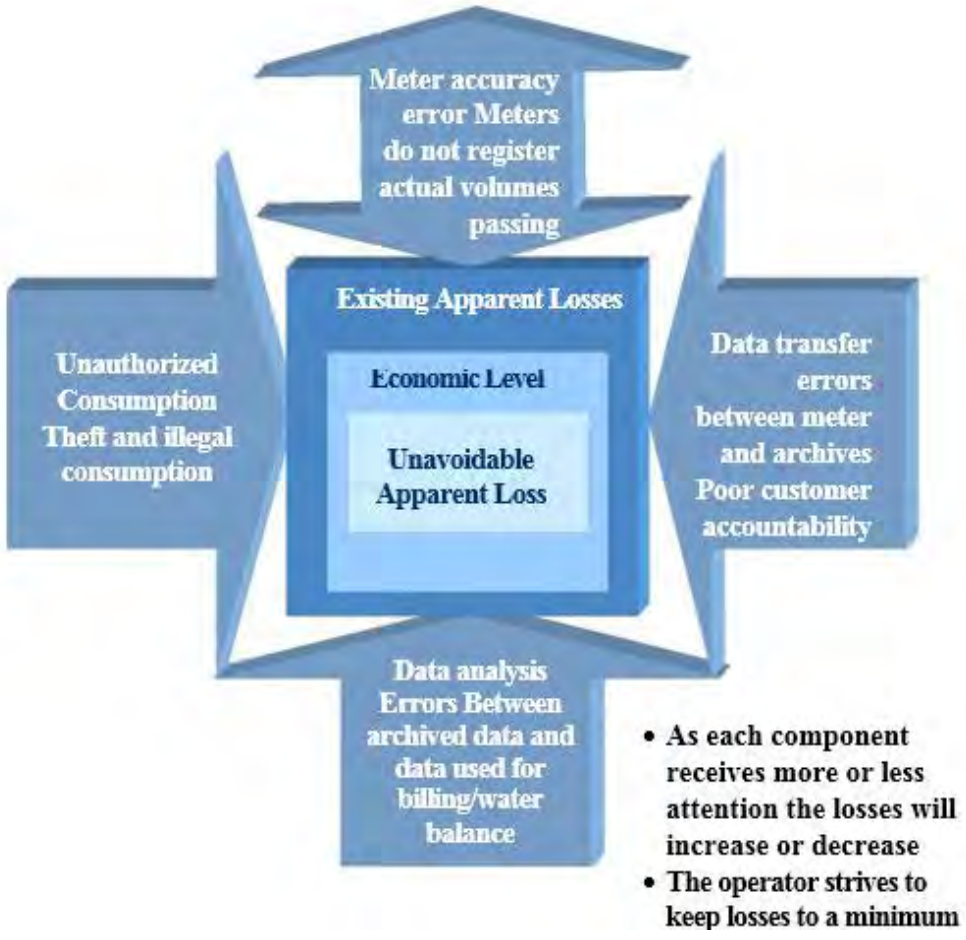
RECOMMENDATIONS

Water Supplied

The first area of loss recovery is about making sure the total system input of water is accurately metered. The master meters at each treatment facility for East Chicago are very important for the utility and water measured at these system input locations need to be measured correctly. This area of water supplied has the *biggest overall impact* on the results of the audit. Therefore, the utility should continue to test and calibrate the meters annually and apply any errors identified to the volumes from each meter. The Data Validity Grade for the VOS is high for this area. While East Chicago is not under any state mandate for production meter testing, the production meter testing and calibrations ensure accurate accounting for the most important area of the audit, Water Supplied.

Apparent Loss Controls

Apparent Loss Controls can be applied using the AWWA "Four Pillar" approach as shown below.



Meter Accuracy

Based on data in the 2019 IURC report, no large customer meters were tested for accuracy and the accuracy of the smaller meters is not known. The audit team did find on the city website a notification that stated new radio frequency (RF) meters were being installed to replace existing outdated and obsolete meters. This notice also stated a new advanced metering infrastructure (AMI) system was going to be installed to automatically collect and transmit data from the new RF meters to the water department. This meter replacement was scheduled to have a completion date of 2018.

In the 2019 IURC report under the Metering Technology section there are three different meter reading technologies listed, RF, touch pad and manual. If the entire meter population was not changed out to RF meters this should be reflected in the pre-audit questionnaire sent to the city at the start of this audit.

The accuracy of the residential meters was not available for this audit. Analyzing and comparing the total throughput and age to the rest of the meter population may aid in accelerating a change-out program. The 12-15 year mark is where the audit team typically sees meter inaccuracies increase in the residential sector for most water utilities depending on water quality and types of meters. The larger commercial meters, if properly maintained, can usually last 20 years.

A deeper meter analysis based on consumption and age should be planned for a few years down the road and conducted so that an economic basis for any potential change out program can be established and validated.

The Audit Team suggests utilizing the results of either an in-house or contracted meter testing program to further target a meter replacement program. Size generally gets sorted out in this process but there may be some meters that are bigger that do not generate as much revenue as smaller meters, at that point, the sizing of the meter needs to be reviewed.

- A portion of meter revenue needs to be set aside for an annual meter-testing budget, not just meter replacements.

- Meters need to be tested based on levels of revenue being generated. Experience has shown that the following guidelines seem to work but the Utility may have other guidelines that are followed:

  -Meters that generate **$14,000.00/year** or more in revenue test every year.
  -Meters that generate **$7000.00/year** or more in revenue test every 2 years.

  -Meters that generate **$3000.00-$7000.00/year** in revenue test every three years.
  -Meters that generate **$1000.00-$3000.00/** year in revenue test every fourth year.

  These figures will allow a meter-testing program to pay for itself and be cost effective for the utility.

- Meter testing needs to be conducted following a well-established methodology. This means following AWWA guidelines on flow rates for testing and conducting evaluations for each meter tested for sizing, and type. The testing should bring into consideration the “on site” conditions where the meters are located as it is usually not feasible to remove meters from settings to test meters on a test bench in a shop. Also, businesses

change in a building from time to time. As a result, the water use pattern will change with it and the meters should be evaluated accordingly.

- Displacement meter testing should be looked at with consideration given to the low flow threshold. This was discussed earlier in the meter accuracy area of the audit with references to Utah State's study of displacement meters. Low flow accuracy limits starts at 95% accuracy, so 5% of the meter's use at low flow can be compromised but yet still meet new meter accuracy limits for low flow. By claiming a higher level of meter accuracy for the overall meter population during an audit, the utility shifts some water loss to the Real loss side of the equation. In some cases, the result is the utility could be looking for more leakage that does not exist. The Auditors did not see this in East Chicago but also had to somewhat assume the current level of performance for the smaller meters in the utility. The recommendation is to have random sampling tests conducted on the smaller meters as a regular meter maintenance practice.

Right sizing of the meters is an area where potential revenue recovery is possible over the long term for commercial accounts. Meters can be too big or too small when a change of building occupancy occurs. When meters are tested in place for the larger settings, right sizing should always be a part of the visual inspection program each time the meter is tested. Generally the low flow element should see approximately 20-30% of the total flow on a compound meter and the analysis identified several meters that should be reviewed further for consideration in downsizing the meter. It must be cautioned that reducing the size of a meter to regain some lost low flow accuracy must be balanced with the potential revenue loss due to the reduction of fixed costs.

Meter Data Transfer Errors and Data Analysis Errors

Meter data transfer errors and Data Analysis errors do not appear to be a major issue with the utility. If the city did adopt a new AMI meter reading system the volume figure used in this year's audit may be less than the default used in the software. The audit team did recognize the city uses the MUNIS ERP system for data reporting and billing so there is less of a chance for manual data errors.

If the data from 2019 IURC report in the Meter Technology section is correct there are 1,500 meters that are read manually and 2,408 that are read by a touch pad. The manual reads may result in errors in data entry and the touch pad may have communication problems occasionally.

System Data Improvements

As the distribution system is worked on/improved, those physical changes need to be added to the GIS data if available. This would include such items as correct count of actual service connections to the water system. These connections should be organized as residential, commercial and fire service connections. The number of connections (active and inactive) in the audit software is used in the calculation of the UARL (unavoidable loss).

The audit team did not receive a water system diagram showing source water, treatment facilities, storage reservoirs and transmission and distribution system lines. This information aids the team to fully understand the entire water system and identify potential areas of concern relating to water loss.

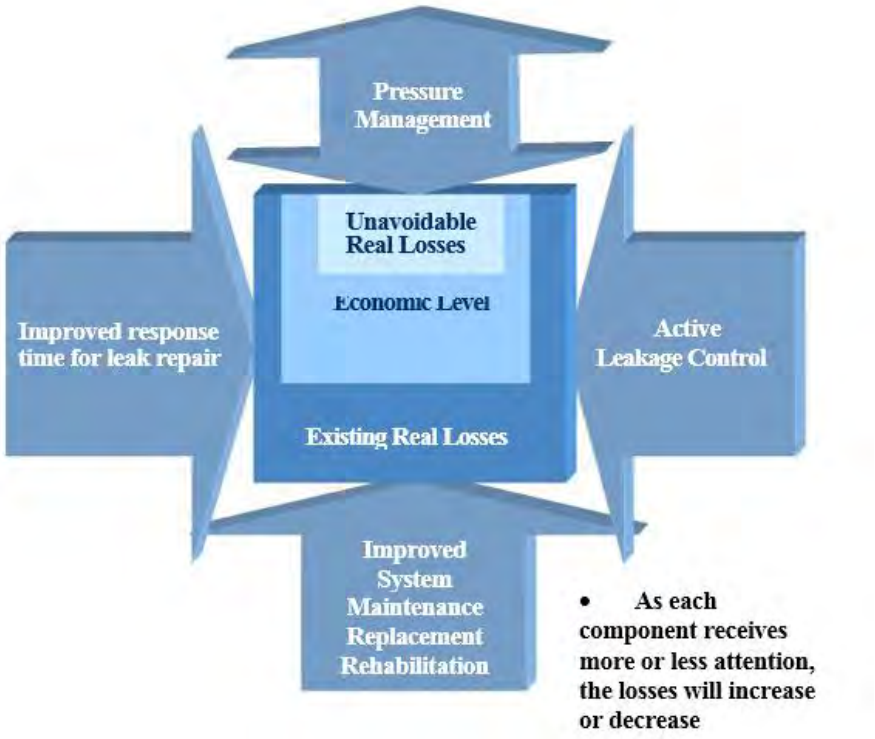
The figures used for the Volume from Own Sources (VOS) were totals from both treatment facilities. The volumes from each facility should be separated for next year's audit. The audit team was informed the conventional sand filter plant is operating two days a week currently. The accuracy of the master meters at each treatment facility should be tested annually and used in the master meter accuracy adjustment so the VOS is accurate for the audit year.

In reviewing the water distribution system section of the city website the audit team studied the **Current Situation** bullet points and in summary the city recognizes there is an increase in water loss, there are many lead and/or lead solder customer service lines that need replaced, currently there was not an effective method of locating and correcting sources of non-revenue water, including water theft and main leaks.

The **Future Improvements** bullet points identified several projects that directly address water loss and nonrevenue water such as, Implementation of District Metered Areas (DMA) to monitor and improve flow measurement in the water mains, leak detection, service line replacements and hydrant locks.

Real Loss Controls

Real Loss Controls can be applied using the AWWA "Four Pillar" approach as shown below.



Leak Detection

Active Leak Detection Control

East Chicago does not have a proactive leak detection program as part of the overall Water Loss Control Program. It is suggested that a survey program be conducted annually for the entire system as a way to reduce leakage. The cost of the leakage as indicated by the Real Loss calculation in dollars lost, indicate this program would pay for itself each year until the ILI ratio is reduced. In addition, the Variable Production Cost appears to show that the loss of water appears to put the utility in a position where it can "afford to leak". This is not a good position to be in since it can cause complacency and deter from a Proactive leak detection program.

Pressure Management is a practice taken by many utilities to control leakage. When pressure goes up, so does leakage (mostly UARL). The utility pressure is estimated at an average of 70 PSI overall. The auditors consider that operating pressure to be reasonable. Water hammer can occur from various activities. Water hammer was not explored by the audit team as it is assumed the utility staff does practice safe operating of hydrants to prevent water hammer.

System Improvements and Main Replacements

With the calculated ILI of 20.08, the need for improved data collection and validation would aid in tightening up some of the key figures used in the audit. The city has proposed projects for fire hydrant maintenance, replacement of inoperable valves and components, proactive leak detection and lead line replacements. These activities will aid in identifying where the Real Loss is occurring.

It would be an opportune time to consider internal pipe condition assessment. A sample pipeline condition assessment testing program may be cost effective to identify areas where there is still operational life left in certain pipe sections and funds could be diverted to more serious areas of the system. Given the age of the pipes and the mixture of pipe materials in East Chicago, consideration should be given for pipeline condition assessment program as a preventative approach. The condition assessment will allow for strategic targeted main replacements and help contain costs over an extended time frame. Tracking main breaks is good but additional detail would be needed to be documented to more accurately track the volumes from leaks identified and complete a detailed economic intervention analysis for the current leak detection program.

Real Loss Component Analysis

East Chicago may want to look at utilizing the free Real Loss Component Analysis Tool developed by the Water Research Foundation (Project 4372A). This is suggested as a way for the utility to work on Real loss controls beyond an Active Acoustic Leak Detection program. The frequency of the acoustic program should include a full survey of the 90 miles of distribution system mains each year.

The Real Loss Component Analysis Tool is a free Excel based program that takes the water audit several steps further into Real loss analysis. The real loss analysis results will help guide the utility into the possible implementation of District Metered Areas (DMA's) that can help isolate some of the background leakage not able to be located using conventional means. The Real loss "study" portion can be implemented either internally (the Utility) or it can be initiated by contract.

Unmetered Water Uses

Hydrant Flushing

East Chicago should discuss with the Fire Department about documenting the specific hydrants flushed and include an estimate of the time the hydrant was flushed including the appearance of the water being flushed as a way to more accurately account for Unmetered Unbilled water use. While this will not eliminate part of the Apparent Loss totally, it can help account for Unmetered Unbilled water use. Hydrant diffusers with build in flow gauges should be used and the flow recorded. When the utility staff or fire department flushes, it is easy to give the field crews computer tablets to record the location of the flush, the amount of time for the flush, hydrant conditions, and more. Calculations can be automatically made for flush amounts that can then be recorded.

Conduct an annual water audit and validate the results.

East Chicago is committed to conducting a water audit annually as a way to monitor water loss and prioritize the loss reduction efforts. That means setting an annual agenda to have an audit setup and tracked yearly. The assignment of the audit can be to someone or a committee in the utility or the audit can be contracted out. This audit team does not recommend monthly audits as water use can vary month to month due to a variety of issues, up to and including meter misreads that get corrected month to month. The audit process means looking at the Data Validity Grades and Validity Score and using it to assist in planning of long range system improvements and data collection annually. These validity scores should improve each year the audit is performed and as the water system is modernized and updated. This auditing will allow for long range goal setting as well as being able to monitor year to year each goal that has been set.

The way to get a better Validity score is to incrementally improve the data set for each data entry into the Audit Spreadsheet. The Grading Matrix tab of the audit does just that. It is highlighted to show the current Grading scale for the data input and *spells out what the utility needs to do as a next step to get to the next highest level grade*.

Additional Water Audit Comments

The Audit team feels that with the implementation of the water loss controls suggested, the utility will see its overall Validity Score improve, and its Infrastructure Leakage Index come down. The ILI of 20.08 is not an indication of the operational efficiency or management of the distribution system but more of the age of the system and the figure used in the Unavoidable Annual Real Losses (UARL) calculation. Using the Infrastructure Correction Factor (ICF) in the calculation of the Validity Score of 66 demonstrates the acceptance of the age of the current distribution system as an indication of why the ILI appears to be high compared to best practice utilities.

The Audit team believes a more in-depth analysis of the larger meters accuracy is important. A detailed analysis of the overall recorded use of the commercial and industrial meters should be completed to evaluate the current testing schedule. A more in-depth analysis of the potential over-sizing issue should be completed in addition to the review and analysis of the 2-inch and larger meters in the system should be completed.

Use of the Data Validity Grades for Improvements

It is recommended that East Chicago make use of the Grading Matrix contained in the Audit software. Each data entry from the Volume from own Sources (VOS under Water Supplied) to the Variable Production Cost (VPC) was rated according to each data entry's particular grade as applied from the matrix. For example, the Audit Team graded the VOS entry as a "7".

6.
At least 75% of treated water production sources are metered, or at least 90% of the source flow is derived from metered sources. Meter accuracy testing and/or electronic calibration of related instrumentation is conducted annually. Less than 25% of tested meters are found outside of +/- 6% accuracy.
7.
Conditions between 6 and 8
8.
100% of treated water production sources are metered, 100% of the source flow is derived from metered sources. Meter accuracy testing and electronic calibration of related instrumentation is conducted annually. Less than 10% of tested meters are found outside of +/- 6% accuracy.

Conditions between 8 and 10

Conduct meter accuracy testing for all meters on a semi-annual basis, along with calibration of all related instrumentation. Repair or replace meters outside of +/- 3% accuracy. Investigate new meter technology; pilot one or more replacements with innovative meters in attempt to improve meter accuracy.

For this audit, the Audit team utilized the third party meter accuracy test results supplied for this period and did not modified the system input volume based on these results. East Chicago has detailed records of the daily pumpage and volumes.

The same criteria of "meet, beat or retreat" from the grade was applied to each of the 20 DVG entries. For East Chicago to receive higher DVG's, the Grading Matrix has each improvement criteria highlighted. The suggestions made by the Audit team for overall improvements not only include particular actions but also in so doing, those actions will result in a higher grade.

Water Loss Audit - Certificate of Level 1 Validation

Utility Name: East Chicago, Indiana
PWSID #: 5245012 Water Loss Audit Year: 2019

Water Loss Audit prepared by/primary contact:

Name: James Fisher (MESCO), Winna Guzman (East Chicago) Phone: JM: 859.380.9703, WG: 219. 391.8466

Organization, Title: JM: Consulting Auditor, WG: Director

Email: jimf@mesimpson.com, wguzman@eastchicago.com

Comments from utility (optional; attach additional pages if needed): Making progress on water loss with leak detection and meter change-outs. Currently focused on lead line replacements.

Certified Water Loss Audit Validation prepared by:

Name: John H. Van Arsdel Phone: 800.255.1521 (O), 219.405.4014 (C)

Organization, Title: M.E. Simpson C0., Inc., Vice President

Email: john@mesimpson.com

Certified Validator License Number: _____

Validation Metrics (to be completed by Validator; fill in all that apply):

Water Audit Data Validity Score (out of 100): 71

Apparent Loss (gallons/service connection/day): 59.98

Real Loss (gallons/service connection/day): 410.21

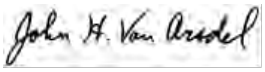
Real Losses (gallons/length of main/day): N/A, this metric is for smaller systems.

Infrastructure Leakage Index (ILI): **20.08**

Certification Statement:

I hereby certify that:

1. I did not work on the water loss audit portion of this project.
2. I have conducted a Level 1 Validation review of the above referenced water loss audit according to the 2017 Level 1 Water Audit Validation: Guidance Manual (Water Research Foundation) and the results meet the requirements of the American Water Works Association methodology for water loss auditing.
3. The validation documentation for the above referenced water loss audit is summarized in the Level 1 Validation Form, which is available upon request.

Certified Validator Signature:  Date: 6.30.21

Level 1 Validation Form

WATER SYSTEM NAME: East Chicago, Indiana DATE: 6.25.21

Instructions: this form is to be used by Certified Validators to document their work. Once completed, a utility should maintain a copy for their records. This form is not required to be submitted to the State.

Part I. ***Water Supplied*** Pre-Interview Notes:	

AWWA Water Audit Input	Input Adjusted (Y/N)	Final Data Validity Grade ("DVG")	Confirmation of Input Derivation	Confirmation of DVG Assignment
1) Volume from Own Sources ("VOS")	No	8	**Supply meter profile:** 42" and 30" meters Meter type: 1 Venturi Meter, 1 Spool style Mag meter Number of Meters: 2 **VOS input data source:** Production records. IURC annual reports. **Comments:** two types of filtration used, (rapid sand, Membrane). No info on settings for meters. No schematic of system, only a water main map with limited detail about treatment plant effluent and Tank locations. **Confirmed input value: 3,784.422 MG**	**Percent of VOS metered: 100%** **Signal calibration frequency:** Annually **Volumetric testing frequency:** Annually. **Volumetric testing method:** Tested w/"strap on" by Gasvoda Assoc. **Percent of VOS tested and/or calibrated:** 100% **Comments:** Possible issues with "strap on" testing Limited test docs to review. No flow profile taken. **Confirmed DVG:** 8

VALIDATOR NAME: John H. Van Arsdel

PHONE: 800.255.1521 EMAIL: john@mesimpson.com

Level 1 Validation Form

WATER SYSTEM NAME: East Chicago, Indiana DATE: 6.25.21

Part I. Water Supplied Continued

AWWA Water Audit Input	Input Adjusted (Y/N)	Final DVG	Confirmation of Input Derivation	Confirmation of DVG Assignment
2) Volume from Own Sources Master Meter Error Adjustment ("MMEA")	No	10	**Adjustment basis:** No Adjustment made **Net storage change included:** No. Found that the volume changes amount to a net of 170,000 gals, and would have no major effect on the audit. **Comments:** 1 spool mag meter tested, Size is 42". Siemens Mag Flow tubes. 1-30" tested and described as DP meter (assume Venturi Meter). No percentages of accuracies for any meters listed on certificates. **Confirmed input value:** 0.00% (from test results of meters). Data submitted indicates a "10" the DVG.	**Supply meter read frequency:** SCADA reads at any time but meters read daily **Supply meter read method:** SCADA (4-20 mAmp sig.) **Frequency of data review**: daily **Storage level monitoring frequency:** No adjustment for Tank levels made for audit. **Comments:** **Confirmed DVG: 10**
3) Water Imported ("WI")	N/A	N/A	**Import meter profile:** Interconnected to Hammond Water and Indiana American. Both are unmetered Emergency Connections. **WI data source:** **Comments:** **Confirmed input value:** N/A	**Percent of WI metered:** N/A **Signal calibration frequency:** **Volumetric testing frequency:** **Volumetric testing method:** **Percent of WI tested and/or calibrated:** **Comments:** **Confirmed DVG: N/A**

VALIDATOR NAME: John H. Van Arsdel

PHONE: 800.255.1521 EMAIL: john@mesimpson.com

Level 1 Validation Form

WATER SYSTEM NAME: East Chicago, Indiana DATE: 6.25.21

Part I. Water Supplied Continued

AWWA Water Audit Input	Input Adjusted (Y/N)	Final DVG	Confirmation of Input Derivation	Confirmation of DVG Assignment
4) Water Imported MMEA	N/A	N/A	**Adjustment basis:** N/A **Comments:** No Exported water used **Confirmed input value:**	**Import meter read frequency:** N/A **Import meter read method:** **Frequency of data review:** **Comments**: **Confirmed DVG**:
5) Water Exported ("WE")	N/A	N/A	**Export meter profile:** No water exported. **WE data source:** **Comments:** **Confirmed input value:**	**Percent of WE metered: N/A** **Signal calibration frequency:** **Volumetric testing frequency:** **Volumetric testing method:** **Percent of WE tested and/or calibrated:** **Comments:** **Confirmed DVG: N/A**

VALIDATOR NAME: John H. Van Arsdel

PHONE: 800.255.1521 EMAIL: john@mesimpson.com

Level 1 Validation Form

WATER SYSTEM NAME: East Chicago, Indiana DATE: 6.25.21

Part I. Water Supplied Continued

AWWA Water Audit Input	Input Adjusted (Y/N)	Final DVG	Confirmation of Input Derivation	Confirmation of DVG Assignment
6) Water Exported MMEA	N/A	N/A	**Adjustment basis: N/A** **Comments:** **Confirmed input value: N/A**	**Export water meter read frequency:** N/A **Export meter read method:** **Frequency of data review:** **Comments:** **Confirmed DVG: N/A**

VALIDATOR NAME: John H. Van Arsdel

PHONE: 800.255.1521 EMAIL: john@mesimpson.com

Level 1 Validation Form

WATER SYSTEM NAME: East Chicago, Indiana DATE: 6.25.21

Part II. Authorized Consumption Pre-Interview Notes:	

AWWA Water Audit Input	Input Adjusted (Y/N)	Final DVG	Confirmation of Input Derivation	Confirmation of DVG Assignment
7) Billed Metered Authorized Consumption ("BMAC")	No	8	**Customer meters & reads profile:** AMI/AMR read system (82% AMI/ 18% AMR touch read with some manual reads.) **Age profile:** 0-20 yrs. **Read system:** AMI (Fixed Base and touch read) **Read frequency:** Monthly. Res identical on the 15th, Commercial/Industrial on the 23rd. **Billing data pro-rated?** Lag Billing applied. **Comments:** In process of going full fixed base by end of 2021. Able to have DVG improved from 6 to 8. Will finish change out of older meters this year. **Confirmed input value: 2,557.575 MG**	**Percent of customers metered: 100%** **Small meter testing policy:** Not Tested… changed out if there is an issue **# of small meters/year:** 0 **Large meter testing policy:** Occasional LG M Tests (last records show 2014 LG M Testing but not since) **# of large meters tested/year:** 0 **Meters replaced/year:** as needed **Billing data auditing practice**: EC is new to audit practices so there were none previously **Comments:** See above **Confirmed DVG: 8**

VALIDATOR NAME: John H. Van Arsdel

PHONE: 800.255.1521 EMAIL: john@mesimpson.com

Level 1 Validation Form

WATER SYSTEM NAME: East Chicago, Indiana DATE: 6.25.21

Part II. Authorized Consumption Continued

AWWA Water Audit Input	Input Adjusted (Y/N)	Final DVG	Confirmation of Input Derivation	Confirmation of DVG Assignment
8) Billed Unmetered Authorized Consumption ("BUAC")	N/A	N/A	**Billed unmetered profile:** Everything is metered/ billed **Input derivation:** **Comments:** **Confirmed input value: N/A**	**Policy for metering exemption:** Everything is now metered. **Input derivation:** **Comments:** **Confirmed DVG: N/A**
9) Unbilled metered Authorized Consumption ("UMAC")	N/A	N/A	**Unbilled metered profile:** No unbilled metered use. **Input derivation:** **Comments:** **Confirmed input value: N/A**	**Policy for metering exemption**: **Comments**: **Confirmed DVGN/A**
10) Unbilled unmetered Authorized Consumption ("UUAC")	No	5	**Unbilled unmetered profile:** Default value applied. **Input derivation:** Default value **Comments:** EC Needs to itemize UUAC **Confirmed input value:** 47.305 from default	**Input derivation:** Default value **Default of adjusted default applied:** Yes **Completeness of documentation:** Default. So none. **Comments:** **Confirmed DVG:** 5

VALIDATOR NAME: John H. Van Arsdel

PHONE: 800.255.1521 EMAIL: john@mesimpson.com

Level 1 Validation Form

WATER SYSTEM NAME: East Chicago, Indiana DATE: 6.25.21

Part III. Water Losses Pre-Interview Notes:	

AWWA Water Audit Input	Input Adjusted (Y/N)	Final DVG	Confirmation of Input Derivation	Confirmation of DVG Assignment
11) Unauthorized Consumption ("UC")	No	5	**Default applied?** Yes **Input derivation if customized:** **Comments:** Need to explain to EC what this is. **Confirmed input value:**	**Instances and extent of UC documented:** None **Comments:** Default taken **Confirmed DVG: 5**
12) Customer Metering inaccuracies ("CMI")	No	5	**Input derivation:** 5 % used based on IWA's recommendation for % meters can be off even if new. **Comments:** See above **Confirmed input value:** 134.609MG	**Characteristics of meter testing:** No current meter testing performed, meters are changed out if meter is suspected of an issue. Utility looking at testing program. **Characterizations of meter replacement:** As needed. **Comments:** **Confirmed DVG:**
13) Systematic data handling errors ("SDHE")	No	5	**Input derivation:** Default value used **Comments:** Default value used **Confirmed input value:** 6.394 MG	**If custom estimate provided:** Default value used **Characteristic of read collection and billing process:** AMI/AMR in use. Reads performed monthly. **Characteristic of billing process and billing data auditing:** AMI/AMR read system. Billing software is third party. **Confirmed DVG: 5**

Part IV. System Data Pre-Interview Notes:	

VALIDATOR NAME: John H. Van Arsdel

PHONE: 800.255.1521 EMAIL: john@mesimpson.com

Level 1 Validation Form

WATER SYSTEM NAME: East Chicago, Indiana DATE: 6.25.21

AWWA Water Audit Input	Input Adjusted (Y/N)	Final DVG	Confirmation of Input Derivation	Confirmation of DVG Assignment
14) Length of Mains	No	8	**Input derivation:** IURC report **Hydrant lateral length included:** yes **Comments:** need to confirm miles **Confirmed input value:** 90 miles	**Mapping format:** GIS **Asset Management database:** GIS **Map updates & field validation:** Implemented this year. **Comments:** **Confirmed DVG:** 8. Improved original DVG from 6 to 8.
15) Number of Active and Inactive Service Connections	No	7	**Input derivation:** IURC report **Basis for database query:** IURC report **Comments:** See above **Confirmed input value:** 6,873	**GIS updated & field validation:** current and in process. **Estimated error of total count within:** 3%, still a lot of old former industrial sites to confirm have been cut and capped. **Comments:** City in the process of GIS implementation, still gathering field data. **Confirmed DVG: 7**

VALIDATOR NAME: John H. Van Arsdel

PHONE: 800.255.1521 EMAIL: john@mesimpson.com

Level 1 Validation Form

WATER SYSTEM NAME: East Chicago, Indiana DATE: 6.25.21

Part IV. System Data Continued

AWWA Water Audit Input	Input Adjusted (Y/N)	Final DVG	Confirmation of Input Derivation	Confirmation of DVG Assignment
16) Average Length of Service Connection	No	7	**Are customer meters at curb stop/property line?** No **Where are customer meters installed if not at the curb stop?** Inside building. Some commercial meters in vaults. **Customer service line derivation:** GIS in progress of being implemented. Estimated length given, Residential lots are smaller lots. **Comments:** See above **Confirmed input value:** 50 feet	**Comments:** Estimated by City Staff **Confirmed DVG:** 7, changed from 5 to 7 per discussion with staff and auditors.
17) Average Operating Pressure	No	7	**Number of zones, general setup:** One Zone, no booster stations. **Typical pressure range:** 70 PSI **Input derivation:** Fire flows, hydraulic study by third party consulting Engineer. **Comments:** **Confirmed input value:** 70 PSI	**Extent of static pressure data collection:** WT Plant. Towers, fire flow tests. **Characterization of real-time pressure data collection:** **Hydraulic model in place?** Burke Engineering updated 3.21. **Calibrated?** Yes **Age of model:** 2021 **Comments: Appears to be god data.** **Confirmed DVG:** 7 (Improved from 5 during Validation)

Part V. Cost Data

Pre-Interview Notes:

VALIDATOR NAME: John H. Van Arsdel

PHONE: 800.255.1521 EMAIL: john@mesimpson.com

Level 1 Validation Form

WATER SYSTEM NAME: East Chicago, Indiana DATE: 6.25.21

AWWA Water Audit Input	Input Adjusted (Y/N)	Final DVG	Confirmation of Input Derivation	Confirmation of DVG Assignment
18) Total annual operating cost ("TOC")	No	7	**Input Derivation:** IURC report **Comments:** Includes usual data sources **Confirmed input value:** $5,281,402	**Frequency of internal auditing:** Annually during IURC reporting **Frequency of third-party CPA auditing:** None **Comments:** recommend 3rd party audit of financials. **Confirmed DVG: 7**
19) Customer retail unit cost ("CRUC")	No	8	**Input derivation:** Aver. Of 4 rates. IURC report **Sewer charges volumetric?** Volume based? **Sewer charges included?** No. **Comments:** **Confirmed input value:** $1.84/kgals	**Characterization of calculation:** Aver. Of 4 rates (may need corrections) **Comments: IURC report** **Confirmed DVG: 8**

VALIDATOR NAME: John H. Van Arsdel

PHONE: 800.255.1521 EMAIL: john@mesimpson.com

Level 1 Validation Form

WATER SYSTEM NAME: East Chicago, Indiana DATE: 6.25.21

Part V. Cost Data Continued

AWWA Water Audit Input	Input Adjusted (Y/N)	Final DVG	Confirmation of Input Derivation	Confirmation of DVG Assignment
20) Variable production cost ("VPC")	No	7	**Supply profile:** IURC report **Direct variable costs included:** Yes **Secondary costs included:** yes **Comments: costs appear to be good.** **Confirmed input value:** $1,395.56	**Characterization of calculation:** IURC report **Comments:** No 3rd party CPA used – yet. **Confirmed DVG: 7**

VALIDATOR NAME: John H. Van Arsdel

PHONE: 800.255.1521 EMAIL: john@mesimpson.com

Level 1 Validation Form

WATER SYSTEM NAME: East Chicago, Indiana DATE: 6.25.21

Part VI. Summary

Final Call Notes:

Total Data Validity Score	Infrastructure Leakage Index (ILI)	Real Losses (gal/conn/day)
71	20.08	410.21

Condition of Infrastructure & Description of Water Loss Control Activity

Pipe network age range: Mix of Old and new

Main breaks/year: 25 in 2019

Service breaks/year: 129 in 2019

Main and service line replacement program (historical & current): Lead line replacement in progress. Older mains are next.

No current proactive leakage management: Recently implemented a Leak Detection Program and will continue with it.

Meter Replacements, smaller meters: Just replaced 5,698

Meter Replacement, larger meters: 29 in 2013

GIS and asset management: GIS recently implemented.

Old cast iron main replacements: What type of program do they have?? None in place currently because lead service lines have taken priority.

VALIDATOR NAME: John H. Van Arsdel

PHONE: 800.255.1521 EMAIL: john@mesimpson.com

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
+ Click to add a comment

Water Audit Report for: East Chicago IN Water Works (5245012)
Reporting Year: 2019 | 1/2019 - 12/2019

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<---------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED

						Pcnt:	Value:	
Volume from own sources:	8	3,784.422	MG/Yr	10	0.00%			MG/Yr
Water imported:		0.000	MG/Yr					MG/Yr
Water exported:		0.000	MG/Yr					MG/Yr
WATER SUPPLIED:		**3,784.422**	MG/Yr					

Enter negative % or value for under-registration
Enter positive % or value for over-registration

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:	Value:	
Billed metered:	8	2,557.575	MG/Yr			
Billed unmetered:			MG/Yr			
Unbilled metered:			MG/Yr			
Unbilled unmetered:	5	47.305	MG/Yr	1.25%		MG/Yr
AUTHORIZED CONSUMPTION:		**2,604.880**	MG/Yr			

Default option selected for Unbilled unmetered - a grading of 5 is applied but not displayed

Use buttons to select percentage of water supplied **OR** value

WATER LOSSES (Water Supplied - Authorized Consumption) **1,179.542** MG/Yr

Apparent Losses

				Pcnt:	Value:	
Unauthorized consumption:		9.461	MG/Yr	0.25%		MG/Yr
Customer metering inaccuracies:	5	134.609	MG/Yr	5.00%		MG/Yr
Systematic data handling errors:	5	6.394	MG/Yr	0.25%		MG/Yr
Apparent Losses:		**150.464**	MG/Yr			

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: **1,029.078** MG/Yr

WATER LOSSES: **1,179.542** MG/Yr

NON-REVENUE WATER

NON-REVENUE WATER: **1,226.847** MG/Yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	8	90.0	miles	
Number of active AND inactive service connections:	7	6,873		
Service connection density:		76	conn./mile main	
Are customer meters typically located at the curbstop or property line?		No		
Average length of customer service line:	7	50.0	ft	(length of service line, beyond the property boundary, that is the responsibility of the utility)
Average operating pressure:	7	70.0	psi	

COST DATA

Total annual cost of operating water system:	7	$5,281,402	$/Year	
Customer retail unit cost (applied to Apparent Losses):	8	$1.84	$/1000 gallons (US)	
Variable production cost (applied to Real Losses):	7	$1,395.56	$/Million gallons	☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

*** YOUR SCORE IS: 71 out of 100 ***

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Unauthorized consumption

APPENDIX D

IDEM Capacity Development Self-Assessment

APPENDIX E

Preliminary Design Summary

APPENDIX F

Signatory Authorization Resolution

APPENDIX G

Per Acceptance Resolution

RESOLUTION NO. WD ~~20-08~~ 21-08

A RESOLUTION AUTHORIZING AND DESIGNATING THE BOARD PRESIDENT AND/OR VICE PRESIDENT THE AUTHORIZED SIGNATORIES FOR STATE REVOLVING LOAN FUND TRANSACTIONS

WHEREAS, the State Revolving Loan Program requires the designation by a participating governmental entity of the authorized signatory for transacting its business.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the East Chicago Department of Waterworks that the Board President or Board Vice President be hereby designated the authorized signatories for all State Revolving Loan Fund transactions including, but not limited to disbursement request forms.

PASSED and ADOPTED on this the 7th day of June 2021.

Henry Ventura, President

Joseph Ochoa, Vice President

Anthony Askounis, Member

/s/ Raymond Lopez

Raymond Lopez, Member

John Bakota, Member

ATTEST:

Anthony Herrera, Secretary

APPENDIX H

Financial Information Form

APPENDIX I

Public Hearing Requirements

(To be provided when complete.)

JC-5

Anthony Copeland
MAYOR

City of East Chicago
4527 INDIANAPOLIS BLVD.
EAST CHICAGO, INDIANA 46312
219-391-8200 • 219-391-8397 FAX

March 31, 2022

Mr. Brett Roberts, Drinking Water Program Manager
DWSRF Administrator
100 North Senate Avenue, Room 1275
Indianapolis, IN 46204

Re: East Chicago, Indiana Department of Water Works
State Revolving Funds (SRF) Loan Application

Dear Mr. Roberts:

The City of East Chicago is submitting the attached Application Form and documentation for your consideration relating to the Drinking Water State Revolving Fund Loan Program (DWSRF).

Should you have any questions or need additional information, please feel free to contact my office at your convenience.

Sincerely,

Anthony Copeland, Mayor

ER
Enclosures

Cc: John P. Caruso, Christopher B Burke Engineering, Ltd.
Joseph Allegretti, Corporation Counsel
Andre Riley, BakerTilly Municipal Advisors, LLC

APPLICATION FORM
Drinking Water State Revolving Fund Loan Program (DWSRF)[1]

Return completed form to:
DWSRF Administrator
100 North Senate Avenue, Rm. 1275
Indianapolis, IN 46204

Section I. APPLICANT and SYSTEM INFORMATION

1. Applicant Name (community or water system name): East Chicago Department of Waterworks
2. Type of Applicant (check one):
   - ☒ Municipality (City, Town, County, Township)
   - ☐ Regional Water District
   - ☐ Non-profit Water Corporation
   - ☐ For-profit Utility
   - ☐ School
   - ☐ Other _____
3. Public Water Supply ID Number: IN 5245012
4. Location of the Proposed Project: City / Town: City of East Chicago
   County(ies): Lake Civil Township(s) : North
   State Representative District: 2 State Senate District: 2 Congressional District: 1
5. Population Served (https://myweb.in.gov/IDEM/DWW): 27,457
6. Population Trend (http://data.census.gov): ☐ Increasing ☒ Decreasing
7. Median Household Income for Service Area (http:/data.census.gov): $32,839.00
8. Unemployment Rate Data (http://data.bls.gov): 9.1%
9. Number of Connections (Current): 6,939 (Post-Project): 6,939
10. Current User Rate/4,000 gal.: $7.36 Estimated Post-Project Rate/4,000 gal.: No Change
11. Is the utility regulated by the Indiana Utility Regulatory Commission (IURC)?: ☒ Yes ☐ No
12. Applicant's Data Universal Numbering System (DUNS) Number[2]: 168 059 301
13. Does the Utility have any Interlocal agreements?: ☐ Yes ☒ No
    If yes, will they expire after final maturity of the SRF Loan?: ☐ Yes ☐ No
    If no, agreements will need to be renewed to ensure they expire after the final maturity of the SRF Loan.

Section II. CAPACITY DEVELOPMENT

Pursuant to the Safe Drinking Water Act, a DWSRF Loan Program Participant must certify that the Participant possesses the technical, managerial, and financial capacity to operate the water system or that the DWSRF Loan Program assistance will ensure compliance with the Safe Drinking Water Act (40 CFR 35.3520(d)(2)).

1. Does your system currently possess technical, managerial and financial capacity? ☒ Yes ☐ No
2. If no, will technical, managerial and financial capacity be achieved after the implementation of the water system's DWSRF project? ☐ Yes ☐ No

To assess the technical, managerial, and financial capacity of the water system, the Participant is encouraged to complete the "Indiana Department of the Environmental Management (IDEM) Capacity Development Self-Assessment", available at **www.srf.in.gov** .

[1] By submitting this form the Community is applying to multiple funding sources administered by the Authority, including the state Water Infrastructure Assistance Program. The Authority will determine the fund source that best serves the proposed project.
[2] SRF Participants must register with the SAM.gov, which requires the Participant to have a DUNS Number. For more information about how to obtain a DUNS number and register in SAM.gov, see **www.srf.in.gov** .

Section III. CONTACT INFORMATION

Authorized Signatory (an official of the Community or water system that is authorized to contractually obligate the applicant with respect to the proposed project):
Name: Joseph Ochoa
Title: President, E Chicago Board of WaterWorks
Address: 400 East Chicago Avenue
City, State, Zip Code: East Chicago, IN 46312
Telephone # (include area code): 219-391-8469/219-775-5668
E-mail: joe8aces@hotmail.com

Applicant Staff Contact (person to be contacted directly for information if different from authorized signatory):
Name: Ms. Winna Guzman
Title: Director, East Chicago Water Department
Address: 400 E. Chicago Avenue
City, State, Zip Code: East Chicago, IN 46312
Telephone # (include area code): 219-391-8469/219-670-0745
E-mail: wguzman@eastchicago.com

Certified Operator:
Name: Obed Perez, Jr.
Telephone # (include area code): 219-391-8487
E-mail: operez2@eastchicago.com

Grant Administrator (if applicable):
Contact: Not Applicable
Firm:
Address:
City, State, Zip Code:
Telephone # (include area code):
E-mail:

Consulting Engineer:
Contact: John P. Caruso, PE
Firm: Christopher B. Burke Engineering, Ltd.
Address: 9575 W. Higgins Road, Suite 600
City, State, Zip Code: Rosemont, IL 60018
Telephone # (include area code): 847-823-0500
E-mail: jcaruso@cbbel.com

Bond Counsel:
Contact: Scott Evans Peck
Firm: Faegre Drinker Biddle & Reath, LLP
Address: 300 N. Meridian Street, Suite 2500
City, State, Zip Code: Indianapolis, IN 46204
Telephone # (include area code): 317-237-1075
E-mail: scott.peck@faegredrinker.com

Financial Advisor:
Contact: Andre Riley
Firm: Baker Tilly Municipal Advisors, LLC
Address: 8365 Keystone Crossing, Suite 300
City, State, Zip Code: Indianapolis, IN 46240
Telephone # (include area code): 317-465-1537
E-mail: andre.riley@bakertilly.com

Local Counsel:
Contact: Joseph P. Allegretti
Firm: Joseph P. Allegretti, Attorney At Law
Address: 303 Ridge Road
City, State, Zip Code: Munster, IN 46321
Telephone # (include area code): 219-836-0222/219-765-4074
E-mail: joeallegretti00@gmail.com

Section IV. PROJECT INFORMATION

1. **Project Need** - Describe the facility needs in terms of age, condition, date of most recent rehabilitation/replacement, and any public health or Safe Drinking Water Act compliance issues or violations (if applicable):

Replace aged/obsolete existing elevated water tank which is too short for current water system operating pressures, provide new watermain to south neighborhood (Roxanna) to increase pressure and redundancy; furnish and install filter skids at membrane water treatment plant to provide additional filtration capacity and redundancy during maintenance/cleaning/replacement of membrane filters, and replace existing mambrane filters at water treatment plant as they reach their end of life cycle.

2. **Proposed Project** - Describe the scope of the proposed project and how it will address the applicant's needs as enumerated above. Please provide a map showing proposed work areas, if possible. Note: Projects that are solely for fire suppression or economic development are not eligible for funding under the Safe Drinking Water Act.

Design and construction of nre approximate 2 million gallon elevated storage tank at a height to meet current operating pressure of distribution system; install new watermain to serve south neighborhood to provide redundancy, increase pressure and increase fire flow capacity; furnish and install new filter skids at membrane water filtration plant to increase capacity and redundancy, and replace existing filter membranes as they reach their end of life cycle.

- Does the utility have a back-up power source?: ☒ Yes ☐ No
- Does the applicant have an Asset Management Program in place? ☐ Yes ☒ No
- Will the proposed project incorporate Green or Climate Ready Project Components?: ☒ Yes ☐ No

  If yes, complete the appropriate Checklist, found at http://www.in.gov/ifa/srf/2385.htm.
- Has the utility participated in Regional Planning Initiatives?[3]: ☒ Yes ☐ No
- What was the date of the utility's last Non-Revenue Water Audit?[4]: 06/25/21

  Was the last Non-Revenue Water Audit submitted to the IFA?: ☒ Yes ☐ No
- Is land acquisition and/or easements needed for this project? ☐ Yes ☒ No

  If yes, has all land been acquired? ☐ Yes ☐ No

  If yes, are all easements secured? ☐ Yes ☐ No

[3] Per IC 5-1.2-11.5-7 and 5-1.2-11-8, the Applicant has or will participate in a cooperative/ regional activity (e.g., attend an IFA Regional Planning Meeting [www.in.gov/ifa/3035] or cooperative activity) acceptable to the Authority.
[4] Per 8-1-30.8-8 and 5-1.2-11-8, for Drinking Water systems to apply to Authority programs a utility must demonstrate to the Authority that it has completed annual audits of non-revenue water, and submitted to the Authority as outlined in IC 8-1-30.8-6.

3. **Project Cost Estimate:**

Source (intake or wells)	$
Treatment	$ 6,000,000.00
Storage	$ 5,000,000.00
Distribution/Transmission	$ 1,500,000.00
Other:	$
TOTAL CONSTRUCTION:	$ 12,500,000.00
Non-construction Costs	$ 350,000.00
TOTAL ESTIMATED PROJECT COST:	$ 12,850,000.00

Other Funding Sources:

	Application Submittal (date)	Amount Requested (dollars)	Amount Awarded (if applicable)
Office of Community and Rural Affairs			
U.S. Dept. of Commerce Economic Development Administration			
U.S. Dept. of Agriculture Rural Development			
Local Funds			
Other:			

4. Will this project proceed if other funding sources are not in place?: ☒ Yes ☐ No

5. Anticipated SRF Loan Amount (after other funding): $ 12,850,000.00

6. What was the end date of the last full State Board of Accounts Audit?: As of 12/31/2020

7. Important Anticipated Dates

   Preliminary Engineering Report Submittal: 5/1/2022

   Bid Open Date: 11/1/2022

   SRF Loan Closing: 11/30/2022

   Construction Start: 3/1/2022

   Construction Complete: 11/1/2023

Section V. ADDITIONAL FINANCIAL QUESTIONS

Please confirm your answers with your legal and financial advisers prior to submitting your responses as related to the applicant's plans to issue bonds that will be used to secure the requested SRF loan

A. Will this SRF loan be repaid from net revenue of the applicant's utility being improved by the SRF project?:

☐ Yes ☒ No

If "yes", then please answer the following additional questions:

- Are there any other debt obligations of this utility (i.e., bank loans, guarantee savings contracts, installment payment contracts, bank or financing purchase leases, loans from other utilities of the applicant)?

☐ Yes ☐ No

- Is an estimated debt service coverage percentage currently available (coverage is computed by taking Net Revenues and dividing it by maximum annual debt service inclusive of both the planned new and any outstanding revenue bonds)? ☐ Yes ☐ No
  - if available, the coverage estimate is _____ percent.

Please know that prior to any loan preclosing, a formal pro forma coverage showing of at least 125% is required by SRF.

B. Will net revenues be the sole source of repayment? ☒ Yes ☐ No

If "no" was marked in Questions A and B, then please answer the following additional questions:

- What is the planned source(s) to provide funds to make SRF loan repayments? Check below as applicable:

☐ property taxes. If checked:
  - Is a preliminary determination & remonstrance process under IC 6-1.1-20 required? ☐ Yes ☐ No
  - Has that preliminary determination & remonstrance process under IC 6-1.1-20 been completed? ☐ Yes ☐ No

☐ tax increment revenues. If checked:
  - Has a TIF area already established? ☐ Yes ☐ No

If already established:
1) Please provide history of tax increment revenues (at least five (5) years)
2) Provide a schedule of projected tax increment revenues, debt service (which includes existing obligations pledged with tax increment revenues) and a showing that the 125% coverage requirement is met.

☐ other (describe: _____).

C. Will proceeds be used to payoff an existing BAN? ☐ Yes ☒ No

- if "yes", provide amount of the payoff _____.
- And, provide the purpose for which the BAN was used: ☐ Construction ☐ Non-construction

If Construction is selected, the subject of the BAN will require SRF review prior to construction.

Section VI. SIGNATURE

I certify that I am legally authorized by the legislative body to sign this application. To the best of my knowledge and belief, the foregoing information is true and correct.

Joseph Ochoa
Signature of Authorized Signatory (Community Official)

Joseph Ochoa
Printed or Typed Name

President Water Board
Title of Authorized Signatory

4/1/22
Date

JC-6

Anthony Copeland
MAYOR

City of East Chicago
4527 INDIANAPOLIS BLVD.
EAST CHICAGO, INDIANA 46312
219-391-8200 • 219-391-8397 FAX

March 31, 2022

Mr. Brett Roberts, Drinking Water Program Manager
DWSRF Administrator
100 North Senate Avenue, Room 1275
Indianapolis, IN 46204

Re: East Chicago, Indiana Department of Water Works
State Revolving Funds (SRF) Loan Application

Dear Mr. Roberts:

The City of East Chicago is submitting the attached Application Form and documentation for your consideration relating to the Drinking Water State Revolving Fund Loan Program (DWSRF).

Should you have any questions or need additional information, please feel free to contact my office at your convenience.

Sincerely,

Anthony Copeland, Mayor

ER
Enclosures

Cc: John P. Caruso, Christopher B Burke Engineering, Ltd.
Joseph Allegretti, Corporation Counsel
Andre Riley, BakerTilly Municipal Advisors, LLC

APPLICATION FORM
Drinking Water State Revolving Fund Loan Program (DWSRF)[1]

Return completed form to:
DWSRF Administrator
100 North Senate Avenue, Rm. 1275
Indianapolis, IN 46204

Section I. APPLICANT and SYSTEM INFORMATION

1. Applicant Name (community or water system name): East Chicago Department of Waterworks
2. Type of Applicant (check one):

☒ Municipality (City, Town, County, Township) ☐ For-profit Utility
☐ Regional Water District ☐ School
☐ Non-profit Water Corporation ☐ Other _____

3. Public Water Supply ID Number: IN 5245012
4. Location of the Proposed Project: City / Town: City of East Chicago
   County(ies): Lake Civil Township(s) : North
   State Representative District: 2 State Senate District: 2 Congressional District: 1
5. Population Served (https://myweb.in.gov/IDEM/DWW): 27,457
6. Population Trend (http://data.census.gov): ☐ Increasing ☒ Decreasing
7. Median Household Income for Service Area (http:/data.census.gov): $32,839.00
8. Unemployment Rate Data (http://data.bls.gov): 9.1%
9. Number of Connections (Current): 6,939 (Post-Project): 6,939
10. Current User Rate/4,000 gal.: $7.36 Estimated Post-Project Rate/4,000 gal.: No Change
11. Is the utility regulated by the Indiana Utility Regulatory Commission (IURC)?: ☒ Yes ☐ No
12. Applicant's Data Universal Numbering System (DUNS) Number[2]: 168 059 301
13. Does the Utility have any Interlocal agreements?: ☐ Yes ☒ No

    If yes, will they expire after final maturity of the SRF Loan?: ☐ Yes ☐ No

    If no, agreements will need to be renewed to ensure they expire after the final maturity of the SRF Loan.

Section II. CAPACITY DEVELOPMENT

Pursuant to the Safe Drinking Water Act, a DWSRF Loan Program Participant must certify that the Participant possesses the technical, managerial, and financial capacity to operate the water system or that the DWSRF Loan Program assistance will ensure compliance with the Safe Drinking Water Act (40 CFR 35.3520(d)(2)).

1. Does your system currently possess technical, managerial and financial capacity? ☒ Yes ☐ No
2. If no, will technical, managerial and financial capacity be achieved after the implementation of the water system's DWSRF project? ☐ Yes ☐ No

To assess the technical, managerial, and financial capacity of the water system, the Participant is encouraged to complete the "Indiana Department of the Environmental Management (IDEM) Capacity Development Self-Assessment", available at **www.srf.in.gov** .

[1] By submitting this form the Community is applying to multiple funding sources administered by the Authority, including the state Water Infrastructure Assistance Program. The Authority will determine the fund source that best serves the proposed project.
[2] SRF Participants must register with the SAM.gov, which requires the Participant to have a DUNS Number. For more information about how to obtain a DUNS number and register in SAM.gov, see **www.srf.in.gov** .

Section III. CONTACT INFORMATION

Authorized Signatory (an official of the Community or water system that is authorized to contractually obligate the applicant with respect to the proposed project):
Name: Joseph Ochoa
Title: President, E Chicago Board of WaterWorks
Address: 400 East Chicago Avenue
City, State, Zip Code: East Chicago, IN 46312
Telephone # (include area code): 219-391-8469/219-775-5668
E-mail: joe8aces@hotmail.com

Applicant Staff Contact (person to be contacted directly for information if different from authorized signatory):
Name: Ms. Winna Guzman
Title: Director, East Chicago Water Department
Address: 400 E. Chicago Avenue
City, State, Zip Code: East Chicago, IN 46312
Telephone # (include area code): 219-391-8469/219-670-0745
E-mail: wguzman@eastchicago.com

Certified Operator:
Name: Obed Perez, Jr.
Telephone # (include area code): 219-391-8487
E-mail: operez2@eastchicago.com

Grant Administrator (if applicable):
Contact: Not Applicable
Firm:
Address:
City, State, Zip Code:
Telephone # (include area code):
E-mail:

Consulting Engineer:
Contact: John P. Caruso, PE
Firm: Christopher B. Burke Engineering, Ltd.
Address: 9575 W. Higgins Road, Suite 600
City, State, Zip Code: Rosemont, IL 60018
Telephone # (include area code): 847-823-0500
E-mail: jcaruso@cbbel.com

Bond Counsel:
Contact: Scott Evans Peck
Firm: Faegre Drinker Biddle & Reath, LLP
Address: 300 N. Meridian Street, Suite 2500
City, State, Zip Code: Indianapolis, IN 46204
Telephone # (include area code): 317-237-1075
E-mail: scott.peck@faegredrinker.com

Financial Advisor:
Contact: Andre Riley
Firm: Baker Tilly Municipal Advisors, LLC
Address: 8365 Keystone Crossing, Suite 300
City, State, Zip Code: Indianapolis, IN 46240
Telephone # (include area code): 317-465-1537
E-mail: andre.riley@bakertilly.com

Local Counsel:
Contact: Joseph P. Allegretti
Firm: Joseph P. Allegretti, Attorney At Law
Address: 303 Ridge Road
City, State, Zip Code: Munster, IN 46321
Telephone # (include area code): 219-836-0222/219-765-4074
E-mail: joeallegretti00@gmail.com

Section IV. PROJECT INFORMATION

1. **Project Need -** Describe the facility needs in terms of age, condition, date of most recent rehabilitation/replacement, and any public health or Safe Drinking Water Act compliance issues or violations (if applicable):

Replacement of aged lead service lines to comply with current State and Federal recommendations.

2. **Proposed Project -** Describe the scope of the proposed project and how it will address the applicant's needs as enumerated above. Please provide a map showing proposed work areas, if possible. Note: Projects that are solely for fire suppression or economic development are not eligible for funding under the Safe Drinking Water Act.

The scope of work entails full replacement of residential lead service lines leading from the water main directly into the structure. This will allow the City to continue its commitment to replace lead service lines and reduce the health risk associated with exposure to lead in drinking water. It is a long term solution to protect public health. Also, there are aging, deteriorated and leaking lead servies lines throughout the distribution system that impact audits/billing and leak detection efforts. To date, the City has replaced a total of 615 water service lines to date.

- Does the utility have a back-up power source?: ☒ Yes ☐ No
- Does the applicant have an Asset Management Program in place? ☐ Yes ☒ No
- Will the proposed project incorporate Green or Climate Ready Project Components?: ☒ Yes ☐ No

  If yes, complete the appropriate Checklist, found at http://www.in.gov/ifa/srf/2385.htm.
- Has the utility participated in Regional Planning Initiatives?[3]: ☒ Yes ☐ No
- What was the date of the utility's last Non-Revenue Water Audit?[4]: 06/25/21

  Was the last Non-Revenue Water Audit submitted to the IFA?: ☒ Yes ☐ No
- Is land acquisition and/or easements needed for this project? ☐ Yes ☒ No

  If yes, has all land been acquired? ☐ Yes ☐ No

  If yes, are all easements secured? ☐ Yes ☐ No

[3] Per IC 5-1.2-11.5-7 and 5-1.2-11-8, the Applicant has or will participate in a cooperative/ regional activity (e.g., attend an IFA Regional Planning Meeting [www.in.gov/ifa/3035] or cooperative activity) acceptable to the Authority.
[4] Per 8-1-30.8-8 and 5-1.2-11-8, for Drinking Water systems to apply to Authority programs a utility must demonstrate to the Authority that it has completed annual audits of non-revenue water, and submitted to the Authority as outlined in IC 8-1-30.8-6.

3. **Project Cost Estimate:**

Source (intake or wells)	$
Treatment	$ 0.00
Storage	$ 0.00
Distribution/Transmission	$ 10,000,000.00
Other:	$
TOTAL CONSTRUCTION:	$ 10,000,000.00
Non-construction Costs	$ 250,000.00
TOTAL ESTIMATED PROJECT COST:	$ 10,250,000.00

Other Funding Sources:

	Application Submittal (date)	Amount Requested (dollars)	Amount Awarded (if applicable)
Office of Community and Rural Affairs			
U.S. Dept. of Commerce Economic Development Administration			
U.S. Dept. of Agriculture Rural Development			
Local Funds			
Other:			

4. Will this project proceed if other funding sources are not in place?: ☒ Yes ☐ No

5. Anticipated SRF Loan Amount (after other funding): $ 10,250,000.00

6. What was the end date of the last full State Board of Accounts Audit?: As of 12/31/2020

7. Important Anticipated Dates

Preliminary Engineering Report Submittal: May 1, 2022
Bid Open Date: 11/1/2022
SRF Loan Closing: 11/30/2022
Construction Start: 3/1/2023
Construction Complete: 11/1/2023

Section V. ADDITIONAL FINANCIAL QUESTIONS

Please confirm your answers with your legal and financial advisers prior to submitting your responses as related to the applicant's plans to issue bonds that will be used to secure the requested SRF loan

A. Will this SRF loan be repaid from net revenue of the applicant's utility being improved by the SRF project?:

☐ Yes ☒ No

If "yes", then please answer the following additional questions:

- Are there any other debt obligations of this utility (i.e., bank loans, guarantee savings contracts, installment payment contracts, bank or financing purchase leases, loans from other utilities of the applicant)?

☐ Yes ☐ No

- Is an estimated debt service coverage percentage currently available (coverage is computed by taking Net Revenues and dividing it by maximum annual debt service inclusive of both the planned new and any outstanding revenue bonds)? ☐ Yes ☐ No
  - if available, the coverage estimate is _____ percent.

Please know that prior to any loan preclosing, a formal pro forma coverage showing of at least 125% is required by SRF.

B. Will net revenues be the sole source of repayment? ☒ Yes ☐ No

If "no" was marked in Questions A and B, then please answer the following additional questions:

- What is the planned source(s) to provide funds to make SRF loan repayments? Check below as applicable:

☐ property taxes. If checked:
- Is a preliminary determination & remonstrance process under IC 6-1.1-20 required? ☐ Yes ☐ No
- Has that preliminary determination & remonstrance process under IC 6-1.1-20 been completed? ☐ Yes ☐ No

☐ tax increment revenues. If checked:
- Has a TIF area already established? ☐ Yes ☐ No

If already established:
1) Please provide history of tax increment revenues (at least five (5) years)
2) Provide a schedule of projected tax increment revenues, debt service (which includes existing obligations pledged with tax increment revenues) and a showing that the 125% coverage requirement is met.

☐ other (describe: _____).

C. Will proceeds be used to payoff an existing BAN? ☐ Yes ☒ No

- if "yes", provide amount of the payoff _____.
- And, provide the purpose for which the BAN was used: ☐ Construction ☐ Non-construction

  If Construction is selected, the subject of the BAN will require SRF review prior to construction.

Section VI. SIGNATURE

I certify that I am legally authorized by the legislative body to sign this application. To the best of my knowledge and belief, the foregoing information is true and correct.

Joseph Ochoa
Signature of Authorized Signatory (Community Official)

Joseph Ochoa
Printed or Typed Name

President Water Board
Title of Authorized Signatory

4/1/22
Date