

**BOARD OF WATER & WASTEWATER COMMISSIONER'S**  
**MEETING AGENDA\***  
**Harwich Water Department, 196 Chatham Road, Harwich MA**  
*Thursday, March 23, 2023*  
*11:30 a.m.*

*\*As required by Open Meeting Law, you are hereby informed that the Town will be video and audio taping as well as broadcasting this public meeting. In addition, anyone in the audience who plans to video or audio tape this meeting must notify the Chairman prior to the start of the meeting.*

- I. CALL TO ORDER
- II. EXECUTIVE SESSION
- III. PUBLIC COMMENTS / ANNOUNCEMENTS
- IV. CONSENT AGENDA
  - A. Minutes
    - 1. March 9, 2023
- V. ABATEMENTS
- VI. OLD BUSINESS
  - A. FY24 Assistant Wastewater Superintendent
  - B. FY24 Water & Wastewater Budgets
  - C. 2023 Annual Town Meeting Articles
  - D. Water Restrictions Bylaw & Special Legislation
- VII. NEW BUSINESS
  - A. ATM Article- *Discussion re: Regulating Private Wells*
  - B. Debrief from Joint Meeting with Board of Selectmen
  - C. 2022 Tank Inspection Reports
- VIII. SUPERINTENDENT'S REPORT
- IX. COMMISSIONER'S REPORT
- X. CORRESPONDENCE / ANY OTHER BUSINESS
- XI. NEXT MEETING: TBD
- XII. ADJOURNMENT

*\*Per the Attorney General's Office: The Board of Water Commissioners may hold an open session for topics not reasonably anticipated by the Chair 48 hours in advance of the meeting following "New Business."  
If you are deaf or hard of hearing or are a person with a disability who requires an accommodation, contact the Water Department Office at 508-432-0304 x.0 or by email at [customerservice@harwichwater.com](mailto:customerservice@harwichwater.com).*

Authorized Posting Officer:

Town Posting Date: \_\_\_\_\_

Tracey Alves | Board Secretary

\_\_\_\_\_ | Town Clerk

## IV. CONSENT AGENDA

### A. Minutes

1. March 9, 2023

**MINUTES**  
**HARWICH WATER DEPARTMENT**  
**BOARD OF WATER/WASTEWATER COMMISSIONERS**  
Thursday, March 9, 2023  
11:30 a.m.

**WATER COMMISSIONER'S PRESENT:** Chair Gary Carreiro, Vice Chair Allin Thompson, Clerk Noreen Donahue, Commissioner Judith Underwood, Commissioner John Gough

**OTHERS PRESENT:** Superintendent Dan Pelletier, Comptroller Sandra Sieger, Billing Administrator Wellesley Marsh, Administrative Assistant Tracey Alves

**CALL TO ORDER**

Chair Carreiro called the meeting to order at 11:30 a.m.

**EXECUTIVE SESSION**

**CONSENT AGENDA**

- A. Minutes
  - 1. January 26, 2023
  - 2. February 16, 2023

Chair Carreiro motioned to approve the Consent Agenda. Vice Chair Thompson moved to approve the Consent Agenda with a correction to be made to the Minutes of January 26, 2023. Clerk Donahue also noticed where a correction was required in the Minutes of February 16, 2023. Clerk Donahue seconded the motion with corrections to be made to both the Minutes of January 26, 2023 as well as to the Minutes of February 16, 2023. All Board members were in favor; 5-0-0.

**ABATEMENTS**

- A. 65 Sou'West Dr

The Board reviewed an abatement request made by 65 Sou'West Dr. Commissioner Underwood motioned to deny the request for abatement. Commissioner Gough seconded the motion. All in favor; 5-0-0.

**OLD/UNFINISHED BUSINESS**

- A. Water Restrictions Bylaw & Special Legislation

The procedures that Attorney Giorgio devised for allowing the Department to put charges directly onto the water account were cumbersome. The staff would like to stay with the traditional ticket system for the moment.

What would be proposed for this May town meeting would be one article to change the antiquated amounts which are in the bylaws that are \$50 and \$100 to bring those up to \$100 and \$300.

The second bylaw change will be adding the wells to the people that we can enforce restrictions on.

## **NEW BUSINESS**

### **A. FY24 Wastewater Budget Bylaw & Special Legislation**

Superintendent Pelletier provided the Board with an overview of the revised Wastewater budget.

Clerk Donahue moved to approve the Wastewater Enterprise Fund Budget in the amount of \$1,992,677. Commissioner Underwood seconded the motion. All in favor; 5-0-0.

Clerk Donahue moved to approve and appropriation of \$105,181 from Wastewater Retained Earnings to the FY24 Wastewater budget. Commissioner Underwood seconded the motion. All in favor; 5-0-0.

Clerk Donahue moved to approve a reappropriation of \$857,446 from our Wastewater Enterprise FY23 budget in which \$857,446 represents an excess in the debt amount that was allocated for FY23. Clerk Donahue moves that, that amount, that excess, in the debt from FY23 Wastewater be reappropriated towards the estimated debt for FY24 Wastewater. Commissioner Underwood seconded the motion. All in favor; 5-0-0.

### **B. FY24 Water Budget**

Superintendent Pelletier provided the Board with an overview of the Water budget.

Clerk Donahue moved to approve the Water Enterprise budget in the amount of \$4,534,379. Commissioner Underwood seconded the motion. All in favor; 5-0-0.

One of the articles from last May created a surplus of \$300,000 in Enterprise Fund line. However that was booked, it was added into our Department and wasn't maintained as a separate article which was the intention.

Clerk Donahue moved that \$300,000 be reappropriated to pay for half of the estimate for FY24 new well source exploration phase #2 with a cost of \$600,000. Clerk Donahue moved that the Board appropriate \$300,000 from that line to go towards that \$600,000 cost. Vice Chair Thompson seconded the motion. All in favor; 5-0-0.

### **C. FY24 Assistant Water Superintendent Position**

This topic was a misprint and should have read FY24 Assistant Wastewater Superintendent Position. This topic will be added to the next agenda.

### **D. 2023 Annual Town Meeting Articles**

Superintendent Pelletier recapped the Water and Wastewater articles for May town meeting. There are going to be 12 capital articles plus an additional 2 non-cost articles totaling 14 articles.

### **E. Route 28 Watermain Replacement Project Update**

Superintendent Pelletier provided an updated cost estimate on the Route 28 water main replacement project. The most recent cost estimate has escalated to \$17.5 million.

F. Billing Update

Billing Administrator Marsh briefed the Board with a billing update. The town cancelled the contract with the new billing company. As a temporary measure we have paired with another bill print company based here in Massachusetts. We anticipate keeping the billing schedule on schedule for the April quarter.

**COMMISSIONER'S REPORT**

Clerk Donahue has two items. The Barnstable Septic Loan Program for people connecting has updated their new program called AQUIFund and you can find that on the Barnstable County website. There should be loans available for 0-2%.

Second, it may not be official yet but the very complicated septic tax credit that used to give a maximum of \$6k back over 4 years is now more than likely going to be increased to \$12k. Primary owners would qualify.

Chair Carreiro asked if when going over the wastewater budget and were talking about the possible new position for the new Wastewater Assistant Superintendent position, if we budgeted for our staff? Is there anything coming out of the wastewater budget for what they are doing here, Wellesley, Sandy, Tracey?

Dan relayed that 10% was budgeted within salary and wages for the administrative staff that would come out of the wastewater budget. This small percentage would also be used for meter reading.

**NEXT MEETING**

The next Board meeting will be held on Thursday, March 26, 2023 at 11:30 a.m.

**ADJOURNMENT**

Chair Carreiro motioned to adjourn at 12:44 p.m. Moved by Vice Chair Thompson and seconded by Commissioner Underwood. All in favor; 5-0-0.

\_\_\_\_\_  
Gary Carreiro, Chairman

\_\_\_\_\_  
Dan Pelletier, Superintendent

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Allin P. Thompson, Vice Chair

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Tracey Alves, Board Secretary

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Noreen Donahue, Clerk

\_\_\_\_\_  
Judith Underwood

\_\_\_\_\_  
John Gough

## VI. OLD BUSINESS

### A. FY24 Assistant Wastewater Superintendent

# MEMORANDUM



## Harwich Water & Wastewater Department

196 Chatham Road  
Harwich MA 02645  
P: 508-432-0304  
F: 888-774-3557

[www.harwichwater.com](http://www.harwichwater.com)

**To:** Harwich Board of Selectmen  
**From:** Dan Pelletier, Water/Wastewater Superintendent  
**CC:** Joe Powers, Town Administrator  
**Date:** March 16<sup>th</sup>, 2023  
**RE:** FY24 Assistant Wastewater Superintendent Position

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Included herein for the Boards consideration please find additional detail in support of proposed FY24 Assistant Wastewater Superintendent position.

### **Background:**

At the 2015 Annual Town Meeting the Town of Harwich approved its 40-year Comprehensive Wastewater Management Plan (CWMP). After adoption of the CWMP the Town established a framework where the Board of Selectmen are responsible for the design and construction of the wastewater collections system and implementation of the CWMP. As portions of the collections system are constructed and brought online responsibility for the physical infrastructure and day-to-day operation of the collections system would fall under the Board of Water & Wastewater Commissioners. As a result, the Board of Water Commissioners amended the existing Water Superintendent position to include oversight of the wastewater collections system establishing the new position of Water/Wastewater Superintendent. The responsibility of this position is for the day-to-day management and oversight of the Water Department and wastewater collections system upon commencement of flow. This framework as well as the expansion of the 3-member Water Commission to a 5-member Water/Wastewater Commission was adopted under Article 35 of the 2019 Annual Town Meeting.

### **Evolution of the Water/Wastewater Superintendent Position:**

Upon accepting the position of Water/Wastewater Superintendent in June of 2015 the predominant workload was water related as the CWMP was adopted a month prior and no wastewater construction had occurred. In the immediate years following the adoption of the CWMP, implementation activities responsible to the Board of Selectmen, including IMA negotiation, DHY negotiations, collections system design, securing of easements, legal coordination, public outreach, town meeting related items, and more were fulfilled through the Administration department with ongoing support from the Wastewater Implementation Committee, Town Engineer, and wastewater consultant CDM Smith. At that time, in my role as Water/Wastewater Superintendent I advocated for a seat at the table to be informed of, and provide comments & feedback on the collections system I would ultimately inherit. As the design of Phase 2 was completed and the project progressed to construction my involvement was still somewhat limited and included supporting the Phase 2 Project Outreach Coordinator. These duties grew extensively during construction as the collections system design for Phase 2 did not identify the location of individual sewer stubs, instead it was expected that this information would be provided by the property owners themselves. Due to the technical considerations that need to be made when determining a sewer stub location, this was not a task most residents could complete on their own or with the help of our Public Outreach Coordinator. Simultaneous to the construction of Phase 2 there was a growing public concern with portions of the CWMP as well as turnover in both the Administration and Engineering departments furthering my involvement with CWMP implementation. Since that time, I have had direct involvement in or assumed responsibility for renegotiating the terms of the Harwich-Chatham IMA, overseeing completion on Phase 2, Cold Brook Project, CWMP Revisions, Effluent Recharge Investigation, SewerCAD Modeling, Pleasant Bay Alliance &

Watershed Permit compliance, GSLA ARPA Grant, Route 28 Dry Sewer Pipe, and the Phase 3 Collections System Design. I am grateful for the opportunity to spearhead these efforts and take great pleasure in fulfilling the role my position has evolved into, that said, it should be noted that the additional duties I have taken on limit my ability to support the day-to-day operation of the wastewater department as originally intended.

**Existing & Anticipated FY24 Wastewater Projects:**

Existing:

- CWMP Revisions
- Effluent Recharge Investigation
- Phase 3 Collections System Design
- Cold Brook Project
- Route 28 Dry Sewer Pipe Design

Anticipated:

- Phase 3 Collections System Construction
- Route 28 Dry Sewer Pipe Construction
- Cold Brook Project Construction
- Great Sand Lakes Sewer Design

**Assistant Wastewater Superintendent:**

As noted above, the assumption of duties relating to CWMP implementation has limited my ability to support the day-to-day operations of the wastewater collections system. The proposed Assistant Wastewater Superintendent position is intended to not only fill this gap, but also provide the much-needed support in the areas of CWMP implementation, wastewater construction, and public outreach. Additional information on the position and duties are contained within the attached draft job description.

**Full Time vs. Part Time Employee:**

As conversations surrounding the creation of a new position occurred the concept of a part time Assistant Wastewater Superintendent was contemplated. This concept was originally proposed when considering the anticipated workload and duties responsible to the position and understanding the public sentiment surrounding the creation of new positions. During this exercise a hybrid 50/50 water/wastewater employee was contemplated and included reducing the quantity of FTE within the Water Department from 15FTE to 14.5FTE and splitting the duties between divisions. Ultimately, upon evaluating this concept the Board of Water/Wastewater Commissioners has recommended the position be established as full time, it is the position of the Board that the day-to-day oversight of the collections system, delegated tasks relative to CWMP implementation, and public outreach & support during wastewater construction justify full time status. In addition, the Board also expressed concern about the unintended consequences resulting from the reduction of FTE within the Water Department.

**Assistant Wastewater Superintendent Office Space & Vehicle:**

The Assistant Wastewater Superintendent is proposed to work out of the Water & Wastewater Department office located at 196 Chatham Road. The current office layout can accommodate an additional workstation for this position with no alterations to the building or IT infrastructure. The office is currently equipped with an auxiliary workstation that can be designated to this position. Where it is expected the Asst. Wastewater Superintendent will require a town vehicle to perform the duties of the position, I recommend retaining the better of 2 water dept. vehicles anticipated for trade in this year to be used in FY24. In speaking with Kyle Edson at DPW, he is anticipating 3 police cruisers will be retired next year, it would be my recommendation at that time to repurpose one of the retired cruisers for the Asst. Wastewater Superintendent.

**Phase 2 Collections System Stats:**

- 461 Order to Connect letters have been issued to the Phase 2 service area
- 110 Properties currently connected to the collections system
- Est. Connections in FY24 – additional 150 – 225 connections





## Town of Harwich

Water & Wastewater Department  
196 Chatham Road  
Harwich, MA 02645  
508-432-0304

**Position Title:** Assistant Wastewater Superintendent

**Department:** Wastewater

**Pay Grade:**

### **Statement of Duties**

The Assistant Wastewater Superintendent performs administrative, supervisory, and physical work in the planning, directing, and managing of all wastewater facilities and personnel involved in the Wastewater Department. Performs all other related work as required and as directed by the Superintendent.

### **Essential Functions**

*The essential functions or duties listed below are intended only as illustration of the various types of work that may be performed. The omission of specific statements of duties does not exclude them from the position if work is similar, related, or a logical assignment to the position.*

1. Responsible for the development & implementation of the wastewater department asset management plan.
2. Develop & maintain Standard Operating Procedures (SOPs) for recurring collections system maintenance activities.
3. Provide technical review of plans & specifications for proposed sewer system extensions.
4. Coordinate & oversee collections system maintenance activities including but not limited to, sewer system jetting, wet well cleaning, grease trap inspections, and camera inspections.
5. Coordinate & oversee pump station maintenance including pump/motor service, emergency standby generators, instrumentation, and SCADA equipment.
6. Prepares & maintains pumping reports for determining/validating flow variable expenses relating to Harwich-Chatham Inter Municipal Agreement and future agreements with neighboring communities.
7. Meets with property owners to assist in determining sewer service location.
8. Assist Superintendent in the preparation of bid documents and procurement of department services & supplies.
9. Inspects sewer installations to ensure all work is done in accordance with the department's rules & regulations.
10. Review sewer system as-built diagrams for completeness.
11. Plans and schedules maintenance of buildings and grounds to ensure that facilities are cleaned and kept in good repair.
12. Regularly checks & maintains an inventory of sewer system repair materials & supplies. Advises Superintendent when materials must be reordered and coordinates the receipt of inventory received against packing lists.
13. Processes applications from other utility companies (gas, telephone and electric) for permits to excavate.
14. Creates & assigns work orders to locate and mark-out sewer system pipes and appurtenances.
15. Responds to customer inquiries and complaints.
16. Assist Superintendent with state mandated reporting.
17. Maintain up-to-date knowledge of the methods, techniques and safety requirements relating to wastewater collections systems and pertinent EPA/DEP rules and regulations.
18. Assists the Superintendent in preparing and submitting information and reports regarding departmental plans and operations to federal and state agencies and local Boards and Commissions and Committees as required.
19. In conjunction with the Superintendent serves as town representative for wastewater capital improvement projects.



## **Town of Harwich**

Water & Wastewater Department  
196 Chatham Road  
Harwich, MA 02645  
508-432-0304

20. Keeps abreast of regulatory changes/developments to ensure compliance with all applicable State & Federal rules and regulations.
21. Assist the Superintendent with the planning & implementation of the Town's Comprehensive Wastewater Implementation Plan.
22. Assists the Superintendent in the preparation of in-house publications including informational newsletters on Wastewater Department activities, consumer education and other required regulatory consumer information.
23. Respond to wastewater emergencies occurring during or after regularly scheduled work shift.
24. Assist the Superintendent in coordinating bid processes to ensure compliance with all laws, rules and regulations.
25. Assists the Superintendent in reviewing proposals and monitoring and evaluating contractor performance.

### **Supervision**

Works under the direct supervision of the Superintendent and responsible for the day-to-day oversight of wastewater personnel, contract operations, and the wastewater collections system

### **Recommended Minimum Qualifications**

#### **Education and Experience**

Bachelors of Science in civil, environmental, mechanical, or chemical engineering, or related field. A minimum of five (5) years of experience in the field relating to the construction, repair and maintenance of wastewater collection systems and treatment facilities including the operation of related maintenance and mechanical equipment, or any equivalent combination of education and experience.

#### **Licensing and Certification**

Valid Class D Motor Vehicle Operator's License. Grade 4 (four) Collection System Certification

\*Consider including WWTP License?

#### **Knowledge, Skills and Abilities**

A candidate for this position should have:

- The ability to read diagrams, as-built plans and other detailed schematic drawings;
- Highly skilled and knowledgeable in all facets of sewer department operations;
- Technical knowledge with regard to construction techniques and procedures;
- Working knowledge of office practices and procedures;
- Written and verbal communication skills; and the
- Ability to deal courteously with the public.

#### **Tool and Equipment Used**

All facility equipment, hand tools, snow plow, laboratory equipment. Testing equipment, SCADA computer system, calculators, and general office equipment.



**Town of Harwich**

Water & Wastewater Department  
196 Chatham Road  
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508-432-0304

**Physical Demands**

The physical demands described here are representative of those that must be met by an employee to successfully perform the essential functions of this job. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential functions.

While performing the duties of the job, the employee is frequently required to stand; walk; sit; use hands to finger, handle or feel; reach with hands and arms; climb and balance; stoop, kneel, crouch or crawl; talk, see, smell or hear. The employee must frequently lift and/or move up to 75 pounds.

**Work Environment**

The work environment characteristics described here are representative of those an employee encounters while performing the essential functions of this job. Reasonable accommodations may be made to enable individuals with disabilities to perform the essential functions.

While performing the duties of this job, the employee is frequently exposed to small confined spaces, extreme heat, wet and/or humid conditions, moving mechanical parts, sharp blades, instruments and other sharp objects, vibrations, fumes, gases or airborne particles, blood borne pathogens or other diseases, toxic or caustic chemicals; outside weather conditions; and risk of electrical shock, burns and explosion. The noise level in the work environment is very loud. Regularly works with hazardous materials.

**External and Internal applicants, as well as position incumbents who become disabled as defined under the American With Disabilities Act, must be able to perform the essential job functions (as listed) either unaided or with the assistance of a reasonable accommodation to be determined by management on a case by case basis.**

## VI. OLD BUSINESS

### B. FY24 Water & Wastewater Budgets

**FY 2024 BUDGET  
WATER ENTERPRISE FUND**

Updated 3/16/23

ORG/OBJ	DESCRIPTION	FY 2021 ACTUALS	FY 2022 ACTUALS	FY 2023 BUDGET	FY 2024 BUDGET	% Increase
1320	WATER ENTERPRISE FUND					
596000	OFUS / INDIRECTS	\$730,290	\$727,304	\$759,278	\$818,913	
	<b>WATER ENTERPRISE FUND</b>	\$730,290	\$727,304	\$759,278	\$818,913	7.85%
13204501	WATER ENTERP SALARIES & WAGES	FY 2021 ACTUALS	FY 2022 ACTUALS	FY 2023 BUDGET	FY 2024 BUDGET	
511100	SALARIES ELECTED OFFICIALS	\$3,167	\$5,000	\$5,000	\$5,000	0.00%
511900	SALARIES & WAGES	\$929,095	\$949,016	\$993,386	\$1,034,522	4.14%
512000	SEASONAL S&W	\$14,201	\$4,141	\$33,946	\$35,654	5.03%
512500	COMPENSATORY TIME	\$1,953	\$1,416	\$0	\$0	0.00%
512501	STIPEND	\$0	\$0	\$0	\$0	0.00%
513000	OVERTIME	\$231,946	\$234,945	\$206,020	\$278,396	35.13%
513060	FLUSHING OT	\$0	\$0	\$31,185	\$0	-100.00%
514000	LONGEVITY	\$28,306	\$11,753	\$26,050	\$33,665	29.23%
515000	VACATION SALARIES & WAGES	\$0	\$0	\$0	\$0	0.00%
515005	SICK LEAVE BUY-BACK@RETIREMENT	\$8,299	\$10,818	\$0	\$0	0.00%
515007	SICK LEAVE BONUS PER CONTRACT	\$1,675	\$1,700	\$3,325	\$3,325	0.00%
	<b>WATER ENTERP SALARIES</b>	\$1,218,643	\$1,218,789	\$1,298,912	\$1,390,562	7.06%
						7.06%
13204502	WATER ENTERPRISE FUND EXPENSES	FY 2021 ACTUALS	FY 2022 ACTUALS	FY 2023 BUDGET	FY 2024 BUDGET	
517900	OTHER FRINGE BENEFITS	\$7,530	\$9,971	\$8,800	\$11,000	25.00%
521100	ELECTRIC UTILITY	\$361,269	\$341,499	\$366,427	\$407,177	11.12%
521200	GAS UTILITY	\$5,855	\$7,534	\$8,000	\$8,000	0.00%
524140	VEHICLE/EQUIPMENT MAINTENANCE	\$69,965	\$51,637	\$71,000	\$52,000	-26.76%
524160	BUILDING & GROUNDS MAINTENANCE	\$32,134	\$51,735	\$130,983	\$52,000	-60.30%
525000	TECHNICAL SUPPORT AGREEMENTS	\$23,755	\$34,933	\$43,540	\$43,540	0.00%
526000	BUILDING MAINT AGREEMENTS	\$9,865	\$4,137	\$22,750	\$22,750	0.00%
530800	LABORATORY SERVICES	\$35,314	\$12,278	\$35,314	\$35,314	0.00%
530820	PROFESSIONAL SERVICES	\$106,456	\$86,353	\$60,000	\$85,000	41.67%
530875	PRINTING SERVICES & SUPPLIES	\$8,932	\$9,147	\$10,000	\$10,000	0.00%
534100	ADVERTISING	\$2,730	\$2,491	\$1,500	\$2,500	66.67%
534300	POSTAGE	\$17,017	\$18,094	\$17,500	\$18,500	5.71%
534400	TELEPHONE	\$7,391	\$7,453	\$7,700	\$7,700	0.00%
534430	COMMUNICATION SERVICES	\$17,789	\$16,430	\$19,000	\$19,000	0.00%
541100	PROPANE UTILITY	\$14,250	\$16,067	\$18,944	\$16,100	-15.01%
542000	OFFICE SUPPLIES	\$6,284	\$4,582	\$6,300	\$6,300	0.00%
542013	HARDWARE/SOFTWARE/OFFICE	\$12,721	\$6,042	\$25,924	\$25,924	0.00%
548100	BULK FUEL	\$15,280	\$26,658	\$24,165	\$27,000	11.73%
548200	TREATMENT SUPPLIES	\$42,986	\$14,380	\$27,500	\$18,000	-34.55%
548250	TREATMENT CHEMICALS	\$157,042	\$165,877	\$165,000	\$247,850	50.21%
553000	PUBLIC WORKS SUPPLIES	\$27,799	\$14,751	\$27,800	\$27,800	0.00%
553100	METERS/READ DEVICES & SUPPLIES	\$108,908	\$115,987	\$180,000	\$180,000	0.00%
553200	SERVICE INSTALLATION SUPPLIES	\$48,668	\$77,125	\$48,700	\$77,000	58.11%

**FY 2024 BUDGET  
WATER ENTERPRISE FUND**

Updated 3/16/23

ORG/OBJ	DESCRIPTION	FY 2021 ACTUALS	FY 2022 ACTUALS	FY 2023 BUDGET	FY 2024 BUDGET	% Increase
553300	PIPES, VALVES & FITTINGS	\$72,452	\$110,394	\$90,000	\$110,500	22.78%
553350	WATER MAIN REPLACEMENT	\$98,093	\$31,083	\$35,000	\$85,000	142.86%
553500	POLICE DETAILS	\$27,906	\$27,413	\$35,000	\$27,500	-21.43%
553600	ROAD REPAIRS	\$34,476	\$16,401	\$34,500	\$16,500	-52.17%
553900	MECHANICAL TANK MAINT & INSP	\$6,930	\$12,495	\$10,000	\$13,000	30.00%
554200	GENERATOR MAINT	\$13,809	\$29,634	\$14,000	\$29,700	112.14%
554300	WELL REHAB	\$5,711	\$0	\$45,000	\$45,000	0.00%
558100	UNIFORMS AND SAFETY SUPPLIES	\$2,543	\$3,819	\$17,280	\$10,000	-42.13%
573000	DUES/SUBSCRIPTIONS/TRAVEL	\$12,954	\$8,474	\$13,000	\$13,000	0.00%
573200	WATER MGMT PERMIT	\$7,340	\$6,934	\$8,500	\$8,500	0.00%
575070	OPEB	\$50,000	\$50,000	\$50,000	\$50,000	0.00%
591000	MATURE PRINCIPAL LONGTERM DEBT	\$547,671	\$549,467	\$396,438	\$404,300	1.98%
591500	INTEREST ON LONG TERM DEBT	\$171,150	\$152,510	\$138,115	\$127,941	-7.37%
591550	ADMIN FEE LT DEBT	\$2,343	\$2,219	\$2,095	\$1,963	-6.30%
	<b>WATER ENTERP EXPENSES</b>	<b>\$2,193,318</b>	<b>\$2,096,003</b>	<b>\$2,215,775</b>	<b>\$2,343,359</b>	<b>5.76%</b>
						5.76%
13204504	WATER ENTERP FUND REVENUE	FY 2021 ACTUALS	FY 2022 ACTUALS	FY 2023 BUDGET	FY 2024 BUDGET	
414600	WATER LIENS COLLECTED	\$26,326	\$14,539	\$20,915	\$17,422	-16.70%
417008	PEN & INT WATER LIENS	\$3,115	\$1,641	\$3,116	\$2,457	-21.14%
421100	WATER RATES & SERVICES	\$4,356,298	\$4,298,718	\$4,420,975	\$4,419,575	-0.03%
421200	METERS & SUPPLIES	\$5,325	\$15,564	\$7,252	\$9,151	26.19%
421300	ADMINISTRATIVE FEES	\$700	\$1,236	\$1,645	\$1,332	-19.03%
421400	SERVICE INSTALLATIONS	\$238,410	\$173,601	\$190,659	\$183,693	-3.65%
421450	MARKOUT SERVICES	\$26,627	\$13,734	\$16,753	\$20,181	20.46%
421550	PROPERTY TRANSFER SERVICES	\$24,593	\$20,922	\$23,681	\$22,757	-3.90%
421600	WIRELESS COMMUNICATION LEASE	\$130,164	\$135,483	\$143,903	\$148,220	3.00%
421650	SOLAR REVENUE WATER	\$94,541	\$169,592	\$70,562	\$132,022	87.10%
431100	WATER SERVICE TIGHT PLAN	\$88,015	\$91,728	\$96,016	\$98,056	2.12%
433007	LATE FEE	\$52,982	\$57,019	\$47,065	\$49,815	5.84%
441100	ELECTRICAL SERVICES	\$3,200	\$1,200	\$0	\$0	0.00%
451100	BACKFLOW INSPECTIONS	\$19,472	\$37,464	\$20,366	\$21,838	7.23%
482001	INVESTMENT REVENUE	\$9,144	\$797	\$21,200	\$11,676	-44.93%
484099	MISCELLANEOUS REVENUE	\$60,923	\$55,437	\$54,331	\$52,700	-3.00%
	<b>WATER ENTERP REVENUE</b>	<b>\$5,139,837</b>	<b>\$5,088,676</b>	<b>\$5,138,439</b>	<b>\$5,190,895</b>	<b>1.02%</b>
						1.02%
		FY 2021 ACTUALS	FY 2022 ACTUALS	FY 2023 BUDGET	FY 2024 BUDGET	
	<b>TOTAL REVENUE</b>	<b>\$5,139,837</b>	<b>\$5,088,676</b>	<b>\$5,138,439</b>	<b>\$5,190,895</b>	<b>1.02%</b>
	<b>TOTAL EXPENSES</b>	<b>\$4,142,250</b>	<b>\$4,042,096</b>	<b>\$4,273,965</b>	<b>\$4,552,834</b>	<b>6.52%</b>
	<i>Delta</i>	<i>\$997,587</i>	<i>\$1,046,580</i>	<i>\$864,474</i>	<i>\$638,061</i>	<i>6.52%</i>



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TOWN OF HARWICH - LIVE DATA  
NEXT YEAR BUDGET LEVELS REPORT

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bgnyrpts

PROJECTION: 20241 FY 2024 OPERATING BUDGETS

FOR PERIOD 99

WATER	ENTERPRISE FUND	2022 REVISED BUD	2023 REVISED BUD	2024 REQUEST	2024 TOWN ADMIN	2024 SELECTMEN	2024 FIN COMM
1320	WATER ENTERPRISE FUND						
1320	497000 TRANSFR IN	-2,790.51	0 .00	.00	.00	.00	.00
1320	596000 OPUS	1,710,521.42	1,059,278.00	818,913.00	818,913.00	818,913.00	818,913.00
	TOTAL WATER ENTERPRISE FUND	1,707,730.91	1,059,278.00	818,913.00	818,913.00	818,913.00	818,913.00
13204501	WATER ENTERP SALARIES & WAGES						
13204501	511100 S&WELECTED	3,000.00	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00
13204501	511900 S&W	1,014,437.93	994,713.77	1,016,066.38	1,016,066.38	1,016,066.38	1,034,522.00
13204501	512000 SEAS S & W	33,946.00	34,624.92	35,654.00	35,654.00	35,654.00	35,654.00
13204501	513000 OVERTIME	202,276.00	202,093.62	278,396.00	278,396.00	278,396.00	278,396.00
13204501	513060 FLUSHING	30,618.00	31,650.60	.00	.00	.00	.00
13204501	514000 LONGEVITY	32,379.00	26,005.85	33,665.00	33,665.00	33,665.00	33,665.00
13204501	515007 SCKLVBONUS	3,325.00	3,325.00	3,325.00	3,325.00	3,325.00	3,325.00
13204501	516000 EOS	.00	0 .00	15,989.00	21,044.00	21,044.00	.00
	TOTAL WATER ENTERP SALARIES	1,319,981.93	1,297,413.76	1,388,095.38	1,393,150.38	1,393,150.38	1,390,562.00
13204502	WATER ENTERPRISE FUND EXP						
13204502	517900 OTHER FRIN	8,800.00	8,800.00	11,000.00	11,000.00	11,000.00	11,000.00
13204502	521100 ELECTRIC	359,242.00	366,427.00	407,176.00	407,176.00	407,176.00	407,177.00
13204502	521200 GAS	8,000.00	8,000.00	8,000.00	8,000.00	8,000.00	8,000.00
13204502	524140 V&EMAIN	58,500.00	71,000.00	52,000.00	52,000.00	52,000.00	52,000.00
13204502	524160 B&GMAINT	45,000.00	130,983.00	52,000.00	52,000.00	52,000.00	52,000.00
13204502	525000 TECH SUP	43,540.00	43,540.00	43,540.00	43,540.00	43,540.00	43,540.00
13204502	526000 BLDG AGRMT	22,750.00	22,750.00	22,750.00	22,750.00	22,750.00	22,750.00
13204502	530800 LAB SVCS	30,500.00	35,314.00	35,314.00	35,314.00	35,314.00	35,314.00
13204502	530820 PROFSVCS	60,000.00	60,000.00	85,000.00	85,000.00	85,000.00	85,000.00
13204502	530875 PRINT SVC	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
13204502	534100 ADV	1,500.00	1,500.00	2,500.00	2,500.00	2,500.00	2,500.00
13204502	534300 POSTAGE	17,500.00	17,500.00	18,500.00	18,500.00	18,500.00	18,500.00
13204502	534400 TELEPHONE	7,700.00	7,700.00	7,700.00	7,700.00	7,700.00	7,700.00
13204502	534430 COMM SVCS	16,000.00	19,000.00	19,000.00	19,000.00	19,000.00	19,000.00
13204502	541100 PROPANE	18,944.00	18,944.00	16,100.00	16,100.00	16,100.00	16,100.00
13204502	542000 OFF SUPPLS	5,900.00	6,300.00	6,300.00	6,300.00	6,300.00	6,300.00
13204502	542013 HARD/SOFT	25,924.00	25,924.00	25,924.00	25,924.00	25,924.00	25,924.00
13204502	548100 BULK FUEL	24,165.00	24,165.00	27,000.00	27,000.00	27,000.00	27,000.00
13204502	548200 TREAT SUPP	27,500.00	27,500.00	18,000.00	18,000.00	18,000.00	18,000.00
13204502	548250 TREAT CHEM	165,000.00	165,000.00	247,850.00	247,850.00	247,850.00	247,850.00

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TOWN OF HARWICH - LIVE DATA  
NEXT YEAR BUDGET LEVELS REPORT

PROJECTION: 20241 FY 2024 OPERATING BUDGETS

FOR PERIOD 99

WATER	ENTERPRISE FUND		2022 REVISED BUD	2023 REVISED BUD	2024 REQUEST	2024 TOWN ADMIN	2024 SELECTMEN	2024 FIN COMM
13204502	553000	P.W. SUPPL	26,250.00	27,800.00	27,800.00	27,800.00	27,800.00	27,800.00
13204502	553100	METERS	121,000.00	180,000.00	180,000.00	180,000.00	180,000.00	180,000.00
13204502	553200	INSTALLSUP	43,000.00	481,700.00	77,000.00	77,000.00	77,000.00	77,000.00
13204502	553300	PIPESETC	90,000.00	90,000.00	110,500.00	110,500.00	110,500.00	110,500.00
13204502	553350	MAINREPL	35,000.00	35,000.00	85,000.00	85,000.00	85,000.00	85,000.00
13204502	553500	DETAILS	60,000.00	35,000.00	27,500.00	27,500.00	27,500.00	27,500.00
13204502	553600	RDREP	33,000.00	34,500.00	16,500.00	16,500.00	16,500.00	16,500.00
13204502	553900	MECHTANK	10,000.00	10,000.00	13,000.00	13,000.00	13,000.00	13,000.00
13204502	554200	GENERMINT	12,500.00	14,000.00	29,700.00	29,700.00	29,700.00	29,700.00
13204502	554300	WELLREHAB	45,000.00	45,000.00	45,000.00	45,000.00	45,000.00	45,000.00
13204502	558100	UNIFORMS	17,280.00	17,280.00	10,000.00	10,000.00	10,000.00	10,000.00
13204502	573000	DUB, SB, TRV	13,000.00	13,000.00	13,000.00	13,000.00	13,000.00	13,000.00
13204502	573200	WATPERMIT	8,500.00	8,500.00	8,500.00	8,500.00	8,500.00	8,500.00
13204502	575070	OPEB	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00
13204502	591000	MAT. LT. DBT	549,599.00	396,438.00	404,300.00	404,300.00	404,300.00	404,300.00
13204502	591500	INT LT DBT	152,556.00	138,115.00	127,941.00	127,941.00	127,941.00	127,941.00
13204502	591550	ADM FEE LT	2,222.00	2,095.00	24,138.50	24,138.50	24,138.50	1,963.00
TOTAL WATER ENTERPRISE FUND			2,225,372.00	2,215,775.00	2,365,533.50	2,365,533.50	2,365,533.50	2,343,359.00
13204504 WATER REVENUE ENTERP FUND								
13204504	414600	WATER LIEN	-17,826.00	-20,915.00	-17,422.00	-17,422.00	-17,422.00	-17,422.00
13204504	417008	P&I WATER	-2,578.00	-3,116.00	-2,457.00	-2,457.00	-2,457.00	-2,457.00
13204504	421100	WATER R&S	-4,298,631.00	-4,420,975.00	-4,419,575.00	-4,419,575.00	-4,419,575.00	-4,419,575.00
13204504	421200	METERS	-9,339.00	-7,252.00	-9,151.00	-9,151.00	-9,151.00	-9,151.00
13204504	421300	SVCAPPL	-2,053.00	-1,645.00	-1,332.00	-1,332.00	-1,332.00	-1,332.00
13204504	421400	SVINSTALL	-160,101.00	-190,659.00	-183,693.00	-183,693.00	-183,693.00	-183,693.00
13204504	421450	MKOUTSVC	-5,059.00	-16,753.00	-20,181.00	-20,181.00	-20,181.00	-20,181.00
13204504	421550	PROPTRAN	-16,837.00	-23,681.00	-22,757.00	-22,757.00	-22,757.00	-22,757.00
13204504	421600	WIRELESS	-138,393.00	-143,903.00	-148,220.00	-148,220.00	-148,220.00	-148,220.00
13204504	421650	SOLREV	-70,562.00	-70,562.00	-132,022.00	-132,022.00	-132,022.00	-132,022.00
13204504	431100	SVC TIGHT	-90,780.00	-96,016.00	-98,056.00	-98,056.00	-98,056.00	-98,056.00
13204504	433007	LATE FEE	-50,660.00	-47,065.00	-49,815.00	-49,815.00	-49,815.00	-49,815.00
13204504	451100	BACKFLOW	-20,366.00	-20,366.00	-21,838.00	-21,838.00	-21,838.00	-21,838.00
13204504	482001	INVEST REV	-21,200.00	-21,200.00	-11,676.00	-11,676.00	-11,676.00	-11,676.00
13204504	484099	WATER MISC	-54,331.00	-54,331.00	-52,700.00	-52,700.00	-52,700.00	-52,700.00
TOTAL WATER REVENUE ENTERP F			-4,958,716.00	-5,138,439.00	-5,190,895.00	-5,190,895.00	-5,190,895.00	-5,190,895.00
TOTAL WATER ENTERPRISE FUND			294,368.84	-565,972.24	-618,353.12	-613,298.12	-613,298.12	-638,061.00
TOTAL REVENUE			-4,961,506.51	-5,138,439.00	-5,190,895.00	-5,190,895.00	-5,190,895.00	-5,190,895.00
TOTAL EXPENSE			5,255,875.35	4,572,466.76	4,572,541.88	4,577,596.88	4,577,596.88	4,552,834.00
GRAND TOTAL			294,368.84	-565,972.24	-618,353.12	-613,298.12	-613,298.12	-638,061.00

\*\* END OF REPORT - Generated by Sandra Sieger \*\*





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TOWN OF HARWICH - LIVE DATA  
NEXT YEAR BUDGET LEVELS REPORT

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PROJECTION: 20241 FY 2024 OPERATING BUDGETS

FOR PERIOD 99

WATER	ENTERPRISE FUND	2022 REVISED BUD	2023 REVISED BUD	2024 REQUEST	2024 TOWN ADMIN	2024 SELECTMEN	2024 FIN COMM
Sequence 1	Field #	Total	Page	Break			
	1	Y	Y				
Sequence 2	9	Y	N				
Sequence 3	0	N	N				
Sequence 4	0	N	N				

Report title:  
03/16/2023 13:16 TOWN OF HARWICH - LIVE DATA  
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PROJECTION: 20241 FY 2024 OPERATING BUDGETS

FOR PERIOD 99

Report type: 2  
 Budget level: 1  
 Percentage change calculation method: 1  
 Print first or second year of budget requests: F  
 Print revenue as credit: Y  
 Include cfwd in rev bud: N  
 Include cfwd in actuals: N  
 Print totals only: N  
 Include segment code: N  
 Include report grand totals by account type: Y  
 Print full GL account: N  
 Double space: N  
 Suppress zero bdtg acct: Y  
 Print as worksheet: N  
 Print percent change or comment: C  
 Print text: N  
 Amounts/totals exceed 999 million dollars: N  
 Print five budget levels: N  
 Report view: D

Find Criteria  
 Field Name Field Value  
 Org 1320\*  
 Object  
 Project  
 Account type  
 Account status

**FY 2024 BUDGET  
WASTEWATER ENTERPRISE FUND**

Updated 3/16/23

ORG/OBJ	DESCRIPTION	FY 2021 ACTUALS	FY 2022 ACTUALS	FY 2023 BUDGET	FY 2024 BUDGET	% Increase
1330	WASTEWATER ENTERPRISE FUND					
596000	OFUS	\$0	\$31,446	\$31,687	\$62,148	
	<b>WASTEWATER ENTERPRISE FUND</b>	<b>\$0</b>	<b>\$31,446</b>	<b>\$31,687</b>	<b>\$62,148</b>	<b>96.13%</b>
13304401	WASTEWATER ENTERP SALARIES & WAGES	FY 2021 ACTUALS	FY 2022 ACTUALS	FY 2023 BUDGET	FY 2024 BUDGET	
511900	SALARIES & WAGES	\$77,968	\$78,997	\$82,203	\$95,178	15.78%
516000	ENHANCEMENT OF SERVICES				\$80,000	
	<b>WASTEWATER ENTERP SALARIES</b>	<b>\$77,968</b>	<b>\$78,997</b>	<b>\$82,203</b>	<b>\$175,178</b>	<b>113.10%</b>
13304402	WASTEWATER ENTERPRISE FUND EXPENSES	FY 2021 ACTUALS	FY 2022 ACTUALS	FY 2023 BUDGET	FY 2024 BUDGET	
521100	ELECTRIC UTILITY	\$0	\$3,836	\$20,000	\$20,000	0.00%
521200	GAS UTILITY	\$0	\$562	\$600	\$600	0.00%
530820	PROFESSIONAL SERVICES	\$12,998	\$71,713	\$0	\$398,678	4.60%
530825	PROF/ARCHITECT/ENG SERVICES	\$15,677	\$7,500	\$381,160	\$0	
530875	PRINTING SERVICES & POSTAGE	\$0	\$3,000	\$650	\$3,000	361.54%
554200	GENERATOR MAINT	\$0	\$285	\$2,250	\$2,250	0.00%
554210	COLLECTIONS SYSTEM MAINTENANCE	\$0	\$0	\$20,000	\$20,000	0.00%
591000	MATURE PRINCIPAL LONGTERM DEBT	\$0	\$0	\$1,423,802	\$1,069,826	-24.86%
591500	INTEREST ON LONG TERM DEBT	\$0	\$0	\$254,219	\$216,075	-15.00%
591550	ADMIN FEE LT DEBT	\$0	\$0	\$141,803	\$26,217	-81.51%
	<b>WASTEWATER ENTERP EXPENSES</b>	<b>\$28,675</b>	<b>\$86,896</b>	<b>\$2,244,484</b>	<b>\$1,756,647</b>	<b>-21.73%</b>
13304404	WASTEWATER ENTERP FUND REVENUE	FY 2021 ACTUALS	FY 2022 ACTUALS	FY 2023 BUDGET	FY 2024 BUDGET	
422000	WASTEWATER USER FEES	\$0	\$305	\$0	\$15,000	
482001	INVESTMENT REVENUE	\$1,298	\$288	\$0	\$0	
483000	CONTRIBUTIONS DONATIONS	\$0	\$989	\$0	\$0	
	<b>WASTEWATER ENTERP REVENUE</b>	<b>\$1,298</b>	<b>\$1,582</b>	<b>\$0</b>	<b>\$15,000</b>	
		FY 2021 ACTUALS	FY 2022 ACTUALS	FY 2023 BUDGET	FY 2024 BUDGET	
	<b>INTERFUND TRANSFER IN (CREDIT)</b>				<b>\$1,015,050</b>	
	<b>TOTAL REVENUE</b>	<b>\$1,298</b>	<b>\$1,582</b>	<b>\$0</b>	<b>\$15,000</b>	
	<b>TOTAL EXPENSES</b>	<b>\$106,643</b>	<b>\$197,339</b>	<b>\$537,196</b>	<b>\$1,993,973</b>	
	<i>Delta</i>				<b>\$963,923</b>	

\*INTERFUND TRANSFER IN AS OF 3/16/23; -1,015,050 (CR)



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 NEXT YEAR BUDGET LEVELS REPORT

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WASTEWATER ENTERPRISE			2022 REVISED BUD	2023 REVISED BUD	2024 REQUEST	2024 TOWN ADMIN	2024 SELECTMEN	2024 FIN COMM
1330	WASTEWATER FUND							
1330	497000	TRANSFR IN	-515,331.00	-2,157,018.53	-761,076.00	-761,076.00	-761,076.00	-1,015,050.00
1330	596000	OFUS	31,446.00	31,687.00	34,930.00	34,930.00	34,930.00	62,148.00
	TOTAL WASTEWATER FUND		-483,885.00	-2,125,331.53	-726,146.00	-726,146.00	-726,146.00	-952,902.00
13304401	SEWER SALARIES & WAGES							
13304401	511900	S&W	78,099.00	82,202.93	93,881.16	93,881.16	93,881.16	175,178.00
13304401	516000	EOS	.00	.00	38,301.00	38,301.00	38,301.00	.00
	TOTAL SEWER SALARIES & WAGES		78,099.00	82,202.93	132,182.16	132,182.16	132,182.16	175,178.00
13304402	WASTEWATER EXPENSES							
13304402	521100	ELECTRIC	4,000.00	20,000.00	20,000.00	20,000.00	20,000.00	20,000.00
13304402	521200	GAS	600.00	600.00	600.00	600.00	600.00	600.00
13304402	530825	PROF SVCS	398,286.00	381,160.00	391,679.00	391,679.00	391,679.00	398,678.00
13304402	530875	PRINT SVC	650.00	650.00	3,000.00	3,000.00	3,000.00	3,000.00
13304402	554200	GENERMAINT	2,250.00	2,250.00	2,250.00	2,250.00	2,250.00	2,250.00
13304402	554210	COLLECTION	.00	20,000.00	20,000.00	20,000.00	20,000.00	20,000.00
13304402	591000	MAT. LT. DBT	.00	1,423,801.75	545,000.00	545,000.00	545,000.00	1,069,826.00
13304402	591500	INT LT DBT	.00	254,218.99	216,076.00	216,076.00	216,076.00	216,076.00
13304402	591550	ADM FEE LT	.00	141,802.79	.00	.00	.00	26,217.00
	TOTAL WASTEWATER EXPENSES		405,786.00	2,244,483.53	1,198,605.00	1,198,605.00	1,198,605.00	1,756,647.00
13304404	WASTEWATER REVENUE							
13304404	422200	USER FEES	.00	.00	-15,000.00	-15,000.00	-15,000.00	-15,000.00
	TOTAL WASTEWATER REVENUE		.00	.00	-15,000.00	-15,000.00	-15,000.00	-15,000.00
	TOTAL WASTEWATER ENTERPRISE		.00	201,354.93	589,641.16	589,641.16	589,641.16	963,923.00
	TOTAL REVENUE		-515,331.00	-2,157,018.53	-776,076.00	-776,076.00	-776,076.00	-1,030,050.00
	TOTAL EXPENSE		515,331.00	2,358,373.46	1,365,717.16	1,365,717.16	1,365,717.16	1,993,973.00
	GRAND TOTAL		.00	201,354.93	589,641.16	589,641.16	589,641.16	963,923.00

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TOWN OF HARWICH - LIVE DATA  
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PROJECTION: 20241 FY 2024 OPERATING BUDGETS

FOR PERIOD 99

WASTEWATER ENTERPRISE	2022 REVISED BUD	2023 REVISED BUD	2024 REQUEST	2024 TOWN ADMIN	2024 SELECTMEN	2024 FIN COMM
Sequence 1	1	Y	Y			
Sequence 2	9	Y	N			
Sequence 3	0	N	N			
Sequence 4	0	N	N			

Report title:  
03/16/2023 13:17  
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TOWN OF HARWICH - LIVE DATA  
NEXT YEAR BUDGET LEVELS REPORT

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bgnyrpts

PROJECTION: 20241 FY 2024 OPERATING BUDGETS

FOR PERIOD 99

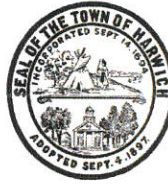
Report type: 2  
 Budget level: 1  
 Percentage change calculation method: 1  
 Print first or second year of budget requests: F  
 Print revenue as credit: Y  
 Include cfwd in rev bud: N  
 Include cfwd in actuals: N  
 Print totals only: N  
 Include segment code: N  
 Include report grand totals by account type: Y  
 Print full GL account: N  
 Double space: N  
 Suppress zero bdgt accts: Y  
 Print as worksheet: N  
 Print percent change or comment: C  
 Print text: N  
 Amounts/totals exceed 999 million dollars: N  
 Print five budget levels: N  
 Report view: D

Find Criteria  
 Field Name Field Value  
 Org 1330\*  
 Object  
 Project  
 Account type  
 Account status

## VI. OLD BUSINESS

### C. 2023 Annual Town Meeting Articles

# MEMORANDUM



## Harwich Water & Wastewater Department

196 Chatham Road  
Harwich MA 02645

P: 508-432-0304

F: 888-774-3557

[www.harwichwater.com](http://www.harwichwater.com)

**To:** Harwich Board of Selectmen  
**From:** Dan Pelletier, Water/Wastewater Superintendent  
**CC:** Joe Powers, Town Administrator  
**Date:** March 16<sup>th</sup>, 2023  
**RE:** 2023 ATM Articles - Water & Wastewater Department

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Included herein please find a summary of the proposed Water & Wastewater articles for the 2023 Annual Town Meeting:

### Water Department:

- FY24 New Source Exploration Phase 2 –Total \$600k (\$300k Retained Earnings + \$300k 2022 ATM Article 21)
- FY24 Pavement Management Plan – Total \$175k (Funding – Retained Earnings)
- FY24 Route 28 Watermain Replacement - \$17.5M (Funding – Water receipts)
- 129 Route 28 Utility Easement - \$10,000 (Funding – Retained Earnings) *this is in support of the watermain replacement project, DOT is requiring we obtain our own separate easement.*
- Water Bylaw Amendments #1 – Increase fines associated with violation of water use restrictions
- Water Bylaw Amendments #2 – Language relative to the regulation of private wells during times of water use restrictions

### Wastewater:

- Phase 3 East Harwich Collections System Expansion - \$50M Funding – Debt Exclusion
- West Harwich Route 28 Sewer Main Installation - \$6.5M Funding – Debt Exclusion
- Assistant Wastewater Superintendent (if adds to staff are standalone article) – S&W 80,000 Fringe 27,181 Funding - OP Budget

## VI. OLD BUSINESS

### D. Water Restrictions Bylaw & Special Legislation

To see if the Town will vote to amend the General Bylaws, Chapter 300 Water , by amending the schedule of fines as set forth below (Text to be added is in bold. Text to be deleted is shown as strikethrough):

§ 300-1. Authority.

## ARTICLE I

### Water Supply Emergency

This bylaw is adopted pursuant to the police and home rule powers of the Town and also pursuant to the authority conferred by MGL c. 40, § 21.

§ 300-2. Purpose.

The purpose of this bylaw is to maintain the public health, safety and welfare by protecting the Town's water supply whenever there is in force a state of water supply emergency by providing for enforcement of any restrictions, requirements, provisions or conditions duly imposed by the Town of Harwich with the approval of the Department of Environmental Protection (DEP).

§ 300-3. Definitions.

For the purpose of this bylaw the following terms shall have the meanings indicated:

**ENFORCEMENT AUTHORITY** — The Town of Harwich's Board of Water Commissioners or its designee or other department or board having responsibility for the operation and maintenance of the water supply, the health agent, the Town police, and the Fire Chief or his authorized designee.

**STATE OF WATER SUPPLY EMERGENCY** — A state of water supply emergency declared on petition of the Town by the Department of Environmental Protection pursuant to MGL c. 21G, §§ 15 through 17 or MGL c. 111, § 160 or by the Governor.

§ 300-4. Requirements.

The following shall apply to all users of water supplied by the Town of Harwich: following notification by the Town of Harwich of the existence of a state of water supply emergency, no person shall violate any provision, condition, requirement or restriction included in a plan approved by the Department of Environmental Protection which has as its purpose the abatement of a water supply emergency. Notification of any provision, restriction, requirement, or condition with which users of water supplied by the Town of Harwich are required to comply to abate a situation of water emergency shall be sufficient for the purposes of this bylaw if it is published in a newspaper of general circulation within the Town of Harwich or by such other notice as is reasonably calculated to reach and inform all users of Town of Harwich water.

§ 300-5. Violations and penalties.



Any person or entity that violates this bylaw shall be liable to the Town of Harwich in the amount of \$50 ~~\$100~~ for the first violation and \$100 ~~\$300~~ for each subsequent violation. Fines shall be recovered by indictment or on complaint before the District Court or by noncriminal disposition in accordance with MGL c. 40, § 21D. Each separate instance of noncompliance following issuance of any warning or citation pursuant to this section or each day of a continuing violation shall constitute a separate offense.

§ 300-6. Right of entry.

Agents of the enforcement authority may enter by owner permission or by warrant only any property for the purpose of inspecting or investigating any violation of this bylaw or for the purpose of enforcing the same.

§ 300-7. Severability.

The invalidity of any portion or provisions of this bylaw shall not invalidate any other portion, provision or section hereof.

§ 300-8. Authority.

## ARTICLE II

### Water Use Restriction

This bylaw is adopted by the Town under its police powers to protect public health and welfare and its powers under MGL c. 40, § 21 et seq. and implements the Town's authority to regulate water use pursuant to MGL c. 41, § 69B. This bylaw also implements the Town's authority under MGL c. 40, § 41A, conditioned upon a declaration of water supply emergency issued by the Department of Environmental Protection.

§ 300-9. Purpose.

The purpose of this bylaw is to protect, preserve and maintain the public health, safety and welfare whenever there is in force a state of water supply conservation or state of water supply emergency by providing for enforcement of any duly imposed restrictions, requirements, provisions or conditions imposed by the Town or by the Department of Environmental Protection.

§ 300-10. Definitions.

For the purpose of this bylaw the following terms shall have the meanings indicated:

**ENFORCING PERSON** — The Board of Water Commissioners, the Board of Health and health agent, police officers of the Town and any other persons designated by the Board of Water Commissioners to enforce this bylaw.

PERSON — Any individual, corporation, trust, partnership or association, or other entity.

STATE OF WATER SUPPLY CONSERVATION — A state of water supply conservation declared by the Town pursuant to § 300-11 of this bylaw.

STATE OF WATER SUPPLY EMERGENCY — A state of water supply emergency declared by the Department of Environmental Protection under MGL c. 21G, §§ 15 to 17.

WATER USERS or WATER CONSUMERS — All public and private users of the Town's public water system, irrespective of any person's responsibility for billing purposes for water used at any particular facility.

§ 300-11. Declaration of state of water supply conservation.

The Town, through its Board of Water Commissioners, may declare a state of water supply conservation upon a determination by a majority vote of the Board that a shortage of water exists and conservation measures are appropriate to ensure an adequate supply of water to all water consumers. Public notice of a state of water supply conservation shall be given under § 300-13 of this bylaw before it may be enforced.

§ 300-12. Restricted water uses.

A declaration of a state of water supply conservation shall include one or more of the following restrictions, conditions, or requirements limiting the use of water as necessary to protect the water supply. The applicable restrictions, conditions, or requirements shall be included in the public notice required under § 300-13.

- A. Odd/even day outdoor watering. Outdoor watering by water users with odd- numbered addresses is restricted to odd-numbered days. Outdoor watering by water users with even-numbered addresses is restricted to even-numbered days.
- B. Outdoor watering ban. Outdoor watering is prohibited.
- C. Outdoor watering hours. Outdoor watering is permitted only during daily periods of low demand, to be specified in the declaration of a state of water supply conservation and public notice thereof.
- D. Filling swimming pools. Filling of swimming pools is prohibited.
- E. Automatic sprinkler use. The use of automatic sprinkler systems is prohibited.

§ 300-13. Notice.

Notification of any provision, restriction, requirement or condition imposed by the Town as part of a state of water supply conservation shall be published in a newspaper of general circulation within the Town, or by such other means reasonably calculated to reach and inform all users of water of the state of water supply conservation. Any restriction imposed under § 300-12 shall not be effective until such notification is provided. Notification of the state of water supply

conservation shall also be simultaneously provided to the Massachusetts Department of Environmental Protection.

§ 300-14. Termination of state of water supply conservation.

A state of water supply conservation may be terminated by a majority vote of the Board of Water Commissioners upon a determination that the water supply shortage no longer exists. Public notification of the termination of a state of water supply conservation shall be given in the same manner required by § 300-13.

§ 300-15. Water supply emergencies.

Upon notification to the public that a declaration of a state of water supply emergency has been issued by the Department of Environmental Protection, no person shall violate any provision, restriction, requirement, or condition of any order approved or issued by the Department intended to bring about an end to the state of emergency.

§ 300-16. Violations and penalties.

Any person violating this bylaw shall be liable to the Town in the amount of ~~\$50~~ **\$100** for the first violation and ~~\$100~~ **\$300** for each subsequent violation, which shall inure to the Town. Fines shall be recovered by indictment, or on complaint before the District Court, or by noncriminal disposition in accordance with MGL c. 40, § 21D. Each day of violation shall constitute a separate offense.

§ 300-17. Severability.

~~The invalidity of any portion or provision of this bylaw shall not invalidate any other portion or provision thereof;~~

Or to take any other action relative thereto.

To see if the Town will vote to amend the General Bylaws, Chapter 300, Water by extending the application of the Bylaw to private well users as set forth below (Text to be added is in bold. Text to be deleted is shown as strikethrough):

### **§ 300 Water Conservation Bylaw.**

§ 300-1. Authority.

Water Supply Emergency

This bylaw is adopted pursuant to the police and home rule powers of the Town and also pursuant to the authority conferred by MGL c. 40, § 21.

§ 300-2. Purpose.

The purpose of this bylaw is to maintain the public health, safety and welfare by protecting the Town's water supply whenever there is in force a state of water supply emergency by providing for enforcement of any restrictions, requirements, provisions or conditions duly imposed by the Town of Harwich with the approval of the Department of Environmental Protection (DEP).

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**WATER USERS or WATER CONSUMERS** — **All public and private users of the Town's public water system and private well users, irrespective of any person's responsibility for billing purposes for water used at any particular facility.**

§ 300-4. Requirements.

The following shall apply to all users of water supplied by the Town of Harwich **and private well users**: following notification by the Town of Harwich of the existence of a state of water supply emergency, no person shall violate any provision, condition, requirement or restriction included in a plan approved by the Department of Environmental Protection which has as its purpose the abatement of a water supply emergency. Notification of any provision, restriction, requirement, or condition with which users of water supplied by the Town of Harwich **or private well users** are required to comply to abate a situation of water emergency shall be sufficient for

the purposes of this bylaw if it is published in a newspaper of general circulation within the Town of Harwich or by such other notice as is reasonably calculated to reach and inform all users of Town of Harwich water.

§ 300-5. Violations and penalties.

Any person or entity that violates this bylaw shall be liable to the Town of Harwich in the amount of \$50 for the first violation and \$100 for each subsequent violation. Fines shall be recovered by indictment or on complaint before the District Court or by noncriminal disposition in accordance with MGL c. 40, § 21D. Each separate instance of noncompliance following issuance of any warning or citation pursuant to this section or each day of a continuing violation shall constitute a separate offense.

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§ 300-8. Authority.

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§ 300-9. Purpose.

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Odd/even day outdoor watering. Outdoor watering by water users with odd- numbered addresses is restricted to odd-numbered days. Outdoor watering by water users with even-numbered addresses is restricted to even-numbered days.

Outdoor watering ban. Outdoor watering is prohibited.

Outdoor watering hours. Outdoor watering is permitted only during daily periods of low demand, to be specified in the declaration of a state of water supply conservation and public notice thereof.

Filling swimming pools. Filling of swimming pools is prohibited.

Automatic sprinkler use. The use of automatic sprinkler systems is prohibited.

§ 300-13. Notice.

Notification of any provision, restriction, requirement or condition imposed by the Town as part of a state of water supply conservation shall be published in a newspaper of general circulation within the Town, or by such other means reasonably calculated to reach and inform all users of water of the state of water supply conservation. Any restriction imposed under § 300-12 shall not be effective until such notification is provided. Notification of the state of water supply conservation shall also be simultaneously provided to the Massachusetts Department of Environmental Protection.

§ 300-14. Termination of state of water supply conservation.

A state of water supply conservation may be terminated by a majority vote of the Board of Water Commissioners upon a determination that the water supply shortage no longer exists. Public notification of the termination of a state of water supply conservation shall be given in the same manner required by § 300-13.

§ 300-15. Water supply emergencies.

Upon notification to the public that a declaration of a state of water supply emergency has been issued by the Department of Environmental Protection, no person shall violate any provision, restriction, requirement, or condition of any order approved or issued by the Department intended to bring about an end to the state of emergency.

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Any person violating this bylaw shall be liable to the Town in the amount of \$50 for the first violation and \$100 for each subsequent violation, which shall inure to the Town. Fines shall be recovered by indictment, or on complaint before the District Court, or by noncriminal disposition in accordance with MGL c. 40, § 21D. Each day of violation shall constitute a separate offense.

§ 300-17. Severability.

The invalidity of any portion or provision of this bylaw shall not invalidate any other portion or provision thereof;

Or to take any other action relative thereto.

## VII. NEW BUSINESS

### A. ATM Article- *Discussion Re: Private Wells*



## VII. NEW BUSINESS

### B. Debrief from Joint Meeting with Board of Selectmen

## VII. NEW BUSINESS

### C. 2022 Tank Inspection Reports



# HALEY WARD

ENGINEERING | ENVIRONMENTAL | SURVEYING

FORMERLY:  
**CES** INC

March 17, 2023

**Via E-Mail**

Mr. Daniel Pelletier, Superintendent  
Harwich Water Department  
196 Chatham Road  
Harwich, MA 02645

## **Re: 2022 Tank Inspections**

Dear Mr. Pelletier

Enclosed you will find two (2) copies of the MassDEP Tank Inspection Reports for Harwich Water Department's three tanks. Haley Ward completed an annual inspection on the Pleasant Lake Tank. A third party, CorrTech, completed adhesion testing on this tank along with full inspections of the Rt. 39 and Lothrop tanks. There were no sanitary or security deficiencies identified during these inspections. One copy should be maintained at the water office where MassDEP representatives can review the document during the next sanitary survey.

Haley Ward reviewed the full inspection reports and adhesion testing completed by CorrTech and we feel the following outlined excerpts are most relevant. Additional details, commentary and recommendations are included in the reports.

1. Rt. 39 Tank
  - a. No immediate action recommended.
  - b. We understand the intent is for this tank to be replaced in FY31 and not to pursue rehabilitation until that time.
  - c. Monitor the condition of the top tower rods, cylinder rods and erection rods, along with the clevises, pins and connecting plates. Monitor the underside of the bowl's bleed through corrosion. Per CorrTech's report, nothing is



63 Great Road, Suite 200, Maynard, MA 01754  
T: 978.648.6025 | [HALEYWARD.COM](http://HALEYWARD.COM)



actionable at this time.

## 2. Pleasant Lake Tank

- a. Annual inspection completed by Haley Ward. We recommend:
  - i. Replace five (5) light bulbs in the interior column and access tube.
  - ii. Communication equipment rubber boot seals on the roof at the access tube have deteriorated. Not expected to be a major issue, but equipment owners could be notified.
- b. Adhesion testing completed by CorrTech concluded the coatings are currently very well adhered to the tank. The adhesion testing included by x-cut and dolly adhesion pull-off testing. This indicates overcoating the tanks (high pressure power washing followed by overcoating, no containment or abrasive blasting) would be a good option at this time and likely will still be for a few years, given the excellent adhesion. Depending on the number of years until the overcoating, we would recommend repeating a reduced scope of this adhesion testing to confirm the coatings remain well adhered. The reduced scope of adhesion testing could be performed during an annual inspection with a simple x-cut adhesion test.
- c. Haley Ward will follow up with updated budget estimating for the overcoat project in the first week of April.

## 3. Lothrop Concrete Reservoir

- a. No action recommended from full inspection; tank in good working order and in compliance with DEP guidelines and OSHA standards.
- b. Monitor isolated interior corrosion cells from assumed exposed steel. These are not uncommon, but should be further investigated in the next full inspection, by 2027. Per CorrTech's report, these are not actionable at this time.



Thank you for the opportunity of performing this inspection. If you have any questions related to the report or need assistance with the tanks, please do not hesitate to contact our office at any time.

Very truly yours,

HALEY WARD, INC.

Myles Killar, P.E.  
Project Manager

Enclosure - 2 copies of MassDEP Inspection Reports



**HALEY WARD**

ENGINEERING | ENVIRONMENTAL | SURVEYING

## 2022 ANNUAL SANITARY AND SECURITY WATER STORAGE TANK INSPECTION REPORT WITH COATING EVALUATION

### Pleasant Lake Water Storage Tank

FOR HARWICH WATER DEPARTMENT  
BOARD OF WATER COMMISSIONERS



**Corporate Office**  
One Merchants Plaza  
Suite 701  
Bangor, ME 04401  
T: 207.989.4824  
F: 207.989.4881

**HALEYWARD.COM**

INSPECTION COMPLETED NOVEMBER 15, 2022  
JN: 3010113.051

### Report Prepared By:

**Haley Ward, Inc.**

Myles Killar, Project Manager

63 Great Road, Suite 200 | Maynard, MA 01754

T: 978.648.6025



# HALEY WARD.

ENGINEERING | ENVIRONMENTAL | SURVEYING

## 2022 ANNUAL

### SANITARY AND SECURITY INSPECTION

### WITH COATING EVALUATION

### PLEASANT LAKE WATER STORAGE TANK

Name of Tank:   
Location:   
Owner:   
Inspection Date:   
Inspector:



### TANK DATA

Style of Tank:  Construction Date:   
Tank Dimensions:  Constructed By:   
Tank Capacity:  Date of Last Maintenance:   
Tank Serial or Contract No:  Date of Last inspection:



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T: 978.648.6025 | [HALEYWARD.COM](http://HALEYWARD.COM)

## EXECUTIVE SUMMARY

**INSPECTION** – The exterior inspection was conducted from the ground level, the shell ladder and the roof. This inspection is to be considered as an Annual Inspection in compliance with MassDEP Guidelines for Public Water Systems, Chapter 8, Finished Water Systems. In addition, we have added an evaluation of the existing protective coating systems on the exterior surfaces of the tank, and on the interior dry surfaces, along with recommendations for maintenance planning.

**GENERAL CONDITIONS** – For an exterior tank coating system seventeen years old, we consider this coating system to be in good condition. We found a progression in the number and size of spot coating failures, but none of these indicated corrosion with measurable metal loss. Due to the fact that this tank is located near a seashore environment, we would expect to see more failures, some with active corrosion and the associated measurable metal loss. We were pleased to see no such areas during this inspection.

**SANITARY CONDITIONS** – The sanitary condition of the tank appears to be satisfactory; hatches appear to be in good condition and weather tight. The finial appears to be in fair condition and does not allow the entry of storm driven rain. The finial screen appears to be in good condition. The vacuum pallet on the finial appears to be in good condition and is seated correctly.

The rigging couplings in the roof appear to be in good condition and sealed with rubber caps. The overflow outlet and screen is also in good condition.

**RECOMMENDATIONS** – *We recommend that the sanitary conditions at this tank be reviewed annually and during full engineering inspections in compliance with the MassDEP Guidelines for Public Water Systems.*

**SECURITY CONDITIONS** – The tank has a man door in the column which appeared to be in good condition and was locked, and there is an overhead door that can only be opened from inside. The roof access hatch is secured from the inside, but this latch is inoperable at this time and has no provisions for locking.

The site has a chain link fence which is in good condition, with locked gates, both of which are in good condition. The access roadway has a locked gate that is in good condition.

**RECOMMENDATIONS** – *We recommend that the security conditions at this tank be reviewed during the annually and full inspections in compliance with the MassDEP Guidelines for Public Water Systems.*



## EXISTING EXTERIOR CONDITIONS

FLUTED COLUMN – The coating on the fluted column is in good condition with just a few areas where there are deficiencies resulting in corrosion. There is the start of corrosion at some of the welds between the top of the fluted column and the cone plates.

There appears to be corrosion at the welds for the painters' rail. There are also a few small, isolated areas with coating deficiencies and start of corrosion, and there are a few small areas with active corrosion activity. Nothing observed appeared actionable.

FLUTED COLUMN ACCESSORIES – There is active corrosion and what appears to be associated metal loss on the painters' rail fabrication. There is corrosion staining on some of the flute vents, and the coating on the fluted column access hatch to reach the painters rail appears to be in fair condition.

CONE – The coating on the cone section appears to be in good condition. There are a couple of small spots on the cone where the coating has lifted from the steel substrate and there is the start of corrosion activity.

At the area of the cone where the shell overlaps the cone, (drip edge) there is a dark area where they may be mildew activity or possibly the start of corrosion.

On tanks of this design, usually the first main component of the tank where coating failures are experienced is the exterior of the cone plates. This is caused by condensation during the summer months where the coating is continually wet and then dry. We do not see that in our inspection of this tank as yet, but a closer look will be necessary before planning a rehabilitation program.

SHELL -The Coating on the shell appears to be in good condition. There is one area on the shell plates where there appears to be mildew and/or grime that may have washed from the roof. There is some brown staining present in this area also, which could be from corrosion bleed through. These areas are progressive from the previous annual inspection. The area at the very top of the shell plate and the roof overhang has a dark discoloration that could be mildew activity or the start of corrosion activity. This area should also be closely reviewed before planning a rehabilitation program.

ROOF – The coating on the roof is also in good condition. There is some minor corrosion bleed through of about 3 to 4-percent of the roof area, and a few spots where the coating has failed where there is exposed steel substrate with some active corrosion.

ROOF ACCESSORIES - The coating on the roof hatches appears to be in good condition. The coating on the roof finial is in fair condition but has a number of spot areas where the coating has delaminated from the galvanized steel. The galvanizing appears to be in good condition and showed no signs of deterioration or corrosion.

The coating on the handrail system appeared to be in good condition.

**INTERIOR OF ACCESS TUBE AND CATWALK** – The coating on the interior (dry) side of the access tube appeared to be in good condition. The coating on the access tube ladder was in good condition. The coating on the floor of the access tube has corrosion on the cover of the basin beneath, and moderate staining on the rest of the floor. The coating on the floor of the catwalk from the access tube to the fluted column stiffener floor was in poor condition and had spot coating deterioration, exposed steel substrate and active corrosion.

**UNDERSIDE OF TANK BELLY** - The coating on the underside of the belly (floor of water chamber) appeared to be in fair condition with corrosion bleed through on about 30-35 percent of the surfaces. On tanks of this design, this area is usually the first main component of the tank interior where coating failures are experienced due to the condensation related wet and dry conditions.

**INTERIOR OF FLUTED COLUMN AND ACCESSORIES** The coating on the floor and handrail of the fluted column stiffeners (walkways) appeared to be in good condition; there is a moderate amount of grim on the floor areas. The fluted column interior surfaces appeared to be in good condition.

The fluted column ladder and platforms appeared to be in good condition. The coating on the fluted column base plate and anchor bolts also appeared to be in good condition.

The coating on the underside surface of the steel condensate ceiling appeared to be in good condition. The coating on the upper side of the condensate ceiling appeared to have been repaired recently near the center.

**LIGHTING WITHIN ACCESS TUBE** – There are a few on the lights within the access tube and catwalk which were not working, suspect burned out bulbs.

***RECOMMENDATIONS*** – *We recommend that the lighting system in the access tube and catwalk be checked, and any burned out bulbs be replaced.*

**RECENT MODIFICATIONS TO TANK** – Recently the existing 12-inch inlet/outlet piping was removed, and new 24-inch piping and valves were installed within the control room.

This piping was insulated and extended up the fluted column wall and carried beneath and connected to the tank belly.

**COMMUNICATION EQUIPMENT ON THE TANK** – Cellular communication coax cables enter the fluted column through an opening reinforcement plate and extend up interior face of column. The cables are attached to the catwalk for the access tube and extend up the tube. The cables exit the

access tube through sleeves in the roof with rubber boot seals, some are faulty and may allow storm water to enter tube.

The cables run within cable trays on the roof to the handrail system, and to the various cellular equipment mounted to the handrail system. The mounting to the tank handrail appears to be satisfactory, rubber protection was used in many areas where clamps were tightened to the tank handrail system.

When OpenCape Emergency Communications Equipment was proposed for mounting on the tank years ago, there was question about the handrail systems ability to support the new equipment along with that existing. It was decided that the handrail would need additional support. A stay-back support system was proposed, but welding was not allowed on the roof. A magnetic plate system was approved and installed on a trial basis.

***RECOMMENDATIONS –We recommend that any rubber boot seals that appear to be faulty be replaced by those responsible for this equipment, to prevent the entry of storm water to the access tube.***

**TANK FOUNDATION AREA** – The coating on the exterior fluted column base plate appears to be in good condition, some grime was present. The sealant (grout) between the fluted column base plate and the concrete foundation is in fair condition, with some corrosion staining breaking through, expected to be corrosion from the underside of the base plate that most likely was not fully painted, or the coating was damaged during the welding of the fluted column to the plate during erection.

The concrete foundation appears to be in good condition, there are a number of areas where there is minor cracking in the concrete, but this is not unusual for a water storage tank foundation.

**TANK PROTECTIVE SYSTEM** – The coating on the overhead door protective system (bollards) is in poor condition with active spot corrosion.

**MISCELLANEOUS OBSERVATIONS** – During the 2018 inspection, there was a large osprey nest in one of the disc antennas, but there was no sign of this reoccurrence during this inspection.

**CONCLUSIONS** – We were happy to see that the areas inspected were generally in good condition, and there was nothing observed on the tank that is actionable. We cannot comment on the interior belly, shell and roof within the wet area of the tank as these areas were not part of this inspected.

CorrTech completed adhesion testing in November. Results will be summarized elsewhere in a cover letter.

The next full tank inspection will be used to plan for this tanks rehabilitation. Depending on the timing of the rehabilitation, this inspection should likely include updated adhesion testing and measuring of existing coating thicknesses of all exterior coatings, and interior coatings on the water bearing surfaces of the tank, including the underside of the tank belly. Once the inspection is completed and reviewed, it will be

possible to provide recommendations to the Harwich Water Department on planning for rehabilitation in the future.

Based upon the information available to date, we feel that there are three options for consideration. These options may change once the full engineering inspection is completed, and we see what the condition of the interior wet area coatings are.

1. Spot Repair – All faults in the coating system on the exterior surfaces of the tank would be surface prepared to remove contaminants, corrosion and any coatings that were not well bonded to the substrate steel. These areas would then receive a two to three coat spot repair.

The coatings on the interior dry surfaces such as the fluted column and accessory areas should not need replacement at that time, power washing and minor spot repairs may be all that is necessary. The coating on the interior wet surfaces will have to be spot surface prepared and a two part spot repair coating will have to be applied. This option will require the tank to be emptied for a period of time to make the spot coating repairs on the interior wet area of the tank.

The goal would be to extend the service life of the existing protective coating systems for an estimated three to five years, and at that time do a complete removal and replacement of all the exterior coating and the interior coating on the wet areas of the tank. This is the least expensive alternative of the three.

2. Spot Repair with Full Overcoat - All faults in the coating system on the exterior surfaces of the tank would be surface prepared to remove contaminants, corrosion and any coatings that were not well bonded to the substrate steel. These spot areas would then receive a two coat prime and intermediate coating, to be followed with a modern full overcoat to all surfaces. This system will use the existing coating as a base for the full overcoat.

The coatings on the interior dry surfaces such as the fluted column and accessory areas should not need replacement at that time, power washing and minor spot repairs may be all that is necessary. The coating on the interior wet (water bearing) surfaces will have to be spot surface prepared and a two part spot repair coating will have to be applied. This option will require the tank to be emptied for a period of time to make the spot coating repairs on the interior wet area of the tank and to apply the full over coat system to the exterior cone, shell and roof.

The goal would be to extend the service life of the existing protective coating system for approximately eight to ten years, understanding that this option can only be considered if the adhesion testing indicates a positive bond between existing coating layers, and the substrate steel. This option would be more expensive than Option 1., but significantly less than the cost for Option 3 to follow.

3. Complete Coating System Replacement: Perform power washing of all exterior surfaces. Install a full specialized containment system required for air quality control, and conduct abrasive blasting to remove all existing coatings and any corrosion present. A system of rigid pipe staging and flexible sheeting most likely would be utilized to encase the fluted column,

cone, shell and roof areas while the abrasive blasting is conducted. The exterior surfaces should receive a new four coat protective system.

The coatings on the interior dry surfaces such as the fluted column and accessory areas should not need replacement at that time, power washing and spot repairs may be all that is necessary. The coating on the interior wet (water bearing) surfaces will have to be abrasive blasted to remove all existing coatings and any corrosion present, and this includes the under side of the tank belly. These wet area surfaces should receive a full prime coat and a full 100 percent solids epoxy coating system. The underside of the tank belly should receive a prime coat and two coats of epoxy.

This option will require the tank to be emptied to allow the abrasive blasting and coatings to be applied to the interior and exterior surfaces of the cone, shell and roof areas. Although this tank is a bit remote from neighbors but still somewhat near the Cape Cod Technical High School and Route 6 Highway, the air quality control will substantially add to the cost of the work and the down time of the tank.

The goal is to provide new coating systems that will ensure protection of the steel structure for about fifteen to twenty years. This is the most expensive of the three options.

**RECOMMENDATIONS** – *We recommend the next full engineering inspection include special attention to the potential corrosion staining starting on the shell area, the painters' rail, the areas at the roof overhang and the cone area. The inspection should include all interior coating areas, including special attention to the interior surfaces of the wet areas within the water bearing portion of the tank, along with the underside of the tank belly.*

*We recommend that the condition of the coatings on all surfaces of the tank be reviewed annually in compliance with the MassDEP Guidelines for Public Water Systems. We recommend that the inspection includes adhesion testing and coating thickness measurements with particular attention to any areas where there is advanced corrosion present during the full inspections.*

*A representative quantity of adhesion tests should be performed on all these surfaces, to determine if it may be possible to utilize Option 2. indicated above, and to also provide information necessary to project the ability of the existing coatings to protect the steel components of the tank if Option 1. is chosen.*

*We also recommend that consideration be given to determine how all the existing communications equipment on the tank will be protected and/or temporarily relocated from the handrail system during the tank rehabilitation. Once it is determined how and when the rehabilitation will take place, those communication authorized representatives should be put on notice of the plans of the Harwich Water Department, and negotiations conducted on what the responsibilities of each will be. This process can be long and should be finalized prior to final design of the rehabilitation program.*

*We recommend that the document entitled Standards for Design and Approval to Mount or Modify Communications Equipment on Harwich Water Department Water Storage Tanks, be updated and approved by the Board of Water Commissioners. This will spell out the*

*responsibilities of the communication companies during the rehabilitation, including associated costs they may incur.*

*We do recommend that any rubber boot seals on the communications cabling that appear to be faulty be replaced to prevent storm water from entering the access tube.*

*We recommend that the lighting system within the tank be reviewed, and any lights that are not working such as in the access tube and catwalk, be updated with new bulbs or fixtures.*

*We recommend that during the next tank rehabilitation, the securing handle on the underside of the access hatch be modified or replaced to a condition where it can be opened and closed by hand, and once closed, it will remain in that position.*

2022 ANNUAL INSPECTION CHECK LIST

SANITARY CONDITIONS

HATCHES

Roof Hatches Observed Yes  No  Number of Hatches  Hatches Locked Yes  No

*All roof hatches locked*

Access Tube Hatch Observed Yes  No  Hatch Locked Yes  No

*Access roof hatch has a difficult to operate latch on interior side, hatch not at risk of blowing opening*

Locks Opened and Relocked Yes  No  Locks Replaced Yes  No  How Many

Covers Overlap Collar Yes  No

FINIAL (vent)

Finial Inspected Yes  No  Condition of Finial

Screen & Vacuum Pallet Inspected Yes  No

Approximate Shape of Openings:

Finial Prevents the Entry of Rainwater: Yes  No

Screen Prevents the Entry of Birds and Animals: Yes  No

Screen Prevents the Entry of Insects and Dust: Yes  No

*Not expected to be an issue*

OTHER

Sanitary Defects Observed: Yes  No  List

*None*

Watertight Seal Defects Observed: Yes  No  List

*Faulty rubber seals on communications cables at access tube*

Roof Openings Exist: Yes  No  List

*Hatches closed and appear to prevent storm water from entering*

Roof Openings Secured and Watertight: Yes  No  How:

*Rigging couplings capped*

Overflow Screen Observed Yes  No  Condition of Screen

*Screen is in good condition*

Immediate Sanitary Repairs Required: Yes  No  List

*None*

SECURITY CONDITIONS

Column Man Door Exists Yes  No  Door is Locked Yes  No

*Man Door on column is locked*

Column Overhead Door Exists Yes  No  Door is Secured Yes  No

*Overhead door has to be opened from the interior of column*

Signs of Unauthorized Entry Yes  No  How

*No graffiti observed*



Vandalism Observed Yes  No  List

No graffiti observed

Site Fenced Yes  No  List

6' high chain link fence appears to be in good condition

Fence Locked Yes  No  Condition

Fence Gate in good condition and locked

Roadway Gate Locked Site Fenced Yes  No  Condition

Roadway Gate in good condition and locked

#### PARTICULAR CONDITIONS TO BE AWARE OF WHEN CLIMBING THIS TANK

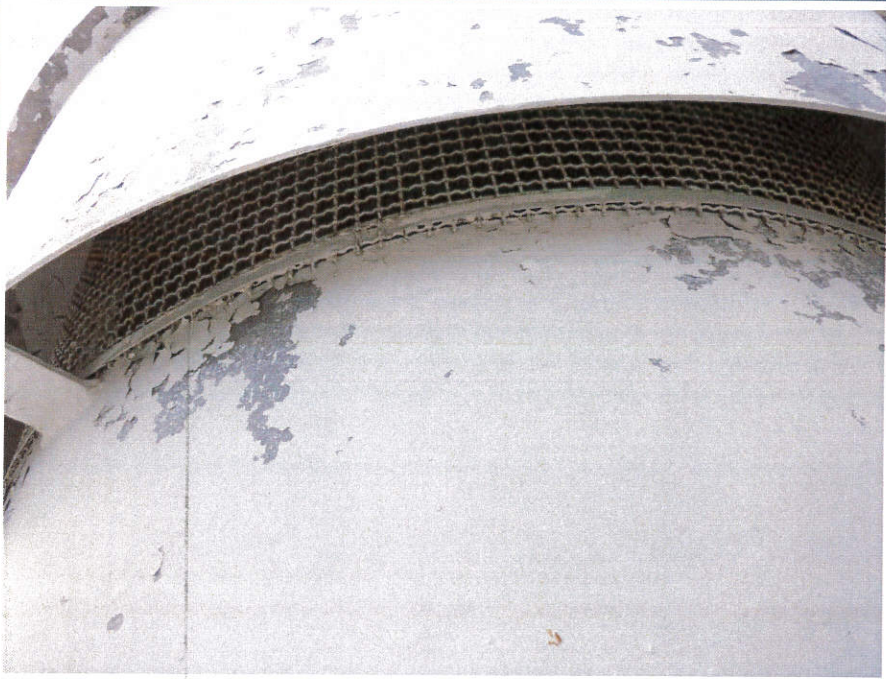
There is a heavy-duty roof hatch latch on the inside of the access tube that is not presently operational or latched. Due to the heavy weight of the hatch, it is doubtful if the wind could open this unit.


***RECOMMENDATIONS*** - *We do recommend that this latch be repaired or replaced to operate with ease the next time that work is performed on this tank.*

P:\MA\Jobs\3010113 Harwich\052 2022 Tank Inspections\Report\2022 Pleasant Lake Annual Tank Inspection.docx




HARWICH WATER DEPARTMENT  
PLEASANT LAKE TANK 2022 ANNUAL INSPECTION

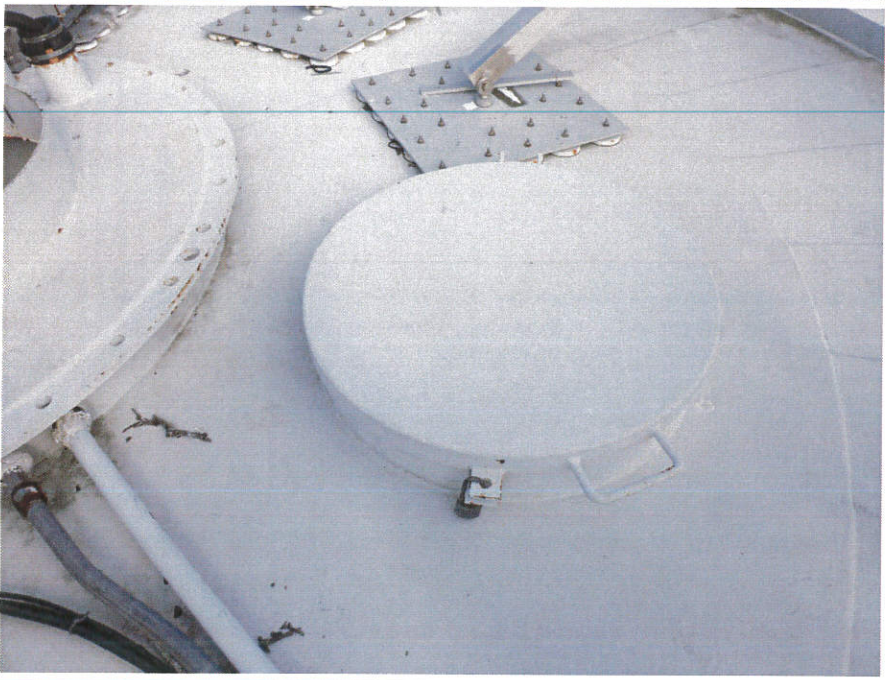
<b>Photo No. 1</b>	
<b>Photo Date:</b> 11/15/22	
<b>Site Location:</b> Pleasant Lake Tank	
<b>Description:</b> Final Screen	
<b>Photo By:</b> MBK	

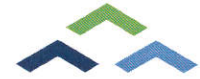
<b>Photo No. 2</b>	
<b>Photo Date:</b> 11/15/22	
<b>Site Location:</b> Pleasant Lake Tank	
<b>Description:</b> Final Vacuum Pallet	
<b>Photo By:</b> MBK	



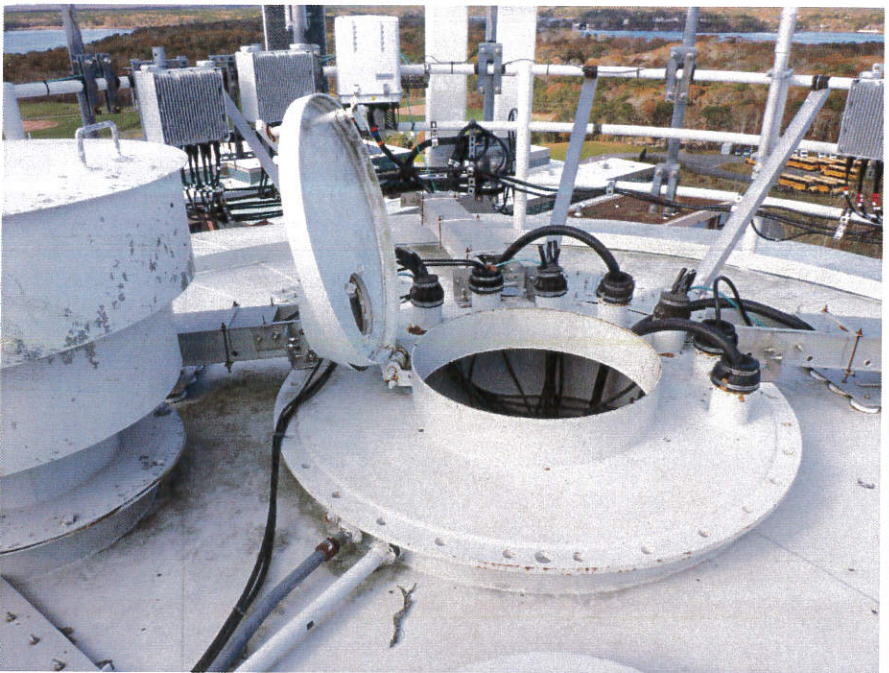
HARWICH WATER DEPARTMENT  
PLEASANT LAKE TANK 2022 ANNUAL INSPECTION


<b>Photo No. 3</b>	
<b>Photo Date:</b> 11/15/22	
<b>Site Location:</b> Pleasant Lake Tank	
<b>Description:</b> Roof hatches	
<b>Photo By:</b> MBK	

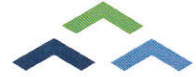
<b>Photo No. 4</b>	
<b>Photo Date:</b> 11/15/22	
<b>Site Location:</b> Pleasant Lake Tank	
<b>Description:</b> Roof hatch	
<b>Photo By:</b> MBK	




HARWICH WATER DEPARTMENT  
PLEASANT LAKE TANK 2022 ANNUAL INSPECTION


<b>Photo No. 5</b>	
<b>Photo Date:</b> 11/15/22	
<b>Site Location:</b> Pleasant Lake Tank	
<b>Description:</b> Roof hatch	
<b>Photo By:</b> MBK	

<b>Photo No. 6</b>	
<b>Photo Date:</b> 11/15/22	
<b>Site Location:</b> Pleasant Lake Tank	
<b>Description:</b> Bowl access floor	
<b>Photo By:</b> MBK	



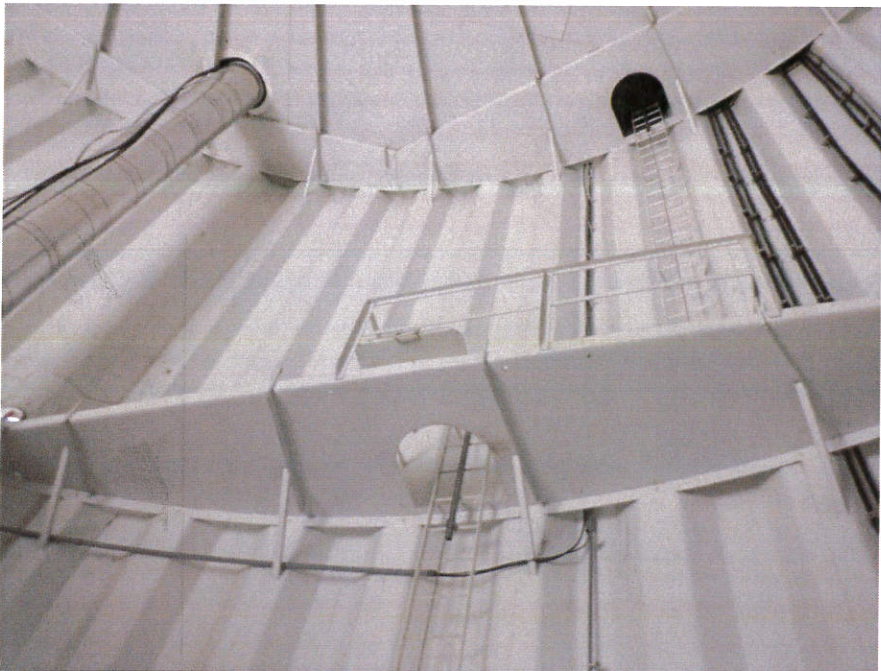
HARWICH WATER DEPARTMENT  
PLEASANT LAKE TANK 2022 ANNUAL INSPECTION


<b>Photo No. 7</b>	
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<b>Site Location:</b> Pleasant Lake Tank	
<b>Description:</b> Overflow screen	
<b>Photo By:</b> MBK	

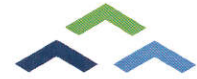
<b>Photo No. 8</b>	
<b>Photo Date:</b> 11/15/22	
<b>Site Location:</b> Pleasant Lake Tank	
<b>Description:</b> Bowl access ladder	
<b>Photo By:</b> MBK	




HARWICH WATER DEPARTMENT  
PLEASANT LAKE TANK 2022 ANNUAL INSPECTION


<b>Photo No. 9</b>	
<b>Photo Date:</b> 11/15/22	
<b>Site Location:</b> Pleasant Lake Tank	
<b>Description:</b> Interior column	
<b>Photo By:</b> MBK	

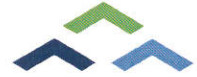
<b>Photo No. 10</b>	
<b>Photo Date:</b> 11/15/22	
<b>Site Location:</b> Pleasant Lake Tank	
<b>Description:</b> Site fence	
<b>Photo By:</b> MBK	




HARWICH WATER DEPARTMENT  
PLEASANT LAKE TANK 2022 ANNUAL INSPECTION

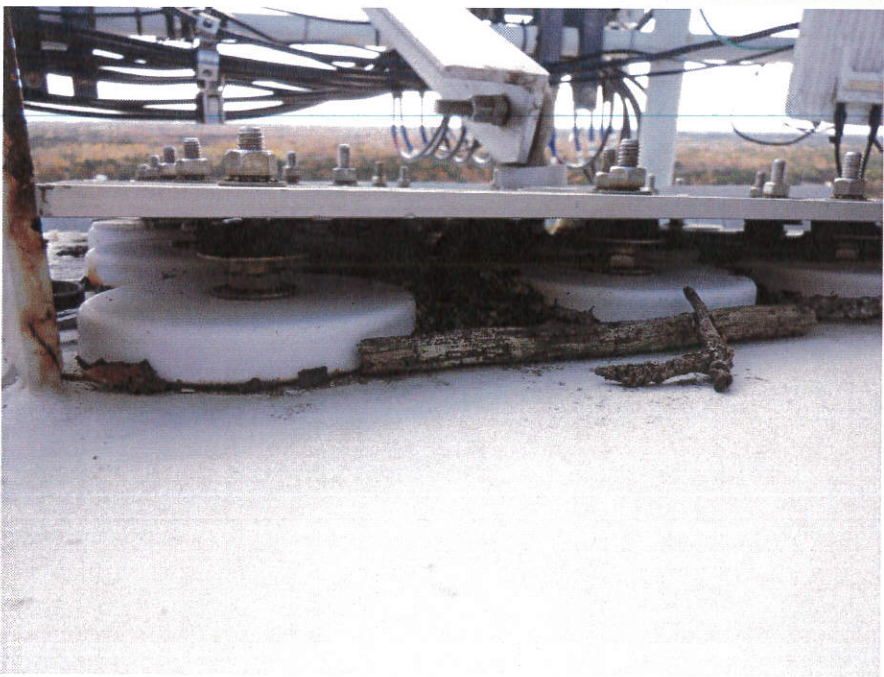
<b>Photo No.</b> 11	
<b>Photo Date:</b> 11/15/22	
<b>Site Location:</b> Pleasant Lake Tank	
<b>Description:</b> Full tank	
<b>Photo By:</b> MBK	

<b>Photo No.</b> 12	
<b>Photo Date:</b> 11/15/22	
<b>Site Location:</b> Pleasant Lake Tank	
<b>Description:</b>	
<b>Photo By:</b> MBK	

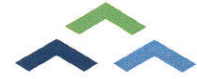


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PLEASANT LAKE TANK 2022 ANNUAL INSPECTION

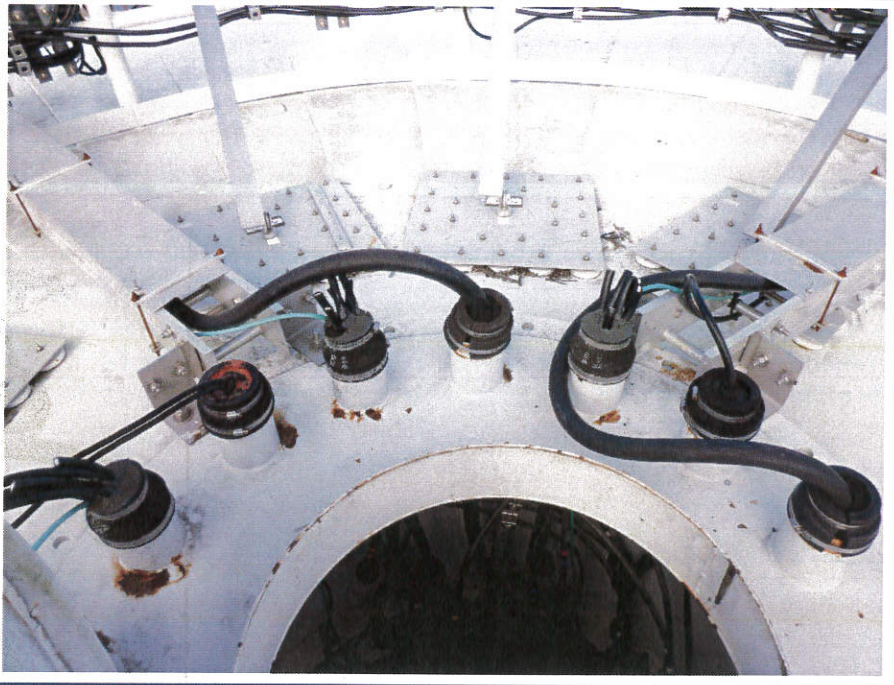
<b>Photo No.</b> 13	
<b>Photo Date:</b> 11/15/22	
<b>Site Location:</b> Pleasant Lake Tank	
<b>Description:</b> Interior column	
<b>Photo By:</b> MBK	


<b>Photo No.</b> 14	
<b>Photo Date:</b> 11/15/22	
<b>Site Location:</b> Pleasant Lake Tank	
<b>Description:</b> Antenna magnets	
<b>Photo By:</b> MBK	





HARWICH WATER DEPARTMENT  
PLEASANT LAKE TANK 2022 ANNUAL INSPECTION

<b>Photo No.</b> 15	
<b>Photo Date:</b> 11/15/22	
<b>Site Location:</b> Pleasant Lake Tank	
<b>Description:</b> Antenna cables	
<b>Photo By:</b> MBK	

<b>Photo No.</b> 16	
<b>Photo Date:</b> 11/15/22	
<b>Site Location:</b> Pleasant Lake Tank	
<b>Description:</b> Light fixture needs bulb replacement	
<b>Photo By:</b> MBK	

## Lothrop tank

CorrTech Report No. 15880-FOR-01-1



Prepared For:

Haley and Ward, Inc.  
63 Great Road, Suite 200  
Maynard, MA 01754

**CORRTECH**

CORROSION UNDERSTOOD

25 South Street  
Hopkinton, MA 01748

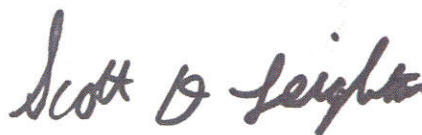
12/22/2022

## STATEMENT OF LIMITATION

Conclusions presented in this document are based on the services described and performed and not on tasks or procedures beyond the scope of the contracted services or time and budgetary constraints imposed by contract limitations.

CorrTech, Inc. has performed this assessment in a professional manner using the degree of skill and care exercised for similar projects under similar conditions by reputable and competent consultants, and in accordance with the procedures established within CorrTech's quality assurance, quality control protocol.

CorrTech, Inc. shall not be responsible for conditions or consequences arising from relevant facts that were concealed, withheld or not fully disclosed at the time the evaluation was performed.



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Report Prepared by: Scott Leighton  
Corrosion Technician  
NACE CIP-2



---

Report Reviewed by: Max Mizejeski  
Corrosion Technician  
NACE CIP-1

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## INTRODUCTION

On November 15, 2022, CorrTech representatives, Bill Birkbeck and Scott Leighton performed a corrosion and structural assessment of the exterior and interior of a drinking water storage tank for Town of Harwich Water Department along with Haley & Ward. The inspection was conducted to establish the current condition of the tank's coatings and concrete substrate. The tank inspected included:

### Lothrop 1.2MG Concrete Water Storage Tank

For applicable standards used in this inspection, please see below.

The interior of the reservoir was inspected with the TankRover remotely operated vehicle, while full. The TankRover is the only piece of equipment like it in the United States and was developed by CorrTech. By using the TankRover the interior of the tank was inspected with no special preparation, confined space entry, no additional disinfection, and no downtime.

The TankRover is equipped with a surface-cleaning tool used to remove loose rust or debris in order to view the potential metal loss under the coating. The unit has high-powered thrusters, which are used to maneuver throughout the tank and are used to wash away bottom sediment for observations. Video is recorded with audio narration on site with digital stills captured for the report.

The TankRover and all tethers were prepared for the inspection by disinfecting equipment with a 200 ppm chlorine spray in accordance with AWWA C652-11.

The exterior portions of the tank were inspected by walking the roof and shell portions that were accessible from the ground.

The objectives of the assessment were to:

1. Perform field inspections and tests to assess the structural integrity of the tank.
2. Assess condition of any protective coatings present
3. Review the safety compliance of tank ladders and access.
4. Review sanitary protection equipment
5. Provide recommendations for rehabilitation.

## APPLICABLE STANDARDS

AWWA D110, 2013, AWWA D110, Wire- and Strand-Wound, Circular, Prestressed Concrete Water Tanks, American Water Works Association (AWWA) Standard D110, Wire- and Strand-Wound, Circular, Prestressed Concrete Water Tanks

MassDEP Chapter 8 - Full Inspection, May, 2011, MassDEP Guidelines for Public Water Systems, Ch. 8, Finished Water Storage, Section 8.1.22, Massachusetts Department of Environmental Protection (MassDEP) Guidelines for Public Water Systems, Chapter 8, Finished Water Storage, 3-5 Year inspections

## EXECUTIVE SUMMARY

The condition and recommendations for the tank are briefly summarized in this section. For detailed information regarding detailed tank conditions and the specific recommendations please refer to the designated section for the tank.

There are no visible unsealed penetrations in the roof structure.

The interior wall of the tank shows sporadic corrosion cell clusters due to assumed exposed steel. No spalling was observed in these areas and due to the concrete wall thickness, this should not be a structural issue anytime soon.

The floor has approximately 1/16 inch or less of sediment uniformly covering the surface.

No structural deficiencies were observed during the inspection.

No sanitary deficiencies were observed during the inspection.

### Tank Data

TANK DATA FOR Lothrop Tank										
<b>Site Information</b>	Fencing In Place:	Yes				Locks on Gates:	Yes			
Address:					Vault Lock in Place:					NR
<b>Tank Information</b>	Tank Name:	Lothrop Tank				Tank Diameter:	79 feet			
Tank Height:	34 feet	Tank Capacity:	1,200,000		Previous Cleaning Date:	NR				
Previous Inspect. Date:		NR			Previous Coating Application:					NR
<b>Foundation</b>	Height:	NR		Adequate Drainage:	NR		Chime Plate Size:	NR		
# of Anchors:	NR		Anchor Bolt Diameter:	NR		Chair Thickness	NR			
Anchor Chair Dimensions:		NR								
<b>Shell Manhole</b>	# of Manholes	1			Diameter:	24 inch				
<b>Ladder</b>	Height from Ground:	10 feet			Safety Cage:	Yes				
Anti Climb Lock :	Yes			Climbing Safety System Style:	Cable					
Rung to Rung Dim:	12 inches	Distance from Shell:	8 inches		Width:	16 inches				
<b>Overflow</b>	Diameter:	12 inches		Air Gap	Yes		Overflow Protection	Yes		
Screen Condition:	Good		Screen Type:	Fine			Splash Pad	Asphalt		
<b>Roof Hatch</b>	Dimensions:	48 inch square			Sanitary Neck	3 inches				
# of Hatches:	1		Hatch Cover Overlap	1.5 inches		Lock	Yes			
<b>Roof Vent</b>	Style:	Mushroom			Diameter:	14 inches				
Cap to Roof Distance:	Screen Condition:		Good			Type:	Fine			
<b>Roof Handrail Hts</b>	Top Rail:	42 inches		Mid Rail:	21 inches		Toe Kick Plate:	4 inches		
<b>Interior</b>	Sediment Depth:	1/16 inches			Sediment Coverage:	Uniform				
Inlet/Outlet Pipe:	Separate		Sediment Ring:	Yes						
<b>Interior Ladder</b>	Climbing Safety System:			NR		Style:	NA			
<b>Columns:</b>	NA		Column Number:	NA		Interior Column Style	NA			

## OBSERVATIONS

Photos provided in the report were created from a digital camera and interior pictures were captured in digital format from the interior video. The interior images are as clear as our printed technology will allow. The copies in the report provide a reference for our comments. Keep in mind that for underwater video snaps, the video provides the greatest detail and should be viewed as part of the report.

Narration on the video is done in the field and some of the comments may be different than the written report.

## INTERIOR

### Roof Structure

Roof is a concrete self-supporting domed structure. No significant cracking or spalling was observed during this survey.

### Shell

Shell is in overall functional condition. No significant cracking or spalling was observed. Sporadic areas of corrosion were found on shell due to apparent exposed metal.

### Columns

Tank is not equipped with support columns.

### Floor Structure

Floor structure shows no visible signs of damage.

### Sediment

Sediment depth is approximately 1/16-inch or less.

### Piping

Inlet/outlet are separate pipes.

Inlet pipe enters tank through the floor and extends vertically along the interior shell.

Outlet pipe is in a sump hole and equipped with a sediment ring.

Overflow pipe is an internal pipe which exits the tank through the lower-mid interior shell.



**EXTERIOR**

## Foundation

Foundation is below grade.

## Manholes

Tank is equipped with one shell manhole. No sanitary issues were found with the shell manhole.

## Ladder

Exterior ladder is in acceptable condition and OSHA compliant.

## Overflow

Overflow pipe is internal and exits tank through lower shell. The end of the pipe is protected by an intact fine mesh screen.

## Shell Structure

Shell does not show significant damage with only minor surface cracking observed sporadically.

## Roof Hatch

Roof hatch appears to be in acceptable condition.

## Roof Vent

Roof vent is a non-pressure relief style with a coarse protective screen intact.

## Hand Rails

Roof hand rails are OSHA compliant and in acceptable condition.

## Roof Structure

Roof has no visible damage.

**RECOMMENDATIONS**

There are no recommendations at this time.

In accordance with current AWWA recommendations, the Lothrop tank should be re-inspected in 2027.

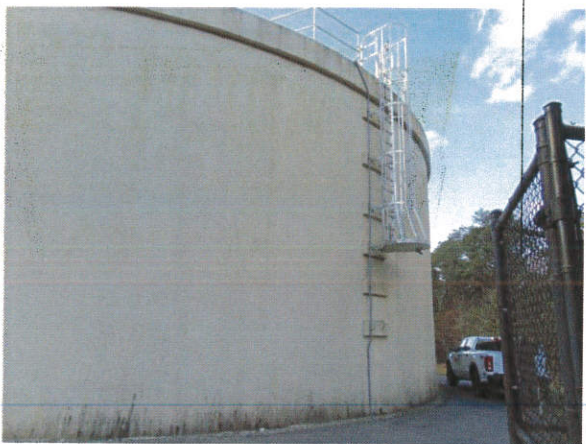
## Appendix I: Photographs



1) Tank overview



4) Overflow pipe tank termination



2) Counter clockwise view of tank with ladder



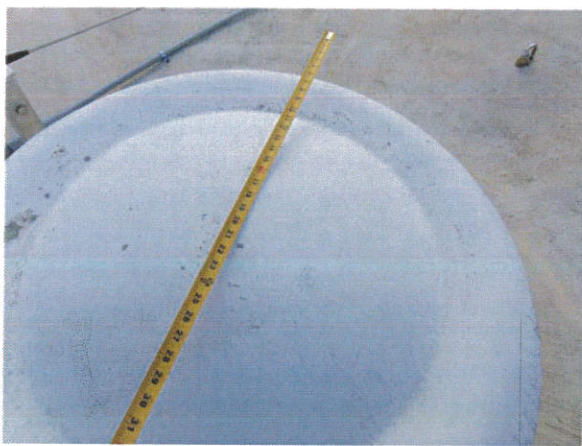
5) Fine mesh protective overflow screen



3) Where tank shell enters grade



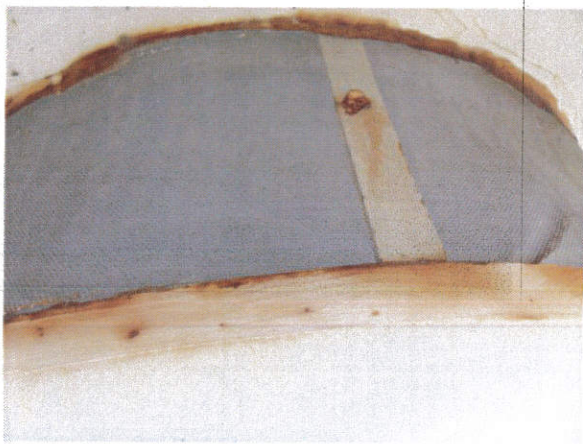
6) Pressure relief style manway



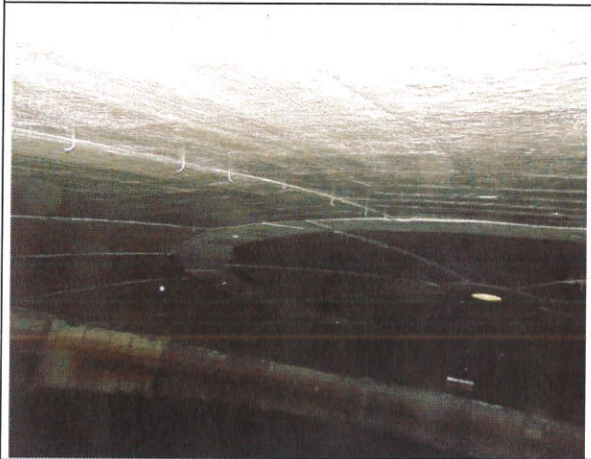
7) Cover of mushroom style vent



10) Roof manway



8) Close up of fine mesh vent screen



11) General view of roof interior



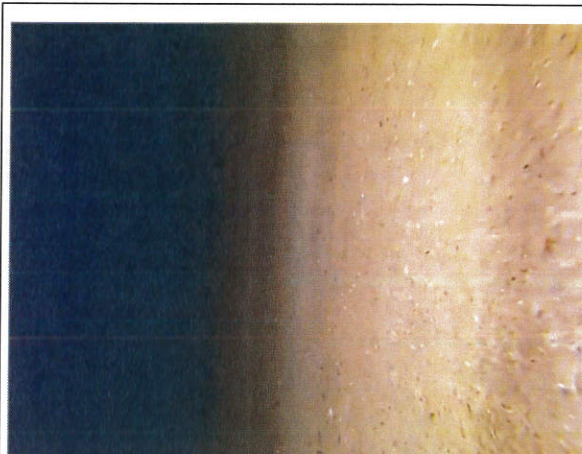
9) Roof safety railing



12) Roof to shell intersection



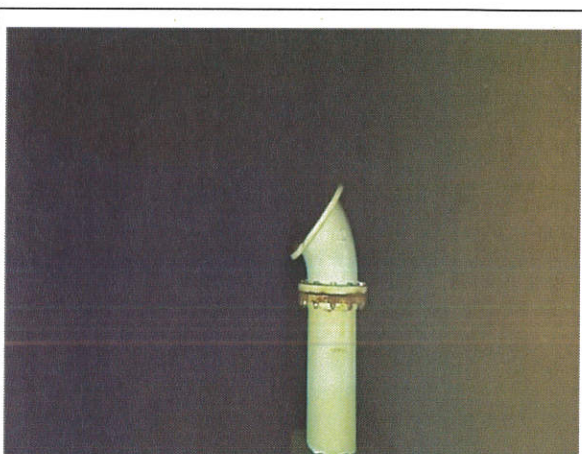
13) Closer view of interior roof to shell intersection



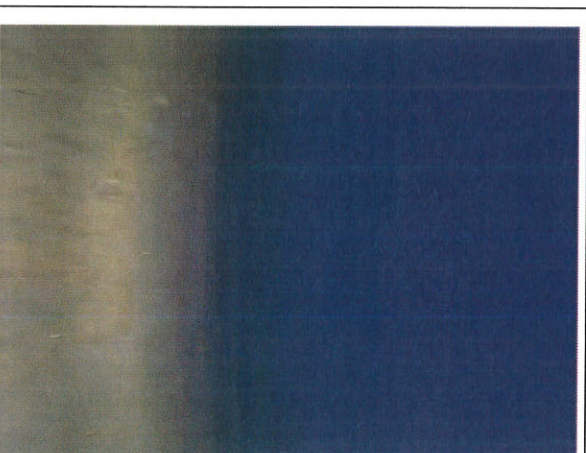
16) General counter clockwise view of shell 4:02



14) Roof manway opening



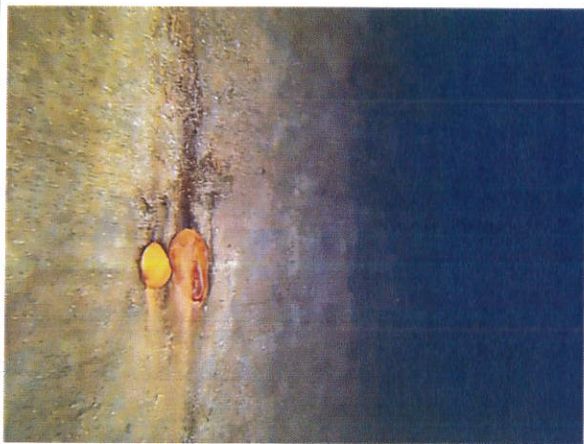
17) Inlet pipe 5:17



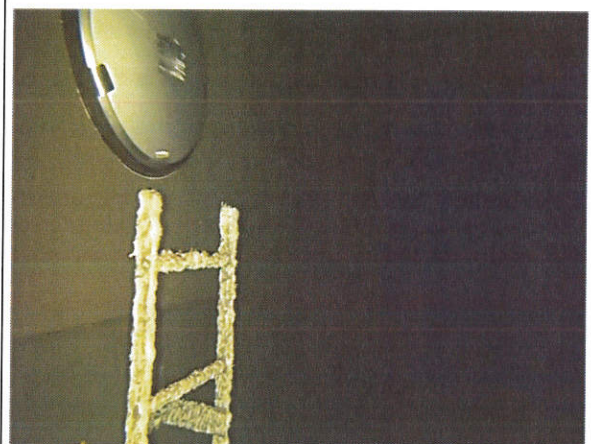
15) General view of tank wall 1:36



18) Repair clamp on inlet pipe 9:32



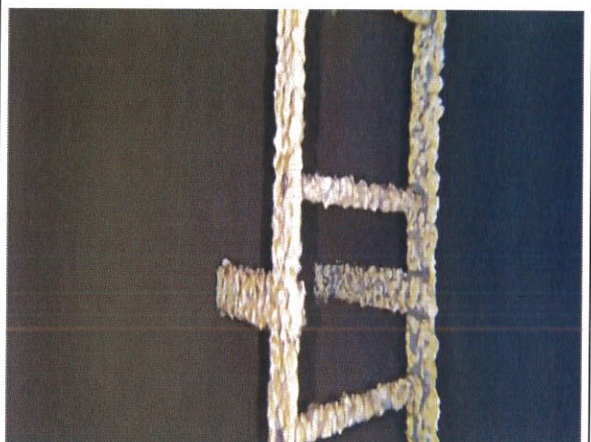
19) Isolated corrosion cells on shell 10:51



22) Shell manway with interior ladder 16:37



20) Close up of corrosion cells on shell  
11:17



23) Widespread corrosion on interior ladder  
16:55



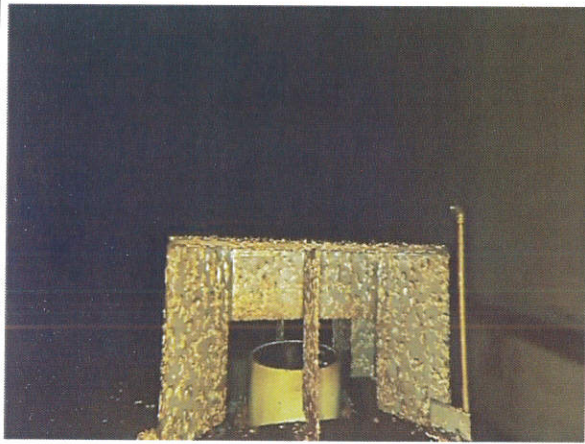
21) Outlet pipe with sediment ring and  
diffuser 13:11



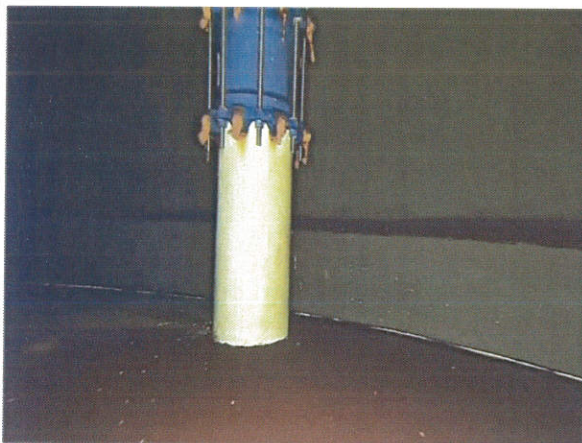
24) Shell manway and tie off above 25:57



25) Dusting of sediment on floor 26:30



26) Close up of outlet pipe 27:38



27) Inlet pipe entry through floor 29:22

## GLOSSARY OF TERMS FOR STEEL/CONCRETE TANKS

**Adhesion-** State in which two surfaces are held together by interfacial forces which may consist of valence forces or interlocking action or both

**Aggregate-** Granular material, such as sand, gravel, crushed stone, crushed hydraulic-cement concrete, or iron blast-furnace slag used with a hydraulic cementing medium to produce either concrete or mortar.

**Bugholes-** Small regular or irregular cavities, usually not exceeding 15 mm in diameter, resulting from entrapment of air bubbles in the surface of formed concrete during placement and compaction.

**Cathodic Protection** - The use of a sacrificial metal or energized substance to polarize the structures surfaces and prevents corrosion.

**Chalking** - The degradation of a paint binders when exposed to ultra-violet light which creates a loose residue on the surface.

**Chemical Attack-** Decomposition of a coating or concrete due to the action of a chemical.

**Chime-** Portion of tank floor plate that extends outside the tank shell and rests on top of the foundation.

**Contraction Joint-** Formed, sawed, or tooled groove in a concrete structure to create a weakened plane and regulate the location of cracking resulting

**Corrosion Cell** - A concentrated localized site of accelerated corrosion that creates pitting.

**Disbondment-** The loss of adhesion between a coating and the substrate.

**Dry Film Thickness** - Total thickness of a paint film when completely cured.

**Efflorescence-** A white crystalline or powdery deposit on the surface of concrete. Efflorescence results from leaching of lime or calcium hydroxide out of a permeable concrete mass over time by water, followed by reaction with carbon dioxide and acidic pollutants.

**Finish-** The texture of a concrete surface after compaction and finishing operations have been performed.

**Finial Vent** - The central roof vent on top of a water tank.

**Grout-** A plastic mixture of cementitious materials and water used as a filler for cracks, or other void spaces, in concrete surfaces to be coated.

**Holiday** - A hole or void in a protective coating that may be invisible to the unaided eye that extends to the substrate.

**Honey Comb-** Voids left in concrete due to failure of the mortar to effectively fill the spaces among coarse aggregate particles.

**Hydraulic, Hydrostatic Pressure-** A force exerted on the concrete/coating interface due to the level of the ground water.

**Isolation Joint-** A separation between adjoining parts of a concrete structure

**Joint Sealant-** Compressible material used to exclude water and solid foreign materials from joints.

**Lap Joint Seam-** Overlapping seam between roof plates that is open and un-welded on the interior.

**Laitance-** A thin, weak brittle layer of cement and aggregate fines on a concrete surface. The amount of laitance is influenced by the degree of working or the amount of water in the concrete.

**Lead Abatement** - The removal of a lead bearing paint system.

**Lead Encapsulation** - The covering over of a lead based paint by applying a compatible topcoat.

**Osmotic Blister** - Raised coating area created by buildup of fluid under the coating. Fluid moves through coating in response to water/solvent concentrations between coating and tank water.

**Osmotic Pressure-** A force exerted on the concrete /coating interface through the capillaries in the concrete due to a moisture differential across the coating.

**Overflow Weir Box-** internal or external box that captures water above the operating height of the tank and directs it to an overflow pipe.

**Pack Rust/Crevice Corrosion-** Advanced form of steel corrosion that forms visible layers of oxidized steel swollen larger than the original steel plate thickness, usually found between steel plates or surfaces.

**Pinholes-** Film defect characterized by small pore-like flaws in a coating which extend entirely through the applied film and have the general appearance of pinpricks, fine holes, or voids when viewed by reflected light.

**Plastic Cracking or Shrinkage-** Cracking that occurs in the surface of fresh concrete soon after it is placed and while it is still plastic,

**Porosity-** The ratio usually expressed as a percentage, of the volume of voids in a material to the total volume of the material, including the voids.

**Reflective Cracking-**Cracking that develops in a coating directly over a dynamic crack in concrete.

**Rigging plug-** Thread steel nipple welded to a tank roof for the purposes of rigging painting cables. Usually sealed with a threaded plug when not in use.

**ROV** - Remotely operated vehicle, underwater inspection device "TankRover" by CorrTech

**Screen Mesh-** Number of openings per linear inch of screen.

**Silt** - Material that accumulates in the bottom of a water tank originating from treatment by products, raw water particles and distribution system debris.

**Silt Stop-** Solid cylinder installed on a floor inlet or outlet pipe to extend the pipe above the floor. Pipe prevents floor sediment from being stirred up or sucked out of the tank during flow.

**Static Cracks-** A crack in the concrete surface whose width does not change.

## GLOSSARY OF TERMS FOR STEEL/CONCRETE TANKS

**Stitch or Skip Weld-** Method of welding two pieces of steel together with intermittent short sections of weld bead. Leaves open lap joints along the unwelded sections.

**Tubercle** - Domed shaped buildup of corrosion products over an active corrosion site. Promotes metal loss through pitting due to differential oxygen concentrations.

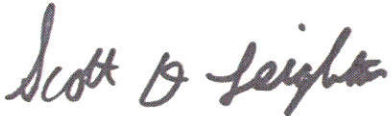
**Ultrasonic Measurement** - The use of high frequency sound waves passed through a material to measure the time required to return. The time required to pass through the material is correlated to the speed of sound in the substrate to yield an actual thickness at a specific location.

**Vapor Barrier-** Waterproof membrane placed under concrete floor slabs that are placed on grade.

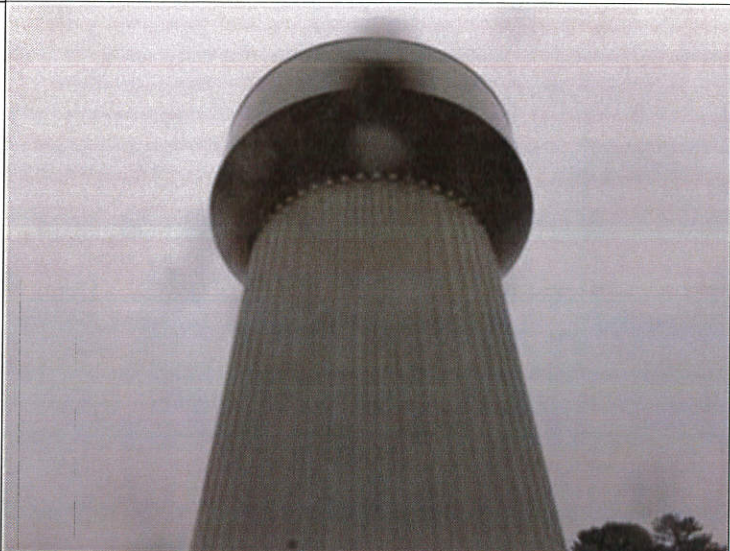
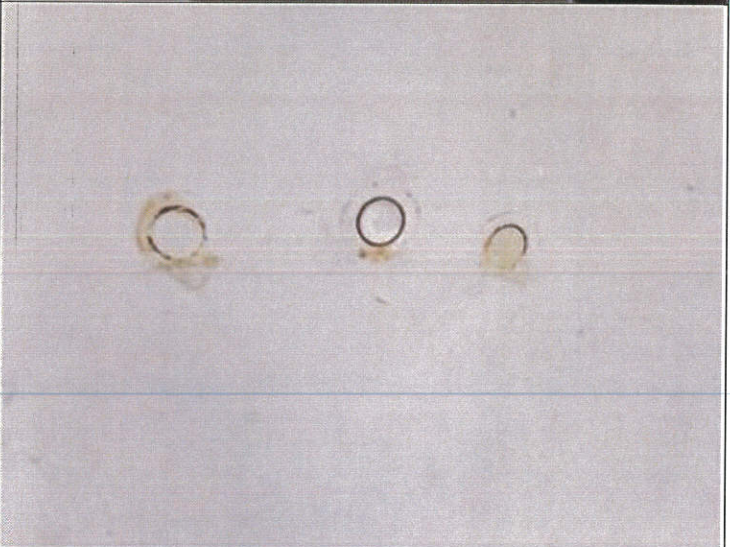






**FIELD REPORT**

<b>Date(s):</b>	11/16/2022 & 11/17/2022	<b>Field Report No.</b>	15880-FIR-01-1
<b>Project / Report Title: Pleasant Lake Exterior Coating Assessment</b>		<b>Client:</b>	
5-Year AWWA ROV Inspections (2) Tanks with sediment removal pricing Harwich, MA		Haley and Ward, Inc. 63 Great Road, Suite 200 Maynard, MA 01754	
<b>Weather:</b>	N/A	<b>Temperature:</b>	40
<b>Background</b>	Scott Leighton and William Birkbeck performed ASTM D4541 & ASTM 3359 adhesion tests on tank fluted column, shell and roof.		
<b>Results</b>	Dolly adhesion pull tests in accordance with ASTM D4541 were essentially glue failures and/or sufficient adhesion and less than 1% coating failure. Tensile strengths of adhesion dolly pull offs were between 1700-2200 PSI and mostly glue failures. Dollys and tank surface were lightly abraded with coarse grit sandpaper in areas where dollys were applied with an epoxy adhesive. ASTM 3359 adhesion tests (X cuts) were performed. Adhesion was found to be sufficient with less than 1% coating failure. Overall adhesion is very good and can be a potentially be overcoated in the future.		
<b>Recommendations</b>	High PSI Pressure washing of exterior tank surfaces.		
<b>Attachments</b>	Photos		
<b>Employee Name / Time IN and OUT / Hrs:</b> Scott Leighton & William Birkbeck		<p>The above constitutes CorrTech's understanding of all items discussed and/or items noted.</p> <p>All concerned parties shall review this report and comment within seven days if any of the items require clarification, correction, and/or require additional discussion.</p>	
<b>Prepared By:</b> CORRTECH, INC.			
  Scott Leighton Project Foreman CorrTech, Inc. 25 South Street Hopkinton, MA 01748			

## RELATED FILES

No	Description	File Attachment
1.	General overview of tank	
2.	View of glue failures on tank shell	

No	Description	File Attachment
3.	Dolly glued on roof prior to ASTM D4541 adhesion test	 A photograph showing a circular dolly with a blue center and a yellow base, mounted on a light-colored, textured roof surface. The number "#4" is handwritten in black marker above the dolly. The surface appears clean and ready for testing.
4.	Glue failure on roof after ASTM D4541 adhesion test	 A photograph showing the same roof surface as in the previous image, but after the adhesion test. The dolly is no longer present, and the circular area where it was located shows significant glue failure, with a large amount of yellow adhesive residue and some debris. The number "#4" is still visible above the failed area.

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B13

Created: 2022-11-17 09:25:02  
PosiTector Body S/N: 871573  
Probe Type: PosiTector 6000 F  
Probe S/N: 423385  
CAL: Cal 1

### Summary

	#	x	$\sigma$	↓	↑
Thickness (mils)	45	12.94	1.62	10.1	17.7

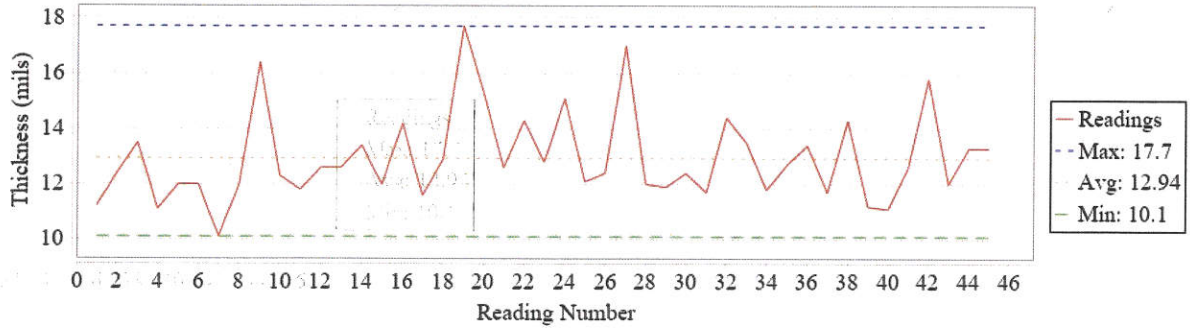
### Readings

#	Thickness (mils)	Time
1	11.2	2022-11-17 09:25:17
2	12.4	09:25:19
3	13.5	09:25:20
4	11.1	09:25:21
5	12.0	09:25:22
6	12.0	09:25:23
7	10.1	09:25:24
8	12.0	09:25:25
9	16.4	09:25:26
10	12.3	09:25:28
11	11.8	09:25:29
12	12.6	09:25:30
13	12.6	09:25:32
14	13.4	09:25:33
15	12.0	09:25:34
16	14.2	09:25:35
17	11.6	09:25:36
18	12.9	09:25:37
19	17.7	09:25:38
20	15.3	09:25:39
21	12.6	09:25:40
22	14.3	09:25:41
23	12.8	09:25:42
24	15.1	09:25:43
25	12.1	09:25:44
26	12.4	09:25:45
27	17.0	09:25:46
28	12.0	09:25:49
29	11.9	09:25:50
30	12.4	09:25:51
31	11.7	09:25:52
32	14.4	09:25:53
33	13.5	09:25:53
34	11.8	09:25:56
35	12.7	09:25:57

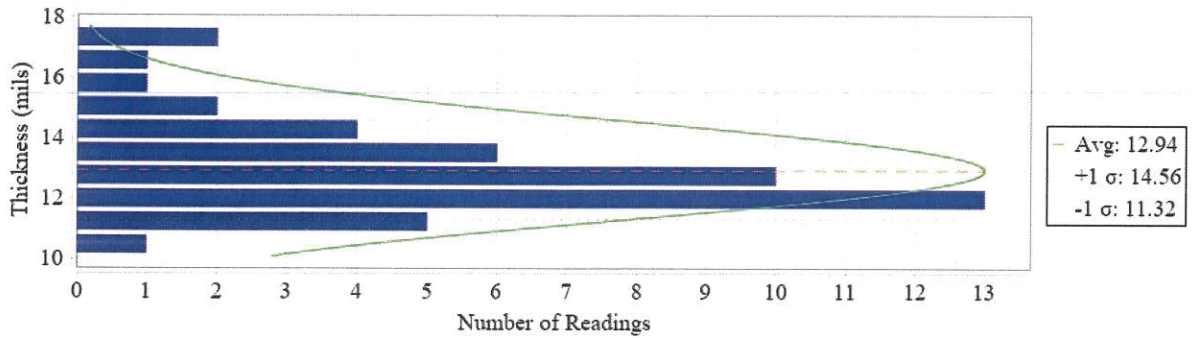
# B13 Readings

#	Thickness (mils)	Time
36	13.4	09:25:58
37	11.7	09:25:58
38	14.3	09:25:59
39	11.2	09:26:00
40	11.1	09:26:03
41	12.6	09:26:04
42	15.8	09:26:06
43	12.0	09:26:07
44	13.3	09:26:08
45	13.3	09:26:08

B13



B13



B14

Created: 2022-11-17 10:07:22  
PosiTector Body S/N: 871573  
Probe Type: PosiTector 6000 F  
Probe S/N: 423385  
CAL: Cal 1

Summary

	#	x	$\sigma$	↓	↑
Thickness (mils)	91	18.10	5.36	10.8	47.0

Readings

#	Thickness (mils)	Time
1	17.1	2022-11-17 10:07:24
2	16.9	10:07:26
3	13.5	10:07:27
4	13.5	10:07:28
5	16.6	10:07:29
6	14.2	10:07:30
7	16.3	10:07:31
8	15.9	10:07:32
9	13.8	10:07:32
10	15.3	10:07:35
11	14.0	10:07:35
12	15.5	10:07:36
13	14.5	10:07:37
14	12.9	10:07:38
15	14.6	10:07:39
16	12.5	10:07:40
17	14.4	10:07:41
18	13.7	10:07:42
19	14.0	10:07:43
20	12.9	10:07:44
21	15.3	10:07:44
22	11.9	10:07:45
23	15.5	10:07:46
24	22.3	10:07:47
25	12.4	10:07:48
26	47.0	10:07:50
27	14.3	10:07:51
28	14.3	10:07:52
29	12.1	10:07:53
30	13.6	10:07:54
31	12.2	10:07:55
32	12.4	10:07:56
33	15.2	10:07:58
34	11.9	10:07:59
35	14.4	10:08:00

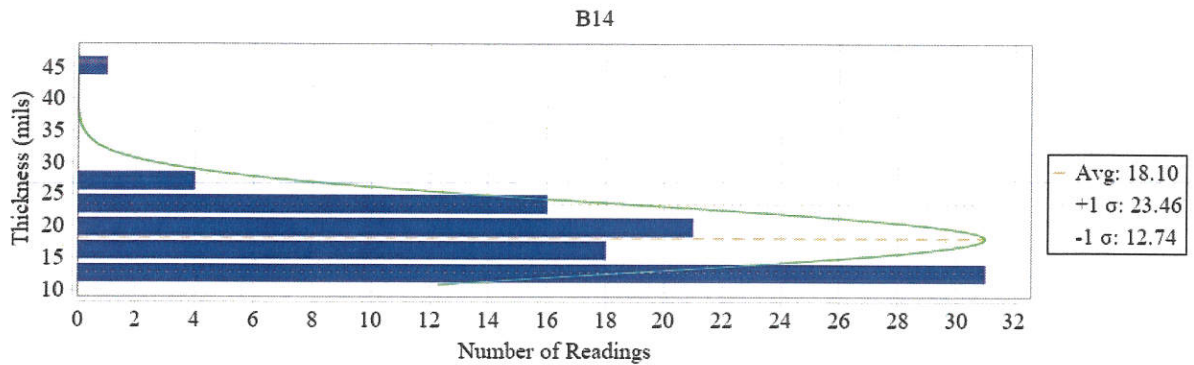
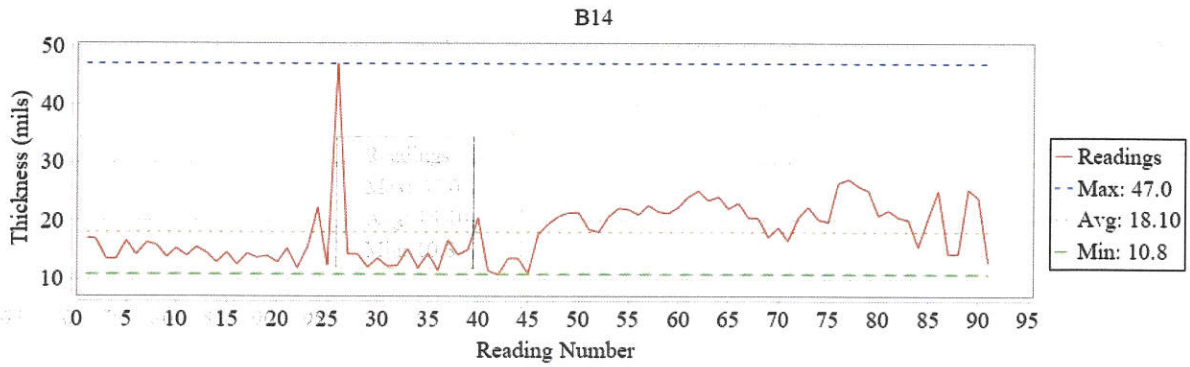
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## B14 Readings

#	Thickness (mils)	Time
36	11.5	10:08:01
37	16.7	10:08:02
38	14.2	10:08:03
39	15.1	10:08:04
40	20.6	10:08:05
41	11.5	10:08:06
42	10.8	10:08:07
43	13.6	10:08:08
44	13.6	10:08:10
45	11.0	10:08:10
46	17.7	2022-11-18 11:28:01
47	19.5	11:28:03
48	20.8	11:28:04
49	21.4	11:28:05
50	21.5	11:28:06
51	18.6	11:28:09
52	18.1	11:28:10
53	20.8	11:28:11
54	22.2	11:28:12
55	22.0	11:28:13
56	21.1	11:28:14
57	22.7	11:28:15
58	21.6	11:28:16
59	21.3	11:28:17
60	22.4	11:28:18
61	24.2	11:28:19
62	25.2	11:28:20
63	23.5	11:28:21
64	24.2	11:28:21
65	22.1	11:28:22
66	23.1	11:28:23
67	20.6	11:28:24
68	20.5	11:28:25
69	17.2	11:28:26
70	18.9	11:28:27
71	16.6	11:28:29
72	20.6	11:28:30
73	22.4	11:28:31
74	20.3	11:28:32
75	19.8	11:28:33
76	26.5	11:28:35
77	27.2	11:28:36
78	26.0	11:28:37
79	25.2	11:28:38
80	20.9	11:28:39
81	21.8	11:28:40
82	20.6	11:28:41
83	20.2	11:28:43

# B14 Readings

#	Thickness (mils)	Time
84	15.5	11:28:44
85	20.5	11:28:47
86	25.2	11:28:48
87	14.3	11:28:52
88	14.4	11:28:53
89	25.4	11:28:54
90	24.0	11:28:55
91	12.8	1969-12-31 19:00:45





**Route 39 Elevated Tank**  
**CorrTech Report No. 15880-FOR-02-1**



**Prepared For:**

**Haley and Ward, Inc.**  
**63 Great Road, Suite 200**  
**Maynard, MA 01754**

**CORRTECH**  
**CORROSION UNDERSTOOD**  
**25 South Street**  
**Hopkinton, MA 01748**

**12/23/2022**

## STATEMENT OF LIMITATION

Conclusions presented in this document are based on the services described and performed and not on tasks or procedures beyond the scope of the contracted services or time and budgetary constraints imposed by contract limitations.

CorrTech, Inc. has performed this assessment in a professional manner using the degree of skill and care exercised for similar projects under similar conditions by reputable and competent consultants, and in accordance with the procedures established within CorrTech's quality assurance, quality control protocol.

CorrTech, Inc. shall not be responsible for conditions or consequences arising from relevant facts that were concealed, withheld or not fully disclosed at the time the evaluation was performed.



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Report Prepared by: Scott Leighton  
Corrosion Technician  
NACE CIP-2



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Report Reviewed by: Max Mizejeski  
Corrosion Technician  
NACE CIP-1

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## INTRODUCTION

On November 18, 2022, CorrTech representatives, Scott Leighton and William Birkbeck performed a corrosion and structural assessment of the exterior and interior of the Route 39 elevated water storage tank in Harwich, MA for Haley & Ward. The inspection was conducted to establish the current condition of the tank's coatings and steel substrate. The tank inspected included:

### Route 39 Elevated Tank

For applicable standards used in this inspection, please see below.

The interior of the reservoir was inspected with a remotely operated vehicle (ROV) while full. By using the ROV the interior of the tank was inspected with no special preparation, confined space entry, no additional disinfection, and no downtime.

The ROV is equipped with high-powered thrusters, which are used to maneuver throughout the tank and are used to wash away bottom sediment for observations. Video is recorded with audio narration on site with digital stills captured for the report.

The ROV and all tethers were prepared for the inspection by disinfecting equipment with a 200-ppm chlorine spray in accordance with AWWA C652.

The exterior portions of the tank were inspected by walking the roof and shell portions that were accessible from the ground.

The objectives of the assessment were to:

1. Perform field inspections and tests to assess the structural integrity of the tank
2. Assess condition of interior and exterior protective coatings
3. Review the safety compliance of tank ladders and access hatches
4. Review sanitary protection equipment
5. Provide recommendations for rehabilitation

## APPLICABLE STANDARDS

This inspection was performed in general conformance with the following standards:

- AWWA Standard D100, Welded Carbon Steel Tanks for Water Storage
- AWWA Standard D101, Inspecting Steel Tanks, Standpipes, Reservoirs, and Elevated Tanks for Water Storage
- AWWA Standard C652, Disinfection of Water Storage Facilities
- AWWA Manual M42, Steel Water Storage Tanks
- Massachusetts Department of Environmental Protection (MassDEP) Guidelines for Public Water Systems, Chapter 8, Finished Water Storage

**EXECUTIVE SUMMARY**

The condition and recommendations for the tank are briefly summarized in this section. For detailed information regarding detailed tank conditions and the specific recommendations please refer to the designated section for the tank.

Sporadic corrosion has formed at the bottom of the tank throughout the interior shell. No substantial metal loss is apparent.

Uniform sediment has accumulated on the bowl of the tank at approximately 1/16-inch or less.

Surface rust has started to form on the underside of the exterior tank bowl.

### Tank Data

TANK DATA FOR Route 39							
<b>Site Information</b>	Fencing In Place:	Yes			Locks on Gates:	Yes	
Address:	Route 39			Vault Lock in Place:	NR		
<b>Tank Information</b>	Tank Name:	Route 39			Tank Diameter:	81 feet	
Tank Height:	140 feet	Tank Capacity:		Previous Cleaning Date:	NR		
Previous Inspect. Date:	NR			Previous Coating Application:	NR		
<b>Legs Foundation</b>	Leg Diameter:		# of Legs:	9	Leg Height:		
Leg Pad Size		# of Anchors on Legs	2	Leg Anchor Chair Thickness:			
Leg Anchor Bolt Diameter:				Leg Anchor Chair Dimensions			
<b>Foundation</b>	Height:	24	Adequate Drainage:	Yes	Foundation Pad Size:		
# of Anchors:	8	Anchor Bolt Diameter:	1.75 inches	Chair Thickness	NR		
Anchor Chair Dimensions:	NR			Riser Diameter:			
<b>Shell Manhole</b>	# of Manholes	1	Diameter:	24 inch			
<b>Tension Rods</b>	Tension Rod Diameter:				Turnbuckles Engaged:		
	Clevis Pin Intact:				Tension Rod Bowing:		
<b>Ladder</b>	Height from Ground:	15 feet			Safety Cage:	Yes	
Anti Climb Lock :	Yes			Climbing Safety System Style:	Yes		
Rung to Rung Dim:	12 inches	Distance from Shell:	7 inches	Width:	16 inches		
<b>Overflow</b>	Diameter:	8 inches	Air Gap	Yes	Overflow Protection	Yes	
Screen Condition:	Good	Screen Type:	Coarse & Fine		Splash Pad	Rock	
<b>Roof Hatch</b>	Dimensions:	24 inch diameter		Sanitary Neck	3 inches		
# of Hatches:		Hatch Cover Overlap	2 inches		Lock	Yes	
<b>Roof Vent</b>	Style:	NR		Diameter:	NR		
Cap to Roof Distance:	NR	Screen Condition:	NR		Type:	NR	
<b>Roof Handrail Hts</b>	Top Rail:	42 inches	Mid Rail:	21 inches	Toe Kick Plate:	4 inches	
<b>Interior</b>	Sediment Depth:	< .25 inches		Sediment Coverage:	Uniform		
Inlet/Outlet Pipe:	Combination		Sediment Ring:	Yes			
<b>Interior Ladder</b>	Climbing Safety System:	NA		Style:	NA		
<b>Columns:</b>	NA	Column Number:	NA		Interior Column Style	NA	

## OBSERVATIONS

Photos provided in the report were created from a digital camera and interior pictures were captured in digital format from the interior video. The interior images are as clear as our printed technology will allow. The copies in the report provide a reference for our comments. Keep in mind that for underwater video snaps, the video provides the greatest detail and should be viewed as part of the report.

Narration on the video is done in the field and some of the comments may be different than the written report.

## TESTING

### Dry Film Thickness Readings

A Positector 6000 gauge was used to take dry film coating thickness readings on the exterior shell and roof. These reading measure the thickness of the paint remaining on the substrate. For complete data, see APPENDIX II.

Dry Film Thickness Readings

Location	Number of Readings	Average	Minimum	Maximum
Legs, riser, shell & roof	45	13.0	9.5	21.9

(All measurements taken in mils)

## INTERIOR

### Roof Structure

Roof is a welded domed rafter supported structure. Roof structure appears to be in satisfactory condition.

### Roof Coating

Roof coating is 99% intact on the plates and support beams. Rafters have minor edge corrosion formed on skip welded gaps.

### Shell Structure

Shell is a welded structure with no unsealed penetrations, deformations, or warps.

### Shell Coating

Shell coating is 99% intact with minimal sporadic corrosion forming primarily on the bottom of the stiffener supports. Sediment staining has built up on the shell coating below the fluctuation zone. No large areas of adhesion loss were observed.

### Bowl Structure

Bowl is a welded structure that is free from deformation or section loss.

### Bowl Coating

Majority of the bowl has an extremely thin layer of sediment. In areas where the coating could be observed, active corrosion was not observed.

### Sediment

Tank has a thin layer of sediment closer to the riser pipe cone opening.

### Piping

Tank is equipped with a combination inlet/outlet pipe located in the riser pipe and is equipped with an intact sedimentation ring.

### Riser Coating

Riser coating could not be observed.

### Riser Structure

Riser structure could not be observed. Inlet/outlet pipe is the only penetration through to the tank bowl.

## **EXTERIOR**

### Leg Foundation

Leg foundation pads are in overall decent condition with no significant signs of spalling. Some typical biological staining has formed sporadically on the pads.

### Leg Coating

Surface corrosion was observed on less than 1% of the overall coating.

### Riser Foundation

Riser foundation pad is intact. No large cracks, spalls, or exposed rebar were noted.

### Riser Coating

Riser coating is 95% intact with active corrosion observed on less than 1% of surfaces. Some biological staining has formed on riser pipe, mostly on the lower sections.

### Riser Doorway

Riser doorway is intact. Tank riser pipe is a dry area.

### Tension Rods



Tension rods are intact with no significant bowing or deformation. Corrosion has formed on less than 5% of the clevis points and turnbuckle connections.

#### Ladder

Ladder is intact with no section loss or heavy corrosion. Ladder does not meet OSHA standards for toe clearance, ladder rungs should be at least 7-in away from the tank leg or shell. Ladder is equipped with a functional Cable style fall arrest system.

#### Overflow

Overflow pipe penetrates the upper shell at a weir box and extends down a tank leg to just above grade before making a 90-degree bend and extending approximately 15-20 feet to the manmade rock discharge point. Overflow discharge is equipped with a flapper valve and coarse/fine mesh protective screens.

#### Bowl Coating

Tank bowl coating is more than 99% intact. Minor biological staining and moderate rust staining was observed.

#### Shell Coating

Shell coating is 95% intact with minimal corrosion or coating delamination observed.

#### Balcony

Balcony railing system is 42 inches high and currently meets OSHA standards. No warps or other structural issues were noted on the balcony. There is a 24-inch diameter bolted manhole access hatch at the balcony level.

#### Roof Hatch

The ROV was deployed through the 24-in roof hatch located beside the ladder leading to the top of the tank. The manway currently meets the AWWA standard for sanitary curb or hatch cover overlap.

#### Roof Coating

Roof coating is 95% intact with minimal active corrosion.

## RECOMMENDATIONS

Impressed Current Cathodic Protection System is suggested.

An impressed current cathodic protection system (ICCP) could be installed to prevent metal loss of the submerged portions of the tank. ICCP will protect pitted surfaces from further metal loss and preserve the life of the existing coating. Cathodic protection systems will not provide protection to above water and roof surfaces of the tank. Systems installed where freezing can occur should be underwater suspended systems. If properly designed and installed an ICCP system will operate for 15-20 years and consume a very small amount of energy.

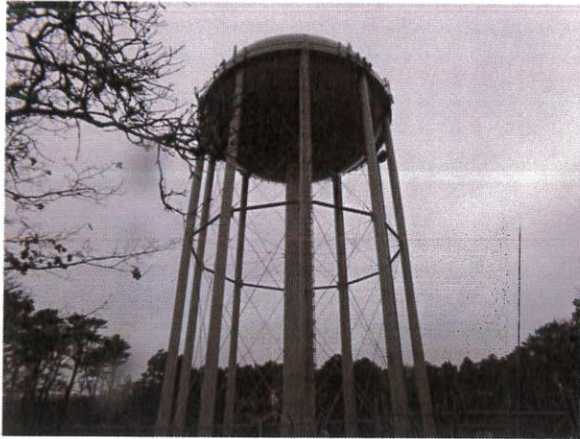
Applicable standard:

- NACE International SP0388, latest revision "Impressed Current Cathodic Protection of Internal Submerged Surfaces of Carbon Steel Water Storage Tanks" and/or AWWA D104-11 :Automatically Controlled, Impressed-current Cathodic Protection for the Interior Submerged Surfaces of Steel Water Storage Tank".

(If firewater add this) The installation of a cathodic protection system, will allow the tank to be inspected every five years instead of three, in accordance with NFPA-25.

Tank should be re-inspected in 2027.

## Appendix I: Photographs



1) Tank overview



4) Typical turnbuckle connection



2) Lower portion of tank



5) View of lower riser pipe



3) Typical view of leg base



6) Close up of anchor bolt for riser pipe



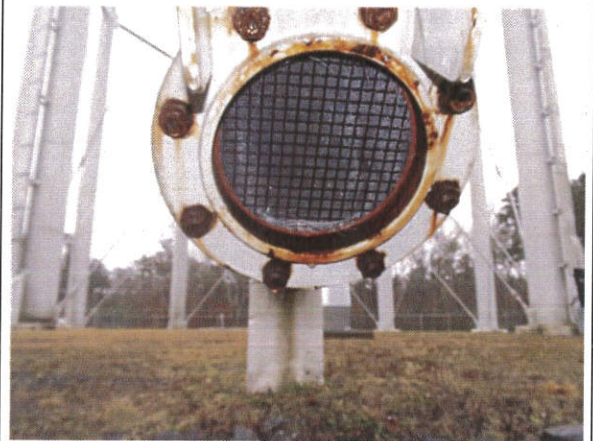
7) Riser pipe base with anchor bolts and foundation



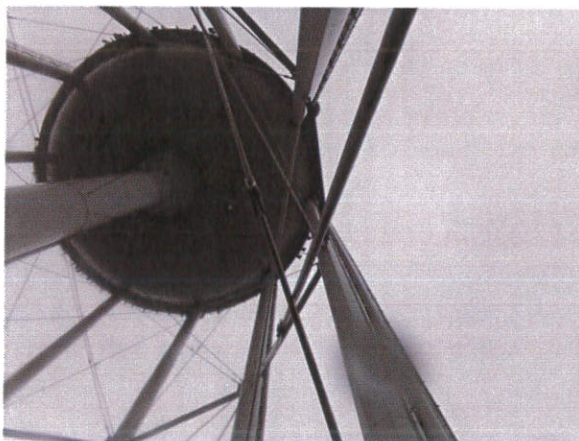
10) Overflow termination with grate for drain



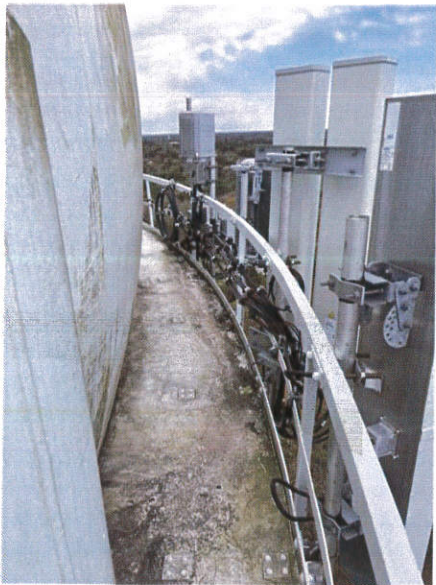
8) Wide view of lower tank bowl with moderate rust staining



11) Close up of overflow pipe termination with coarse and fine mesh protective screens



9) View of tension rods



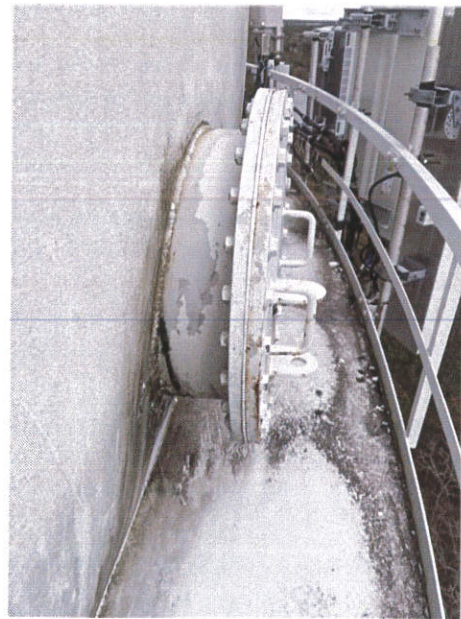
12) General view of balcony



14) General roof view



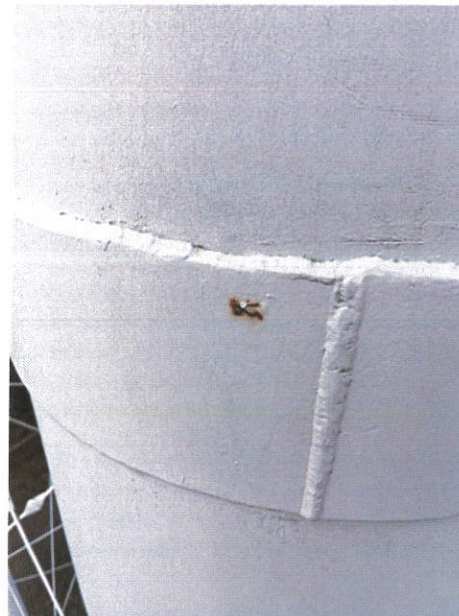
13) Clockwise view of balcony with mildew staining



15) Bolted shell manway



16) View of bowl underside with some surface rust



18) Isolated corrosion cell on tank leg



17) Balcony step off and top of leg ladder with safety cage



19) General interior roof view



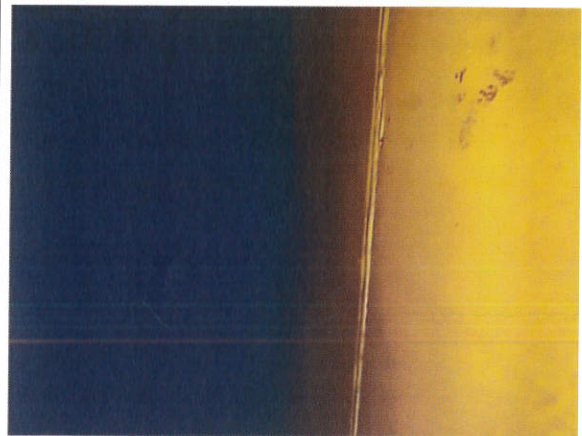
20) Close up of typical roof beam



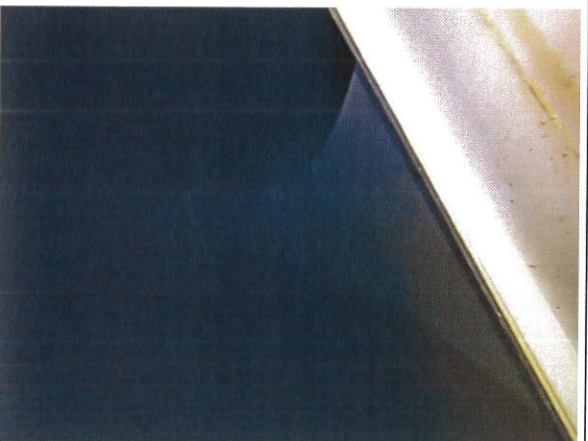
23) Edge corrosion has started at bottom of stiffener beam 4:46



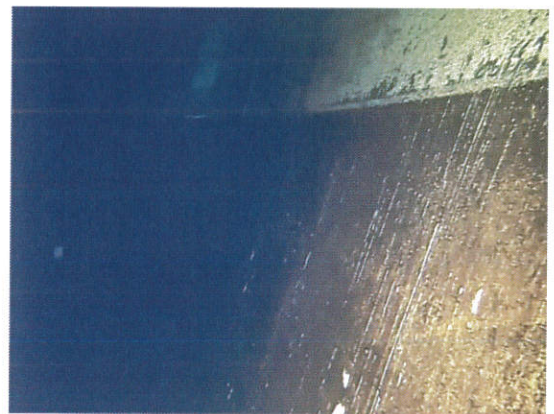
21) General view of upper shell interior 1:11



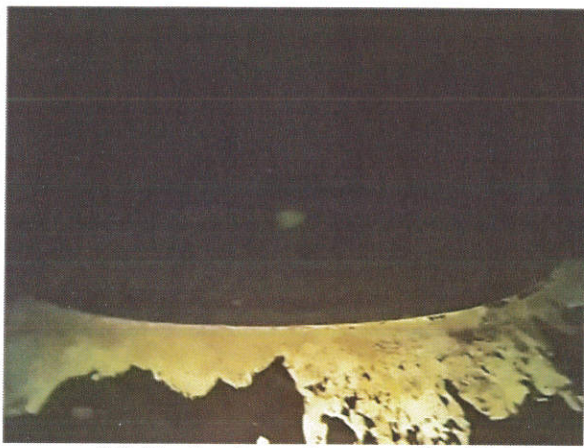
24) Vertical weld seam 11:16



22) View of stiffener beam 1:35



25) Lower tank shell with thin sediment layer 16:22



26) Center floor riser opening 20:51



27) Inlet/outlet pipe 21:29



28) View of floor sediment 21:57



Appendix I  
Interior Paint Thickness Readings

**Appendix II  
Exterior Paint Thickness Readings**

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# B15

Created: 2022-11-18 09:40:09  
PosiTector Body S/N: 871573  
Probe Type: PosiTector 6000 F  
Probe S/N: 423385  
CAL: Cal 1

## Summary

	#	x	$\sigma$	↓	↑
Thickness (mils)	45	13.00	2.76	9.5	21.9

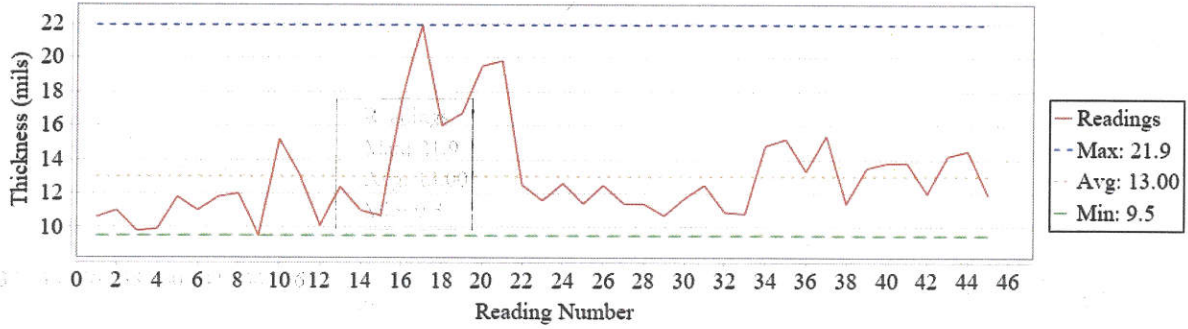
## Readings

#	Thickness (mils)	Time
1	10.6	2022-11-18 09:40:16
2	11.0	09:40:18
3	9.8	09:40:18
4	9.9	09:40:19
5	11.8	09:40:20
6	11.0	09:40:21
7	11.8	09:40:22
8	12.0	09:40:23
9	9.5	09:40:24
10	15.2	09:40:25
11	13.1	09:40:26
12	10.1	09:40:27
13	12.4	09:40:31
14	11.0	09:40:32
15	10.7	09:40:33
16	17.5	09:40:44
17	21.9	09:40:45
18	16.0	09:40:46
19	16.7	09:40:47
20	19.5	09:40:48
21	19.8	09:40:49
22	12.5	09:41:00
23	11.6	09:41:00
24	12.6	09:41:02
25	11.4	09:41:03
26	12.5	09:41:03
27	11.4	09:41:04
28	11.4	09:41:05
29	10.7	09:41:06
30	11.7	09:41:07
31	12.5	09:41:10
32	10.9	09:41:11
33	10.8	09:41:12
34	14.8	09:41:13
35	15.2	09:41:13

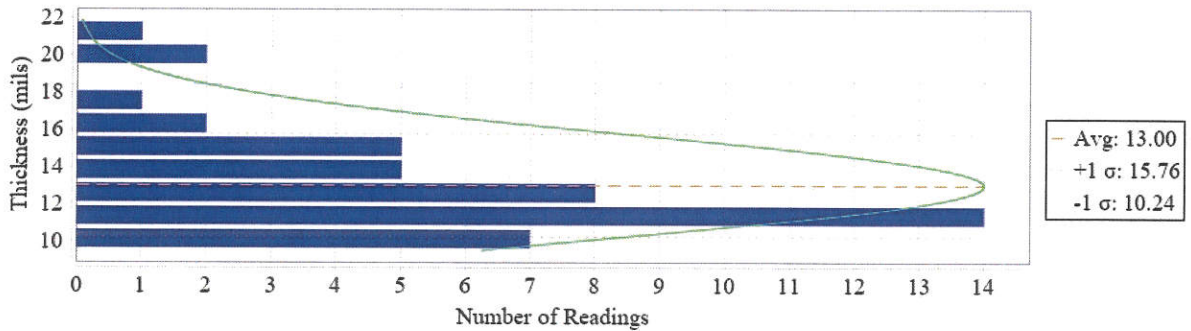
# B15 Readings

#	Thickness (mils)	Time
36	13.3	09:41:14
37	15.4	09:41:17
38	11.4	09:41:18
39	13.5	09:41:19
40	13.8	09:41:20
41	13.8	09:41:21
42	12.0	09:41:21
43	14.2	09:41:22
44	14.5	09:41:23
45	11.9	09:41:24

B15



B15



## GLOSSARY OF TERMS FOR STEEL/CONCRETE TANKS

**Adhesion-** State in which two surfaces are held together by interfacial forces which may consist of valence forces or interlocking action or both

**Aggregate-** Granular material, such as sand, gravel, crushed stone, crushed hydraulic-cement concrete, or iron blast-furnace slag used with a hydraulic cementing medium to produce either concrete or mortar.

**Bugholes-** Small regular or irregular cavities, usually not exceeding 15 mm in diameter, resulting from entrapment of air bubbles in the surface of formed concrete during placement and compaction.

**Cathodic Protection** - The use of a sacrificial metal or energized substance to polarize the structures surfaces and prevents corrosion.

**Chalking** - The degradation of a paint binders when exposed to ultra-violet light which creates a loose residue on the surface.

**Chemical Attack-** Decomposition of a coating or concrete due to the action of a chemical.

**Chime-** Portion of tank floor plate that extends outside the tank shell and rests on top of the foundation.

**Contraction Joint-** Formed, sawed, or tooled groove in a concrete structure to create a weakened plane and regulate the location of cracking resulting

**Corrosion Cell** - A concentrated localized site of accelerated corrosion that creates pitting.

**Disbondment-** The loss of adhesion between a coating and the substrate.

**Dry Film Thickness** - Total thickness of a paint film when completely cured.

**Efflorescence-** A white crystalline or powdery deposit on the surface of concrete. Efflorescence results from leaching of lime or calcium hydroxide out of a permeable concrete mass over time by water, followed by reaction with carbon dioxide and acidic pollutants.

**Finish-** The texture of a concrete surface after compaction and finishing operations have been performed.

**Finial Vent** - The central roof vent on top of a water tank.

**Grout-** A plastic mixture of cementitious materials and water used as a filler for cracks, or other void spaces, in concrete surfaces to be coated.

**Holiday** - A hole or void in a protective coating that may be invisible to the unaided eye that extends to the substrate.

**Honey Comb-** Voids left in concrete due to failure of the mortar to effectively fill the spaces among coarse aggregate particles.

**Hydraulic, Hydrostatic Pressure-** A force exerted on the concrete/coating interface due to the level of the ground water.

**Isolation Joint-** A separation between adjoining parts of a concrete structure

**Joint Sealant-** Compressible material used to exclude water and solid foreign materials from joints.

**Lap Joint Seam-** Overlapping seam between roof plates that is open and un-welded on the interior.

**Laitance-** A thin, weak brittle layer of cement and aggregate fines on a concrete surface. The amount of laitance is influenced by the degree of working or the amount of water in the concrete.

**Lead Abatement** - The removal of a lead bearing paint system.

**Lead Encapsulation** - The covering over of a lead based paint by applying a compatible topcoat.

**Osmotic Blister** - Raised coating area created by buildup of fluid under the coating. Fluid moves through coating in response to water/solvent concentrations between coating and tank water.

**Osmotic Pressure-** A force exerted on the concrete /coating interface through the capillaries in the concrete due to a moisture differential across the coating.

**Overflow Weir Box-** internal or external box that captures water above the operating height of the tank and directs it to an overflow pipe.

**Pack Rust/Crevice Corrosion-** Advanced form of steel corrosion that forms visible layers of oxidized steel swollen larger than the original steel plate thickness, usually found between steel plates or surfaces.

**Pinholes-** Film defect characterized by small pore-like flaws in a coating which extend entirely through the applied film and have the general appearance of pinpricks, fine holes, or voids when viewed by reflected light.

**Plastic Cracking or Shrinkage-** Cracking that occurs in the surface of fresh concrete soon after it is placed and while it is still plastic,

**Porosity-** The ratio usually expressed as a percentage, of the volume of voids in a material to the total volume of the material, including the voids.

**Reflective Cracking-**Cracking that develops in a coating directly over a dynamic crack in concrete.

**Rigging plug-** Thread steel nipple welded to a tank roof for the purposes of rigging painting cables. Usually sealed with a threaded plug when not in use.

**ROV** - Remotely operated vehicle, underwater inspection device "TankRover" by CorrTech

**Screen Mesh-** Number of openings per linear inch of screen.

**Silt** - Material that accumulates in the bottom of a water tank originating from treatment by products, raw water particles and distribution system debris.

**Silt Stop-** Solid cylinder installed on a floor inlet or outlet pipe to extend the pipe above the floor. Pipe prevents floor sediment from being stirred up or sucked out of the tank during flow.

**Static Cracks-** A crack in the concrete surface whose width does not change.

## GLOSSARY OF TERMS FOR STEEL/CONCRETE TANKS

**Stitch or Skip Weld-** Method of welding two pieces of steel together with intermittent short sections of weld bead. Leaves open lap joints along the unwelded sections.

**Tubercle** - Domed shaped buildup of corrosion products over an active corrosion site. Promotes metal loss through pitting due to differential oxygen concentrations.

**Ultrasonic Measurement** - The use of high frequency sound waves passed through a material to measure the time required to return. The time required to pass through the material is correlated to the speed of sound in the substrate to yield an actual thickness at a specific location.

**Vapor Barrier-** Waterproof membrane placed under concrete floor slabs that are placed on grade.