



# REQUEST FOR PROPOSALS TITLE PAGE

Include This Page as the First Page in Your Proposal Response

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## City of Lynchburg, Virginia Procurement Division

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### Proposal Title: Municipal Water Tank Engineering Services

This is the City of Lynchburg's Request for Proposals (RFP) No. 14-882, issued October 30, 2013. Direct inquiries for information should be directed to Lisa Moss: e-mail: [lisa.moss@lynchburgva.gov](mailto:lisa.moss@lynchburgva.gov); Phone: 434-455-4228; Fax: 434-845-0711. All requests for clarification of or questions regarding this RFP must be made in writing and received by 2:00 p.m., November 26, 2013. All responses to this solicitation shall be in strict accordance with the requirements set forth in this RFP document and the ensuing contract documents.

An **Optional Pre-Proposal** meeting will be held on **November 18, 2013 at 1:00 P.M.** in the conference room College Hill Water Treatment Plant 525 Taylor St. Lynchburg, VA. **Following this meeting, the City will visit each of the tank sites to allow Offerors a chance to look at the tanks up-close. This will be the only time the City will open the tank sites for potential Offerors.**

Sealed proposals will be publicly accepted prior to 4:00 p.m., December 5, 2013; however, only the names of firms responding will be available for announcement. Proposals received after the stated due date and time shall not be considered. Submit proposals in a sealed, opaque envelope, and put the RFP number, title, due date and time on the lower left front. Offerors are responsible for having their proposal stamped by Procurement Division staff before the deadline indicated above and acknowledge all addenda so issued in the space provided below. Any alteration or changes to this RFP will be made only by written addendum issued by the Procurement Division, and all Offerors are responsible for obtaining issued addenda from the City's Procurement website: <http://www.lynchburgva.gov/current-solicitations>

Acknowledge receipt of addenda here: No. \_\_\_\_\_ Date: \_\_\_\_\_ No. \_\_\_\_\_ Date: \_\_\_\_\_

Submit Proposals: BY MAIL, GROUND DELIVERY, OR HAND DELIVER TO:

Procurement Division  
Third Floor City Hall  
900 Church Street  
Lynchburg, Virginia 24504

**Information the Offeror deems Proprietary is included in the proposal response in section(s):** \_\_\_\_\_

See Paragraph B. on page 2 for guidelines on submitting proprietary information.

In compliance with this Request for Proposals and all the conditions imposed therein, the undersigned offers and agrees to furnish the services in accordance with the attached proposal or as mutually agreed by subsequent negotiations. By my signature below, I certify that I am authorized to bind the Offeror in any and all negotiations and/or contractual matters relating to this Request for Proposals. Sign in ink and type or print requested information.

Full Legal Name of Offeror: \_\_\_\_\_

Fed ID OR SOC. SEC. NO.: \_\_\_\_\_ Date: \_\_\_\_\_

Address: \_\_\_\_\_ Phone: ( ) \_\_\_\_\_

\_\_\_\_\_ Fax: ( ) \_\_\_\_\_

Signature: \_\_\_\_\_ Typed or Printed Name, Title \_\_\_\_\_

## I. SUBMISSION OF PROPOSALS

- A. An original, so marked, and three (3) copies, so marked, for a total of four (4) copies of the Proposal document are required. In addition, one (1) copy of the Proposal in an electronic format, disk or CD in Microsoft Word format or PDF file must accompany the Proposal. The City will not assume responsibility for reproduction where an insufficient number of copies have been supplied. In any such case, the City will notify the Offeror of the deficiency and request that the appropriate number of copies be delivered within 24 hours. Failure to comply with this or other requirements of this RFP shall be grounds for the City to reject such Proposals. Telegraphic or facsimile submission of Proposals will not be considered. Nothing herein is intended to exclude any responsible bank or in any way restrain or restrict competition. All responsible Offerors are encouraged to submit Proposals. The content of the RFP and the successful Offeror's Proposal will become an integral part of the Contract, but may be modified by provision of the Contract. Offerors must be amenable to inclusion in a Contract any information, exclusive of that which is determined to be proprietary, provided either in response to this RFP or subsequently discussed and agreed upon during the selection/negotiation process. The information received will be considered contractual in nature, and will be used in validation and evaluation of Proposals, and in subsequent actions related to Contract execution and performance of responsibilities.
- B. **Submission of Proprietary Information:** Trade secrets or proprietary information submitted by an Offeror in connection with the submittal shall not be subject to public disclosure under the Virginia Freedom of Information Act. However, the Offeror must invoke the protection of this Section prior to or upon submission of the data or the materials, and must identify the data or the materials to be protected and state the reason why protection is necessary (Section 2.2-4342 of the Code of Virginia). Offerors shall submit, in a separate section of the Proposal, any information that is considered proprietary and copyrighted material, and clearly identify the information as proprietary and/or copyrighted information. Offerors may not declare the entire Proposal proprietary nor may the Offeror declare proposed pricing as proprietary. References may be made within the body of the Proposal to proprietary information; however, all information contained within the body of the Proposal and not in the separate section labeled proprietary shall be considered public information.
- C. Proposals having any erasures or corrections must be initialed in ink by the Offeror.
- D. The City reserves the right to accept or reject any or all Proposals, to waive informalities, and to reissue any RFP and to award a Contract in the City's best interest. The City reserves the right to contract with firms not party to the resultant Contract if determined to be in the City's best interest.
- E. By submitting a Proposal response, the Offeror agrees that the Proposal response will not be withdrawn for a period of one hundred eighty (180) days following the due date for Proposal responses.
- F. By submitting a Proposal response, the Offeror certifies not to have conspired or agreed to intentionally alter or otherwise manipulate the Proposal response for the purpose of allocating purchases or sales to or among persons, raising or otherwise fixing the prices of the goods or services, or excluding other persons from conducting business with the City.
- G. By submitting a Proposal response, the Offeror certifies the Proposal is made without collusion or fraud and the Offeror has not offered or received any kickbacks or inducements from any other Offeror, supplier, manufacturer or subcontractor in connection with the Proposal; and, the Offeror has not conferred with any public employee having official responsibility for this procurement transaction, any payment, loan, subscription, advance, deposit of money, services or anything of more than nominal value, present or promised.
- H. The City will not be responsible for any expense incurred by any Offeror in preparing and submitting a Proposal response. All Proposals submitted will become the property of the City.
- I. The City does not discriminate against faith-based organizations.

- J. **COOPERATIVE PROCUREMENT:** This procurement is being conducted by the City of Lynchburg in accordance with the provisions of 2.2-4304 CODE OF VIRGINIA. Except for contracts for architectural and engineering services, if agreed to by the contractor, other public bodies may utilize this contract. The Contractor shall deal directly with any public body it authorizes to use the contract. The City, its officials and staff are not responsible for placement of orders, invoicing, payments, contractual disputes, or any other transactions between the Contractor and any other public bodies, and in no event shall the City, its officials or staff be responsible for any costs, damages or injury resulting to any party from use of a City Contract. The City assumes no responsibility for any notification of the availability of the contract for use by other public bodies, but the Contractor may conduct such notification.
- K. It is the policy of the City of Lynchburg to maximize participation by minority and women owned business enterprises in all aspects of City contracting opportunities.

## II. PURPOSE

The purpose of this RFP is to solicit proposals from qualified engineering firms to provide municipal water tank engineering services. The City of Lynchburg reserves the right to award multiple contracts if it is found to be in the best interest of the City.

## III. GENERAL

It is the intent of this RFP to secure inspection services for preparation of Preliminary Engineering Reports for thirteen ground-level water storage tanks, construction bid document preparation for water storage tank rehabilitation, and inspection services and construction administration for these rehabilitation projects. These services shall include preliminary engineering reports, (PER), construction contract documents (CD), bidding phase services (BP), construction administration (CA), and resident inspection (RI).

## IV BACKGROUND INFORMATION/PROJECT DESCRIPTION

The City of Lynchburg Department of Water Resources operates and maintains 13 ground level water storage tanks used in water treatment and storage of finished water throughout the distribution system. All water storage tanks are welded steel, painted inside and out with ringwalls or mat foundations and underground piping vaults. Three tanks have integral steel roofs, two are open top, and the others have geodesic aluminum domes.

Tank Name	Roof Type	Volume (MG)	Diameter (ft)	Height (ft)
College Hill Coagulation #1	Open	1.7	67	67
College Hill Coagulation #2	Open	4.0	97	100
College Hill 1.4 MG Clearwell	Alum	1.4	62	66
College Hill 4.5 MG	Alum	4.5	110	63
College Hill 10.5 MG	Alum	10.5	235	28
Leesville Road	Alum	3.0	93	61
Huntingwood	Steel	2.0	98	38
Candlers Mountain #1	Alum	2.0	100	36
Candlers Mountain #2	Alum	1.0	70	36
Fort Hill #1	Alum	0.3	26	72
Fort Hill #2	Steel	0.5	34	74
Mill Lane	Steel	5.0	200	22
Wingate	Alum	0.5	62	24

The Department of Water Resources inspects each water tank, internal and external, at a minimum of once every 5 years. Tanks are rehabilitated as required based on the results of the 5 year inspections.

Rehabilitation may include removal of old paint, new three-tier paint overcoat, and other repairs needed to the base slab, caulking, tank structure, roof, screens and other peripheral tank appurtenances. It is expected that coatings life will range between 12 and 20 years depending on exposure.

The following table lists the last inspection and the last rehabilitation of each tank.

Tank Name	Last Inspection	Last Rehabilitation
College Hill Coagulation #1	2011	2005 (is,es)
College Hill Coagulation #2	2011	2005 (is,es)
College Hill 1.4 MG Clearwell	2012 (w)	2011 (eo), 1998 (is,es)
College Hill 4.5 MG	2009 (w)	2008 (is,es)
College Hill 10.5 MG	2009	2013 (eo), 1999 (is,es)
Leesville Road	2011	2011 (es), 1992 (i-original)
Huntingwood	2009	2010 (eo), 1991 (is,es)
Candlers Mountain #1	2009	1998 (is,es)
Candlers Mountain #2	2009	1998 (is,es)
Fort Hill #1	2009 (w)	2007 (is,es)
Fort Hill #2	2009 (w)	2007 (is,es)
Mill Lane	2011	2005 (is,es)
Wingate	2011	2002 (original construction)

- is = internal paint (strip to bare metal)
- io = internal paint (overcoat)
- es = external paint (strip to bare metal)
- eo = external paint (overcoat)
- w = warranty inspection

Ten of the reports are attached. Warranty inspection reports for Fort Hill #1, Fort Hill #2, and College Hill 4.5 MG are available as hard copies and may be viewed by contacting Scott Parkins at the Department of Water Resources (434-455-4248) or they will be available for review at the Pre-Proposal meeting.

**V. PROPOSED SCOPE OF WORK**

The Project will consist of inspection of each of the 13 steel water storage tanks and preparation of a PER summarizing findings. After considering the recommendations of the PER and funding availability, the Owner reserves the right to determine the schedule and the extent of design and construction projects. The following table shows a potential list of services that may be required under this contract.

Tank Name	Services Required				
	PER	CD	BP	CA	RI
College Hill Coagulation #1	✓				
College Hill Coagulation #2	✓				
College Hill 1.4 MG Clearwell	✓				
College Hill 4.5 MG	✓				
College Hill 10.5 MG	✓	✓ (int)	✓	✓	✓
Leesville Road	✓	✓ (int)	✓	✓	✓
Huntingwood	✓	✓ (int)	✓	✓	✓

Candlers Mountain #1	✓	✓	✓	✓	✓
Candlers Mountain #2	✓	✓	✓	✓	✓
Fort Hill #1	✓				
Fort Hill #2	✓				
Mill Lane	✓				
Wingate	✓	✓	✓	✓	✓

PER – Inspection and Preliminary Engineering Report

CD – Construction Documents

BP – Bid Phase Services

CA – Construction Administration

RI – Resident Inspection

(int) – Internal only

- a. The Offeror shall inspect and provide an evaluation for each of the 13 steel water storage tanks. The inspection shall include condition assessment of internal and external coating systems and the exposed concrete base pad, grout, vents, access manways, cathodic protection systems, level indicators, screens, and all peripheral piping inside the tank and in external vaults. The objective of the evaluation is to determine extent and priority of tank rehabilitation needs and to gather enough information to scope design phase services. A Preliminary Engineering Report documenting findings shall be prepared to include summary of findings, photographs of key features and defects, recommendations for recoatings and repairs needed to meet compliance with OSHA and VDH regulations, estimate of life expectancy of existing coatings, and estimates of probable construction costs for rehabilitation.

Prior to each tank inspection, the Owner will drain each tank (with 3 exceptions) to allow for internal inspection, and the Offeror will be responsible for thoroughly high pressure washing and cleaning the tank interior. For the College Hill 10.5 MG, Wingate, and Mill Lane tanks, the tank interior shall be inspected by diving either by human or remote operated vehicle. The Offeror is responsible for disinfection of any personnel or equipment in contact with potable water.

The Offeror shall be responsible for all OSHA safety requirements in completing the inspections, including fall protection.

The Owner shall be provided with three paper copies and three digital copy (on CD) of each PER.

- b. Where designated by the Owner, the Offeror shall provide design services for the rehabilitation of the identified tanks according to the recommendations of the Preliminary Engineering Reports and as further defined by the Owner. Submit to the Owner technical specification documents in MS Word format. Any technical sketches and drawings shall be provided in pdf format. Once approved by the Owner, the final contract technical specifications shall be sealed by a Professional Engineer, using a Commonwealth of Virginia professional registration, and submitted to the Danville Office of the Virginia Department of Health (VDH) for approval and issuance of a Waterworks Construction Permit. The Offeror shall respond to any comments and resubmit to VDH until approved.
- c. The Offeror shall provide bidding phase services, including attendance at the pre-bid conference, recording any questions requiring a written response and preparing written addenda or responses to questions received during the pre-bid conference or asked afterwards.

- d. The Offeror shall provide construction administration services including conducting the pre-construction conference with the Contractor, participating in monthly progress meetings, and reviewing submittals, requests for information, requests for change orders, and pay applications.
- e. The Offerors shall provide the services of a full-time project inspector during contracted tank rehabilitation projects. The inspector shall be on-site during all Contractor work activities. He shall attend the pre-construction meeting and all monthly progress meetings and work with the Contractor to verify that the application of coatings is in accordance with the design specifications. The inspector shall document the work and testing completed in a daily construction report to be submitted to the City.

## VI. PROPOSED SCHEDULE OF IMPLEMENTATION

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<u>Date</u>	<u>Scheduled Item</u>
October 30, 2013	Issue Request for Proposals
November 26, 2013	Last day to submit questions to procurement
December 5, 2013	Proposals Due Prior to 4:00 p.m.
4-6 weeks	City completes review of proposals and generates shortlist
January-February	City interviews selected firms
TBD	City begins contract negotiations, obtains administrative approvals, Contract Documents assimilated
TBD	City issues Intent to Award Contract and Executes Contract Documents

## IV. PROPOSAL PREPARATION

The proposal response must address the items included in the Scope of Services and the Criteria for Proposal Evaluation. Proposals should be prepared simply, providing straightforward and concise responses to requests for information and descriptions of qualifications and capabilities. Responses shall be limited to no more than thirty pages excluding the cover by including all other materials. Each copy of the proposal must be bound with all documentation in a single volume where practical. Failure to do so will result in a lowered evaluation. Incomplete proposals may be determined nonresponsive. The City reserves the right to request additional information or clarification if necessary throughout the evaluation process.

Offerors should organize the Proposals using the format described below and in the following order:

- A. Title page
- B. Table of Contents
- C. Brief history of the firm including:
  - Years in business as an established firm;
  - Firm principals;
  - Size of firm (denote partnerships or subcontractors necessary to facilitate full service scope);
  - The name, position and telephone number of contact person authorized to conduct negotiations and authorize final contracts or otherwise bind the firm to a contractual relationship; and
  - A specific listing of services the firm is uniquely qualified to provide.
- D. Specific staff experience, by professional and educational qualifications, as it relates to providing services for the project scope including:

- E. Provide a time line and schedule applicable for the proposed project.
- F. Brief summary as to why the firm(s) feels qualified to provide the requested services.
- G. List at least three current and/or past work assignments of similar nature that the firm has directly contracted to provide within the last three years as a reference. For each reference, a brief description of services provided, organizational name, contact person and title, address and telephone number shall be provided.
- H. A qualifying statement as to your firm's registry status with the Virginia State Corporation Commission.
- I. A current annual financial report and the previous year's report and a statement regarding any recent or foreseeable mergers or acquisitions to provide evidence of the firm's financial stability.
- J. Hourly rate structure for each representative of the firm to be assigned to the project by name and position/title. Describe any other direct costs not included in hourly rates, and provide an estimated overall fee for services. This fee is a nonbinding estimate and final costs for services will be based on the final scope and contract negotiations with the selected firm.

**V. CRITERIA FOR PROPOSAL EVALUATION**

Proposals will be reviewed and evaluated according to the following criteria:

<b>Criteria</b>	<b>Weight</b>
Experience of the lead firm and sub-consultants in providing services as described herein	25%
Experience and qualifications of the Project Manager, Project Inspector, and key staff members with similar types of projects	25%
Demonstrated understanding of the scope of work, organization, scheduling and coordination. Capabilities to perform work within the project schedule and budgetary requirements	50%
<b>TOTAL</b>	<b>100%</b>

**VI. METHOD OF AWARD**

Following evaluation of the written proposals as submitted, selection shall be made of two or more Offerors deemed to be fully qualified and best suited among those submitting proposals, on the basis of the factors involved in the Request for Proposal. At the option of the City, Offerors may be required to give an oral presentation to clarify or elaborate on their proposal. Negotiations shall then be conducted with the selected Offerors. Price shall be considered, but need not be the sole determining factor. After negotiations have been conducted, the City shall determine which Offeror has made the best proposal and may award the contract to that Offeror. Should the City determine in writing and in its sole discretion that only one Offeror is fully qualified, or that one Offeror is clearly more highly qualified than the others under consideration, a contract may be negotiated and awarded to that Offeror. The City reserves the right to award to multiple Offerors if it is in the best interest of the City.

**VII. CONTRACT TERM**

The initial term of this contract shall be for five (5) years, from contract signing, upon mutual consent of the parties to the contract. Any time extensions granted by the City shall be by written amendment signed by both parties to the original agreement.

## VIII. GENERAL TERMS AND CONDITIONS

The following terms and conditions shall be incorporated into the negotiated contract. If any Offeror wants to amend or discuss during negotiations any term, the Offeror should set forth any objection, change, or addition in their proposal submission. Otherwise, submission of a proposal by an Offeror will obligate such Offeror to enter into a contract incorporating the terms and conditions of this section.

### A. **Subcontracting and Assignment of Work**

The successful firm shall not subcontract or assign portions of the work, other than those specifically defined in the CONTRACT, without the express written consent of the City. A description of any work the Offeror proposes to subcontract shall be submitted to the City for review and approval along with the name and address of the individual, firm, or corporation that is the proposed subcontracting firm. This submittal shall also include a list of the key personnel that the subcontractor firm will assign to the project. All work performed by any subcontractor firm shall be coordinated by the successful firm and the successful firm will be responsible to the City for all work performed by any subcontracting firm or special consultant.

### B. **Payment for Services**

Payments to the successful firm shall be made within 30 days after receipt of an approved invoice for services provided in the previous month. Backup documentation for each invoice shall be provided in detail satisfactory to the City. The successful firm's records and documentation supporting such invoices shall be made available to the City upon reasonable request. The successful firm agrees to retain all records, documents and support materials relevant to the CONTRACT for a period of five years following final payment.

### C. **Independent Successful Firm**

The successful firm is an independent successful firm and nothing contained in a subsequent CONTRACT shall constitute or designate such firm or any of its agents or employees as employees of the City.

### D. **Termination and Ownership of Documents**

The City reserves the right to terminate the contract upon written notice to the Successful firm. In the event of termination pursuant to this paragraph which is not the fault of the Successful firm, the Successful firm shall be paid for all services provided through the date of termination. The contract will terminate immediately upon failure of the City of Lynchburg, City Council to appropriate funds for its continuance.

The Successful firm agrees that all information and materials gathered and/or prepared by or for it under the terms of the CONTRACT shall be delivered to, become and remain the property of the City upon completion of the work or termination of the CONTRACT. The City shall have the right to use and reproduce the data and reports submitted hereunder, without additional compensation to the Successful firm.

### E. **Insurance**

The selected firm shall be required to maintain in force such insurance, in amounts acceptable to the City, as will protect himself and the City from claims which may arise out of or result from the execution of the work, whether such execution be by himself, his employees, agents, subcontractor firms or by anyone for whose acts any of them may be liable. This coverage should include, at a minimum, Worker's Compensation, General Liability (including premises/operations, independent successful firms, products and completed operations, contractual liability and personal injury liability) and Professional Liability. All insurance shall be provided by companies authorized to conduct business in the Commonwealth. The selected firm shall furnish the City with an original Certificate of Insurance upon request. The Certificate should name the City as additional insured. The selected firm shall notify the City at least 30 days prior to policy cancellation, non-renewal or reduction of coverage.

**F. Laws and Regulations**

The Successful firm shall abide by all Federal, State and Local laws and regulations governing the provision of the services called for in the contract. The Successful firm shall give notice and comply with all laws, ordinances, rules, regulations, and lawful orders of any public authority bearing on the performance of the work. Any legal proceedings arising out of or related to this agreement shall be filed by the parties in the City of Lynchburg General District Court or the Lynchburg Circuit Court.

The selected firm shall not during the performance of any resultant contract knowingly employ an unauthorized alien as defined in the Federal Immigration Reform and Control Act of 1986.

**G. Severability**

Each paragraph and provision of the resultant contract will be severable from the entire agreement and if any provision is declared invalid, the remaining provisions shall remain in effect.

**H. Licenses and Permits**

The Successful firm shall secure and pay for all permits, governmental fees and licenses necessary for the proper execution and completion of the work which are legally required prior to and during the work. The City will not charge for any permits required by the City of Lynchburg.

**I. Nondiscrimination**

If the resultant contract exceeds \$10,000, during the performance of the contract, the successful firm agrees as follows:

- a. The Successful firm will not discriminate against any employee or applicant for employment because of race, religion, color, sex or national origin, except where religion, sex or national origin is a bona fide occupational qualification reasonably necessary to the normal operation of the Successful firm. The Successful firm agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this non-discrimination clause.
- b. The Successful firm, in all solicitations or advertisements for employees placed by or on behalf of the Successful firm, will state that such Successful firm is an equal opportunity employer.
- c. Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this section.
- d. The Successful firm will include the provisions of the foregoing paragraphs a, b and c in every subcontract or purchase order of over \$10,000, so that the provisions will be binding upon each subcontracted firm or vendor.

**J. Payments to Successful Firms**

In accordance with Virginia Code Section 2.2-4354 the Successful firm agrees that:

1. Should any contractor be employed by the Successful firm for the provision of any goods or services under this Contract, the Successful firm agrees to the following:
  - (a) The Successful firm shall, within seven days after receipt of any payments from the City pursuant to this Contract, either:
    - (1) Pay the subcontractor for the proportionate share of the total payment received from the City attributable to the goods or services provided by the subcontractor; or
    - (2) Notify the City, as applicable, and the subcontractor, in writing, of the intention to withhold all or a part of the subcontractors firm's payment with the reason for nonpayment. Written notice to the City shall be given to: City of Lynchburg, Procurement Administrator, 900 Church Street, Lynchburg, VA 24504.
  - (b) The Successful firm shall pay interest to the subcontractors firm, at the rate of one percent per month on all amounts owed to the subcontractors firm that remain unpaid after seven days

following receipt of payment from the City for goods or services provided under this Contract, except for amounts withheld under subparagraph (a)(2) above.

- (c) The Successful firm shall include in each of its subcontracts a provision requiring each subcontractors firm to include or otherwise be subject to the same payment and interest requirements with respect to each lower-tier subcontractors firm.
  - (d) The Successful firm's obligation to pay an interest charge to a subcontractors firm shall not be an obligation of the City.
  - (e) No contract modification shall be allowed for the purpose of providing reimbursement for these interest charges. No cost reimbursement claim shall include any amount for reimbursement of these interest charges.
2. Invoice processing is to be in strict accordance with the rules and regulations set forth by the applicable Jurisdiction and the *Code of Virginia* Section 2.2-4352, requiring payment of invoices within 30 days of receipt of a proper invoice. No promises or commitments on the part of any employee of the Public Body shall bind the Jurisdiction to any other terms and/or conditions other than those set forth in procedures issued by the Public Body.
- (a) Invoices shall be submitted to the City on a monthly basis. The City shall pay the amount of the invoice within thirty (30) days. However, the City shall have the right to verify information contained on an invoice and extend the time of payment until information is received to correct any errors found therein. The invoices submitted shall include, at a minimum, the following information:
    - (1) Project name, city and state project number;
    - (2) City Project Manager;
    - (3) City assigned Contract Number;
    - (4) Not to exceed amount or lump sum amount;
    - (5) Total payments requested to date;
    - (6) Payments received;
    - (7) Balance due;
    - (8) Invoice number;
    - (9) Period during which services were performed; and
    - (10) Brief description of work covered by invoice.
  - (b) Payments shall not be considered as evidence of satisfactory performance of the work either in whole or in part, nor shall any payment be construed as acceptance by the City of any defective work. The City reserves the right to withhold payment in the event the City believes that the work is unsatisfactory.

#### **K. Contractual Claims**

Contractual claims, whether for money or other relief, shall be submitted in writing no later than 60 days after final payment; however, written notice of the Successful firm's intention to file such claim shall have been given at the time of the occurrence or beginning of the work upon which the claim is based. Any notice or claim shall be delivered to the City's Procurement Administrator, Third Floor City Hall, 900 Church Street, Lynchburg Virginia 24504 and shall include a description of the factual basis for the claim and a statement of the amounts claimed or other relief requested. The City's Procurement Administrator shall render a decision on the claim and shall notify the Successful firm within 30 days of receipt of the claim. The Successful firm may appeal the decision of the City's Procurement Administrator by providing written notice to the City Manager, within 15 days of the date of the decision. The City Manager shall render a decision on the claim within 60 days of the date of receipt of the appeal notice and such decision shall be final unless the Successful firm appeals the decision in accordance with the Virginia Public Procurement Act. Invoices for all services or goods provided by the Successful firm shall be delivered to the City no later than 30 days following the conclusion of the work or delivery of the goods.

#### **L. Taxes**

The Successful firm shall pay all City, State and Federal taxes required by law enacted at the time proposals are received and resulting from the work or traceable thereto, under whatever name levied. Said taxes shall not be in addition to the contract price as the taxes shall be an obligation of the Successful firm and not of the City and the City shall be held harmless for same by the Successful firm.

**M. Indemnification**

To the fullest extent permitted by law, the Successful firm, for itself, heirs, representatives, successors and assigns agrees to save, defend, keep harmless and indemnify the City and all of its officials, agents and employees (collectively, the "City") from and against any and all claims, loss, damage, injury, costs (including court costs and attorney's fees), charges, liability or exposure, however caused, resulting from, arising out of or in any way connected with the Successful firm's performance (or nonperformance) of the agreement terms or its obligations under this agreement.

**N. Contract Assignment**

The resultant contract may not be assigned, in whole or part, without the written consent of the City.

**O. Royalty and License Fees and Copyright, Trademark and Patent Protection**

The Successful firm shall pay all royalty and license fees relating to the items covered by the contract. In the event any third party shall claim that the manufacture, use and sales of these goods offered hereby constitutes an infringement of any copyright, trademark, or patent, the Offeror shall indemnify and hold harmless the City from any cost, expense, damage or loss incurred in any manner by the City on account of such alleged infringement.

**P. Responsibility for Property**

The Successful firm shall be responsible for damages to property caused by work performed under the CONTRACT. Property damage to surrounding or adjoining areas caused directly or indirectly by actions or omissions of the Successful firm shall be repaired or replaced by the Successful firm, to the satisfaction of the Owner, at the Successful firm's expense.

**Q. Precedence of Documents**

The precedence of documents shall be as follows: the CONTRACT, the Request for Proposals and the Offeror's response to the Request for Proposals.

**R. Administrative Appeals Procedure**

Any protest to award a contract shall be in writing and shall be delivered so that it is received by the City Manager not later than ten (10) business days after announcement of the award or award, whichever comes first.

**S. Drug Free Workplace**

In accordance with Sec 2.2-4312 of the Virginia Code, during the performance of this contract, the Offeror agrees to (i) provide a drug-free workplace for the offeror's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the Offeror's workplace and specifying the actions that will be taken against employees for violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of the offeror that such offeror maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over \$10,000, so that the provisions will be binding upon each sub-Offeror or vendor.

Successful offeror shall not use, possess, manufacture, or distribute alcohol or illegal drugs during the performance of the contract or while on City premises or distribute it to City employees.

Successful Offeror understands that a violation of these prohibitions constitutes a breach of the contract and that the City has the right cancel the contract.

For the purpose of this section, “Drug-free workplace” means a site for the performance of work done in connection with a specific contract awarded to a Offeror, the employees whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession or use of any controlled substance or marijuana during the performance of the contract.

**T. Right to Audit**

All contracts are subject to audit by Federal, State or City Personnel or their representatives at no cost to the City. Offeror agrees to retain all records, books and other documents relevant to this contract and the funds expended hereunder for at least four (4) years after Contract acceptance, or as required by applicable law. Requests for audits shall be made in writing and Offeror shall respond with all information requested within ten (10) calendar days of the date of the request.

**U. Conflict of Interests Act**

The provisions, requirements, and prohibitions as contained in Sections 2.2-3100, et seq., of the Virginia Code are applicable to this RFP.

**V. Ethics in Public Contracting**

The provisions, requirements, and prohibitions as contained in Sections 2.2-4367 through 2.2-4377, of the Virginia Code, pertaining to bidders, offerors, contractors, and subcontractors are applicable to this RFP.

June 24, 2009

City of Lynchburg  
Dept. of Utilities  
525 Taylor Street  
Lynchburg, VA 24501

Attn: Gregory Poff

Re: 10,500,000 Gallon College Hill Reservoir  
Maintenance (Dive) Inspection

Dear Greg:

Please find enclosed the above referenced report for the 10,500,000 gallon water storage tank. The inspection was completed on April 21, 2009. The report consists of: 1) cover page; 2) conclusions and recommendations; 3) detailed report; 4) Field Inspection Report (FIR); 5) photographs and descriptions; and 6) CD.

Brief explanation: 1) The cover page is self-explanatory. 2) Conclusions and recommendations explain in short form what was found on the tank and what DIXON recommends for repair and maintenance of the tank. 3) This section is the long report that goes into detail to explain what exactly was found and why DIXON makes the recommendations. 4) Field Inspection Report (FIR) is the form that was completed when the inspection team was on-site and includes the dimensions and conditions of the tank. 5) Photographs and descriptions give the Owner a visual record of the condition of the tank and appurtenances. 6) CD is an Adobe PDF format of the complete report and photos for your convenience.

If you have any questions or concerns, please call me at (616) 374-3221 ext. 310.

Thank you for choosing DIXON for your inspection needs.

DIXON ENGINEERING, INC.,

Thomas Rounds  
Project Manager

Enclosures

# Dixon Engineering, Inc.

Maintenance (Dive) Inspection

10,500,000 Gallon Reservoir

College Hill  
Lynchburg, Virginia

Inspection Performed: April 21, 2009  
Report Prepared: June 22, 2009  
Reviewed by Ira M. Gabin, P.E.: June 24, 2009

Phone (616) 374-3221  
Fax (616) 374-7116  
<http://www.dixonengineering.net>  
[dixon@dixonengineering.net](mailto:dixon@dixonengineering.net)

Dixon Engineering Inc.  
1104 Third Ave. Lake Odessa, MI 48849

## **CONCLUSIONS:**

1. The exterior is a polyurethane system that is in fair condition and is slightly faded.
2. The wet interior coating is a multi-coat epoxy system that is in fair condition, with numerous areas of extensive blistering on the floor, spot failures on the floor, and primer bleed-through on the sidewalls. Above the high water line, the coating is in good condition.
3. The wet interior coating is not a lead, chrome, or cadmium bearing coating.

## **RECOMMENDATIONS:**

1. Schedule regular cleanings and inspections of the tank by an independent, third party as recommended by AWWA, or once every five years. Perform the next inspection as a dry, washout inspection.
2. Budget for exterior overcoating in three years, or when aesthetics dictate. At that time the exterior coating will be nearing its twelve year service life. The estimated cost is \$90,000.
3. Reinspect the wet interior in five years. Budget for repainting at that time based on results of the inspection. The estimated cost is \$500,000.
4. Continue cathodic protection for wet interior surfaces. Use a qualified cathodic protection contractor for maintenance.
5. Recaulk areas of missing caulk between the tank's baseplate and foundation. The estimated cost is \$1,000.
6. Repair and seal the foundation to prevent further deterioration. The estimated cost is \$2,000.
7. Annually inspect the vent screen.

## **COST SUMMARY:**

Exterior overcoat:	\$ 90,000
Repair grout:	1,000
Reseal foundation:	<u>2,000</u>
	\$ 93,000
Engineering and contingencies:	<u>18,000</u>
<b>Total:</b>	<b>\$101,000</b>

## **INSPECTION:**

On April 21, 2009, Dixon Engineering, Inc. (DIXON) performed a maintenance (dive) inspection on the 10,500,000 gallon reservoir water storage tank owned by the City of Lynchburg, VA. Purposes of the inspection were to evaluate the interior and exterior coatings' performance and life expectancy; assess the condition of metal surfaces and appurtenances; review safety and health aspects; and make budgetary recommendations for continued maintenance of the tank. All recommendations are incorporated into this report, with budgeting estimates for repairs. The inspection was performed by Thomas Rounds, Project Manager and certified diver; Tucker Adams, certified diver; and Roy Wise, Staff Technician. The dive profile used was 36 ft. for ninety minutes. The diver and all equipment were chlorinated prior to entry into the wet interior. Chlorine residuals were taken prior to the inspection, and after the diver exited the tank. Pre-entry yielded a .7 ppm chlorine residual, and an exit residual of .75 ppm. No cleaning, paint thickness testing, or adhesion testing is done in the wet interior during a dive inspection.

The tank was built in 1963 by Chicago Bridge and Iron with a height-to-high water line of 36 ft. It is welded construction. The exterior and wet interior were last painted in 1999 by G & M Painting. The tank has a subgrade wet interior surface area.

## **CONDITIONS and RECOMMENDATIONS:**

### **Exterior Coating Conditions:**

The exterior coating is a multiple coat epoxy urethane system that is faded and there is some loss of gloss. Surfaces have faded due to exposure to ultraviolet rays, which is a normal occurrence for an exterior coating system. The coating is adequately protecting the metal, and aesthetics are fair. There are several areas where the existing coating appeared to be improperly catalyzed.

The sidewall coating is in good-to-fair condition. Primary method of deterioration is abrasion. A few coating breaks were found. The sidewall coating has been repainted where prior damage existed. The sidewall coating is 12 – 24 mils thick.

The exterior roof is constructed of aluminum and is intact. No leaking was observed.

### **Exterior Coating Recommendations:**

Take no immediate action on the exterior. Budget for overcoating in 2012, or when aesthetics dictate. Current adhesion showed the existing coating would support an additional recoat. The estimated cost to recoat with an epoxy urethane system is \$90,000.

The recommended procedure is to high pressure water clean (5,000 – 10,000 psi) to remove any delaminating or flaking coating and contaminants, followed by spot power tool cleaning to bare metal (SSPC-SP11) any rusted or failed areas.

The coating system would consist of a spot prime coat on the bare metal, a full coat of epoxy, followed by two full coats of polyurethane. The polyurethane system offers excellent abrasion resistance, with high gloss and sheen retention. The coating has a minimum temperature requirement for application, and is sensitive to moisture during the curing process. If moisture is present during the curing process, the appearance will become cloudy, with little or no gloss. The expected life of the system is twelve-to-fifteen years. The system can be recoated again in twelve-to-fifteen years, and a second time approximately twelve years after the first recoating, extending the life of the coating to thirty-five to forty years before total removal would again be necessary. We estimate project length at forty days. The tank would be removed from service to reduce moisture condensation on the surface.

### **Wet Interior Coating Conditions:**

The wet interior coating is an epoxy system applied by G & M Painting in 1999. The sidewall coating is in fair condition, 98% intact, with no significant damage at the high water line, which would be the area most affected by ice pressures and ice movement. Causes of deterioration are blisters, primer bleed-through, and delamination. The coating is still protecting the metal, with the exception of several spot coating breaks.

Coating on the bottom of the tank is in poor condition 90% intact. Cause of deterioration is blisters. Blisters are present on over 75% of the floor panels. The bottom of the tank is covered with light-to-moderate mud sediment, approximately ¼ in.

Moderate, previous pitting of the metal was found on the sidewalls and floor.

Overall adhesion of the coating is fair.

### **Wet Interior Coating Recommendations:**

The existing coating has not deteriorated to the point where replacement is warranted. The cathodic protection system is adequately protecting all areas below the high water line where the coating has deteriorated. Long-term budget for repainting in five years, based on results of the next inspection. The estimated cost is \$500,000. Due to the cost of repainting the wet interior, monitoring existing conditions may delay the need for recoating.

### **Cathodic Protection Conditions:**

The tank has a functioning cathodic protection system. It is a ring, ice-free system that is in good condition. Tank surfaces below the high water line are protected by the system. The supporting ropes and anode wires are in good condition, with no anode breaks noted. The pressure fitting exiting the sidewall showed no signs of leaking.

### **Cathodic Protection Recommendations:**

Continue operation of the submerged cathodic protection system. Have a qualified contractor maintain the system.

### **Site Conditions:**

The tank site is small in size and is fenced with a sliding, double locking security gate. There is a small size staging area for contractors' equipment. The site is well maintained and routinely mowed. Immediately adjacent are high rise apartments and parking. The site is accessible from a municipal paved drive, and the tank is located approximately 100 ft. from the main access road. Drainage for the site is away from the foundation. There were no signs of underground pipe leaks.

### **Site Recommendations:**

Regularly mow the grass away from the tank.

### **Foundation Conditions:**

The exposed foundation is in good condition and showed minor amounts of deterioration (cracking).

### **Foundation Recommendations:**

High pressure wash the concrete and patch the small areas of deterioration. Coat the exposed concrete with an epoxy polyurethane coating to prevent further deterioration. The estimated cost is \$2,000.

### **Grout/Caulk Conditions:**

The caulk is in fair condition, with 20 ft. deteriorated between the base pad and foundation.

### **Grout/Caulk Recommendations:**

Remove all loose or deteriorated caulk and repair with a urethane caulk. The estimated cost is \$1,000.

### **Wet Interior Metal Conditions:**

The steel structure is in good condition above and below the high water line.

**STEEL TANK FIELD INSPECTION REPORT**  
**STANDPIPE/RESERVOIR TANK**

DATE: April 21, 2009

**I. TANK DATA**

OWNER: City of Lynchburg

CLIENT CODE: 46-61-01-08

TANK NAME: College Hill 10,500,000 Gallon Reservoir

LOCATION: Street: Taylor

City: Lynchburg

State: VA

TANK SIZE: Capacity: 10,500,000 gallons

Height to overflow (HWL): 27 feet

Sidewall height: 28 feet

CONSTRUCTION: Welded

Type of structure: Reservoir

Type of Roof: Geodesic dome

DATE CONSTRUCTED: 1963

MANUFACTURER: CB&I

CONTRACT NUMBER: 8-6752

COATING HISTORY	<u>EXTERIOR</u>	<u>DRY INTERIOR</u> <u>N/A</u>	<u>WET INTERIOR</u>
DATE LAST COATED	<u>1999</u>		<u>1999</u>
CONTRACTOR	<u>G&amp;M</u>		<u>G&amp;M</u>
COATING SYSTEM	<u>Polyurethane</u>		<u>Epoxy</u>
SURFACE PREPERATION	<u>SSPC SP6</u>		<u>SSPC SP10</u>
COATING SAMPLES	<u>No</u>		<u>No</u>
HEAVY METAL	<u>No</u>		<u>No</u>

INSPECTED BY: Dixon Engineering, Inc.

INSPECTORS: Inspector: Tucker Adams; Top person: Tom Rounds;

Ground person: Roy Wise

TYPE OF INSPECTION: Dive

DATE LAST INSPECTED: 08/05

## **II. INSPECTION DATA**

### **SITE CONDITIONS**

Fenced: **Yes**  
Control building: **Yes**  
    Location: **Adjacent to tank**  
Antenna control site: **No**  
Site conditions: **Well maintained**  
Neighborhood: **Residential - Municipal**  
To the North: **All municipal property**  
To the East: **Pump house**  
To the South: **Multi-story apartment**  
To the West: **Tanks**  
Power lines within 50 feet: **No**  
Site drainage: **Away from tank**  
Indications of underground leakage: **No**  
Shrub, tree, etc. encroachment: **No**

### **Piping:**

Pit: **No**

### **EXTERIOR COATING**

#### **Sidewall:**

Lettering: **No**  
Logo: **No**  
Topcoat condition: **Fair**  
Primer/Previous coating condition: **Fair**  
    Describe coating: **Chalking – Some abrasions and evident spot repairs**  
Metal condition: **Good**  
Sidewall comments: **Exterior coating 12 – 24 mils**

**Roof: N/A – aluminum geodesic dome**

### **EXTERIOR APPURTENANCES**

**Anchor bolts: N/A**

#### **Foundation:**

Foundation exposed: **Yes**  
Height exposed: **6 – 8 inches**  
Undermining of foundation: **No**

## **EXTERIOR APPURTENANCES**

Exposed foundation condition: **Good**  
Chipped or cracked: **Yes**  
Severity: **Minor**  
Exposed rebar: **No**  
Type of grout: **Cement**  
Condition: **Good**  
Grout missing: **No**  
Comments: **Hairline cracks**

## **EXTERIOR APPURTENANCES**

**Anchor bolts: N/A**

### **Exterior overflow pipe:**

Coating condition: **Good**  
Metal condition: **Good**  
Inside diameter: **12 inches**

### **Sidewall manway:**

Number: **4**  
Size: **3 – 30 inches; 1 – 24 x 18 inches**  
Gasket leaking: **No**  
Hinged: **Yes**  
Sealed with: **Bolted cover**  
Coating condition: **Fair**  
Metal condition: **Good**  
Sidewall manway comments: **No leaks**

### **Sidewall ladder:**

Toe clearance: **11 inches**  
Width of rungs: **16 inches**  
Thickness of rungs: **¾ inch**  
Shape of rungs: **Diamond**  
Fall prevention device: **Yes**  
Type: **Rail**  
Condition: **Good**  
Cage: **No**

### **Step-off platform:**

Dimensions: **5 x 11 feet**

## **EXTERIOR APPURTENANCES**

Railing height: **54 inches**

Toe plate height: **4 inches**

Coating condition: **Poor**

Metal condition: **Good**

Step-off platform comments: **Application of unknown topcoat; poor condition**

### **Roof ladder:**

Style: **Steps**

Coating condition: **All aluminum**

Metal condition: **Good**

Fall prevention device: **No**

Cage: **No**

Roof ladder comments: **10 in. x 30 in. stairs; non-slip design**

### **Roof ladder handrail:**

Coating condition: **Good**

Metal condition: **Good**

Fall prevention device: **No**

Railing height: **37 inches**

Ladder handrail comments: **18 in. mid-rail; 2 in. all aluminum**

### **Center handrail: N/A**

### **Roof hatches:**

Wet interior: **All aluminum**

Dry interior: **N/A**

### **Bolted ventilation hatch:**

Coating condition: **Good**

Neck diameter: **24 inches**

### **Roof vent:**

Number: **2**

Type: **Standard**

Neck diameter: **28 inches**

Vent comments: **All aluminum**

## **EXTERIOR APPURTENANCES**

**Aviation lights: N/A**

**Removable cathodic caps: N/A**

### **Rigging points:**

Rigging clips: **Yes**

Number: **1**

Coating condition: **Aluminum**

Metal condition: **Good**

Rigging comments: **Center roof rigging point**

**Antennas: N/A**

### **Wet interior coating**

**Roof: All aluminum geodesic dome**

### **Sidewall:**

Topcoat condition: **Fair**

Describe coating: **Delamination – Blisters – Some intercoat delamination – questionable coating discoloration**

Mineral deposits: **Moderate**

Metal condition: **Good**

Active pitting: **No**

Sidewall comments: **Spot rusting random; weld seams**

### **Tank bottom:**

Topcoat condition: **Poor**

Primer coating condition: **Fair**

Describe coating: **Delamination -Spot coating breaks to underlying coat - Blisters – Intercoat delamination – Blistering on 75% of floor**

Mineral deposits: **Light**

Metal condition: **Good**

Active pitting: **No**

Previous pitting: **Yes**

Previous pit filling: **Unknown**

Depth of sediment: **¼ inch**

Bottom comments: **75% floor blisters**

## **RECOMMENDATIONS:**

**Foundation: Recaulk foundation baseplate**

**Coating: Exterior: Recoat**

**Interior: Recoat**

Field Inspection Report is prepared from the contractor's viewpoint. It contains information the contractor needs to prepare his bid for any repair or recoating. The engineer uses it to prepare the engineering report. Cost estimates are more accurate if the contractor's problems can be anticipated. While prepared from the contractor's viewpoint, the only intended beneficiary is the owner. These reports are completed with diligence, but the accuracy is not guaranteed. The contractor is still advised to visit the site.



(1) College Hill 10,500,000 Gallon Reservoir.



(2) As reported, the fill lines are overflow from adjacent tanks.



(3) Manways with davit arms.



(4) Some discoloration on sidewalls.



(5) Sidewall panel with some buckle at the weld seam.



(6) Red clay on lower sidewall - some abrasions.



(7) Exterior tank wall has fair aesthetic appearance.



(8) Manways are not leak-free.



(9) Pump house adjacent to tank with high service pumps.



(10) Tank's interior contains a floating cathodic system by Corrpro.



(11) Rectifier was reported as operational.



(12) Exterior abrasion.



(13) SST saddle installed on piping—discoloration of spot repairs.



(14) Tank sidewall contains a non-functional level indicator. Discoloration of spot repairs.



(15) Discoloration of upper sidewall panels may be an indication of improperly catalyzed material.



(16) Hairline cracks and some spalled concrete on side of foundation.



(17) Deteriorated grout.



(18) Discoloration on east sidewall.



(19) Vandal guard on sidewall ladder is padlocked.



(20) Geodesic dome contains stairs and hand rail that are intact.



(21) Hand rail supports extend to the dome framing and are intact.



(22) At the step ending are strips of anti-slip material adhered to the dome panels.



(23) Bolted painter's ventilation hatch.



(24) Roof transition to sidewall stairs.



(25) Center roof tie-off point.



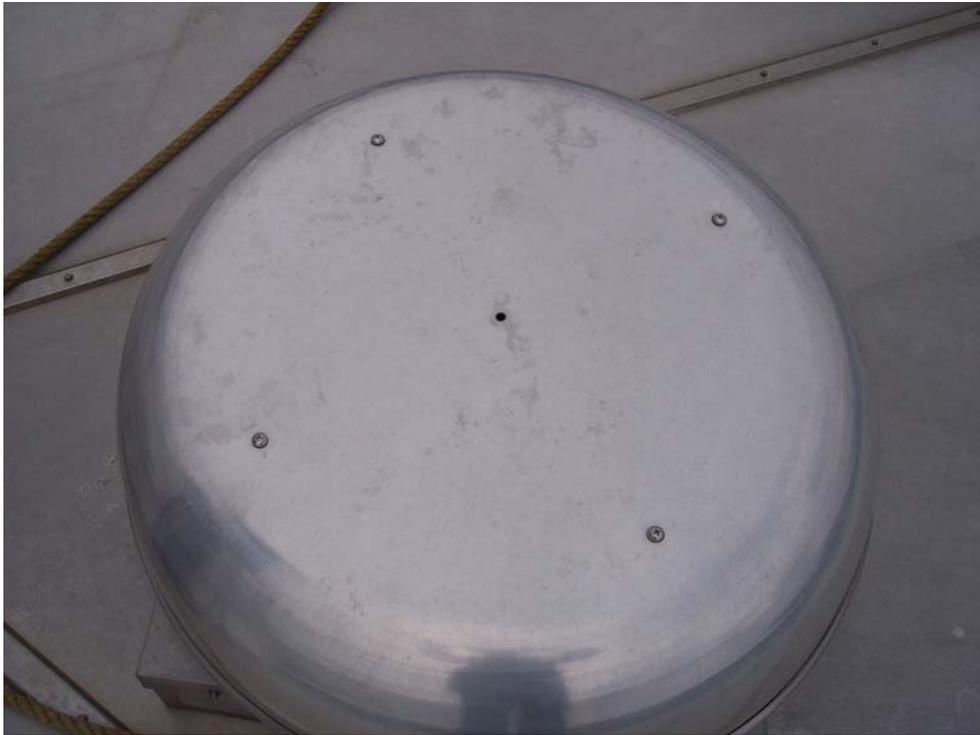
(26) Screened roof vent.



(27) Wind girder - indication of ponding water.



(28) Dual screened roof vent.



(29) Hole in center of roof vent - caulked by inspector at time of inspection.



(30) Wind girder screen is intact.



(31) Screen is secured to tank's sidewall and dome.



(32) Connection to dome.



(33) Wind girder angle support indicates some stress breaking coating.



(34) No indication of leaking dome caps.



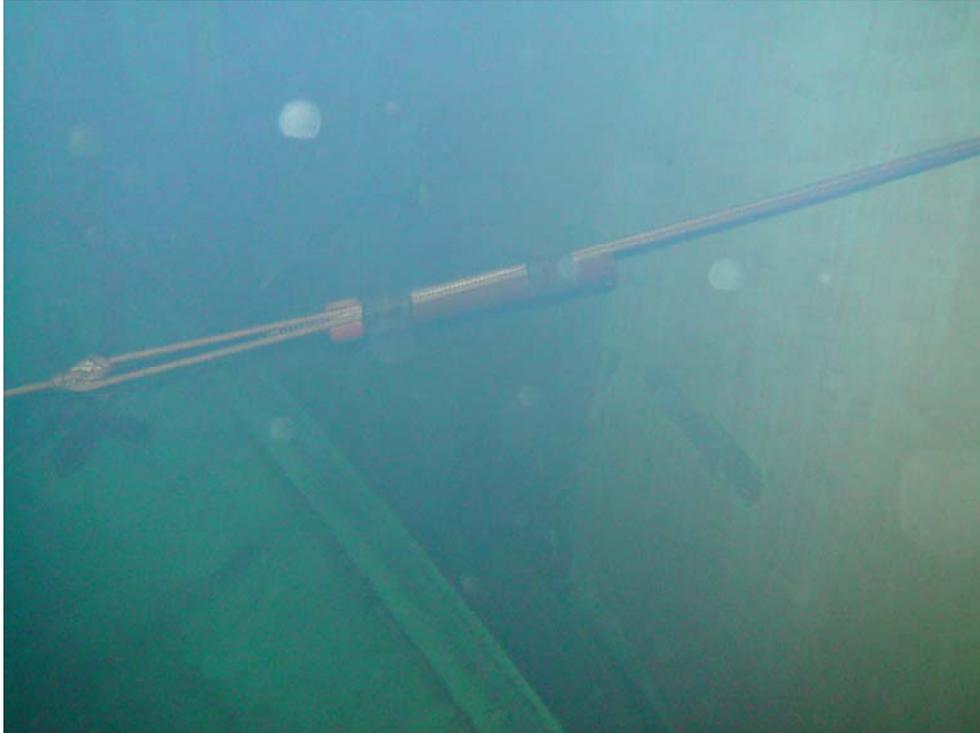
(35) Interior was inspected utilizing a diver.



(36) Wet interior sidewall above water level - coating intact.



(37) Discoloration and primer bleed-through below water level.



(38) Tank has an intact floating-type anode.



(39) Discoloration of topcoat, primer bleed-through, and stripe coat on wet interior.



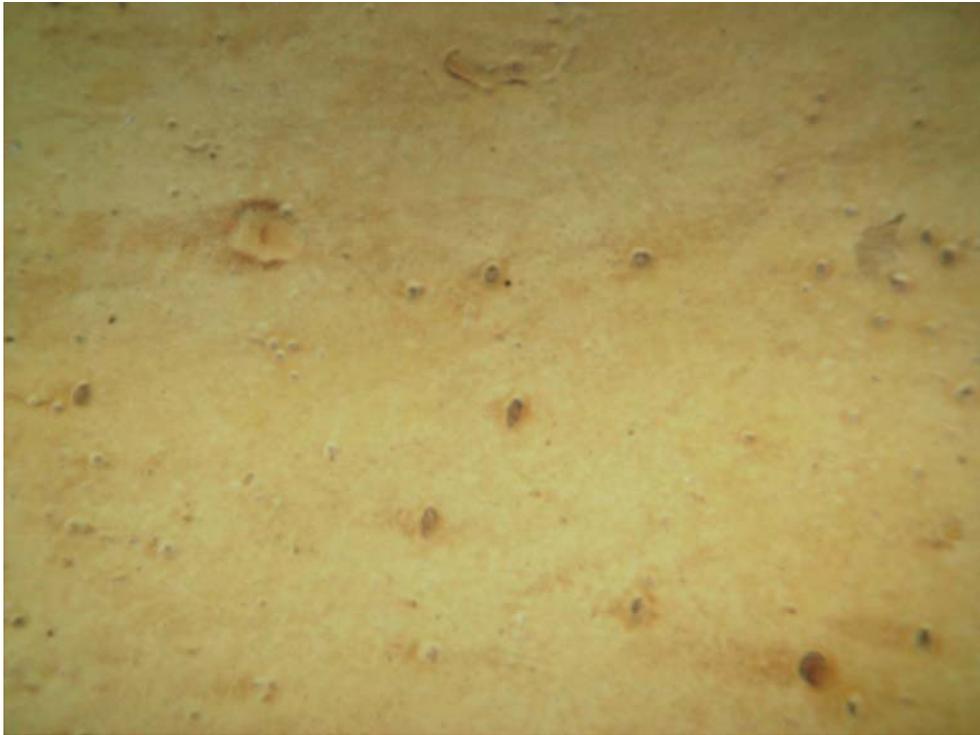
(40) Primer bleed-through.



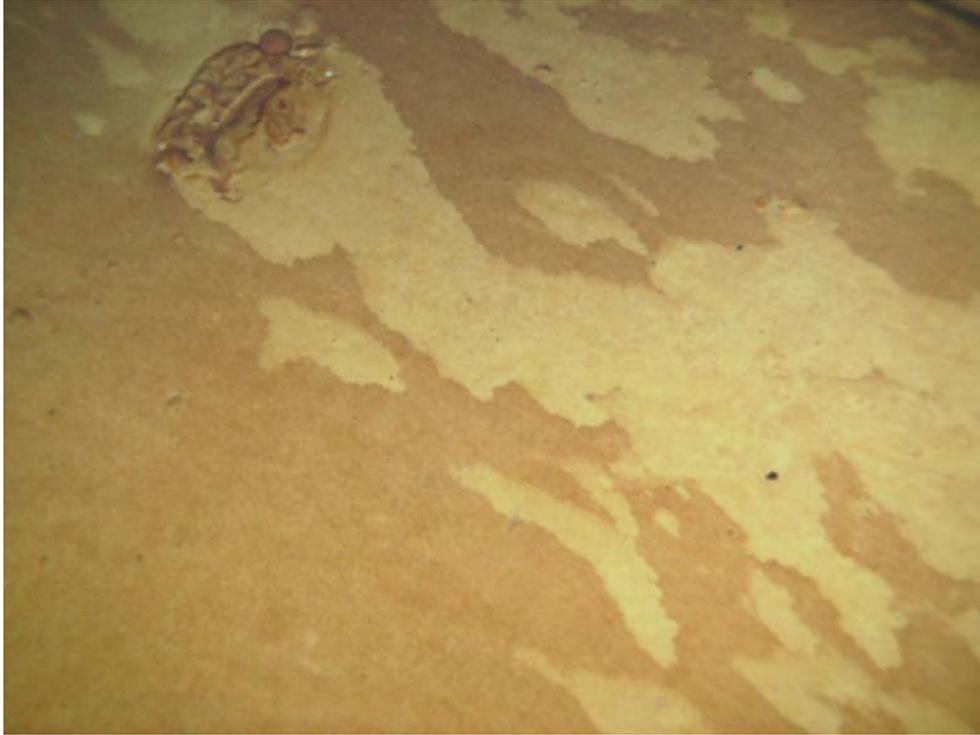
(41) Sidewall stiffener.



(42) Coating repairs were evident.



(43) Blisters.



(44) Sediment.



(45) Sediment.



(46) Corrosion byproduct indicating cathodic system is operational.



(47) Heavily blistered floor.



(48) Spot failures on weld seam.



(49) Heavily blistered floor.



(50) Blisters.



(51) Difficult to see - delamination of coating @12:00.



(52) Sediment.



(53) Silt sediment.



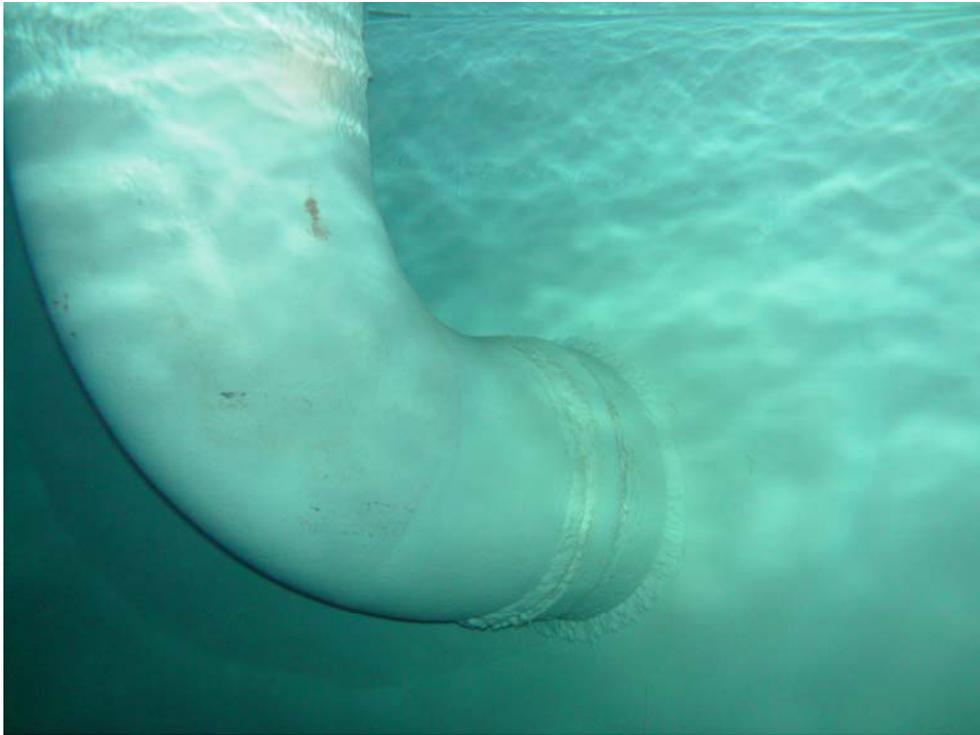
(54) Discoloration of topcoat.



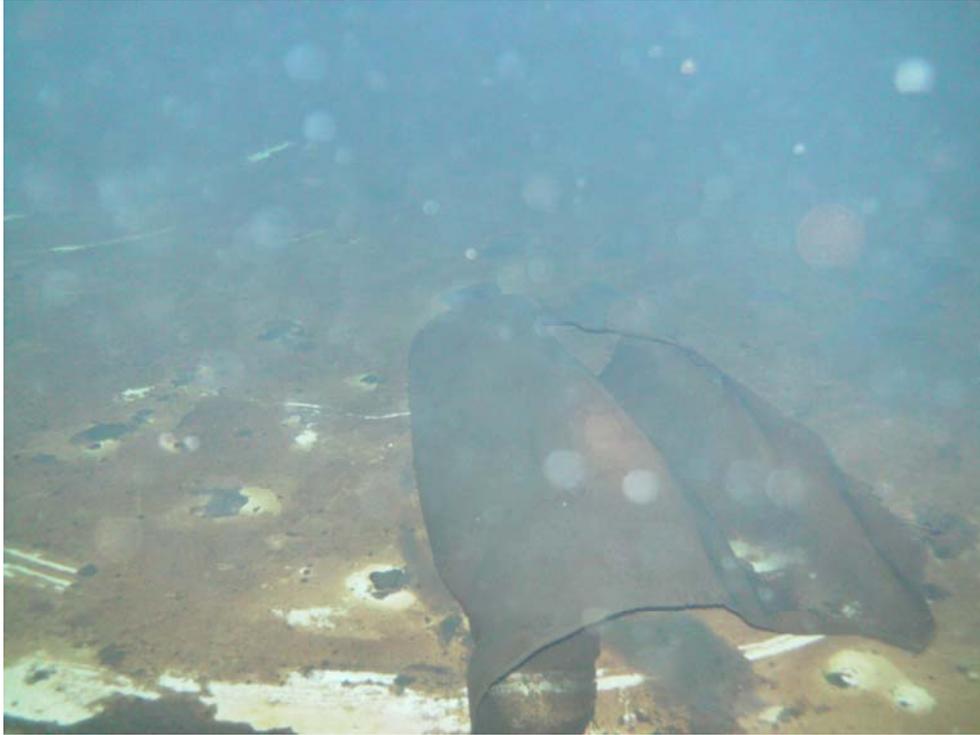
(55) Effluent piping.



(56) Spot rusting near high water line.



(57) Spot failures on overflow pipe.



(58) Two pieces of screen were removed during dive.



(59) Sidewall rust blooms.

June 2, 2009

City of Lynchburg  
Dept. of Utilities  
525 Taylor Street  
Lynchburg, VA 24501

Attn: Scott Parkins, P.E.

Re: 1,000,000 Gallon Ground Storage Tank/Candlers Mtn. #2  
Maintenance Inspection

Dear Scott:

Please find enclosed the above referenced report for the 1,000,000 gallon Candlers Mtn. #2 ground water storage tank. The inspection was completed on April 22, 2009. The report consists of: 1) cover page; 2) conclusions and recommendations; 3) detailed report; 4) Field Inspection Report (FIR); 5) photographs and descriptions; and 6) CD.

Brief explanation: 1) The cover page is self-explanatory. 2) Conclusions and recommendations explain in short form what was found on the tank and what DIXON recommends for repair and maintenance of the tank. 3) This section is the long report that goes into detail to explain what exactly was found and why DIXON makes the recommendations. 4) Field Inspection Report (FIR) is the form that was completed when the inspection team was on-site and includes the dimensions and conditions of the tank. 5) Photographs and descriptions give the Owner a visual record of the condition of the tank and appurtenances. 6) CD is an Adobe PDF format of the complete report and photos for your convenience.

If you have any questions or concerns, please call me at (616) 374-3221 ext. 310.

Thank you for choosing DIXON for your inspection needs.

DIXON ENGINEERING, INC.,

Thomas Rounds  
Project Manager

Enclosures

# Dixon Engineering, Inc.

Maintenance Inspection

1,000,000 Gallon Ground Storage

Candlers Mtn. #2  
Lynchburg, Virginia

Inspection Performed: April 22, 2009  
Report Prepared: May 12, 2009  
Reviewed by Ira M. Gabin, P.E.: June 1, 2009

Phone (616) 374-3221  
Fax (616) 374-7116  
<http://www.dixonengineering.net>  
[dixon@dixonengineering.net](mailto:dixon@dixonengineering.net)

Dixon Engineering Inc.  
1104 Third Ave. Lake Odessa, MI 48849

## **CONCLUSIONS:**

1. The exterior coating is an epoxy urethane system that is in good condition and has good adhesion. Coating deterioration is minor, and the coating's condition is average for an eleven year old system.
2. The wet interior coating is a multi-coat epoxy system that is in good condition and has good adhesion. Above the high water line the coating is in good condition.

## **RECOMMENDATIONS:**

1. Schedule regular cleanings and inspections of the tank by an independent, third party as recommended by AWWA, or once every five years.
2. Continue cathodic protection for wet interior surfaces. Use a qualified cathodic protection contractor for maintenance.
3. Remove the encroaching tree branches from the south side of the tank.
4. Recaulk areas of delaminating caulk between the tank's baseplate and foundation. This could be done by in-house personnel.
5. Redesign and replace the existing wind girder vent screens. The estimated cost is \$12,000. Annually inspect the screens.

## **COST SUMMARY:**

Exterior overcoat (2011 – 2012):	\$45,000
Redesign wind girder vent screen:	<u>12,000</u>
	\$57,000
Engineering and contingencies:	<u>15,000</u>
<b>Total:</b>	<b>\$72,000</b>

## **INSPECTION:**

On April 22, 2009, Dixon Engineering, Inc. (DIXON) performed a maintenance inspection on the 1,000,000 gallon Candler's Mountain reservoir water storage tank owned by the City of Lynchburg, VA. Purposes of the inspection were to evaluate the interior and exterior coatings' performance and life expectancy; assess the condition of metal surfaces and appurtenances; review safety and health aspects; and make budgetary recommendations for continued maintenance of the tank. All recommendations are incorporated into this report, with budgeting estimates for repairs. Inspectors for DIXON were Tom Rounds, Project Manager; and Tucker Adams, and Roy Wise, Staff Technicians. Scheduling and arrangements for the inspection were completed through Scott Parkins, P.E.

The tank was built in 1956 by Richard Engineering with a height-to-high water line of 35 ft. It is welded construction. The exterior and wet interior were last painted in 1998.

## **CONDITIONS and RECOMMENDATIONS:**

### **Exterior Coating Conditions:**

The exterior coating is a multiple coat epoxy urethane system that is beginning to chalk and fade, and there is a minor loss of gloss. Surfaces have faded due to exposure to ultraviolet rays, which is a normal occurrence for an exterior coating system. The coating is adequately protecting the metal and aesthetics are good. The system is performing as designed.

The sidewall coating is in good condition. Primary method of deterioration is age. The sidewall coating is 8 – 10 mils thick.

It is believed that the exterior and interior coatings were completely removed in 1998. An epoxy urethane system was then applied.

Good adhesion was noted throughout in areas tested. The tank is a candidate for overcoating. The existing coating can support additional coats at this time.

The exterior coating is believed to be lead free.

### **Exterior Coating Recommendations:**

Take no immediate action on the exterior. Budget for overcoating in 2011 or 2012, or when aesthetics dictate. Current adhesion showed the existing coating would support an additional recoat. The estimated cost to recoat with an epoxy urethane system is \$45,000.

### **Wet Interior Coating Conditions:**

The wet interior coating is an epoxy system applied in 1998. The sidewall coating is in good condition, 99.8% intact, with no significant damage at the high water line, which would be the

area most affected by ice pressures and ice movement. The sidewalls are covered with moderate mineral staining, which does not affect the integrity of the coating system.

Coating on the bottom of the tank is in good condition, 99.8% intact, with a few coating breaks found. Causes of deterioration are pinholes, spot coating breaks from age, and abrasion. The coating is still protecting the metal, with the exception of a few spot coating breaks. Approximately ½ in. of mud sediment was flushed from the interior. Minor active pitting of the metal was found on the floor.

Overall adhesion of the coating is good. Adhesion was tested by use of low pressure washing. With poor adhesion it would be possible to notice the coating fluctuate and layers of coating would be removed. With very poor adhesion, the existing coating might be removed. This is a crude form of testing, yet the least destructive. A destructive test cuts the coating to the substrate. The test area is then susceptible to corrosion because it has been scratched to bare metal.

#### **Wet Interior Coating Recommendations:**

The existing coating system has not deteriorated to the point where replacement is warranted. The cathodic protection system is adequately protecting all areas below the high water line where the coating has deteriorated. Long-term budget for repainting in ten years. The estimated cost is \$80,000.

#### **Cathodic Protection Conditions:**

The tank has a floating ring, ice-free cathodic protection system that is in good condition. Tank surfaces below the high water line are protected by the submerged cathodic protection system that is attached to the sidewalls. The supporting ropes and anode wires are in good condition, with no anode breaks noted. The pressure fitting exiting the sidewall showed no signs of leaking. The reference anode is intact.

#### **Cathodic Protection Recommendations:**

Continue operation of the submerged cathodic protection system. Have a qualified cathodic protection contractor maintain the system.

#### **Site Conditions:**

The tank site is average in size, and is fenced with a double locking gate. There is an average size staging area for contractors' equipment. The site is maintained in a park-like condition. Commercial development is located to the west of the site. The site is accessible from a paved municipal street, and the tank is located approximately 3 ft. from the main access road. Tree branches are rubbing on the southwest side of the tank. The rubbing has not damaged the coating yet, but may wear through if the branches are not trimmed back. Drainage for the site is away from the foundation. There were no signs of underground pipe leaks.

### **Site Recommendations:**

Regularly mow the grass, and trim the trees next to the tank. Cut back the tree limbs that are rubbing on the tank.

### **Foundation Conditions:**

The exposed foundation is in good condition.

### **Grout/Caulk Conditions:**

Caulk is disbonding between the tank's bottom and ringwall.

### **Grout/Caulk Recommendations:**

Repair the foundation caulk. Caulk keeps water from getting between the foundation and tank. Remove all loose or deteriorated caulk and repair with a urethane caulk. This could be done by in-house personnel.

### **Overflow Pipe Conditions:**

The overflow pipe discharges to a splash pad and a storm drain with the required air gap. The discharge area is in good condition.

### **Hatch/Manway Conditions:**

The roof hatches are hinged and functioned properly during the inspection. They are locked with new padlocks furnished by the City.

The roof area has a painter's hatch with a bolted cover that is in good condition. The hatch is used for ventilation and lighting during maintenance or rescue.

Two – 24 in. manways are located in the sidewalls near the ground. The manways are in good condition. The covers are hinged and the gaskets showed no signs of leaking.

### **Vent Conditions:**

The roof vent is a 26 in. pressure-vacuum cupola design. The vent is in good condition.

There is a circumferential vent screen in the geodesic dome wind girder. Sections of the screen are dislodged, and others are likely to come apart.

### **Vent Recommendations:**

Redesign and replace the existing wind girder vent screens. The estimated cost is \$12,000. Annually inspect the screens to make sure they are open and not damaged.

### **Roof Hand Rail/Painter's Rail Conditions:**

Hand rails are located on the roof to either side of the roof hatches near the sidewalls.

### **Pit/Pit Piping Conditions:**

The tank is operated by an electronic control system located in the pump house adjacent to the tank. The tank has two valve vaults. The valve pit is located between the tank and pump house. The valve pit is newer than the tank. The pit contains an altitude valve. The owner noted there have been no problems with the valve. Piping in the pit is in good condition. Coating on the piping is also in good condition. The pipes and valves have minor surface rust staining. The pit was dry during the inspection.

### **Fill Pipe Conditions:**

The fill pipe is in good condition, and coating on the pipe is also in good condition. There is an 8 in. high removable silt ring on the pipe. The top of the pipe does not have a deflector plate.

### **Fill Pipe Recommendations:**

Install a deflector plate on the top of the fill pipe.

### **Ladder Conditions:**

The exterior ladder is in good condition and meets current OSHA size requirements. The ladder has a rail-type fall prevention device that is in good condition. A locked vandal guard is attached to the bottom of the ladder.

The wet interior does not have a ladder.

### **Wet Interior Metal Conditions:**

The steel structure is in good condition above and below the high water line.

### **Wet Interior Metal Recommendations:**

Add 500 lineal inches of weld grinding during the next wet interior coating project.

**STEEL TANK FIELD INSPECTION REPORT**  
**STANDPIPE/RESERVOIR TANK**

DATE: April 22, 2009

**I. TANK DATA**

OWNER: City of Lynchburg, VA

CLIENT CODE: 46-61-01-12

TANK NAME: Candlers Mountain

LOCATION: Street: Candlers Mountain Road

City: Lynchburg

State: VA

TANK SIZE: Capacity: 1,000,000 gallons

Diameter: 70 feet

Height to overflow (HWL): 35 feet

CONSTRUCTION: Welded

Type of Roof: Geodesic dome

DATE CONSTRUCTED: 1956

MANUFACTURER: Richard Engineering

COATING HISTORY	<u>EXTERIOR</u>	<u>DRY INTERIOR</u> <u>N/A</u>	<u>WET INTERIOR</u>
DATE LAST COATED	<u>1998</u>		<u>1998</u>
COATING SYSTEM	<u>Epoxy urethane</u>		<u>Epoxy</u>
SURFACE PREPARATION	<u>SSPC SP6</u>		<u>SSPC SP10</u>
HEAVY METAL	<u>No</u>		<u>No</u>

INSPECTED BY: Dixon Engineering, Inc.

INSPECTORS: Inspector: Tom Rounds, Top person: Tucker Adams,

Ground person: Roy Wise

TYPE OF INSPECTION: Maintenance

DATE LAST INSPECTED: 11/05

**II. INSPECTION DATA**

**SITE CONDITIONS**

Fenced: Yes

Control building: Yes

Location: Adjacent to tank

Antenna control site: **No**  
Site conditions: **Well maintained**  
Neighborhood: **Rural**  
To the North: **Pump house**  
To the East: **Open**  
To the South: **Woods**  
To the West: **Drive**  
Power lines within 50 feet: **No**  
Site drainage: **Away from tank**  
Indications of underground leakage: **No**  
Shrub, tree, etc. encroachment: **Yes**  
Location: **South of tank - trees**

### **Piping:**

Pit: **Yes**  
Location: **Adjacent to tank**  
Condition of pit structure: **Good**  
SCADA controls: **No**  
Controls heated: **No**  
Altitude valve: **Yes**  
Condition of coating: **Good**  
Condition of metal: **Good**

### **FOUNDATION**

Foundation exposed: **Yes**  
Height exposed: **4 - 6 inches**  
Undermining of foundation: **No**  
Exposed foundation condition: **Good**  
Chipped or cracked: **No**  
Type of grout: **Caulk**  
Condition: **Fair**  
Grout missing: **No**  
Indications of foundation settlement: **No**  
Comments: **Disbonding**

### **EXTERIOR COATING**

#### **Sidewall:**

Lettering: **No**  
Logo: **No**  
Topcoat condition: **Fair**

## **EXTERIOR COATING**

Primer/Previous coating condition: **Good**

Metal condition: **Good**

Sidewall comments: **Exterior mils 8 - 10**

**Roof: Geodesic dome all aluminum – good condition**

## **EXTERIOR APPURTENANCES**

**Anchor bolts: N/A**

### **Exterior overflow pipe:**

Coating condition: **Good**

Metal condition: **Good**

Inside diameter: **12 inches**

Condition of screen: **Good**

Percent of screen open: **100**

Flap gate: **Yes**

Design: **Screened**

Flap gate operable: **Yes**

Air gap: **Yes**

Pipe to ground distance: **15 inches**

Splash pad: **Yes**

Type: **Concrete pad**

Condition: **Good**

### **Sidewall manway:**

Number: **2**

Size: **24 inches**

Gasket leaking: **No**

Hinged: **Yes**

Sealed with: **Bolted cover**

Coating condition: **Good**

Metal condition: **Good**

### **Sidewall ladder:**

Coating condition: **Good**

Metal condition: **Good**

Toe clearance: **14 inches**

Width of rungs: **16 inches**

Thickness of rungs: **3/4 inch**

## **EXTERIOR APPURTENANCES**

Shape of rungs: **Diamond**

Fall prevention device: **Yes**

Type: **Rail**

Cage: **No**

Sidewall ladder comments: **Vandal guard – ladder starts 14 ft. AGL;**  
**vandal guard piano hinge rod**

### **Step-off platform:**

Dimensions: **31 x 120 inches**

Railing height: **42 inches x 72 inches**

Toe plate height: **4 inches**

Coating condition: **Fair**

Metal condition: **Good**

### **Roof ladder: N/A**

### **Roof hand rail: All aluminum**

Metal condition: **Good**

Fall prevention device: **No**

Railing height: **42 inches**

Railing width: **N/A**

Toe plate height: **N/A**

### **Center hand rail: N/A**

### **Roof hatches:**

Wet interior:

Coating condition: **N/A**

Metal condition: **Good**

Neck diameter: **2 - 36 inches**

Shape: **Square**

Hatch security: **Lock**

Dry interior: **N/A**

Hatch comments: **Padlocked after inspection**

### **Bolted ventilation hatch:**

Coating condition: **N/A**

Metal condition: **Good**

Neck diameter: **30 inches**

## **EXTERIOR APPURTENANCES**

### **Roof vent:**

Number: **1**  
Type: **Screened pressure-vacuum**  
Neck diameter: **26 inches**  
Coating condition: **N/A**  
Metal condition: **Good**  
Screen condition: **Good**  
Percent of screen open: **100**  
Vent comments: **Aluminum**

**Aviation lights: N/A**

**Removable cathodic caps: N/A**

**Rigging points: N/A**

**Antennas: N/A**

### **Wet interior coating**

#### **Roof:**

Roof comments: **Aluminum geodesic dome is in good condition; 1 leak during heavy rain on west side**

#### **Sidewall:**

Topcoat condition: **Good**  
Primer coating condition: **Good**  
Describe coating: **No significant coating deterioration**  
Mineral deposits: **Moderate**  
Metal condition: **Good**  
Active pitting: **No**

#### **Tank bottom:**

Topcoat condition: **Good**  
Primer coating condition: **Good**  
Describe coating: **Spot coating breaks to substrate**  
Mineral deposits: **Moderate**  
Metal condition: **Good**  
Active pitting: **Yes**  
Deepest pit depth: **1/32 inch**

## **EXTERIOR APPURTENANCES**

Number of pits: **1-10**

Previous pitting: **Yes**

Deepest pit depth: **1/32 inch**

Number of pits: **1-10**

Previous pit filling: **Unknown**

Depth of sediment: **1/4 inch**

Bottom comments: **Some isolated coating breaks**

## **WET INTERIOR APPURTENANCES**

**Tank ladder: N/A**

### **Cathodic protection:**

Clips: **On sidewalls**

Type: **Floating ring**

Location of controls: **Tank shell**

System condition: **Good**

Cathodic comments: **Appeared operational**

### **Fill pipe:**

Diameter: **16 inches**

Height above floor: **8 inches**

Deflector plate/grate/bar: **No**

Coating condition: **Good**

Metal condition: **Good**

**Separate draw pipe: N/A**

### **Overflow pipe:**

Type: **Weir box**

Coating condition: **Good**

Metal condition: **Good**

**Roof beams: N/A**

**Columns: N/A**

**Sidewall beams: N/A**

**Baffle wall: N/A**

## **WET INTERIOR APPURTENANCES**

**Interior balcony: N/A**

**Spider: N/A**

## **RECOMMENDATIONS:**

**Foundation: Recaulk**

**Coating: Exterior: Budget for overcoat 2010**

**Interior: Continue cathodic protection**

**Health: Redesign wind girder screens**

Field Inspection Report is prepared from the contractor's viewpoint. It contains information the contractor needs to prepare his bid for any repair or recoating. The engineer uses it to prepare the engineering report. Cost estimates are more accurate if the contractor's problems can be anticipated. While prepared from the contractor's viewpoint, the only intended beneficiary is the owner. These reports are completed with diligence, but the accuracy is not guaranteed. The contractor is still advised to visit the site.

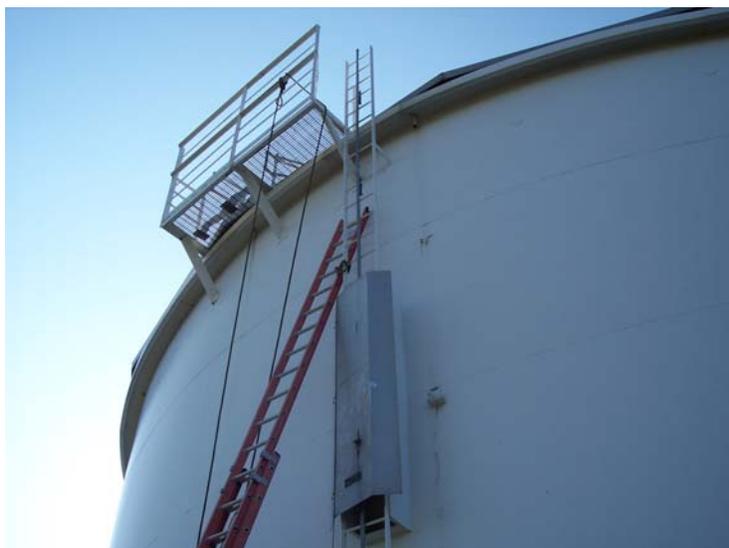


Candlers Mountain #2 1,000,000 Gallon Ground Storage Tank.



(1) Candler Mountain #2  
1,000,000 gallon ground storage  
tank

(2) Small power pole on west  
side of tank.



(3) Vandal guard on exterior lad-  
der.



(4) Non-functional level indicator gauge on sidewall.

(5) A newer Corrpro automatic rectifier on sidewall.

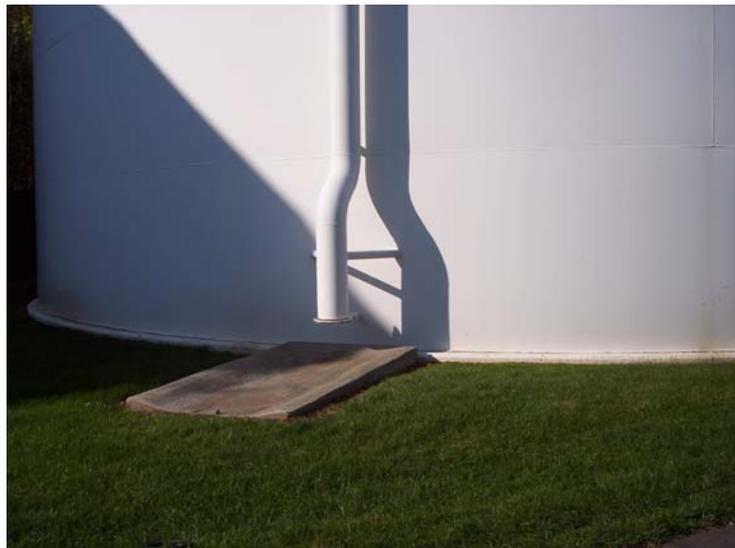


(6) Overflow exits the sidewall and extends down to a splash pad.



(7) Harco rectifier.

(8) Overflow has screened flap gate and terminates above ground level to a splash pad.



(9) Pit piping in valve pit.



(10) Tank site has paved drive

(11) Drainage from site to storm drain.



(12) Tank's exterior has good aesthetic appearance.



(13) Areas of loose caulking were observed.

(14) Base grout is cement and caulking.



(15) Trees encroaching on south side.



(16) Trees encroaching on southeast side.

(17) Tank has two sidewall manways.



(18) Wet interior floor is in good condition.



(19) Cathodic connections are intact.

(20) Floor cleaned up nicely.

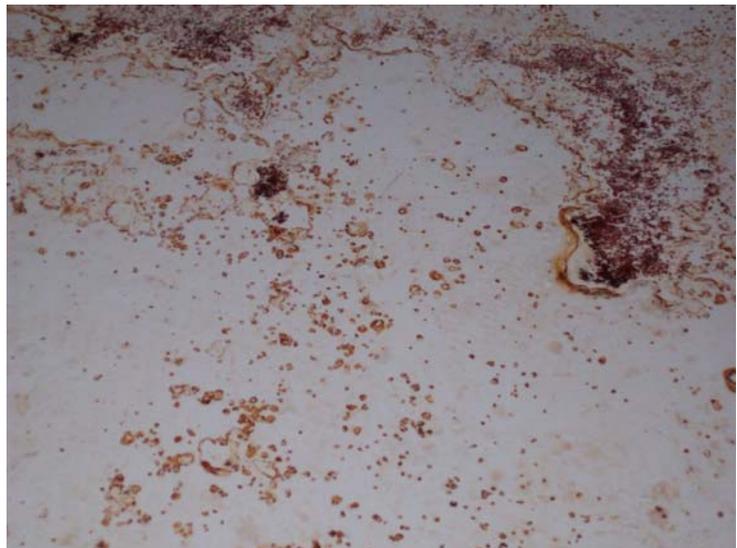


(21) Sidewalls are moderately stained.



(22) Common fill/draw pipe does not have a deflector plate.

(23) Isolated areas of pinholes in coating



(24) Mechanical level indicator float.



(25) Organic material was removed during cleaning.

(26) Floor coating is not heavily stained.



(27) Overflow weir box.



(28) Upper sidewalls are moderately stained.

(29) Buoys are starting to deteriorate.



(30) Upper sidewall has a step-off platform that is intact.



(31) Platform-to-roof hand rail extends to the second manway.

(32) Aluminum roof vent.



(33) Roof vent door is hinged and screened.



(34) Painter's ventilation hatch.



(35) Roof manway.



(36) Some ponding of water is occurring on the roof panels.



(37) Small failed coated areas on platform hand rail.

(38) Spot coating failure at weld seam.



(39) Bird activity on wind girder.



(40) Wind girder screen section is intact.

(41) Wind girder screen opening.



(42) Screen was easily raised.



(43) Screen around roof bracket is not secure.

(44) Attachment to girder section.



June 1, 2009

City of Lynchburg  
Dept. of Utilities  
525 Taylor Street  
Lynchburg, VA 24501

Attn: Scott Parkins, P.E.

Re: 2,000,000 Gallon Ground Storage Tank/Candlers Mtn. #1  
Maintenance Inspection

Dear Scott:

Please find enclosed the above referenced report for the 2,000,000 gallon Candlers Mtn. #1 ground water storage tank. The inspection was completed on April 1, 2009. The report consists of: 1) cover page; 2) conclusions and recommendations; 3) detailed report; 4) Field Inspection Report (FIR); 5) photographs and descriptions; and 6) CD.

Brief explanation: 1) The cover page is self-explanatory. 2) Conclusions and recommendations explain in short form what was found on the tank and what DIXON recommends for repair and maintenance of the tank. 3) This section is the long report that goes into detail to explain what exactly was found and why DIXON makes the recommendations. 4) Field Inspection Report (FIR) is the form that was completed when the inspection team was on-site and includes the dimensions and conditions of the tank. 5) Photographs and descriptions give the Owner a visual record of the condition of the tank and appurtenances. 6) CD is an Adobe PDF format of the complete report and photos for your convenience.

If you have any questions or concerns, please call me at (616) 374-3221 ext. 310.

Thank you for choosing DIXON for your inspection needs.

DIXON ENGINEERING, INC.,

Thomas Rounds  
Project Manager

Enclosures

# Dixon Engineering, Inc.

Maintenance Inspection

2,000,000 Gallon Ground Storage

Candlers Mtn. #1  
Lynchburg, Virginia

Inspection Performed: April 1, 2009

Report Prepared: May 22, 2009

Reviewed by Ira M. Gabin, P.E.: June 1, 2009

Phone (616) 374-3221

Fax (616) 374-7116

<http://www.dixonengineering.net>

[dixon@dixonengineering.net](mailto:dixon@dixonengineering.net)

Dixon Engineering Inc.

1104 Third Ave. Lake Odessa, MI 48849

## **CONCLUSIONS:**

1. The exterior coating is an epoxy urethane system that is in good condition, and is slightly faded. Primary mode of failure is rust bleed-through. The coating has good adhesion. There are only a few areas of spot costing failure on the sidewalls.
2. The wet interior coating is a multi-coat epoxy system that is in good condition, with good adhesion. There are numerous areas of pinholing on the floor and a few on the sidewalls. The roof is an aluminum geodesic dome that is in good condition overall. There are some gaps in the sidewall vent screen.
3. The coating is presumed lead free.

## **RECOMMENDATIONS:**

1. Schedule regular cleanings and inspections of the tank by an independent, third party as recommended by AWWA, or at least once every five years.
2. Recoat the exterior in the next two years. At that time the exterior coating will be at its twelve year service life. The estimated cost is \$65,000.
3. No wet interior repainting is recommended at this time.
4. Install a floating-type cathodic protection system in the interior. The estimated cost is \$16,000.
5. Annually inspect the vent screens.
6. Replace the wind girder vent screen with a sectioned and replaceable modular screen. The estimated cost is \$20,000.
7. The existing aluminum railing is loose in some areas. Tighten the bolts. This could be done by in-house personnel, or with the next exterior overcoating project.

## **COST SUMMARY:**

Exterior overcoat:	\$65,000
Cathodic protection:	16,000
Replace screens:	<u>20,000</u>
	\$101,000
Engineering and contingencies:	<u>20,000</u>
<b>Total:</b>	<b>\$121,000</b>

## **INSPECTION:**

On April 1, 2009, Dixon Engineering, Inc. (DIXON) performed a maintenance inspection on the Candler Mountain #1 2,000,000 gallon reservoir water storage tank owned by the City of Lynchburg, VA. Purposes of the inspection were to evaluate the interior and exterior coatings' performance and life expectancy; assess the condition of metal surfaces and appurtenances; review safety and health aspects; and make budgetary recommendations for continued maintenance of the tank. All recommendations are incorporated into this report, with budgeting estimates for repairs. Inspectors for DIXON were Tom Rounds, Project Manager; and Tucker Adams and Roy Wise, Staff Technicians. Scheduling and arrangement for the inspection were completed through Scott Parkins, P.E.

The tank has a height-to-high water line of 28 ft. It is welded construction. The tank's exterior was last painted in 1998 or 1999 with an epoxy urethane system. The wet interior was last painted in 1998 or 1999 with an epoxy system.

## **EXTERIOR COATING CONDITIONS:**

The exterior coating is a multiple coat epoxy urethane system. The sidewall coating is in good condition, with minor coating breaks, with small amounts of surface rust and rust staining. Primary method of failure is spot coating breaks.

The exterior coating is continuing to chalk and fade, and there is a loss of gloss. The system is performing as specified, protecting exterior metal surfaces and offering a fair aesthetic appearance. Surfaces are slightly faded due to exposure to ultraviolet rays, which is a normal occurrence for an exterior coating system.

## **EXTERIOR COATING RECOMMENDATIONS:**

Budget for exterior recoating in approximately two years. At that time the exterior coating will be at its twelve year service life. Fading will continue and more rust spots will occur, decreasing the tank's aesthetic appearance.

Within two years plan to high pressure water clean (5,000 – 10,000 psi) to remove any delaminating or flaking coating and contaminants, followed by spot power tool cleaning to bare metal (SSPC-SP11) any rusted or failed areas. The bare metal then would be spot prime coated, followed by one full coat of epoxy, and two full coats of urethane. The polyurethane system offers excellent abrasion resistance, with high gloss and sheen retention. The additional recoat would supply an added barrier thickness for continued service. The estimated cost is \$65,000.

## **WET INTERIOR COATING CONDITIONS:**

The wet interior coating is an epoxy system applied in 1998 or 1999. It is in good condition overall. Coating failure is occurring along some floor and sidewall weld seams, and there are a few areas of rust bleed-through.

The sidewall coating is 99.9% intact, with no significant damage at the high water line, which would be the area most affected by ice pressures and ice movement. Cause of deterioration is pinholes. The sidewalls are covered with light mineral staining, which does not affect the integrity of the coating system.

Coating on the bottom of the tank is in good condition, 99% intact. Cause of failure is pinholes. The bottom is covered with light mineral staining, which does not affect the integrity of the coating system. Less than 1 in. of mud sediment was flushed from the interior.

The coating is still protecting the metal, with the exception of several spot coating breaks.

Overall adhesion of the coating is good. Adhesion was tested by use of low pressure washing. This is a crude form of testing, yet the least destructive. With poor adhesion it would be possible to notice the coating fluctuate and layers of coating would be removed. With very poor adhesion, the existing coating might be removed.

#### **WET INTERIOR COATING RECOMMENDATIONS:**

The existing coating system has not deteriorated to the point where replacement is warranted.

#### **CATHODIC PROTECTION CONDITIONS:**

The tank does not have a cathodic protection system. There are clips for rope connections, an obsolete rectifier, and a 3 in. compression-type penetration.

#### **CATHODIC PROTECTION RECOMMENDATIONS:**

Install an impressed current cathodic protection system. The system is designed with a horizontal ring configuration. The anode is suspended into the lower one-third of the tank by floats. As water fills the tank, the anode takes the desired configuration. This design is considered ice-free. Formation of ice normally occurs at the high water level, and some along the sidewalls. As long as the tank is operated in the upper one-half of its capacity, the probability of ice damage is very low. The anode used is a platinized niobium or titanium wire with a design life of ten years. The system also incorporates copper/copper sulfate reference anodes.

The system is automatically controlled by monitoring the water-to-tank potential. It provides protection to steel surfaces where holidays (coating pinholes), or coating breaks exist. Cathodic protection operates by inhibiting galvanic cell corrosion where steel is exposed. The system creates an equipotential across the tank and drives the tank potential down to a point (-850 millivolts) where corrosion is essentially non-existent. Only surfaces in contact with water are protected because water acts as the electrolyte for the circuit; therefore, areas of the roof and upper sidewalls are not protected by the system. The estimated cost is \$16,000.

### **SITE CONDITIONS:**

The tank site is large in size and is fenced.

### **OVERFLOW PIPE CONDITIONS:**

The tank has a 12 in. diameter overflow pipe that starts at the high water level, and extends down along the exterior sidewall to ground level. The discharge end of the pipe has a screened flap gate. The pipe discharges to a splash pad that drains into a nearby catch basin. The pipe has the required air gap. The pipe, screen, and splash pad are in good condition.

### **VENT CONDITIONS:**

The roof vent is in good condition.

The screen around the sidewall vent area has some gaps large enough for animal entry.

### **VENT RECOMMENDATIONS:**

Replace the sidewall vent screen with a sectioned screen with replaceable modules. The estimated cost is \$20,000.

### **ROOF HAND RAIL/PAINTER'S RAIL CONDITIONS:**

The roof hand rail is loose in places.

### **ROOF HAND RAIL/PAINTER'S RAIL RECOMMENDATIONS:**

Tighten the bolted connections. This could be done by in-house personnel, or included with the next overcoating project.

**STEEL TANK FIELD INSPECTION REPORT**  
**STANDPIPE/RESERVOIR TANK**

DATE: April 1, 2009

**I. TANK DATA**

OWNER: Lynchburg, VA  
CLIENT CODE: 46-61-01-11  
TANK NAME: North Tank  
LOCATION: Street: Candlers Mountain  
City: Lynchburg  
State: VA  
TANK SIZE: Capacity: 2,000,000 gallons  
Diameter: 110 feet  
Height to overflow (HWL): 28 feet  
Sidewall height: 32 feet  
CONSTRUCTION: Welded  
Type of Roof: Aluminum geodesic dome  
DATE CONSTRUCTED: No label

COATING HISTORY	<u>EXTERIOR</u>	<u>DRY INTERIOR</u> <u>N/A</u>	<u>WET INTERIOR</u>
DATE LAST COATED	<u>1999</u>		<u>1999</u>
COATING SYSTEM	<u>Epoxy urethane</u>		<u>Epoxy</u>
SURFACE PREPARATION	<u>SSPC SP6</u>		<u>SSPC SP10</u>
HEAVY METAL	<u>No</u>		<u>No</u>

INSPECTED BY: Dixon Engineering, Inc.  
INSPECTORS: Inspector: Tom Rounds, Top person: Tucker Adams, Ground person: Roy Wise  
TYPE OF INSPECTION: Maintenance  
DATE LAST INSPECTED: August 30, 2005

**II. INSPECTION DATA**

**SITE CONDITIONS**

Fenced: Yes  
Control building: Yes  
Location: Adjacent to tank

Antenna control site: No  
Site conditions: Well maintained  
Neighborhood: Rural  
To the North: Wooded  
To the East: Wooded  
To the South: Wooded  
To the West: Road  
Power lines within 50 feet: No  
Site drainage: Away from tank  
Indications of underground leakage: No  
Shrub, tree, etc. encroachment: No

**Piping:**

Pit: Yes  
Location: Adjacent to tank  
Condition of pit structure: Good  
SCADA controls: Yes  
Controls heated: No  
Condition of coating: Fair  
Condition of metal: Good  
Piping comments: Some pinpoint rusting

**FOUNDATION**

Foundation exposed: Yes  
Height exposed: 8 - 10 inches  
Undermining of foundation: No  
Exposed foundation condition: Good  
Chipped or cracked: No  
Type of grout: Caulk  
Indications of foundation settlement: No  
Comments: Remove loose caulk and recaulk

**EXTERIOR COATING**

**Sidewall:**

Lettering: No  
Logo: No  
Topcoat condition: Fair  
Primer/Previous coating condition: Fair  
Describe coating: Chalking - Fading - Spot coating breaks to substrate – Erosion – Exterior recoat

## **EXTERIOR COATING**

Metal condition: **Good**

### **Roof: (Aluminum geodesic dome)**

Roof comments: **Some ponding water on aluminum panels**

## **EXTERIOR APPURTENANCES**

**Anchor bolts: N/A**

### **Exterior overflow pipe:**

Coating condition: **Good**

Metal condition: **Good**

Inside diameter: **12 inches**

Condition of screen: **Good**

Percent of screen open: **100**

Flap gate: **Yes**

Design: **Screened**

Air gap: **Yes**

Pipe to ground distance: **18 inches**

Splash pad: **Yes**

Type: **Concrete pad - Stone**

Condition: **Good**

### **Sidewall manway:**

Number: **1**

Size: **1 - 24 inches; 1 - 30 inches**

Gasket leaking: **No**

Hinged: **Yes**

Sealed with: **Bolted cover**

Coating condition: **Good**

Metal condition: **Good**

Sidewall manway comments: **Davit arm nuts rust streaking**

### **Sidewall ladder:**

Coating condition: **Good**

Metal condition: **Good**

Toe clearance: **7+ inches**

Width of rungs: **16 inches**

Thickness of rungs: **3/4 inch**

Shape of rungs: **Diamond**

## **EXTERIOR APPURTENANCES**

Fall prevention device: **Yes**

Type: **Cable**

Condition: **Good**

Cage: **No**

### **Step-off platform:**

Dimensions: **32 x 60 inches**

Railing height: **42 inches**

Toe plate height: **4 inches**

Coating condition: **Good**

Metal condition: **Good**

### **Roof stairs:**

Style: **Steps**

Coating condition: **Aluminum**

Metal condition: **Good**

Stair dimensions: **12 x 24 inches**

Fall prevention device: **No**

Cage: **No**

Roof ladder comments: **All aluminum**

### **Roof hand rail:**

Metal condition: **Good**

Fall prevention device: **No**

Railing height: **42 inches**

Toe plate height: **N/A**

Ladder handrail comments: **All aluminum**

### **Center handrail: N/A**

### **Roof hatches:**

Wet interior: Condition: **Good**

Metal condition: **Good**

Neck diameter: **30 inches**

Shape: **Square**

Hatch security: **Lock**

Dry interior: **N/A**

## **EXTERIOR APPURTENANCES**

### **Bolted ventilation hatch:**

Coating condition: **Good**

Neck diameter: **30 inches**

Ventilation hatch comments: **Intact**

### **Roof vent:**

Number: **1**

Type: **Screened pressure-vacuum**

Neck diameter: **24 x 24 inches**

**Aviation lights: N/A**

**Removable cathodic caps: N/A**

**Rigging points: N/A**

**Antennas: N/A**

### **Wet interior coating**

**Roof: Aluminum geodesic dome**

Roof comments: **2 geodesic dome caps observed dripping during heavy rain**

### **Sidewall:**

Topcoat condition: **Good**

Primer coating condition: **Good**

Describe coating: **Spot coating breaks to substrate – Blisters (few)**

Mineral deposits: **Moderate**

Metal condition: **Good**

Active pitting: **No**

Sidewall comments: **Some spot repairs evident**

### **Tank bottom:**

Topcoat condition: **Fair**

Primer coating condition: **Fair**

Describe coating: **Spot coating breaks to substrate - Blisters - Rust undercutting – Active corrosion 200 spots, 1 hand size with some metal loss**

## **EXTERIOR APPURTENANCES**

Mineral deposits: **Light**

Metal condition: **Good**

Active pitting: **Yes**

Deepest pit depth: **1/16 inch**

Number of pits: **More than 75**

Previous pitting: **Yes**

Previous pit filling: **Yes**

Depth of sediment: **1 inch**

Bottom comments: **during next painting, add weld grinding (500 lin. in.) floor and wall; DFT 6 - 11**

## **WET INTERIOR APPURTENANCES**

**Tank ladder: N/A**

**Cathodic protection: N/A**

Cathodic comments: **Old 3 in. compression-type entrance fitting**

**Fill pipe:**

Diameter: **16 inches**

Height above floor: **6 inches**

Deflector grate: **Yes**

Coating condition: **Good**

Metal condition: **Good**

Fill pipe comments: **Outer ring higher than pipe**

**Separate draw pipe: N/A**

**Overflow pipe:**

Type: **Weir box**

Coating condition: **Good**

Metal condition: **Good**

**Roof beams: N/A**

**Columns: N/A**

**Sidewall beams: N/A**

**Baffle wall: N/A**

## **WET INTERIOR APPURTENANCES**

**Interior balcony: N/A**

**Spider: N/A**

## **RECOMMENDATIONS:**

**Foundation: Remove non-adhering caulking and recaulk**

**Coating: Exterior: Recoat**

**Interior: Install cathodic system**

**Health: Redesign and install wind girder screen**

**Repairs: Modify interior drain pipe to be removable**

Field Inspection Report is prepared from the contractor's viewpoint. It contains information the contractor needs to prepare his bid for any repair or recoating. The engineer uses it to prepare the engineering report. Cost estimates are more accurate if the contractor's problems can be anticipated. While prepared from the contractor's viewpoint, the only intended beneficiary is the owner. These reports are completed with diligence, but the accuracy is not guaranteed. The contractor is still advised to visit the site.



Candlers Mountain #1 2,000,000 Gallon Ground Storage Tank.

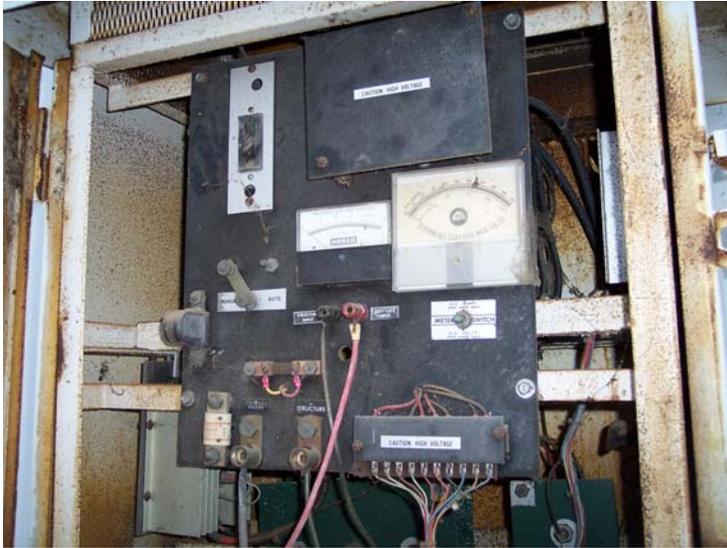


(1) Candler Mountain #1  
2,000,000 gallon ground storage  
tank.

(2) Overflow extends down  
sidewall.



(3) Small buckle in side shell.



(4) Old Goodall rectifier is mounted on the sidewall—it is non-functional.

(5) Sidewall manway located on the north side was used for access



(6) 3 in. compression fitting is located behind the panel for the old cathodic system.



(7) Non-functional level indicator on the sidewall.

(8) Overflow has screened flap gate.



(9) Overflow terminates above ground level and to a splash pad.



(10) Vandal deterrent is locked and is in good condition.

(11) Another manway is located 180 degrees from the accessed manway.



(12) Platform is in good condition.



(13) Areas of loose grout were observed.

(14) Base grout is cement and caulking.



(15) Abrasions on sidewall.



(16) Bolt and nut missing from the vandal guard.



(17) Safety rail is intact.



(18) Rust blooms on bottom of the angle iron.



(19) Rust bleed-through on underside of the angle at top platform.

(20) Hole in wind girder vent screen.



(21) Small gap between screen and wind girder.



(22) Gap in screen.



(23) Screen gap.



(24) Unsecured section of screen.



(25) Secured section of screen.

(26) Screen gap.



(27) Screen gap.



(28) Torn screen.



(29) Level indicator cable.



(30) No anchor bolts on side shell platform.



(31) Platform to roof has hand rail

(32) Hand rail extends to second manway.



(33) Hand rail is attached to the roof via U-shaped extruded aluminum.



(34) Painter's ventilation hatch.



(35) Manway with padlock.



(36) Center roof vent screen is intact.



(37) Small failed coated areas on wind girder.

(38) Six cathodic clips are installed in the floor.



(39) A representative panel from the interior floor.



(40) Spot failures and blisters around sidewall manway.

(41) Spot failures to substrate.



(42) Spot failures to substrate.



(43) Spot failure to substrate.

(44) Spot failure to substrate.



(45) Exposed steel is actively pitting.



(46) Spot failure.

(47) Drain and fill/draw pipe.



(48) Not a lot of staining on the floor.



(49) Floor was cleaned up and is free from significant staining.

(50) Some areas showed no coating breaks.

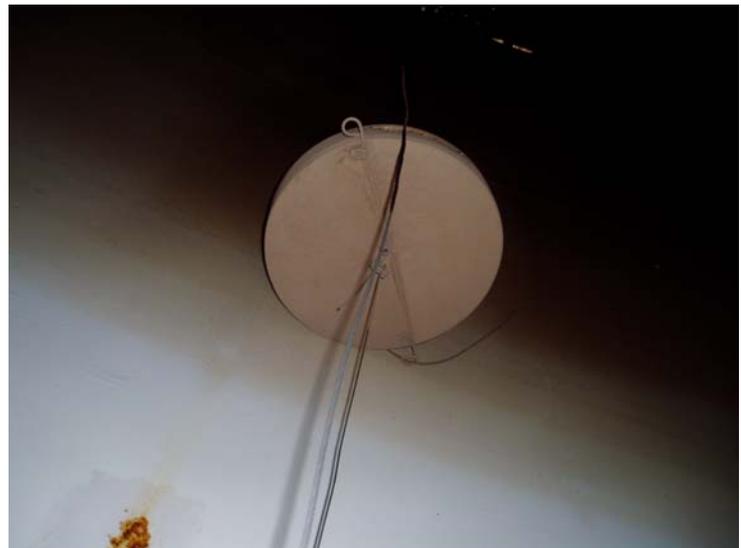


(51) Down to substrate - actively corroding.



(52) Active corrosion on localized floor panels.

(53) Level indicator float is hung up—all components are not installed to make operational.



(54) Staining on sidewalls



(55) Overflow weir box.

(56) Pit adjacent to tank with isolation valves.



(57) Pit contains altitude valve.

May 4, 2009

City of Lynchburg  
DPW-Utilities Division  
525 Taylor Street  
Lynchburg, VA 24501

Attn: Scott Parkins, P.E.

Re: 2,000,000 Gallon Ground Storage Tank  
Huntingwood Tank

Dear Greg:

Please find enclosed the above referenced report for the 2,000,000 gallon water storage tank. The inspection was completed on March 31, 2009. The report consists of: 1) cover page; 2) conclusions and recommendations; 3) detailed report; 4) Field Inspection Report (FIR); 5) photographs and descriptions; and 6) CD.

Brief explanation: 1) The cover page is self-explanatory. 2) Conclusions and recommendations explain in short form what was found on the tank and what DIXON recommends for repair and maintenance of the tank. 3) This section is the long report that goes into detail to explain what exactly was found and why DIXON makes the recommendations. 4) Field Inspection Report (FIR) is the form that was completed when the inspection team was on-site and includes the dimensions and conditions of the tank. 5) Photographs and descriptions give the Owner a visual record of the condition of the tank and appurtenances. 6) CD is an Adobe PDF format of the complete report and photos for your convenience.

If you have any questions or concerns, please call me at (616) 374-3221 ext. 310.

Thank you for choosing DIXON for your inspection needs.

DIXON ENGINEERING, INC.,

Thomas Rounds  
Project Manager

Enclosures

# Dixon Engineering, Inc.

Maintenance Inspection

2,000,000 Gallon Ground Storage

Huntingwood Tank  
Lynchburg, Virginia

Inspection Performed: March 31, 2009  
Report Prepared: April 30, 2009  
Reviewed by Ira M. Gabin, P.E.: May 1, 2009

Phone (616) 374-3221  
Fax (616) 374-7116  
<http://www.dixonengineering.net>  
[dixon@dixonengineering.net](mailto:dixon@dixonengineering.net)

Dixon Engineering Inc.  
1104 Third Ave. Lake Odessa, MI 48849

## **CONCLUSIONS:**

1. The exterior coating is an epoxy urethane system that is in fair condition, is moderately faded, but has good adhesion. There are numerous areas of spot coating failure on the roof. Coating deterioration is moderate, and the coating's condition is above average for an eighteen year old system.
2. The wet interior coating is a multi-coat epoxy system that is in good condition, and has good adhesion. There are a few areas of minor spot failure on the floor. Above the high water line the coating is in good condition. The roof coating is deteriorating at open lap seams and on the roof beam edges. The roof beams and lap joints have minor edge corrosion.

## **RECOMMENDATIONS:**

1. Schedule regular cleanings and inspections of the tank by an independent, third party as recommended by AWWA, or once every five years.
2. Budget for repainting the interior roof beams and stiffeners in five years, based on the findings of the next inspection. The estimated cost is \$75,000.
3. High pressure water clean (5,000 – 10,000 psi), spot power tool clean, and recoat the exterior with a polyurethane system. The estimated cost is \$95,000.
4. Install a floating-type cathodic protection system in the interior. The estimated cost is \$17,000.
5. Weld plates with threaded couplings for interior rigging over the cathodic lift holes in the tank's roof. The estimated cost is \$3,000.
6. Recaulk areas of missing caulk between the tank's baseplate and foundation. The estimated cost is \$1,000.
7. Determine if the existing antenna is needed and remove if not needed.

## **COST SUMMARY:**

Exterior overcoat:	\$95,000
Weld caps:	3,000
Grout repair:	1,000
Cathodic protection:	<u>17,000</u>
	\$116,000
Engineering and contingencies:	<u>25,000</u>
<b>Total:</b>	<b>\$141,000</b>

## **INSPECTION:**

On March 31, 2009, Dixon Engineering, Inc. (DIXON) performed a maintenance inspection on the 2,000,000 gallon reservoir owned by the City of Lynchburg, VA. Purposes of the inspection were to evaluate the interior and exterior coatings' performance and life expectancy; assess the condition of metal surfaces and appurtenances; review safety and health aspects; and make budgetary recommendations for continued maintenance of the tank. All recommendations are incorporated into this report, with budgeting estimates for repairs. Inspectors for DIXON were Thomas Rounds, Project Manager; and Tucker Adams and Roy Wise, Staff Technicians. Scheduling and arrangements for the inspection were completed through Scott Parkins, P.E.

The tank was built in 1978 by Reco with a height-to-high water line of 36 ft. It is welded construction. The exterior and wet interior were last painted in 1991.

## **CONDITIONS and RECOMMENDATIONS:**

### **Exterior Coating Conditions:**

The exterior coating is a multiple coat epoxy urethane system that is beginning to chalk and fade, and there is a loss of gloss. Surfaces have faded due to exposure ultraviolet rays, which is a normal occurrence for an exposed coating system. The coating is adequately protecting the metal and aesthetics are fair, but the coating system has exceeded its service life. The coating is beginning to erode and once epoxy is exposed, a rapid deterioration will occur. The system is performing better than would be expected for an eighteen year old system. While the coating may appear to have an acceptable aesthetic quality. Minor coating breaks will continue to appear, allowing rust to form on the surface.

The sidewall coating is in fair condition. Primary method of deterioration is erosion. A few coating breaks were found, with small amounts of surface rust. The sidewall coating is 7 – 9 mils thick. The sidewalls are covered with heavy algae growth.

The roof coating is in fair condition. The primary methods of deterioration are delamination, spot coating breaks to the substrate, rust undercutting, and erosion. There are moderate coating breaks, with small amounts of surface rust and rust staining. The roof coating is 7 – 10 mils thick.

The exterior coating system is believed to be lead free.

### **Exterior Coating Recommendations:**

The existing coating is a polyurethane system. Coating adhesion is good and would support an overcoat. The recommended procedure is to high pressure water clean (5,000 – 10,000 psi) to remove any delaminating or flaking coating and contaminants, followed by spot power tool cleaning to bare metal (SSPC-SP11) any rusted or failed areas.

The coating system would consist of a spot prime coat on the bare metal, a full coat of epoxy, and two coats of polyurethane. The polyurethane system offers excellent abrasion resistance, with high gloss and sheen retention. The coating has a minimum temperature requirement for application, and is sensitive to moisture during the curing process. If moisture is present during the curing process, the appearance will become cloudy, with little or no gloss. The expected life of the system is twelve-to-fifteen years. The system can be recoated again in twelve-to-fifteen years, and a second time approximately twelve years after the first recoating, extending the life of the system to thirty-five to forty years before total removal would again be necessary. We estimate project length at thirty days. The tank would be removed from service to reduce moisture condensation on the surface. The estimated cost is \$95,000.

### **Wet Interior Coating Conditions:**

The wet interior coating is an epoxy system reportedly applied in 1991. The wet interior coating is believed to be an epoxy system based on appearance (white). Based on the roof coating, it was apparent that the tank has been abrasive blast cleaned and painted at least once since 1978. The most prevalent coating for wet interiors in the late 1980's and 1990's was epoxy.

The roof coating is in fair condition, 99% intact, with the primary areas of deterioration along the lap seams, beam edges, and in the crevices. The tank's roof contains open lap seams that have started to rust and stain, typical for a tank of this construction where the lap seams are open and not seal welded or caulked. Staining in the lap seams is not a concern, but should be monitored during future inspections for corrosion growth. Roof beam edge corrosion is typical, but should be corrected before structural loss of steel occurs. Coating deterioration is occurring along some of the roof support beams, and there is rust at the roof-to-beam junction.

The sidewall coating is in good condition, 99.9% intact, with no coating breaks found. There is no significant damage at the high water line, which would be the area most affected by ice pressures and ice movement. The coating is still protecting the metal, with the exception of a few coating breaks. The sidewalls are covered with moderate mineral staining, which does not affect the integrity of the coating system. Spot touch-up repairs were noted.

Coating on the bottom of the tank is in good condition, 99.8% intact, with a few coating breaks found. Cause of deterioration is spot coating breaks. The coating is still protecting the metal, with the exception of a few coating breaks. The bottom is covered with light mineral staining, which does not affect the integrity of the coating system. Approximately 1 in. of mud sediment was flushed from the interior.

Moderate, previous pitting of the metal was found on the sidewalls and floor. It appeared that a small amount of pit filler has been used to fill pits in the sidewalls in the past.

Overall adhesion of the coating is good. Adhesion was tested by use of lower pressure washing. With poor adhesion it would be possible to notice the coating fluctuate and layers of coating would be removed. With very poor adhesion, the existing coating might be removed. This is a crude form of testing, yet the least destructive. A destructive test cuts the coating to the

substrate. The test area is then susceptible to corrosion because it has been scratched to bare metal.

### **Wet Interior Coating Recommendations:**

The existing coating system has not deteriorated to the point where replacement is warranted. A cathodic protection system would protect all areas below the high water line where the coating has deteriorated. Long-term budget for repainting the roof beams and stiffeners in five years. The estimated cost is \$75,000. Update conditions after the next inspection to determine the scope of roof painting work required.

### **Cathodic Protection Conditions:**

The tank does not have a functioning cathodic protection system. Clips and a pressure fitting have been installed for a cathodic protection system.

### **Cathodic Protection Recommendations:**

Install an impressed current cathodic protection system. The system is designed with a horizontal ring configuration. The anode is suspended into the lower one-third of the tank by floats. As water fills the tank, the anode takes the desired ring configuration. This design is considered ice-free. Formation of ice normally occurs at the high water level and some along the sidewalls. As long as the tank is operated in the upper one-half of its capacity, the probability of ice damage is very low. The anode used is a platinized niobium or titanium wire with a design life of ten years. The system also incorporates copper/copper sulfate reference anodes.

The system is automatically controlled by monitoring the water-to-tank potential. It provides protection to steel surfaces where holidays (coating pinholes), or coating breaks exist. Cathodic protection operates by inhibiting galvanic cell corrosion where steel is exposed. The system creates an equi-potential across the tank and drives the tank potential down to a point (-850 millivolts) where corrosion is essentially non-existent. Only surfaces in contact with water are protected because water acts as the electrolyte for the circuit; therefore, areas of the roof and upper sidewalls are not protected by the system. The estimated cost is \$17,000.

Installation of cathodic protection should delay the need to abrasive blast clean and repaint. For reference, the estimated cost to abrasive blast clean and repaint with three coats of epoxy is \$280,000.

Weld shut the existing cathodic lift holes. The caps should have threaded couplings that would be used for wet interior rigging. The estimated cost is \$3,000.

### **Site Conditions:**

The well maintained tank site is large in size and is fenced with a double locking gate. There is a large size staging area for contractors' equipment. One home is located to the north, and woods are on three sides. Neighbors are near the tank and extra precaution will need to be taken to keep

paint and/or debris from entering the neighboring property. The site is accessible from a paved drive, and the tank is located approximately 500 ft. from the main access road. Drainage for the site is away from the foundation. There were no signs of underground pipe leaks.

**Foundation Conditions:**

The exposed foundation is in good condition.

**Grout/Caulk Conditions:**

The caulk is in fair condition, with gaps developing that will allow moisture to enter.

**Grout/Caulk Recommendations:**

Repair the foundation caulk. Caulk keeps water from getting between the foundation and tank. Remove all loose or deteriorated caulk and repair with a urethane caulk. The estimated cost is \$1,000.

**Hatch/Manway Conditions:**

The roof hatches are hinged and functioned properly during the inspection. The wet interior hatch is secured with a padlock matching the owner's master key system.

**Vent Conditions:**

The roof has three – 24 in. pressure-vacuum design vents. They are in good condition.

**Vent Recommendations:**

Replace the existing roof vent flange nuts. Cost would be incidental to exterior repainting.

Annually inspect the screens to make sure they are intact.

**Antenna Conditions:**

The hand rail has one antenna attached to it.

**Antenna Recommendations:**

Determine if the antenna is operational, and remove if unneeded.

**Ladder Conditions:**

The exterior ladder is in good condition and meets current OSHA size requirements.

The wet interior does not have a ladder.

**Wet Interior Metal Conditions:**

The steel structure is in good condition above and below the high water line. Minor pitting had occurred prior to the current coating.

The interior roof is supported by eighty-four radial stiffeners, one ring of beams, and seven columns that are in good condition, with minor corrosion in the crevices and at the edges.

The columns are tubular and appeared in alignment.

**STEEL TANK FIELD INSPECTION REPORT**  
**STANDPIPE/RESERVOIR TANK**

DATE: March 31, 2009

**I. TANK DATA**

OWNER: City of Lynchburg

CLIENT CODE: 46-61-01-09

TANK NAME: Huntingwood

LOCATION: City: Lynchburg

State: VA

TANK SIZE: Capacity: 2,000,000 gallons

Diameter: 98 feet

Height to overflow (HWL): 36 feet

Sidewall height: 38 feet

CONSTRUCTION: Welded

Type of structure: Reservoir

Type of Roof: Flat

DATE CONSTRUCTED: 1978

MANUFACTURER: Reco

CONTRACT NUMBER: D0492

COATING HISTORY	<u>EXTERIOR</u>	<u>DRY INTERIOR</u> N/A	<u>WET INTERIOR</u>
DATE LAST COATED	<u>1991</u>		<u>1991</u>
COATING SYSTEM	<u>Epoxy urethane</u>		<u>Epoxy urethane</u>
SURFACE PREPERATION	<u>SSPC SP6</u>		<u>SSPC SP10</u>

INSPECTED BY: Dixon Engineering, Inc.

INSPECTORS: Inspector Tom Rounds, Top person Tucker Adams, Ground person Roy Wise

TYPE OF INSPECTION: Maintenance

DATE LAST INSPECTED: 11/05

**II. INSPECTION DATA**

**SITE CONDITIONS**

Fenced: Yes

Control building: No

Antenna control site: No  
Site conditions: Well maintained  
Neighborhood: Residential  
To the North: Residential  
To the East: Residential  
To the South: Woods  
To the West: Woods  
Power lines within 50 feet: No  
Site drainage: Away from tank  
Indications of underground leakage: No  
Shrub, tree, etc. encroachment: No  
Other concerns: 1 house north

### Piping:

Pit: Yes  
    Location: Adjacent to tank  
Condition of pit structure: Good  
SCADA controls: Yes  
Controls heated: No  
Altitude valve: Yes  
Condition of coating: Fair  
    Describe coating: Pinpoint rusting  
Condition of metal: Good

### FOUNDATION

Foundation exposed: Yes  
Height exposed: 8 inches  
Undermining of foundation: No  
Exposed foundation condition: Good  
Chipped or cracked: No  
Type of grout: Caulk  
    Grout missing: No  
Indications of foundation settlement: No  
Comments: Grout/caulk shrunk - recaulk

### EXTERIOR COATING

#### **Sidewall:**

Lettering: No  
Logo: No  
Topcoat condition: Fair

## **EXTERIOR COATING**

Primer coating condition: **Good**

Describe coating: **Chalking - Erosion**

Metal condition: **Good**

Sidewall comments: **7 – 9 mils; degrading on south and west sides; significant mildew growth**

### **Roof:**

Topcoat condition: **Fair**

Primer/Previous coating condition: **Fair**

Describe coating: **Chalking - Fading - Spot coating breaks to substrate - Erosion**

Dry film thickness: **7 - 11 mils**

Coating adhesion: **5A**

Metal condition: **Good**

Roof comments: **20 spot breaks to substrate**

## **EXTERIOR APPURTENANCES**

**Anchor bolts: N/A**

### **Exterior overflow pipe:**

Flap gate: **No**

Air gap: **Yes – in pit**

Splash pad: **No**

Overflow comments: **Overflow extends from inside tank through floor to pit, then to storm drain**

### **Sidewall manway:**

Number: **2**

Size: **24 inches**

Gasket leaking: **No**

Hinged: **Yes**

Sealed with: **Bolted cover**

Coating condition: **Good**

Metal condition: **Good**

Sidewall manway comments: **Davit arms**

### **Sidewall ladder:**

Coating condition: **Good**

Metal condition: **Good**

## **EXTERIOR APPURTENANCES**

Toe clearance: **11 inches**  
Width of rungs: **16 inches**  
Thickness of rungs: **¾ inch**  
Shape of rungs: **Round**  
Fall prevention device: **Yes**  
Type: **Rail**  
Condition: **Good**  
Cage: **No**

### **Step-off platform:**

Dimensions: **To roof**  
Railing height: **42 inches**  
Toe plate height: **5 inches**  
Coating condition: **Good**  
Metal condition: **Good**

**Roof ladder: N/A**

**Roof ladder handrail: N/A**

**Center handrail: N/A**

### **Roof hatches:**

Wet interior: Coating condition: **Poor**  
Metal condition: **Good**  
Neck diameter: **30 inches**  
Shape: **Square**  
Hatch security: **Lock**

Dry interior: **N/A**

Hatch comments: **Locked on arrival; locked upon completion**

**Bolted ventilation hatch: N/A**

### **Roof vent:**

Number: **3**  
Type: **Screened pressure-vacuum**  
Neck diameter: **24 inches**  
Coating condition: **Fair**  
Metal condition: **Good**

## **EXTERIOR APPURTENANCES**

Screen condition: **Good**

Percent of screen open: **100**

**Aviation lights: N/A**

### **Removable cathodic caps:**

Number: **50**

Coating condition: **N/A**

Metal condition: **Good**

Aligned: **Yes**

Cathodic cap comments: **SST caps all in alignment**

### **Rigging points:**

Rigging couplings: **Yes**

Number: **26**

Rigging clips: **No**

Coating condition: **Good**

Metal condition: **Good**

### **Antennas:**

Location: **Roof** Number: **1 separate pedestal**

Cable runs: **From pole-to-stiffener ring**

Antennas or cables interfere with climbing: **No**

Antenna comments: **Antenna may be abandoned**

## **WET INTERIOR COATING**

### **Roof:**

Topcoat condition: **Fair**

Primer coating condition: **Fair**

Describe coating: **Spot coating breaks to substrate**

Roof comments: **Rust at lap seams, edges of beams**

### **Sidewall:**

Topcoat condition: **Good**

Primer coating condition: **Good**

Describe coating: **Blisters around manway**

Mineral deposits: **Moderate**

Metal condition: **Good**

Active pitting: **No**

## **EXTERIOR APPURTENANCES**

Sidewall comments: **Some touch-ups; appeared to be Aquatapoxy**

### **Tank bottom:**

Topcoat condition: **Good**

Primer coating condition: **Good**

Mineral deposits: **Light**

Metal condition: **Good**

Active pitting: **No**

Depth of sediment: **.5 inch**

Bottom comments: **3 spots to exposed substrate**

## **WET INTERIOR APPURTENANCES**

**Tank ladder: N/A**

### **Cathodic protection:**

Clips and pressure fitting present: **No**

Cathodic comments: **Removable cathodic caps on roof**

### **Fill pipe:**

Diameter: **18 inches**

Height above floor: **4 inches**

Deflector plate/grate/bar: **No**

Coating condition: **Fair**

Metal condition: **Good**

**Drain Pipe: Yes**

**Separate draw pipe: N/A**

### **Overflow pipe:**

Type: **Funnel**

Coating condition: **Good**

Metal condition: **Good**

### **Roof beams:**

Style: **Radial - 84**

Shape: **Channel**

Dimensions: **3 x 5 inches**

## **WET INTERIOR APPURTENANCES**

Coating condition: **Fair; some deterioration on edges and bottom flanges**

Metal condition: Good

### **Columns:**

Number: 7

Shape: **Round**

Dimensions: **8 inches**

Coating condition: **Good**

Metal condition: **Good**

**Sidewall beams: N/A**

**Baffle wall: N/A**

**Interior balcony: N/A**

**Spider: N/A**

## **RECOMMENDATIONS:**

**Foundation: Recaulk**

**Coating: Exterior: Recoat**

**Interior: Install floating-type cathodic protection system**

Field Inspection Report is prepared from the contractor's viewpoint. It contains information the contractor needs to prepare his bid for any repair or recoating. The engineer uses it to prepare the engineering report. Cost estimates are more accurate if the contractor's problems can be anticipated. While prepared from the contractor's viewpoint, the only intended beneficiary is the owner. These reports are completed with diligence, but the accuracy is not guaranteed. The contractor is still advised to visit the site.



(1) Lynchburg, Virginia Huntingwood 2,000,000 Gallon Tank.



(2) Sidewalls are heavily covered with mildew.

(3) Lower sidewall.



(4) Tank foundation is free from vegetation.



(5) Mildew adheres to the weld seams first, and then expands.

(6) Caulking has shrunk, allowing moisture to migrate.



(7) Mildew on all sides of the tank.



(8) Exterior has a level indicator.

(9) Pit is directly adjacent to tank.



(10) Manways are properly marked.



(11) Influent, drain, and overflow piping.



(12) Altitude valve in pit.



(13) Water was drained to storm drain.



(14) Loose caulking.

(15) Site lighting attached to tank.

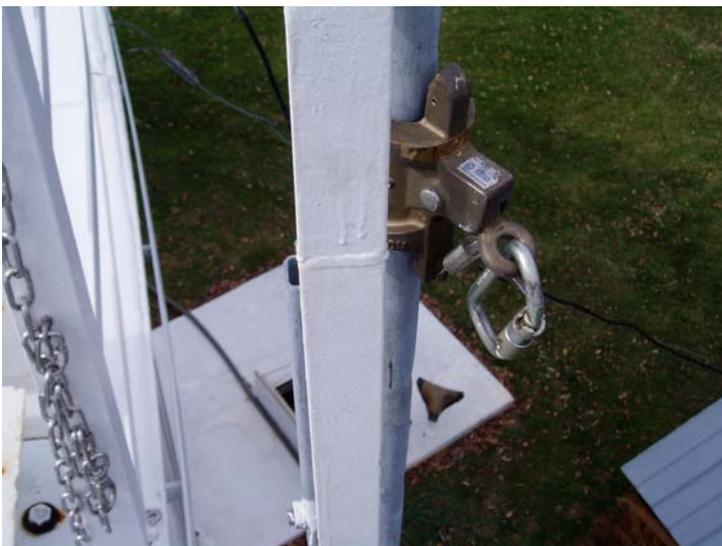


(16) Ladder was required to access the tank ladder.



(17) Sidewall ladder has a rail-type fall prevention device.

(18) Sidewall stiffener.



(19) Top of ladder is halved at the roof transition.



(20) Roof manway has a railing that is intact.

(21) Level indicator pulley system.



(22) Wet interior hatch.



(23) Top of ladder.

(24) The three roof vents are intact.



(25) All cathodic caps are aligned.



(26) Water level indicator appeared operational.

(27) Expanded metal vent screen.



(28) Mesh screen on diaphragm.



(29) Spot failures on roof.

(30) Spot failures on roof.



(31) Failure to substrate.



(32) Some stickers attached to roof vent.

(33) Wet interior walls are heavily mineral stained.



(34) Floor was pressure washed and cleaned.



(35) Floor coating is in good condition for its age.

(36) Overflow, drain, and common influent and effluent pipe.

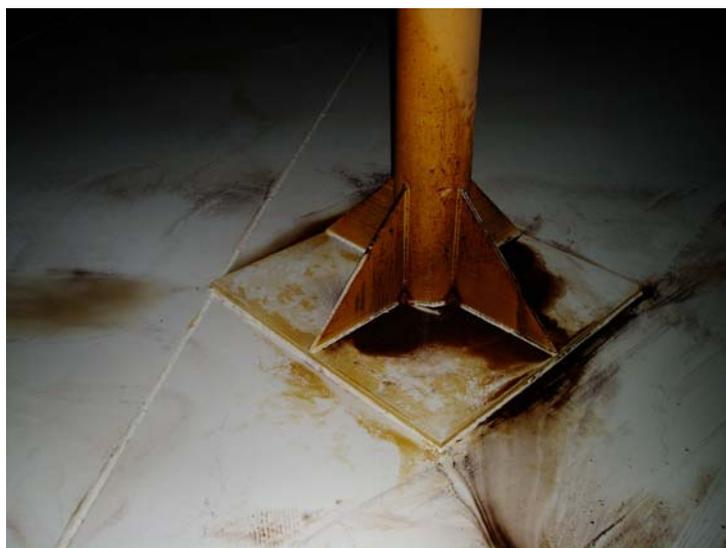


(37) All columns are intact.



(38) Some floor staining.

(39) Deposits are similar to the 2005 inspection.



(40) Support columns and bases are free from defects.



(41) Small isolated spot failures.

(42) Floor—14 mils is a typical coating thickness reading.



(43) All radial beams are intact.



(44) Overflow support.

(45) Overflow supported as designed.



(46) No cathodic caps are out-of-alignment.



(47) Touch-ups on sidewalls.

(48) May have been an Aquata-poxy.



(49) Reading of 12 mils.

December 19, 2011

City of Lynchburg  
DPW Utilities Division  
525 Taylor Street  
Lynchburg, VA 24501

Attn: Scott Parkins, P.E.

Re: 1,700,000 Gallon Standpipe  
Maintenance Inspection

Mr. Parkins:

Please find enclosed the above referenced report for the 1,700,000 gallon standpipe water storage tank. The inspection was completed on October 25, 2011. The report consists of: 1) cover page; 2) conclusions and recommendations; 3) detailed report; 4) Field Inspection Report (FIR); 5) photographs and descriptions; and 6) DVD.

Brief explanation: 1) The cover page is self-explanatory. 2) Conclusions and recommendations explain in short form what was found on the tank and what DIXON recommends for repair and maintenance of the tank. 3) This section is the long report that goes into detail to explain what exactly was found and why DIXON makes the recommendations. 4) Field Inspection Report (FIR) is the form that was completed when the inspection team was on-site and includes the dimensions and conditions of the tank. 5) Photographs and descriptions give the Owner a visual record of the condition of the tank and appurtenances. 6) DVD is an Adobe PDF format of the complete report and photos for your convenience.

If you have any questions or concerns, please call me at 616-374-3221 ext. 310.

Thank you for choosing DIXON for your inspection needs.

FOR DIXON ENGINEERING, INC.,

Thomas Rounds

Enclosures

# Dixon Engineering, Inc.

Maintenance Inspection

1,700,000 Gallon Coagulation  
Tank #1

Lynchburg, Virginia

Inspection Performed: October 25, 2011  
Report Prepared: December 1, 2011  
Reviewed by Ira M. Gabin, P.E.: December 13, 2011

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Dixon Engineering Inc.  
1104 Third Ave. Lake Odessa, MI 48849

## **CONCLUSIONS:**

1. The exterior coating is an epoxy urethane coating system that is in good condition. The coating has not faded. Primary modes of failure are abrasion and rust bleed-through at south foundation flange. Coating deterioration is minor and the condition is average for a six year old coating system.
2. The wet interior coating is a multi coat epoxy system that is in good condition overall. The coating has good adhesion. Above the high water line, the coating is in good condition.

## **RECOMMENDATIONS:**

1. Schedule regular cleanings and inspections of the tank by an independent third party as recommended by AWWA, or once every five years.
2. Complete the recommended work immediately.
3. Spot power tool clean, prime, and topcoat failed areas on top flange of mixing basin. Perform repair on base of tank base flange on south side of tank adjacent to rock fill.
4. Energize the cathodic protection system.
5. Water clean and spot repair coat the foundations flange on south side of tank to prevent further deterioration.

## **INSPECTION:**

On October 25, 2011, Dixon Engineering, Inc. (DIXON) performed a maintenance inspection on the 1,700,000-gallon standpipe coagulation tank owned by the City of Lynchburg, Virginia. Purposes of the inspection were to evaluate the interior and exterior coating's performance and life expectancy; assess the condition of metal surfaces and appurtenances; review safety and health aspects; and make budgetary recommendations for continued maintenance of the tank. All recommendations, with budgeting estimates for repairs are incorporated in this report. The inspection was performed by Thomas Rounds, Project Manager. The inspector was assisted by Dan Mervin, P.E., Staff Engineer, and Kayla Melton, Staff Technician. Scheduling and arrangements for the inspection were completed through Scott Parkins, P.E. A source of water for cleaning was provided by the City. Following the inspection, no chlorine was added. The tank is a raw water tank.

## **TANK INFORMATION:**

The tank was built in 1951 by Pitt Des Moines with a height-to-high water line of 65 feet 2 inches. The tank is welded construction. The exterior was last painted in 2005 by Corfu. The wet interior was last painted in 2005 by Corfu.

## **CONDITIONS AND RECOMMENDATIONS:**

### **EXTERIOR COATING CONDITIONS:**

The exterior coating system is a multiple coat epoxy urethane coating system.

Dixon Engineering, Inc. provided specifications and project management in 2005. Information from our records showed the exterior was abrasive blast cleaned to SSPC-SP6 in 2005. Bare metal surfaces were then primed, followed by application of one full intermediate coat, and two full finish coats to the entire tank.

The exterior coating is in good condition overall. The coating is adequately protecting the metal and the aesthetics are good. The system is performing as would be expected for a six year old system.

The sidewall coating is in good condition. There are small amounts of surface rust at the bottom flange on the south side, and a spot failure to the substrate on the top flange of the mixing basin.

Good adhesion was noted during pressure washing.

This exterior system is known to be lead free.

### **EXTERIOR COATING RECOMMENDATIONS:**

Spot power tool clean and recoat the small failure areas noted. This can be done by in-house personnel. Budget for exterior overcoating in the year 2017 or more, or when aesthetics dictate. Perform a maintenance inspection in five years to update the recoating times and costs.

### **WET INTERIOR COATING CONDITIONS:**

The wet interior coating is an epoxy system applied by Corfu in 2005. The coating is in good condition overall.

Coating deterioration is occurring on the top edges of the flange between mixing basin 5 and 6. The failure may have been an abrasion.

The sidewall coating is in good condition. The coating on the sidewalls is 100 percent intact. No coating breaks were found on the sidewalls.

The sidewalls are covered with light mineral staining, which does not affect the integrity of the coating system.

The tank bottom was covered with approximately 3-inches of mud sediment. The tank was not completely drained.

### **WET INTERIOR COATING RECOMMENDATIONS:**

Take no immediate action on the wet interior. When the coating is no longer protecting the metal at coating breaks, the cathodic protection system will prevent corrosion.

### **CATHODIC PROTECTION CONDITIONS:**

The tank contains a functioning cathodic protection system.

### **CATHODIC PROTECTION RECOMMENDATIONS:**

Energize the cathodic protection system.

### **FOUNDATION CONDITIONS:**

The exposed foundation is in good condition.

### **GROUT/CAULK CONDITIONS:**

The grout is in good condition.

**WET INTERIOR METAL CONDITIONS:**

The steel structure is in good condition above the high water line and in good condition below it.

**STEEL TANK FIELD INSPECTION REPORT**  
**STANDPIPE TANK**

DATE: October 25, 2011

**I. TANK DATA**

OWNER: City of Lynchburg, Virginia

CLIENT CODE: 46-61-01-05

TANK NAME: Coagulation Tank #1

LOCATION: Street: 525 Taylor Street

City: Lynchburg

State: Virginia

TANK SIZE: Capacity: 1,700,000 gallons

Diameter: 67 feet

Height to overflow (HWL): 65 feet 2 inches

Sidewall height: 67 feet

CONSTRUCTION:  Welded  Riveted  Bolted

Type of structure:  Standpipe  Reservoir

Type of Roof:  Hemisphere  Flat  Cone  None

DATE CONSTRUCTED: 1951

MANUFACTURER:  CB&I  Pitt-Des Moines  PT&T

Maguire Inc.  Caldwell  Maguire Iron

COATING HISTORY	<u>EXTERIOR</u>	<u>WET INTERIOR</u>
DATE LAST COATED	<u>2005</u>	<u>2005</u>
CONTRACTOR	<u>Corfu</u>	<u>Corfu</u>
COATING SYSTEM	<u>Polyurethane</u>	<u>Epoxy</u>
SURFACE PREPARATION	<u>SSPC SP-6</u>	<u>SSPC SP-10</u>
COATING MANUFACTURER	<input checked="" type="checkbox"/> Tnemec	<input checked="" type="checkbox"/> Tnemec
COATING SAMPLES	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
HEAVY METAL	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INSPECTED BY: Dixon Engineering, Inc.

PERSONNEL: Inspector Tom Rounds, Top person Dan Mervin, Ground person Kayla Melton

TYPE OF INSPECTION:  Preliminary Maintenance  Maintenance

Warranty  Dry  Dive  Float  ROV

DATE LAST INSPECTED: 2004

## **II. INSPECTION DATA**

### **SITE CONDITIONS**

Fenced:  Yes  No

Control building:  Yes  No

Location:  Adjacent to tank

Antenna control site:  Yes  No

SCADA controls  Yes  No

Location:  In building  Outside

Site conditions:  Well maintained  Not maintained

Neighborhood:  Residential  Retail  Industrial  Rural

Municipal

To the North: Coagulation Tank #2

To the East: Treatment building

To the South: Municipal drive

To the West: Parking and storage building

Power lines within 50 feet:  Yes  No

Site drainage:  Toward tank  Away from tank

Indications of underground leakage:  Yes  No

Shrub, tree, etc. encroachment:  Yes  No

### **PIPING:**

Structure Type:  Pit  Building

Location:  Adjacent to tank  Under Tank

Condition of structure:  Good  Fair  Poor

Structure is:  Dry  Damp

Altitude valve:  Yes  No

Condition of coating:  Good  Fair  Poor

Describe coating:  Delaminating  Rust bleed through  Erosion

No coating remaining

Condition of metal:  Good  Fair  Poor

### **FOUNDATION**

Foundation exposed:  Yes  No

## **FOUNDATION**

Height exposed: 0-10 inches

Undermining of foundation:  Yes  No

Exposed foundation condition:  Good  Fair  Poor

Chipped or cracked:  Yes  No

Type of grout:  Cement  Caulk  None

Condition:  Good  Fair  Poor

Grout missing:  Yes  No

Indications of foundation settlement:  Yes  No

## **EXTERIOR COATING**

### **Sidewall:**

Lettering:  Yes  No

Logo:  Yes  No

Topcoat condition:  Good  Fair  Poor

Primer/Previous coating condition:  Good  Fair  Poor

Describe coating:  Chalking  Fading  Delaminating

Spot coating breaks to substrate  Rust bleed through

Erosion  Rust undercutting  No significant coating deterioration

Dry film thickness: 14 mils

Metal condition:  Good  Fair  Poor

Sidewall comments: Good gloss.

### **Roof:**

N/A

## **EXTERIOR APPURTENANCES**

### **Anchor bolts:**

N/A

### **Exterior overflow pipe:**

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

Inside diameter: 12 inches

Overflow comments: Discharges underground.

### **Sidewall manway:**

Number:  1  2

**EXTERIOR APPURTENANCES**

Size: 30 inches and 24 inches

Gasket leaking:  Yes  No

Hinged:  Yes  No

Sealed with:  Bolted cover  Crabs  Bar

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

**Sidewall stairs:**

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

**Antennas:**

N/A

**WET INTERIOR COATING**

**Upper deck:**

Topcoat condition:  Good  Fair  Poor

Primer coating condition:  Good  Fair  Poor

Describe coating:  Delaminating  Spot coating breaks to substrate  Rust bleed through  Erosion  Rust undercutting

No significant coating deterioration

Metal condition:  Good  Fair  Poor

**Mixing basins:**

Topcoat condition:  Good  Fair  Poor

Primer coating condition:  Good  Fair  Poor

Describe coating:  Delaminating  Spot coating breaks to substrate  Rust bleed through  Blisters  Erosion  Rust undercutting

No significant coating deterioration

Mineral deposits:  Light  Moderate  Heavy

Metal condition:  Good  Fair  Poor

Active pitting:  Yes  No

**Sidewall:**

Topcoat condition:  Good  Fair  Poor

Primer coating condition:  Good  Fair  Poor

Describe coating:  Delaminating  Spot coating breaks to substrate  Rust bleed through  Blisters  Erosion  Rust undercutting

No significant coating deterioration

**WET INTERIOR COATING**

Mineral deposits:  Light  Moderate  Heavy  
Metal condition:  Good  Fair  Poor  
Active pitting:  Yes  No

**Tank bottom:**

Concrete – uncoated  
Previous pit filling:  Yes  No  Unknown  
Depth of sediment: 3 inches  
Bottom comments: 6 inches of water remained on floor.

**WET INTERIOR APPURTENANCES**

**Tank ladder:**

Coating condition:  Good  Fair  Poor  
Metal condition:  Good  Fair  Poor  
Toe clearance: 6 inches  
Width of rungs: 13 inches  
Thickness of rungs: 5/8 inch  
Shape of rungs:  Diamond  Round  Rebar  
Shape of side rails:  Angle  Flat  C-channel  
Fall prevention device:  Yes  No  
Type:  Rail  Cable  T-rail  
Condition:  Good  Fair  Poor  
Ladder comments: Extends from inside of mixing basin #6 floor to floor.

**Cathodic protection:**

Location of Clips:  On floor  On sidewalls  
Type:  Floating ring  Hanging *wire/rod*  
Location of controls:  Sidewall  In building  In dry interior  
 Upper deck  
System condition:  Good  Fair  Poor

**Influent pipe:**

Diameter: 30 inches  
Height above floor: 4 inches/feet  
Deflector *plate/grate/bar*:  Yes  No  
Removable silt ring:  Yes  No  
Coating condition:  Good  Fair  Poor  
Metal condition:  Good  Fair  Poor

## WET INTERIOR APPURTENANCES

### **Effluent pipe:**

Diameter: 30 inches

### **Overflow pipe:**

Type:  Weir box  Vortex break  Funnel  Elbow

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

Overflow comments: Two overflows.

### **Sidewall beams and column:**

Location:  Below mixing basins  At sidewall  At diffuser

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

Sidewall beam and column comments: All beams and column intact.

### **Baffle wall:**

N/A

### **Upper balcony:**

Location: 7<sup>th</sup> floor

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

## RECOMMENDATIONS:

**Foundation:**  No work

### **Coating:**

**Exterior:**  No work

**Wet Interior:** Repair coating breaks on mixing basin top flange.

Complete work:  Immediately  In 1-2 years  In 2-5 years

After next 5 year inspection

**Health:**  No work

**Safety:**  No work

**Repairs:** Energize cathodic system.

Complete work:  Immediately  In 1-2 years  In 2-5 years  After next 5 year inspection  With next paint project

Field Inspection Report is prepared from the contractor's viewpoint. It contains information the contractor needs to prepare his bid for any repair or recoating. The engineer uses it to prepare the engineering report. Cost estimates are more accurate if the contractor's problems can be anticipated. While prepared from the contractor's viewpoint, the only intended beneficiary is the owner. These reports are completed with diligence, but the accuracy is not guaranteed. The contractor is still advised to visit the site.



City of Lynchburg, Virginia 1,700,000 gallon Coagulation Tank #1  
inspection conducted October 25, 2011



1) Coagulation tank was abrasive blast cleaned inside and out during a 2005 tank painting project.



2) There were no observed issues with the spiral stairs.



3) Security cameras are located on the stair support brackets.



4) There were no leaks at tank penetrations.



5) A new overflow pipe was installed in 2010.



6) Bracketing and support coating is intact.



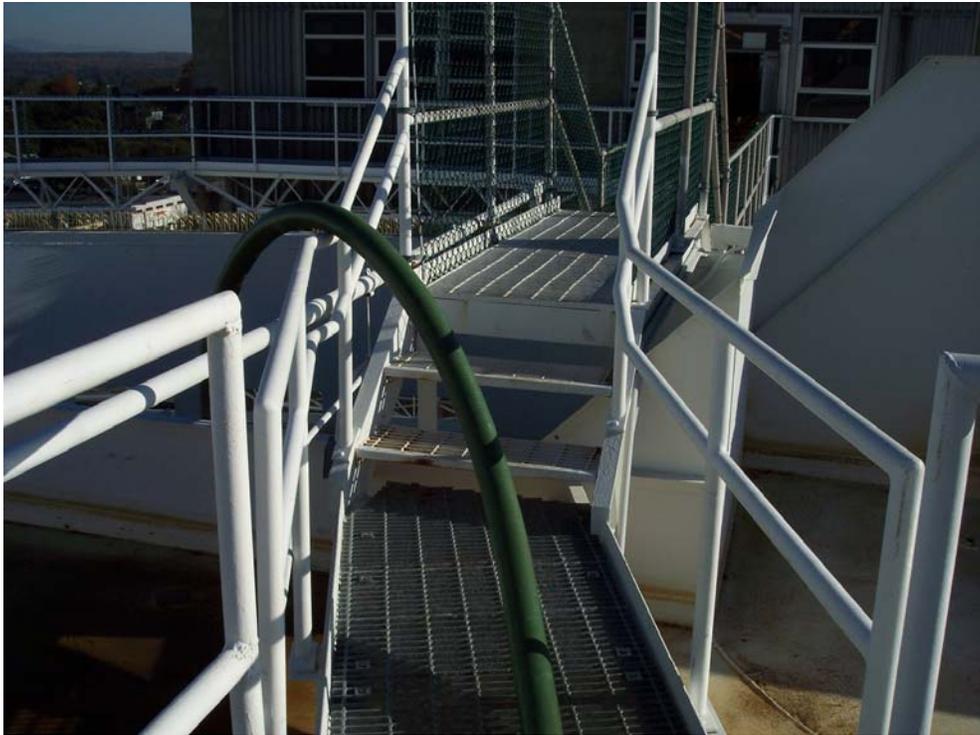
7) Bracketing and support is intact.



8) Overflow piping is intact.



9) A bolted manway was used for access. Note: a brass pipe plug can be installed in test hole to eliminate any additional rust streaking.



10) The upper deck of the coagulation tank is on the 7th floor and requires the use of an elevator.



11) Small spot failures.



12) Handrails are intact.



13) Safety chain to sidewall ladder is secured.



14) A spot failure to the substrate between mixing basin 5 and 6 will undercut, and coating should be repaired.



15) Area should be ground, feathered and an epoxy/urethane repair system installed.



16) There are a few grating clips needing alignment and a few missing.



17) Surfaces were cleaned prior to inspection.



18) Staining is occurring.



19) The Bird X product has failed. Broken and missing sections were observed.



20) Staining from inaccessible areas and influent pipe.



21) Raw water stains and influent pipe.



22) All beams and walkway connections are intact.



23) Overflow funnel is intact.



24) Each box has a counter weighted flap gate.



25) Counter weighted flap gate was pushed closed after cleaning.



26) Stains do not affect the coatings performance.



27) A couple of the flap gate bolts are corroded.



28) Staining on floor does not affect the coatings performance.



29) Center pivot on mixing unit.



30) Good gloss and no failures noted on the exterior, overflow weir for effluent.



31) Missing and broken Bird X.



32) Overflow weir is intact.



33) Bolted manway removed for access.



34) All interior support angles are intact. Coatings are performing well, with some rust staining from lapped joints above the diffuser hood.



35) This stain on the diffuser hood appears to be drips from mixing basins above.



36) All basins and support brackets are intact with no coating failures observed.



37) Fill pipe intact.



38) The floor was not completely drained for inspection.



39) Support angle brackets intact.



40) Coatings are stained but intact.



41) Rake arm assembly intact.



42) Cathodic system appears intact.



43) Adjustment rods intact.



44) Small spot failures at weld seam.



45) Floating cathodic system appeared intact.



46) Bottom of mixing boxes are intact.



47) Floor and walls are heavily stained.



48) A bit of a gap exists between wall and concrete sloped floor.

July 12, 2011

City of Lynchburg  
Department of Utilities  
525 Taylor Street  
Lynchburg, VA 24501

Attn: Scott Parkins

Re: 4,000,000 Gallon Standpipe (College Hill Coagulation Tank #2)  
Maintenance Inspection

Mr. Parkins:

Please find enclosed the above referenced report for the 4,000,000 gallon College Hill Coagulation Tank #2 water storage tank. The inspection was completed on May 17, 2011. The report consists of: 1) cover page; 2) conclusions and recommendations; 3) detailed report; 4) Field Inspection Report (FIR); 5) photographs and descriptions; and 6) CD.

Brief explanation: 1) The cover page is self-explanatory. 2) Conclusions and recommendations explain in short form what was found on the tank and what DIXON recommends for repair and maintenance of the tank. 3) This section is the long report that goes into detail to explain what exactly was found and why DIXON makes the recommendations. 4) Field Inspection Report (FIR) is the form that was completed when the inspection team was on-site and includes the dimensions and conditions of the tank. 5) Photographs and descriptions give the Owner a visual record of the condition of the tank and appurtenances. 6) CD is an Adobe PDF format of the complete report and photos for your convenience.

If you have any questions or concerns, please call me at 616-374-3221 ext. 310.

Thank you for choosing DIXON for your inspection needs.

FOR DIXON ENGINEERING, INC.,

Thomas Rounds  
Project Manager

Enclosures

# Dixon Engineering, Inc.

Maintenance Inspection

4,000,000 Gallon Standpipe  
College Hill Coag #2

Lynchburg, Virginia

Inspection Performed: May 17, 2011  
Report Prepared: July 7, 2011  
Reviewed by Ira M. Gabin, P.E.: July 11, 2011

Phone (616) 374-3221  
Fax (616) 374-7116  
<http://www.dixonengineering.net>  
[dixon@dixonengineering.net](mailto:dixon@dixonengineering.net)

Dixon Engineering Inc.  
1104 Third Ave. Lake Odessa, MI 48849

## **CONCLUSIONS:**

1. The exterior coating is an epoxy urethane coating system that is in good condition. The coating has not faded. Primary mode of failure is abrasions. The coating has good adhesion. Coating deterioration is minor and the condition is average for a six year old coating system.
2. The wet interior coating is a multi coat epoxy system that is in good condition overall. The coating has good adhesion. Below the high water line the coating is in good condition with some rust streaking from behind the painter's ring and behind stitch welded brackets. Above the high water line, the coating is in good condition.

## **RECOMMENDATIONS:**

1. Schedule regular cleanings and inspections of the tank by an independent third party as recommended by AWWA, or once every five years.
2. Continue cathodic protection for the wet interior surfaces. Use a qualified cathodic protection contractor for maintenance.

## **INSPECTION:**

On May 17, 2011, Dixon Engineering, Inc. (DIXON) performed a maintenance inspection on the 4,000,000-gallon standpipe Coagulation Tank #2 owned by the City of Lynchburg, Virginia. Purposes of the inspection were to evaluate the interior and exterior coating's performance and life expectancy; assess the condition of metal surfaces and appurtenances; review safety and health aspects; and make budgetary recommendations for continued maintenance of the tank. All recommendations, with budgeting estimates for repairs are incorporated in this report. The inspection was performed by Thomas Rounds, Project Manager. The inspector was assisted by Tucker Adams and Larry Houck, Staff Technicians. Scheduling and arrangements for the inspection were completed through Scott Parkins. A fire hose and source of water for cleaning was provided by the City.

## **TANK INFORMATION:**

The tank was built in 1966 with a height-to-high water line of 77 feet. The tank is welded construction. The exterior was last painted in 2005 by Corfu Contracting. The wet interior was last painted in 2005 by Corfu Contracting.

## **CONDITIONS AND RECOMMENDATIONS:**

### **EXTERIOR COATING CONDITIONS:**

The exterior coating system is a multiple coat epoxy urethane coating system.

Dixon Engineering provided specifications and inspection services showed the exterior was pressure washed and abrasive blast cleaned to an SSPC-SP6 commercial finish in 2005.

The exterior coating is in good condition overall. The coating is adequately protecting the metal and the aesthetics are good. The system is performing as would be expected for a 6 year old system.

The sidewall coating is in good condition.

A few areas of abrasion damage were noted on the lower sidewall. These areas will surface rust and undercut the surrounding coating. Some asphalt staining is also present from repaving, but should not damage the coating.

### **EXTERIOR COATING RECOMMENDATIONS:**

Take no immediate action on the exterior. Budget for exterior overcoating in the year 2017, or when aesthetics dictate. Perform a maintenance inspection in five years to update the recoating times and costs. Current adhesion showed the existing coating would support an additional recoat. The estimated cost to recoat with an epoxy urethane system is \$55,000.

### **WET INTERIOR COATING CONDITIONS:**

The wet interior coating is an epoxy system applied by Corfu in 2005.

The sidewall coating is in good condition. The coating on the sidewalls is 99.99 percent intact. No coating breaks were found on the sidewalls. There is not any significant damage at the high water line.

The sidewalls are covered with light mineral staining, which does not affect the integrity of the coating system. Staining is present at inaccessible areas behind the stiffeners and beams.

The tank floor is concrete and is in good condition.

The tank bottom was covered with approximately 8-inches of mud sediment that was flushed from the interior.

The rake arm assembly coating is in good condition. Small blisters were present on the mixer assembly.

Overall adhesion of the coating is good. Adhesion was tested by use of low-pressure washing. With poor adhesion, it would be possible to notice the coating fluctuate and layers of coating would be removed. With very poor adhesion, the existing coating may be removed.

### **WET INTERIOR COATING RECOMMENDATIONS:**

The existing coating system is in good condition, and repainting is not warranted. Reinspect in 5 years to update coating conditions and recommendations.

### **CATHODIC PROTECTION CONDITIONS:**

The tank contains a functioning cathodic protection system.

The supporting ropes and anode wires are in good condition with no anode breaks noted.

**PIT AND PIT PIPING CONDITIONS:**

The tank is operated by an electronic control system located in the pit next to the tank.

The piping is in good condition. Coating on the pipes is in good condition.

The pit was dry but damp during the inspection.

**SITE CONDITIONS:**

The size of the tank site is average and is fenced with a locking gate.

There is an average sized staging area for the contractor's equipment.

The site is well maintained and paved.

**FOUNDATION CONDITIONS:**

The exposed foundation is in good condition.

**GROUT/CAULK CONDITIONS:**

The exterior baseplate grout is in good condition.

**DECK LIGHTS AND ELECTRICAL CONDITIONS:**

The tank has three separate deck spotlight poles with double lights mounted on the upper deck. All are functional. One light has become loose from the mount. All lights have ponding water inside lenses.

Electrical outlets are located at the top deck and appear to be functional.

**DECK LIGHTS AND ELECTRICAL RECOMMENDATIONS:**

Remove water from fixtures and repair as necessary.

Reset the loose fixture to the mounting pole.

### **OVERFLOW PIPE CONDITIONS:**

The tank has a 12-inch diameter overflow pipe that extends down through the wet interior, extends down along the sidewall, and down below grade to storm drain system.

The discharge end of the overflow pipe is not visible.

### **HATCH AND MANWAY CONDITIONS:**

The tank has one 24-inch bolted sidewall manway and one bolted 30-inch sidewall manway. They showed no signs of leakage.

### **LADDER CONDITIONS:**

#### Exterior:

The tank has no exterior sidewall ladder.

#### Wet:

There is no ladder in the wet interior.

### **LADDER RECOMMENDATIONS:**

During the next major recoating, install four (4) ladders in the mixing boxes on the upper level.

### **WET INTERIOR METAL CONDITIONS:**

The steel structure is in good condition above the high water line and in good condition below it.

#### Stiffener:

The tank's interior sidewall has a stiffener ring that is angular in construction and situated below the perimeter weir. It is in good condition. There is some rust streaking from behind the angle.

The tank has two exterior stiffeners, one at the top of the sidewall and one 24 feet below that are in good condition.

#### Columns:

The upper deck mixing tanks and deck are supported by six columns.

The columns are in good condition and in alignment.

**STEEL TANK FIELD INSPECTION REPORT**  
**COAGULATION #2 TANK**

DATE: May 17, 2011

**I. TANK DATA**

OWNER: City of Lynchburg

CLIENT CODE: 46-61-01-06

TANK NAME: College Hill Coag #2

LOCATION: Street: Taylor St.

City: Lynchburg

State: Virginia

TANK SIZE: Capacity: 4,000,000 gallons

Diameter: 97 feet

Height to overflow (HWL): 77 feet

Sidewall height: 100 feet

CONSTRUCTION:  Welded  Riveted  Bolted

Type of structure:  Standpipe  Reservoir

Type of Roof:  Hemisphere  Flat  Cone

DATE CONSTRUCTED: 1966

MANUFACTURER:  CB&I  Pitt-Des Moines  PT&T

Maguire Inc.  Caldwell  Maguire Iron  Westech

COATING HISTORY	<u>EXTERIOR</u>	<u>WET INTERIOR</u>
DATE LAST COATED	<u>2005</u>	<u>2005</u>
CONTRACTOR	<u>Corfu</u>	<u>Corfu</u>
COATING SYSTEM	<u>Epoxy urethane</u>	<u>Epoxy</u>
SURFACE PREPARATION	<u>SSPC SP-6</u>	<u>SSPC SP-10</u>
COATING MANUFACTURER	<input checked="" type="checkbox"/> Tnemec	<input checked="" type="checkbox"/> Tnemec
HEAVY METAL	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INSPECTED BY: Dixon Engineering, Inc.

PERSONNEL: Inspector Tom Rounds, Top person Tucker Adams and Larry Houck

TYPE OF INSPECTION:  Preliminary Maintenance  Maintenance

Warranty  Dry  Dive  Float  ROV

DATE LAST INSPECTED: 2006 (Warranty)

## II. INSPECTION DATA

### SITE CONDITIONS

Fenced:  Yes  No

Control building:  Yes  No

Location:  Adjacent to tank

Antenna control site:  Yes  No

SCADA controls  Yes  No

Location:  In building  Outside  Transducer in pit

Site conditions:  Well maintained  Not maintained

Neighborhood:  Residential  Retail  Industrial  Rural

Municipal

To the North: Residential

To the East: Municipal/residential

To the South: Municipal/residential

To the West: Municipal/residential

Power lines within 50 feet:  Yes  No

Site drainage:  Toward tank  Away from tank

Indications of underground leakage:  Yes  No

Shrub, tree, etc. encroachment:  Yes  No

### PIPING:

Structure Type:  Pit  Building

Location:  Adjacent to tank  Under Tank

Condition of structure:  Good  Fair  Poor

Structure is:  Dry  Wet: Depth of water 6 inches

Condition of coating:  Good  Fair  Poor

Describe coating:  Delaminating  Rust bleed through  Erosion

No coating remaining

Condition of metal:  Good  Fair  Poor

### FOUNDATION

Foundation exposed:  Yes  No

Height exposed: 1-6 inches

Undermining of foundation:  Yes  No

Exposed foundation condition:  Good  Fair  Poor

Chipped or cracked:  Yes  No

Type of grout:  Cement  Caulk  None

Condition:  Good  Fair  Poor

Grout missing:  Yes  No

**FOUNDATION**

Indications of foundation settlement:  Yes  No

Foundation comments: Asphalt on north side.

**EXTERIOR COATING**

**Sidewall:**

Lettering:  Yes  No

Logo:  Yes  No

Topcoat condition:  Good  Fair  Poor

Primer/Previous coating condition:  Good  Fair  Poor

Describe coating:  Chalking  Fading  Delaminating

Spot coating breaks to substrate  Rust bleed through

Erosion  Rust undercutting  No significant coating deterioration

Dry film thickness: 10-12 mils

Metal condition:  Good  Fair  Poor

Sidewall comments: No destructive testing occurred; small abrasions on lower exterior sidewall, asphalt from driveway repainting also staining the bottom of the sidewall.

**Roof:**

N/A

**EXTERIOR APPURTENANCES**

**Anchor bolts:**

N/A

**Sidewall manway:**

Number:  1  2

Size: one 24-inches and one 30-inches

Gasket leaking:  Yes  No

Hinged:  Yes  No

Sealed with:  Bolted cover  Crabs  Bar

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

Sidewall manway comments: East side opened for access, take 6 foot ladder.

**Sidewall ladder:**

N/A

## EXTERIOR APPURTENANCES

### **Step-off platform:**

N/A

### **Balcony:**

N/A

### **Roof ladder:**

N/A

### **Roof ladder handrail:**

N/A

### **Center handrail:**

N/A

### **Roof hatches:**

N/A

### **Roof vent:**

N/A

### **Deck lights:**

Condition:  Good  Fair  Poor

Functioning:  Yes  No

Design:  Double red  Beacon  Single Strobe

Photoelectric Cell:  Yes  No

Items higher than lights:  Yes  No

Deck lights comments: Some water inside lenses; one light fixture is loose on center set.

### **Removable cathodic caps:**

N/A

### **Rigging points:**

N/A

### **Antennas:**

N/A

## WET INTERIOR COATING

### Roof:

N/A

### Sidewall:

Topcoat condition:  Good  Fair  Poor

Primer coating condition:  Good  Fair  Poor

Describe coating:  Delaminating  Spot coating breaks to substrate  Rust bleed through  Blisters  Erosion  Rust undercutting  No significant coating deterioration

Mineral deposits:  Light  Moderate  Heavy

Metal condition:  Good  Fair  Poor

Active pitting:  Yes  No

Previous pitting:  Yes  No

Deepest pit depth: 1/16 inch

Number of pits:  1-10  11-25  26-75  More than 75

Previous pit filling:  Yes  No  Unknown

Sidewall comments: Some rust streaks behind stiffeners and plates.

### Tank bottom:

Rake arm assembly topcoat condition:  Good  Fair  Poor

Primer coating condition:  Good  Fair  Poor

Describe coating:  Delaminating  Spot coating breaks to substrate  Rust bleed through  Blisters  Erosion  Rust undercutting  No significant coating deterioration

Mineral deposits:  Light  Moderate  Heavy

Metal condition:  Good  Fair  Poor

Active pitting:  Yes  No

Previous pitting:  Yes  No

Deepest pit depth: 1/16 inch

Number of pits:  1-10  11-25  26-75  More than 75

Previous pit filling:  Yes  No  Unknown

Depth of sediment: 8 inches

Bottom comments: Concrete sloped to center floor; some crack repairs not holding up.

## WET INTERIOR APPURTENANCES

### Tank ladder:

N/A

## WET INTERIOR APPURTENANCES

### **Cathodic protection:**

Clips present:  Yes  No

Location of Clips:  On floor  On sidewalls

Type:  Floating ring  Hanging wire/rod

Location of controls:  Sidewall  In building  Upper deck

System condition:  Good  Fair  Poor

### **Fill pipe:**

Diameter: 30 inches

Height above floor: 6 inches

Deflector plate/grate/bar:  Yes  No

Removable silt ring:  Yes  No

Recirculation line in pipe:  Yes  No

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

### **Separate draw pipe:**

N/A

### **Overflow pipe:**

Type:  Weir box  Vortex break  Funnel  Elbow

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

### **Roof beams:**

N/A

### **Columns:**

Number: 6

Shape:  Round  Square  Channel  I-beam  H-beam

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

## RECOMMENDATIONS:

**Foundation:**  No work

### **Coating:**

**Exterior:** Repair exterior abrasions.

Complete work:  Immediately  In 1-2 years  In 2-5 years  
 After next 5 year inspection

**Wet Interior:**  No work

**Health:** Replace failed Bird X on tank top. Scott is checking into stainless steel Bird X. City will elect to find a solution.

**Safety:**  No work

**Repairs:**  No work

Field Inspection Report is prepared from the contractor's viewpoint. It contains information the contractor needs to prepare his bid for any repair or recoating. The engineer uses it to prepare the engineering report. Cost estimates are more accurate if the contractor's problems can be anticipated. While prepared from the contractor's viewpoint, the only intended beneficiary is the owner. These reports are completed with diligence, but the accuracy is not guaranteed. The contractor is still advised to visit the site.



City of Lynchburg, Virginia 4,000,000 gallon College Hill Coagulation Tank #2 Inspection  
May 17, 2011



1. 4,000,000 gallon coagulation tank with newer chlorine injection facility.



2. Pit Piping.



3. Some abandoned electrical was marked for removal.



4. View from south of College Hill Coag #1.



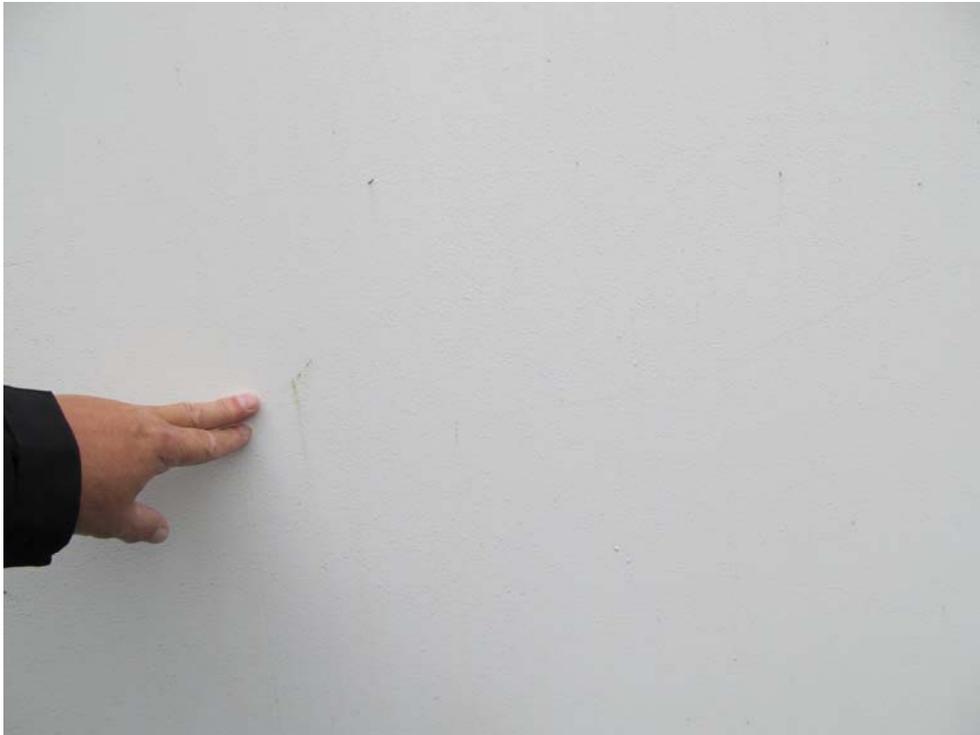
5. Pits have aluminum Bilco style hatches.



6. Pipe and electrical trestle was also completed as part of the 2005 project.



7. Abrasions on the exterior lower side wall.



8. Small abrasions on the lower sidewall.



9. Abrasions on the lower sidewall.



10. Recently applied asphalt on sidewall as part of the driveway repaving.



11. One 24-inch manway and one 30-inch manway exists. They were not leaking.



12. View of the effluent weir.



13. Vinyl covered fencing is in good condition.



14. Good gloss and color. Fencing is intact as part of the 2005 rehabilitation project.



15. The Bird X attached to the top of the tank flange has failed.



16. Vinyl fencing is intact.



17. Influent piping stained surfaces, small spot coating failures most likely due to UV degradation.



18. Spot failures to substrate.



19. Staining and some coating loss at the high water line due to UV degradation.



20. One of six mixing chambers.



21. Rust streaking from behind beam.



22. Rust streaking from behind sidewall stiffener.



22. V notch weirs intact.



23. Coating above the water level is in good condition.



24. Rust streaking from behind sidewall stiffener.



25. Upper deck coating is in good condition.



26. Interior of the mixing chambers with heavily stained corners.



27. Drain valves were closed upon completion of inspection.



28. Some blisters were observed on the mixing mechanism.



29. The mixing chambers are free from major coating defects.



30. Cathodic system is intact.



31. A vendor for the equipment supplier was on site to look at the alignment of the shaft and bearings.



32. Staining is occurring where the sediment is collecting.



33. Small blisters were observed on the mixer assembly.



34. Cathodic system is intact.



35. Coatings are in good condition and not heavily stained on the box walls.



36. South tank west side.



37. Tank is in good condition.



38. Grating in mixing chamber is intact.



39. Cathodic system runs through cone.



40. Deck lighting fixture is loose and not aligned. Water is inside fixture.



41. Effluent piping and truss work is in good condition and free from coating defects.



42. Sludge moved to the sump.



43. Richard checks center bearing for wear.



44. Beams stained, some edge spot coating breaks exist.



45. Sludge removal, floor heavily stained where sludge accumulated.



46. Support structure for cone is intact



47. Rake arms were looked at by the supplier as set up by the City. Coatings were in good condition on the rake arm.



48. Cathodic system is intact.



49. Anchorage points are intact.



50. Beams and columns intact.



51. Some concrete repairs were done in 2005, caulking was completed and some is intact, some has not held up.



52. Caulked area opened up.



53. Caulking has opened up.

July 14, 2011

City of Lynchburg  
Department of Utilities  
525 Taylor St.  
Lynchburg, VA 24501

Attn: Scott Parkins

Re: 5,000,000 Gallon Reservoir (Mill Lane) Tank  
Maintenance Inspection

Mr. Parkins:

Please find enclosed the above referenced report for the 5,000,000 gallon toroellipse water storage tank. The inspection was completed on May 18, 2011. The report consists of: 1) cover page; 2) conclusions and recommendations; 3) detailed report; 4) Field Inspection Report (FIR); 5) photographs and descriptions; and 6) CD.

Brief explanation: 1) The cover page is self-explanatory. 2) Conclusions and recommendations explain in short form what was found on the tank and what DIXON recommends for repair and maintenance of the tank. 3) This section is the long report that goes into detail to explain what exactly was found and why DIXON makes the recommendations. 4) Field Inspection Report (FIR) is the form that was completed when the inspection team was on-site and includes the dimensions and conditions of the tank. 5) Photographs and descriptions give the Owner a visual record of the condition of the tank and appurtenances. 6) CD is an Adobe PDF format of the complete report and photos for your convenience.

If you have any questions or concerns, please call me at 616-374-3221 ext. 310.

Thank you for choosing DIXON for your inspection needs.

FOR DIXON ENGINEERING, INC.,

Thomas Rounds  
Project Manager

Enclosures

# Dixon Engineering, Inc.

Dive Maintenance Inspection

5,000,000 Gallon Reservoir  
Mill Lane

Lynchburg, Virginia

Inspection Performed: May 18, 2011  
Report Prepared: July 6, 2011  
Reviewed by Ira M. Gabin, P.E.: July 8, 2011

Phone (616) 374-3221  
Fax (616) 374-7116  
<http://www.dixonengineering.net>  
[dixon@dixonengineering.net](mailto:dixon@dixonengineering.net)

Dixon Engineering Inc.  
1104 Third Ave. Lake Odessa, MI 48849

## **CONCLUSIONS:**

1. The exterior coating is an epoxy urethane coating system that is in good condition. The coating has not faded. There were no significant failures observed. The aesthetics are poor as the tank is heavily streaked with mildew.
2. The wet interior coating is a three coat epoxy system that is in good condition overall. The coating has good adhesion. Below the high water line the coating is in good condition. Above the high water line, the coating is in good condition. The roof coating is deteriorating at the open lap seams. There is rust streaking occurring at the tops of the roof beams.

## **RECOMMENDATIONS:**

1. Schedule regular cleanings and inspections of the tank by an independent third party as recommended by AWWA, or once every five years.
2. Complete the recommended work as recommended in the next 5 year inspection. The coating work is the greatest cost and largest part of the recommendations. The repairs and up grades should be completed during the next major tank rehabilitation process when coating repairs are made.
3. Budget for exterior over-coating in six years, or when aesthetics dictate. At that time, the tank's exterior coating would be nearing its twelve year service life. The estimated cost is \$180,000
4. Continue cathodic protection for the wet interior surfaces. Use a qualified cathodic protection contractor for maintenance.
5. Repair areas of missing or damaged caulk between the tank's base-plate and the foundation. The estimated cost is \$1,000. This could be done in-house.
6. Annually inspect the vent screens. Screen defects found during the inspection are being repaired by City personnel.

## **INSPECTION:**

On May 18, 2011, Dixon Engineering, Inc. (DIXON) performed a maintenance dive inspection on the 5,000,000-gallon Mill Lane ground reservoir water storage tank owned by the City of Lynchburg, Virginia. Purposes of the inspection were to evaluate the interior and exterior coating's performance and life expectancy; assess the condition of metal surfaces and appurtenances; review safety and health aspects; and make budgetary recommendations for continued maintenance of the tank. All recommendations, with budgeting estimates for repairs are incorporated in this report. The inspection was performed by Thomas Rounds, project manager and standby diver. The diver was Tucker Adams; assisted by Larry Houck, staff technician. The dive profile used was 35 feet for 45 minutes. Chlorine residuals were taken prior to the inspection and after the diver exited the tank. All equipment and the diver were chlorinated prior to entry into the wet interior. Note: The pre and post entry chlorine residual measurements may be significantly lower than those you routinely collect from the tank at the base of the fill pipe. This is because our samples were collected from the upper portion of the tank where disinfectant residuals are often lower. This is due to water stratification and the inherent short circuiting flow patterns of most tanks with a single inlet/outlet pipe at the bottom of the floor.

## **TANK INFORMATION:**

The tank was built in 1978 by an unknown manufacturer with a height-to-high water line of 22 feet. The tank is welded construction. The exterior was last painted in 2005 by Corfu Painting. The wet interior was last painted in 2005 by Corfu Painting.

## **CONDITIONS AND RECOMMENDATIONS:**

### **EXTERIOR COATING CONDITIONS:**

The exterior coating system is a multiple coat epoxy urethane coating system.

Dixon Engineering records showed the exterior was pressure washed and abrasive blast cleaned to a SSPC-SP6 commercial blast finish in 2005. Bare metal surfaces were then primed, followed by application of a full intermediate coat, and a full finish coat to the entire tank over the existing coating.

The exterior coating is in good condition overall. The coating is adequately protecting the metal but the aesthetics are poor. There is mildew growth on the sidewalls. The system is performing as would be expected for a six year old system.

The sidewall coating is in good condition. No coating breaks were found on the sidewalls.

The roof coating is in good condition. No coating breaks were found on the roof.

There is no logo or lettering on the sidewall.

**EXTERIOR COATING RECOMMENDATIONS:**

Take no immediate action on the exterior. Budget for exterior overcoating in the year 2017, or when aesthetics dictate. Perform a maintenance inspection in five years to update the recoating times and costs. Current adhesion showed the existing coating would support an additional recoat. The estimated cost to recoat with an epoxy urethane system is \$180,000.

**WET INTERIOR COATING CONDITIONS:**

The wet interior coating is an epoxy system applied by Corfu in 2005.

The roof coating is in good condition. The coating is 99.9 percent intact, with the primary areas of deterioration along the lap seams, the beam edges, and in the crevices. The tank's roof contains open lap seams that have started to rust and streak. Staining is typical for a tank of this construction where the lap seams are open and not seal welded or caulked. Staining in the lap seams is not a concern, but should be monitored during future inspections for corrosion growth. Roof beam top rust streaking is typical.

The sidewall coating is in good condition. The coating on the sidewalls is nearly 100 percent intact. Causes of deterioration are pinholes and blisters. The coating is still protecting the metal. There were a few pinholes in weld seams and blisters observed mostly near the cut out door sheet used during the last repainting project.

The tank bottom is covered with light sediment. Some areas were cleaned off for observation. The coating on the tank bottom is in good condition. The coating is still protecting the metal.

**WET INTERIOR COATING RECOMMENDATIONS:**

Reinspect the tank in five years.

### **CATHODIC PROTECTION CONDITIONS:**

The tank has a floating ring, ice-free cathodic protection system that is in good condition. Tank's surfaces below the high water line are protected by the submerged cathodic protection system that is suspended from the sidewall.

### **CATHODIC PROTECTION RECOMMENDATIONS:**

Continue operation of the submerged cathodic protection. Have a qualified contractor maintain the system.

### **PIT AND PIT PIPING CONDITIONS:**

The tank is operated by an electronic control system. There are three pits – influent piping, metering, and effluent.

The piping is in good condition. Coating on the pipes is in good condition.

The pits have hinged lids for access.

Black widow spiders were observed in pits. Caution.

### **SITE CONDITIONS:**

The size of the tank site is large and is fenced with a locking gate.

There is a large sized staging area for the contractor's equipment.

The site is well maintained and mowed.

There is residential development to the west. It is adjacent to residential development to the south.

The site is accessible from a county road. The tank is located approximately 100 feet from the main access road.

### **FOUNDATION CONDITIONS:**

The exposed foundation is in good condition.

**CAULK CONDITIONS:**

The caulk is in fair condition. Fifty feet of the caulk is missing or damaged between the bottom plate and the foundation.

**CAULK RECOMMENDATIONS:**

Repair the caulk by removing all dried, cracked caulk and replace/fill missing areas with new caulking. The estimated cost is \$1,000. This could be completed in-house.

**ROOF HANDRAIL AND PAINTER'S RAIL:**

A handrail is located on the roof to either side of the roof hatch near the sidewall ladder.

**OVERFLOW PIPE CONDITIONS:**

The tank has a 12-inch diameter overflow pipe that extends down through the wet interior, into the pit on the west side, and through the floor to the storm drain.

The pipe discharges to a storm drain in the ground.

**HATCH AND MANWAY CONDITIONS:**

The tank has a 30 x 30-inch diameter flip-top, square, roof access to the wet interior. The hatch is in good condition.

The roof wet interior hatch was secured with a padlock matching the owner's master key system.

**VENT CONDITIONS:**

There are four roof vents that are 12-inch pressure-vacuum design. The vents are in good condition. The baffle screens are corroding. The City was in the process of changing all vent screens the day of the inspection.

**VENT RECOMMENDATIONS:**

Annually inspect the screen to make sure the screen is open and not damaged.

### **LADDER CONDITIONS:**

#### Exterior:

The tank has an exterior sidewall ladder that starts approximately 10-feet above ground level, and extends up to the roof. The ladder is not caged and is in good condition.

#### Wet:

The wet interior contains a ladder that is in good condition.

The wet interior ladder contains a rail-type fall prevention device. The fall prevention device is in good condition.

### **FILL PIPE CONDITIONS:**

The fill pipe penetrates through the wet interior floor in the northeast pit and is in good condition.

### **WET INTERIOR METAL CONDITIONS:**

The steel structure is in good condition above the high water line and in good condition below it.

#### Roof Beams:

The interior roof is supported by 210 beams that are in good condition.

#### Columns:

The roof beams are supported by circular rings that are supported by 22 columns.

The columns are tubular and are in good condition.

**STEEL TANK FIELD INSPECTION REPORT**  
**RESERVOIR TANK**

DATE: May 18, 2011

**I. TANK DATA**

OWNER: City of Lynchburg

CLIENT CODE: 46-61-01-01

TANK NAME: Mill Lane Reservoir

LOCATION: Street: Mill Lane

City: Lynchburg

State: Virginia

TANK SIZE: Capacity: 5,000,000 gallons

Diameter: 200 feet

Height to overflow (HWL): 20 feet

Sidewall height: 22 feet

CONSTRUCTION:  Welded  Riveted  Bolted

Type of structure:  Standpipe  Reservoir

Type of Roof:  Hemisphere  Flat  Cone

DATE CONSTRUCTED: 1978

MANUFACTURER:  CB&I  Pitt-Des Moines  PT&T

Maguire Inc.  Caldwell  Maguire Iron  Unknown

CONTRACT NUMBER: \_\_\_\_\_

COATING HISTORY	<u>EXTERIOR</u>	<u>WET INTERIOR</u>
DATE LAST COATED	<u>2005</u>	<u>2005</u>
CONTRACTOR	<u>Corfu</u>	<u>Corfu</u>
COATING SYSTEM	<u>Epoxy/urethane</u>	<u>Epoxy</u>
SURFACE PREPARATION	<u>SSPC SP-6</u>	<u>SSPC SP-10</u>
COATING MANUFACTURER	<input checked="" type="checkbox"/> Tnemec	<input checked="" type="checkbox"/> Tnemec
COATING SAMPLES	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
HEAVY METAL	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

INSPECTED BY: Dixon Engineering, Inc.

PERSONNEL: Diver Tucker Adams, Top person Tom Rounds, Ground person Larry Houck

TYPE OF INSPECTION:  Preliminary Maintenance  Maintenance  
 Warranty  Dry  Dive  Float  ROV

DATE LAST INSPECTED: 2006 Warranty Inspection

## II. INSPECTION DATA

### SITE CONDITIONS

Fenced:  Yes  No

Control building:  Yes  No

Location:  Adjacent to tank

Antenna control site:  Yes - monopole  No

Number:  1  2

Location:  Adjacent to tank

SCADA controls  Yes  No

Site conditions:  Well maintained  Not maintained

Neighborhood:  Residential  Retail  Industrial  Rural

To the North: Woods

To the East: Mill Lane road

To the South: Apartments

To the West: Woods

Power lines within 50 feet:  Yes  No

Location: North side

Site drainage:  Toward tank  Away from tank

Indications of underground leakage:  Yes  No

Shrub, tree, etc. encroachment:  Yes  No

### PIPING:

Structure Type:  3 Pits  Building

Location:  Adjacent to tank  Under Tank

Condition of structure:  Good  Fair  Poor

Structure is:  Dry  Wet

Condition of coating:  Good  Fair  Poor

Describe coating:  Delaminating  Rust bleed through  Erosion

No coating remaining

Condition of metal:  Good  Fair  Poor

### FOUNDATION

Foundation exposed:  Yes  No

## **FOUNDATION**

Height exposed: 8+ inches

Undermining of foundation:  Yes  No

Exposed foundation condition:  Good  Fair  Poor

Chipped or cracked:  Yes  No

Severity:  Minor  Moderate  Severe

Location:  At anchor bolts  Varies

Exposed rebar:  Yes  No

Type of grout:  Cement  Caulk  None

Condition:  Good  Fair  Poor

Grout missing:  Yes  No

Amount missing: 150 feet

Indications of foundation settlement:  Yes  No

Foundation comments: Recaulk base.

## **EXTERIOR COATING**

### **Sidewall:**

Lettering:  Yes  No

Logo:  Yes

Topcoat condition:  Good  Fair  Poor

Primer/Previous coating condition:  Good  Fair  Poor

Describe coating:  Chalking  Fading  Delaminating

Spot coating breaks to substrate  Rust bleed through

Erosion  Rust undercutting  No significant coating deterioration

Dry film thickness: 9-12 mils

Metal condition:  Good  Fair  Poor

Sidewall comments: Heavy mildew buildup.

### **Roof:**

Topcoat condition:  Good  Fair  Poor

Primer/Previous coating condition:  Good  Fair  Poor

Describe coating:  Chalking  Fading  Delaminating

Spot coating breaks to substrate  Rust bleed through  Erosion

Rust undercutting  No significant coating deterioration

Dry film thickness: 14 mils

Metal condition:  Good  Fair  Poor

Roof comments: Ponding water at corners, mildew buildup.

## EXTERIOR APPURTENANCES

### **Anchor bolts:**

N/A

### **Exterior overflow pipe:**

N/A

### **Sidewall manway:**

Number:  1  2  3

Size: Two 24 inches, One 30 inches

Gasket leaking:  Yes  No

Sealed with:  Bolted cover  Crabs  Bar

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

### **Sidewall ladder:**

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

Toe clearance: 8+ inches

Width of rungs: 16 inches

Thickness of rungs: 7/8 inches

Shape of rungs:  Diamond  Round  Rebar

Fall prevention device:  Yes  No

Type:  Rail  Cable  T-rail

Condition:  Good  Fair  Poor

Cage:  Yes  No

### **Step-off platform:**

N/A

### **Balcony:**

N/A

### **Roof ladder:**

N/A

### **Roof ladder handrail:**

N/A

**EXTERIOR APPURTENANCES**

**Center handrail:**

N/A

**Roof hatches:**

Wet interior: Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

Neck diameter:  24  30 inches

Shape:  Round  Square  Tombstone

Hatch security:  Lock  Rope/Wire  Bolt  None

Dry interior:  N/A

**Bolted ventilation hatch:**

N/A

**Roof vent:**

Number:  1  2  4

Type:  Standard  Screened pressure-vacuum  Copula

Neck diameter: 12 inches

Vent Material:  Aluminum  Steel

Coating condition:  Good  Fair  Poor  Not coated

Metal condition:  Good  Fair  Poor

Vent comments: Exterior screen expanded metal, good condition, interior screen, aluminum window screen, corroded, City is replacing today.

**Aviation lights:**

N/A

**Removable cathodic caps:**

Welded shut

Number: 258

Coating condition:  Good  Fair  Poor

**Rigging points:**

N/A

**Antennas:**

N/A

## **DRY INTERIOR APPURTENANCES**

### **Drain valve:**

Location:  Bottom of sidewall

Number:  1  2

Coating condition:  Good  Fair  Poor  Not accessed, insulated box

Mud valve comments: Not accessed, City reported valve broke in past from ice, City insulated.

### **Site Lighting:**

Lights functioning:  Yes  No

Number burnt out:  All  Unknown

Site lighting comments: One pole on south side loose and light pole is crooked.

## **WET INTERIOR COATING**

### **Roof:**

Topcoat condition:  Good  Fair  Poor

Primer coating condition:  Good  Fair  Poor

Describe coating:  Delaminating  Spot coating breaks to substrate  Rust bleed through  Erosion  Rust undercutting  
 No significant coating deterioration

Metal condition:  Good  Fair  Poor

Condition of laps: Condition:  Good  Fair  Poor

Lap seams:  Open  Welded  Caulked

Roof comments: Starting to see rust streaks from seams and tops of roof beams.

### **Sidewall:**

Topcoat condition:  Good  Fair  Poor

Primer coating condition:  Good  Fair  Poor

Describe coating:  Delaminating  Spot coating breaks to substrate  Rust bleed through  Blisters  Erosion  Rust undercutting  
 No significant coating deterioration

Mineral deposits:  Light  Moderate  Heavy

Metal condition:  Good  Fair  Poor

Active pitting:  Yes  No

Previous pit filling:  Yes  No  Unknown

Sidewall comments: Few spot failures on weld seams near door sheet.

## **WET INTERIOR COATING**

### **Tank bottom:**

Topcoat condition:  Good  Fair  Poor  Covered with light sediment

Depth of sediment: less than 1/8 inch

## **WET INTERIOR APPURTENANCES**

### **Tank ladder:**

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

Toe clearance: 8 inches

Width of rungs: 16 inches

Thickness of rungs: 3/4 inch

Shape of rungs:  Diamond  Round  Rebar

Shape of side rails:  Angle  Flat  C-channel

Fall prevention device:  Yes  No

Type:  Rail  Cable  T-rail

Condition:  Good  Fair  Poor

### **Cathodic protection:**

Clips and pressure fitting present:  Yes  No

Location of Clips:  On floor  On sidewalls

Type:  Floating ring  Hanging wire/rod

Location of controls:  Sidewall  In building  In dry interior

System condition:  Good  Fair  Poor

Cathodic comments: Green light was on.

### **Fill pipe:**

Diameter: 30 inches

### **Overflow pipe:**

Type:  Weir box  Vortex break  Funnel  Elbow

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

### **Roof beams:**

Number: 210

Shape:  Angle  Channel  Truss  I-beam

Connections:  Bolted  Welded

Coating condition:  Good  Fair  Poor

**WET INTERIOR APPURTENANCES**

Metal condition:  Good  Fair  Poor

**Columns:**

Number: 22

Shape:  Round  Square  Channel  I-beam

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

**RECOMMENDATIONS:**

**Foundation:** Remove loose caulking and recaulk.

Complete work:  Immediately  In 1-2 years  In 2-5 years  After next 5 year inspection  With exterior paint project

**Coating:**

**Exterior:** Budget for exterior overcoat in 2017. Consider color change to better hide mildew.

**Wet Interior:**  No work

**Health:** Monitor vent screens annually.

**Safety:**  No work

**Repairs:**  No work

Field Inspection Report is prepared from the contractor's viewpoint. It contains information the contractor needs to prepare his bid for any repair or recoating. The engineer uses it to prepare the engineering report. Cost estimates are more accurate if the contractor's problems can be anticipated. While prepared from the contractor's viewpoint, the only intended beneficiary is the owner. These reports are completed with diligence, but the accuracy is not guaranteed. The contractor is still advised to visit the site.



Mill Lane 5,000,000 gallon reservoir dive inspection performed May 18, 2011.



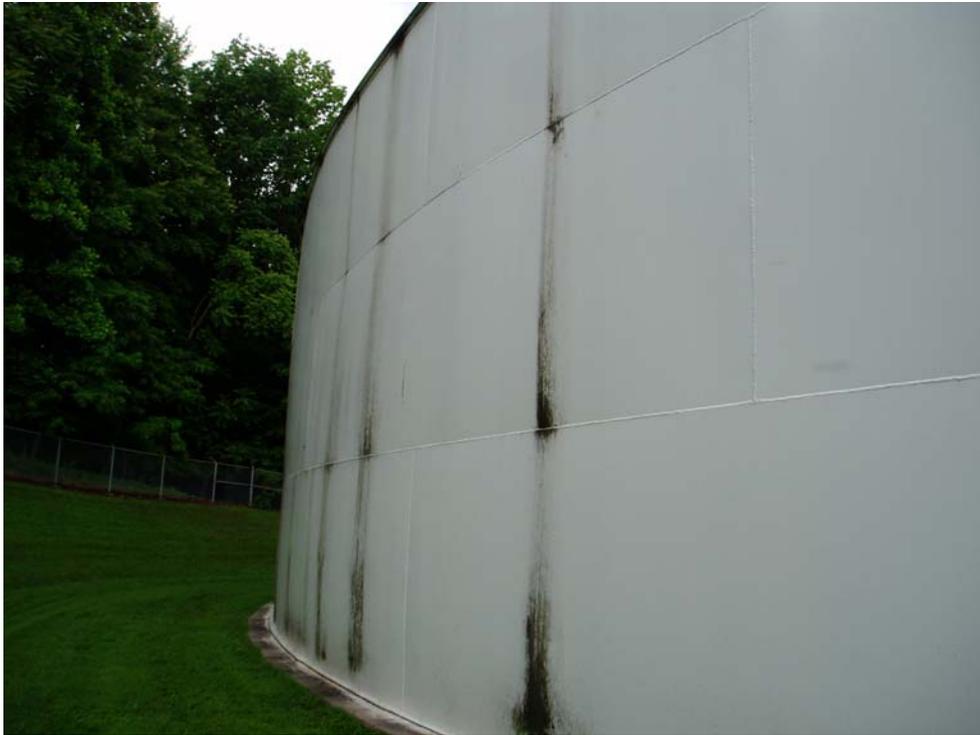
2. Tank is accessed through a double locking gate. Tank is mildew streaked.



3. All manways are leak free and intact.



4. Mechanical level indicator is operational.



5. Roof drainage along sidewall and algae growth from runoff.



6. Ground wires are intact.



7. Site is lighted for security. South light pole foundation has heaved, and concrete is loose.



8. Foundation is loose.



9. Heavy mildew on the west side. The drain valve installed in 2005 froze and broke the valve body. The City has since replaced the valve and covered it with an insulated fiberglass box



10. Some narrow gaps in the foundation caulking.



11. The cathodic rectifier panel was operational.



12. Pit piping is in good condition.



13. Pit piping is in good condition.



14. Some ponding water on the roof. The coating is intact.



15. There are four aluminum roof vents.



16. Roof vents showed some rust streaks on top side of the flange.



17. Baffle plate was removed and the fine screen is deteriorating.



18. The 1/4 inch mesh screen is intact.



19. Hinged manway was used for access.



20. Wet interior ladder is intact.



21. Float for water level indicator is intact.



22. Roof beams and coatings are intact.



23. Spot rust streaking from lap seams, between roof and roof panels is normal.



24. Center roof beam column support is intact.



25. Rust streaking between beam tops and roof.



26. Vent hole with screen missing.



27. Support columns are intact.



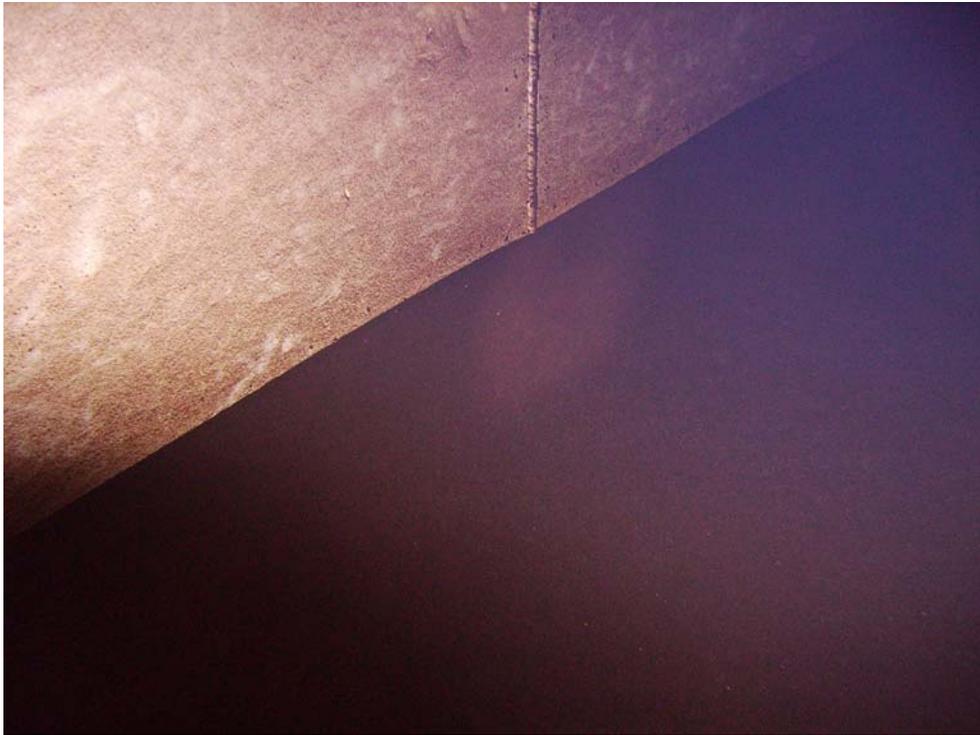
28. Rust streaking down channel side.



29. Large gaps between ceiling plates and beams.



30. Underwater the sidewalls are mineral stained.



31. Staining on submerged surfaces.



32. Drain valve piping.



33. Welds are intact.



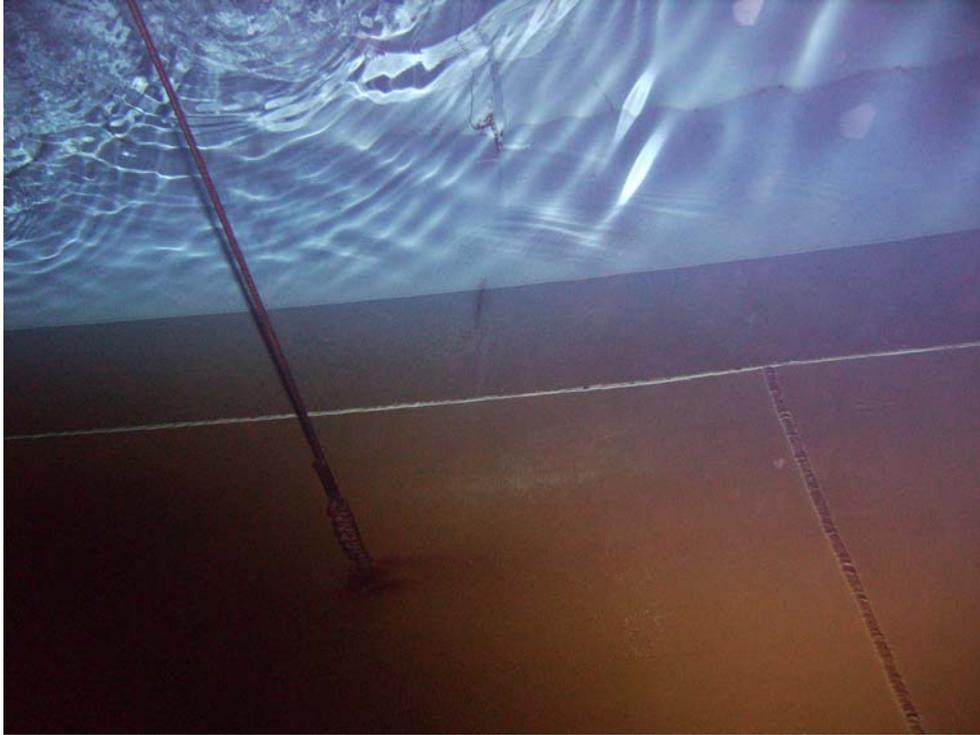
34. Light covering of mineral deposits .



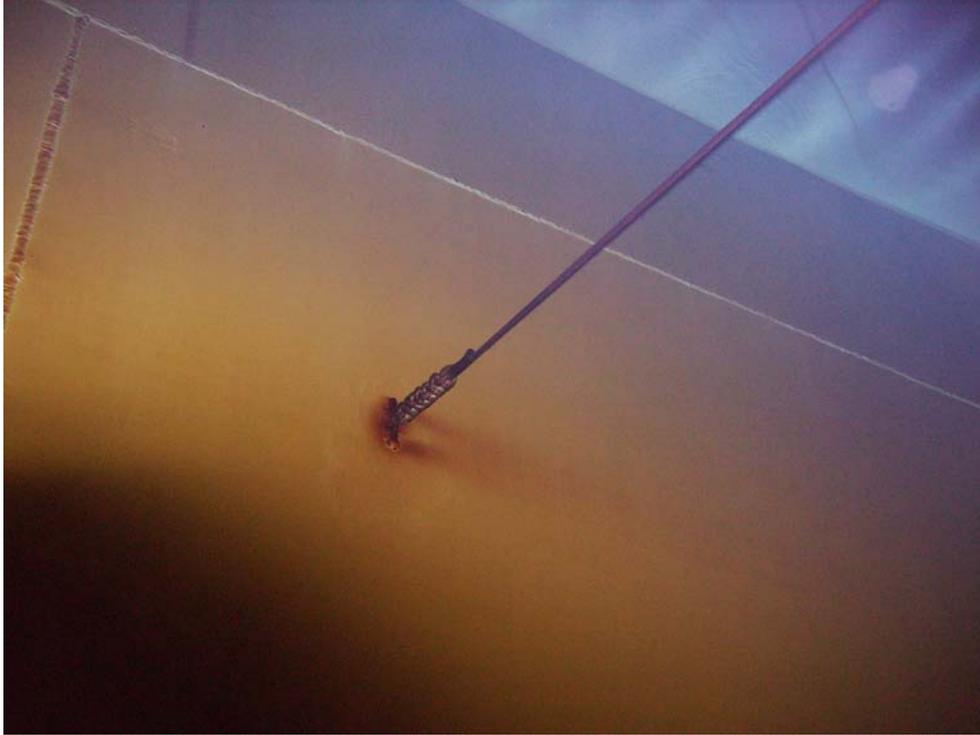
35. Repairs to the door sheet the contractor installed when painting.



36. Diver hand wiped off mineral deposits.



37. All cathodic lines are secure and intact.



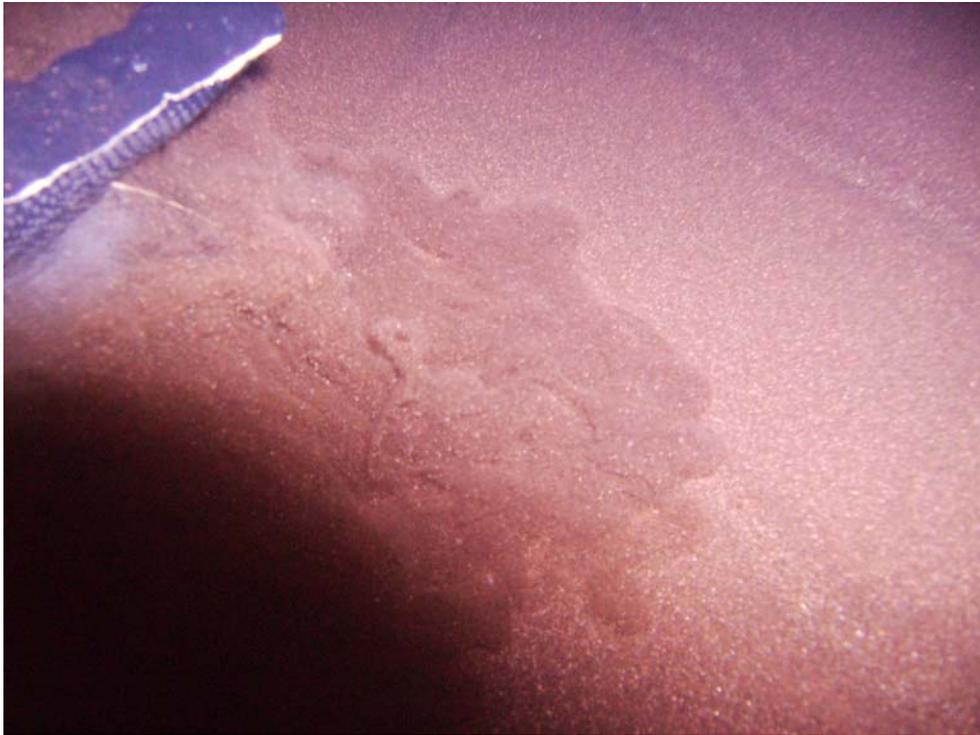
38. Cathodic line is intact.



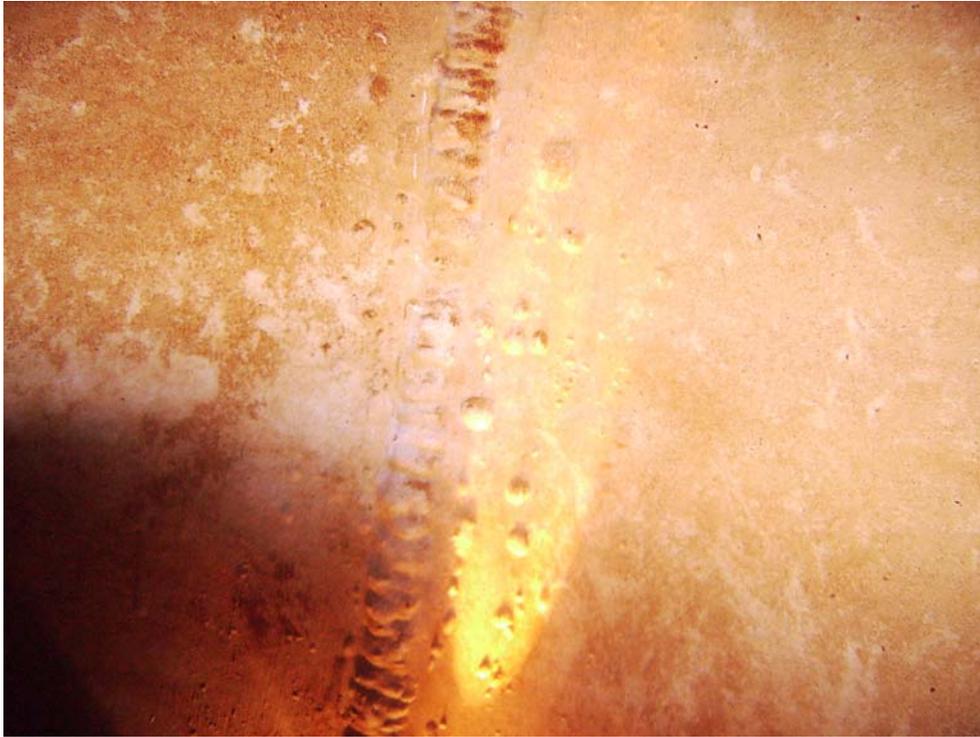
39. Minor staining.



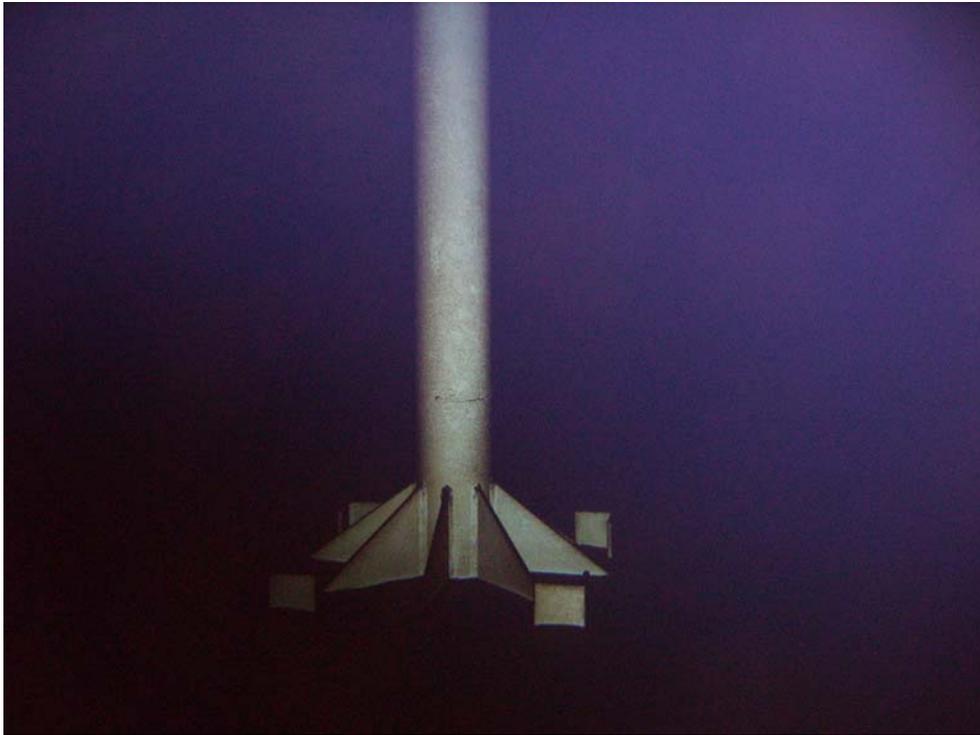
40. Floor sediment with light fluffy covering.



41. Covering of the floor with a minor sediment less than 1/8 of an inch.



42. Some blistering is occurring adjacent to the cut access panel.



43. Center column base is intact.



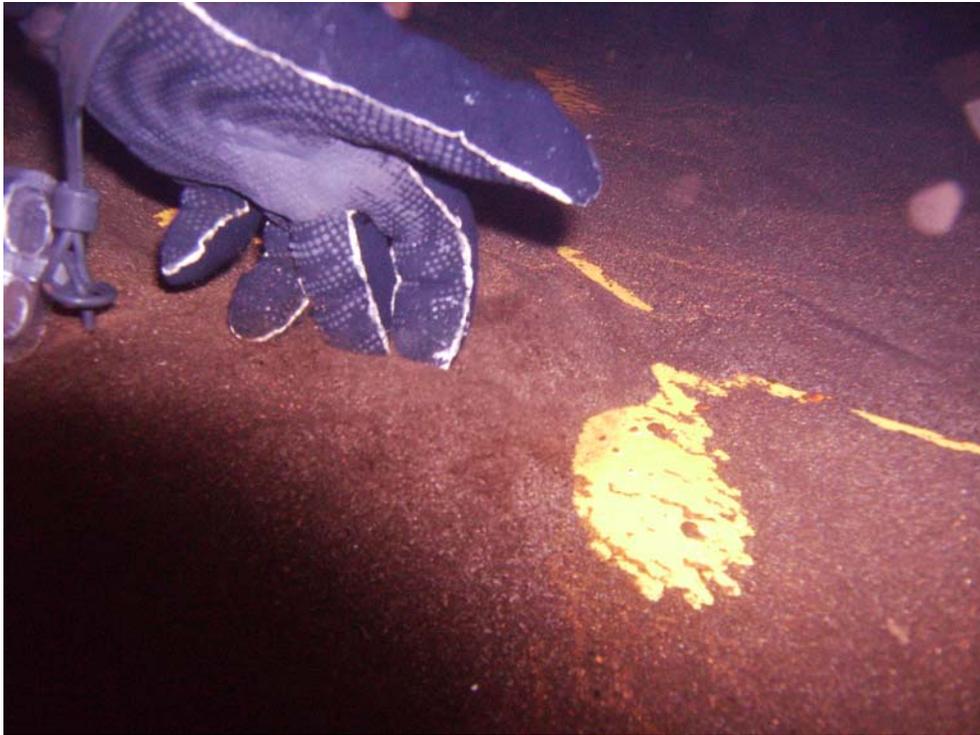
44. Sidewall with minor staining.



45. Effluent piping.



46. Piece of corroded vent screen.



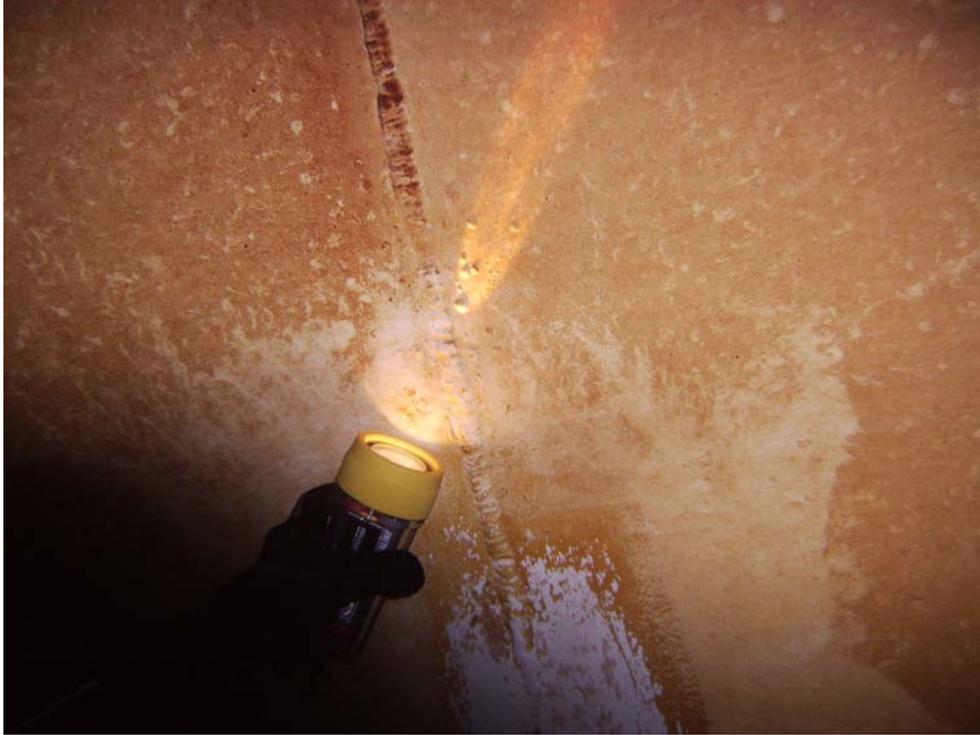
47. Small amount of sediment on tank floor.



48. Light fluffy sediment.



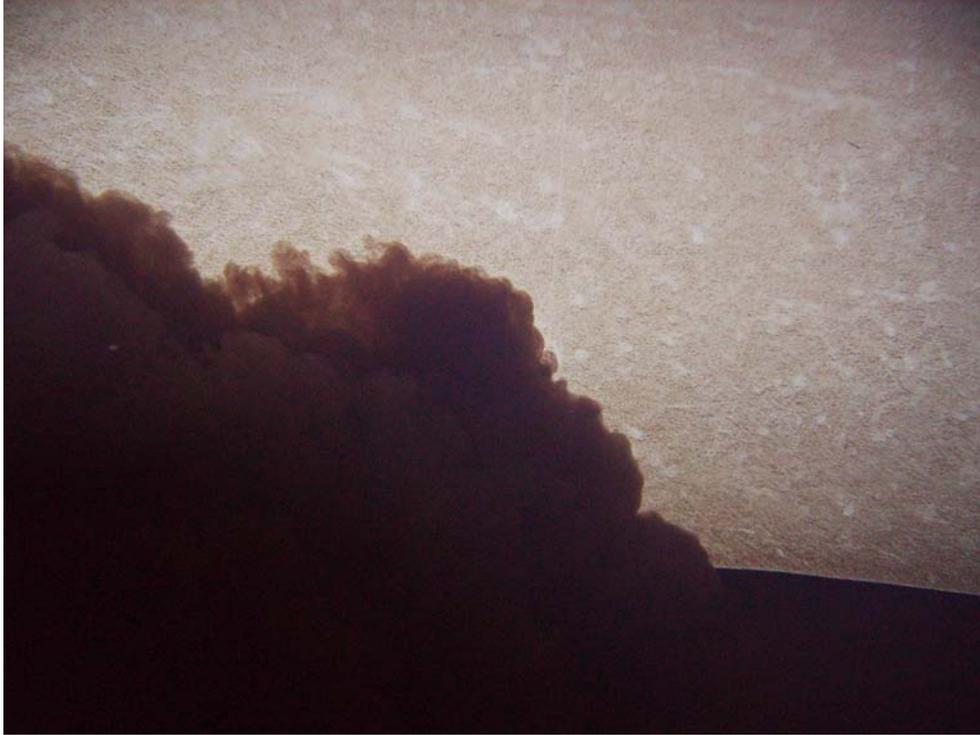
49. About 1/4 inch of sediment.



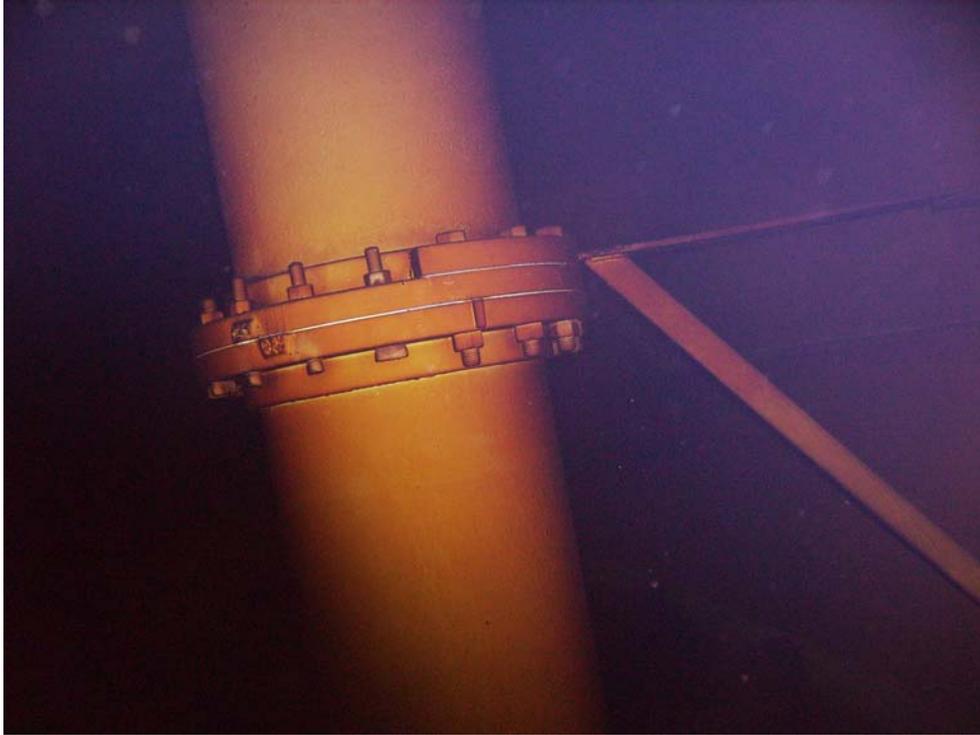
50. Minor osmotic blistering adjacent to a weld seam.



51. Mud settling zone.



52. Sediment stirred up to show how light it is.



53. Overflow piping intact.

July 14, 2011

City of Lynchburg  
Department of Utilities  
525 Taylor St.  
Lynchburg, VA 24501

Attn: Scott Parkins, P.E.

Re: 500,000 Gallon Reservoir (Wingate)  
Maintenance Inspection

Mr. Parkins:

Please find enclosed the above referenced report for the 500,000 gallon Wingate reservoir water storage tank. The inspection was completed on May 18, 2011. The report consists of: 1) cover page; 2) conclusions and recommendations; 3) detailed report; 4) Field Inspection Report (FIR); 5) photographs and descriptions; and 6) CD.

Brief explanation: 1) The cover page is self-explanatory. 2) Conclusions and recommendations explain in short form what was found on the tank and what DIXON recommends for repair and maintenance of the tank. 3) This section is the long report that goes into detail to explain what exactly was found and why DIXON makes the recommendations. 4) Field Inspection Report (FIR) is the form that was completed when the inspection team was on-site and includes the dimensions and conditions of the tank. 5) Photographs and descriptions give the Owner a visual record of the condition of the tank and appurtenances. 6) CD is an Adobe PDF format of the complete report and photos for your convenience.

If you have any questions or concerns, please call me at 616-374-3221 ext. 310.

Thank you for choosing DIXON for your inspection needs.

FOR DIXON ENGINEERING, INC.,

Thomas Rounds  
Project Manager

Enclosures

# Dixon Engineering, Inc.

Maintenance Inspection

5,000,000 Gallon Reservoir  
Wingate

Lynchburg, Virginia

Inspection Performed: May 18, 2011  
Report Prepared: July 6, 2011  
Reviewed by Ira M. Gabin, P.E.: July 8, 2011

Phone (616) 374-3221  
Fax (616) 374-7116  
<http://www.dixonengineering.net>  
[dixon@dixonengineering.net](mailto:dixon@dixonengineering.net)

Dixon Engineering Inc.  
1104 Third Ave. Lake Odessa, MI 48849

## **CONCLUSIONS:**

1. The exterior coating is the original epoxy urethane coating system that is in good condition. The coating has not faded significantly. The coating has good adhesion. Coating deterioration is minor and the condition is above average for a nine year old coating system.
2. The wet interior coating is a multi coat epoxy system that is in good condition overall. Below the high water line the coating has areas of minor spot failures on the weld seams, and a few pinholes on the floor and sidewalls. Above the high water line, the coating is in good condition.
3. Coatings are original from the 2002 construction.

## **RECOMMENDATIONS:**

1. Schedule regular cleanings and inspections of the tank by an independent third party as recommended by AWWA, or once every five years.
2. Budget for exterior overcoating in five years, or when aesthetics dictate. At that time, the tank's exterior coating will be nearing its fifteen year service life. The estimated cost is \$30,000.
3. Continue cathodic protection for the wet interior surfaces. Use a qualified cathodic protection contractor for maintenance. Contact your cathodic protection vendor and service cathodic system. Red light is indicating it is non-working.
4. Repair cracks in the foundation(s) by routing and filling with a mortar material. The estimated cost is \$1,000.
5. Repair areas of missing and damaged caulk between the tank's baseplate and the foundation. The estimated cost is \$100 if completed in-house.
6. Install a screened flap gate on the end of the overflow pipe. The estimated cost is \$1,500.

## **INSPECTION:**

On May 18, 2011, Dixon Engineering, Inc. (DIXON) performed a maintenance dive inspection on the 500,000-gallon Wingate reservoir water storage tank owned by the City of Lynchburg, Virginia. Purposes of the inspection were to evaluate the interior and exterior coating's performance and life expectancy; assess the condition of metal surfaces and appurtenances; review safety and health aspects; and make budgetary recommendations for continued maintenance of the tank. All recommendations, with budgeting estimates for repairs are incorporated in this report. The inspection was performed by Thomas Rounds, project manager and backup diver. The dive was performed by Tucker Adams, staff technician, certified diver, and NACE Certified Coating Inspector. The diver was assisted by Larry Houck, staff technician. The dive profile used was 24 feet for 30 minutes. Chlorine residuals were taken prior to the inspection and after the diver exited the tank. All equipment and the diver were chlorinated prior to entry into the wet interior. Note: The pre and post entry chlorine residual measurements may be significantly lower than those you routinely collect from the tank at the base of the fill pipe. This is because our samples were collected from the upper portion of the tank where disinfectant residuals are often lower. This is due to water stratification and the inherent short circuiting flow patterns of most tanks with a single inlet/outlet pipe at the bottom of the floor.

## **TANK INFORMATION:**

The tank was built in 2002. It has a height-to-high water line of 22 feet. The tank is welded construction with an aluminum geodesic domed roof. The exterior was last painted in 2002 by the original constructors. The wet interior was last painted in 2002 by the original constructors.

## **CONDITIONS AND RECOMMENDATIONS:**

### **EXTERIOR COATING CONDITIONS:**

The exterior coating system is presumed to be a multiple coat epoxy urethane coating system. There was no information provided for construction coatings.

The exterior coating is in good condition overall. The coating is adequately protecting the metal and the aesthetics are good. The system is performing as would be expected for a nine year old system.

The bottom sidewall has light algae growth.

There is no lettering or logo on the sidewall.

### **EXTERIOR COATING RECOMMENDATIONS:**

Take no immediate action on the exterior. Budget for exterior overcoating in the year 2016, or when aesthetics dictate. Perform a maintenance inspection in five years to update the recoating times and costs. The estimated cost to recoat with an epoxy urethane system is \$30,000.

### **WET INTERIOR COATING CONDITIONS:**

The wet interior coating is an original epoxy system applied in 2002.

The sidewall coating is in good condition. The coating on the sidewalls is 99.9 percent intact. A few pinhole coating breaks were found on the sidewalls. There is no significant damage at the high water line. The coating is still protecting the metal and adhesion is good.

The coating on the tank bottom is in good condition, 99.9 percent intact. The bottom is covered with light sediment, which does not affect the integrity of the coating system.

The tank bottom was covered with approximately greater than 1/8-inch of mud sediment.

### **CATHODIC PROTECTION CONDITIONS:**

The tank contains a cathodic protection system. It is not functioning as indicated by the red light on the rectifier panel.

### **CATHODIC PROTECTION RECOMMENDATIONS:**

Continue operation of the submerged cathodic protection. Have a qualified contractor maintain the system and correct any problem with the system.

### **SITE CONDITIONS:**

The size of the tank site is large and is fenced with a locking gate.

There is a large sized staging area for the contractor's equipment.

The site is well maintained in a rural, wooded setting.

**SITE RECOMMENDATIONS:**

Regularly mow the grass near the tank. Mow away from the tank so cuttings don't accumulate on tank.

**FOUNDATION CONDITIONS:**

The exposed foundation is in good condition and showed minor amounts of deterioration. Deterioration includes cracking, chipping, and spalling with no rebar exposed.

**FOUNDATION RECOMMENDATIONS:**

Repair the cracks in the foundation(s) by routing and filling with mortar material. The estimated cost is \$1,000, or this could be done by in-house personnel.

**CAULK CONDITIONS:**

The caulk is in fair condition. Five feet of the caulk is missing between the bottom plate and the foundation.

**CAULK RECOMMENDATIONS:**

Repair the caulk by removing all dried, cracked caulk and replace/fill missing areas with new caulking. The estimated cost is \$100 if completed in-house.

**AVIATION LIGHTS AND ELECTRICAL CONDITIONS:**

Check lights at night to determine if operational.

**OVERFLOW PIPE CONDITIONS:**

The tank has a 12-inch diameter overflow pipe that extends down along the sidewall and down to ground level.

The end of the pipe has a screened flange that is in good condition.

**OVERFLOW PIPE RECOMMENDATIONS:**

Install a screened flap gate with a corrosion resistant screen on the end of the overflow pipe. The flap gate would allow water to discharge even if the screen becomes plugged or frosted over. It

is designed to stay closed to prevent rodents or birds from entering the pipe. The estimated cost is \$1,500.

**HATCH AND MANWAY CONDITIONS:**

The tank has five 30-inch diameter flip-top, square aluminum roof access hatches to the wet interior. The hatches are in good condition.

**LADDER CONDITIONS:**

Exterior:

The tank has an exterior sidewall ladder that starts at grade, and extends up to a small platform at the top of the sidewall at the roof. The ladder is caged and is in good condition.

Wet:

There is no ladder in the wet interior.

**STEEL TANK FIELD INSPECTION REPORT**  
**RESERVOIR TANK**

DATE: May 18, 2011

**I. TANK DATA**

OWNER: City of Lynchburg

CLIENT CODE: 46-61-01-14

TANK NAME: Wingate

LOCATION:

City: Lynchburg

State: Virginia

TANK SIZE: Capacity: 500,000 gallons

Diameter: 62 feet

Height to overflow (HWL): 22 feet

Sidewall height: 24 feet

CONSTRUCTION:  Welded  Riveted  Bolted

Type of structure:  Standpipe  Reservoir

Type of Roof:  Hemisphere  Flat  Cone  Aluminum geodesic dome

DATE CONSTRUCTED: 2002

COATING HISTORY	<u>EXTERIOR</u>	<u>WET INTERIOR</u>
DATE LAST COATED	<u>2002</u>	<u>2002</u>
CONTRACTOR	<u>Unknown</u>	<u>Unknown</u>
COATING SYSTEM	<u>Epoxy urethane</u>	<u>Epoxy</u>
SURFACE PREPARATION	<u>SSPC SP-6</u>	<u>SSPC SP-10</u>
COATING MANUFACTURER	<input type="checkbox"/> <u>Unknown</u>	<input type="checkbox"/> <u>Unknown</u>

INSPECTED BY: Dixon Engineering, Inc.

PERSONNEL: Diver Tucker Adams, Top person Tom Rounds, Ground person Larry Houck

TYPE OF INSPECTION:  Preliminary Maintenance  Maintenance

Warranty  Dry  Dive  Float  ROV

## II. INSPECTION DATA

### SITE CONDITIONS

Fenced:  Yes  No  
Control building:  Yes  No  
Antenna control site:  Yes  No  
SCADA controls  Yes  No  
Site conditions:  Well maintained  Not maintained  
Neighborhood:  Residential  Retail  Industrial  Rural  
To the North: Woods  
To the East: Woods  
To the South: Woods  
To the West: Woods  
Power lines within 50 feet:  Yes  No  
Site drainage:  Toward tank  Away from tank  
Indications of underground leakage:  Yes  No  
Shrub, tree, etc. encroachment:  Yes  No  
Site Comments: Stable gravel drive.

### PIPING:

N/A

### FOUNDATION

Foundation exposed:  Yes  No  
Height exposed: 20 inches  
Undermining of foundation:  Yes  No  
Exposed foundation condition:  Good  Fair  Poor  
Chipped or cracked:  Yes  No  
Severity:  Minor  Moderate  Severe  
Location:  At anchor bolts  Varies  
Exposed rebar:  Yes  No  
Type of grout:  Cement  Caulk  None  
Condition:  Good  Fair  Poor  
Grout missing:  Yes  No  
Indications of foundation settlement:  Yes  No  
Foundation comments: Recaulk disbanded grout.

### EXTERIOR COATING

#### Sidewall:

Lettering:  Yes  No  
Logo:  Yes  No

**EXTERIOR COATING**

Topcoat condition:  Good  Fair  Poor  
Primer/Previous coating condition:  Good  Fair  Poor  
Describe coating:  Chalking  Fading  Delaminating  
 Spot coating breaks to substrate  Rust bleed through  
 Erosion  Rust undercutting  No significant coating deterioration  
Metal condition:  Good  Fair  Poor  
Sidewall comments: No destructive testing occurred.

**Roof:**

All aluminum geodesic dome  
Metal condition:  Good  Fair  Poor

**EXTERIOR APPURTENANCES**

**Anchor bolts:**

N/A

**Exterior overflow pipe:**

Coating condition:  Good  Fair  Poor  
Metal condition:  Good  Fair  Poor  
Inside diameter: 12 inches  
Condition of screen:  Good  Fair  Poor  
Percent of screen open: 100  
Flap gate:  Yes  No  
Design:  Solid  Screened  
Flap gate operable:  Yes  No  
Air gap:  Yes  No  
Pipe to ground distance: 12 inches  
Splash pad:  Yes  No  
Type:  Concrete pad  Stone  Concrete storm drain  
Condition:  Good  Fair  Poor  
Overflow comments: Pipe stands rusted.

**Sidewall manway:**

Number:  1  2  
Size: One 24-inch, one-30-inch  
Gasket leaking:  Yes  No  
Hinged:  Yes  No  
Sealed with:  Bolted cover  Crabs  Bar

**EXTERIOR APPURTENANCES**

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

Sidewall manway comments: No leaks.

**Sidewall ladder:**

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

Toe clearance: 8 inches

Width of rungs: 18 inches

Thickness of rungs: 3/4 inch

Shape of rungs:  Diamond  Round  Rebar

Fall prevention device:  Yes  No

Cage:  Yes  No

Diameter: 30 inches

Condition:  Good  Fair  Poor

Sidewall ladder comments: Vandal deterrent.

**Step-off platform:**

Dimensions: 28 in. x 10 ft.

Railing height: 42 inches

Toe plate height: 4 inches

Metal condition:  Good  Fair  Poor

Step-off platform comments: Anchor clips missing.

**Balcony:**

N/A

**Roof ladder:**

N/A

**Roof ladder handrail:**

N/A

**Center handrail:**

From step off platform to vent and manway 180° from platform

Location:  Ring on roof  From step off platform to vent and manway 180° from platform

Coating condition:  Good  Fair  Poor  N/A - Aluminum

**EXTERIOR APPURTENANCES**

Metal condition:  Good  Fair  Poor

Height: 42 inches

Toe plate height: None

Painter's rail:  Yes  No

**Roof hatches: Quantity of 5, one center, four perimeter**

Metal condition:  Good – all aluminum  Fair  Poor

Neck diameter:  24  30 inches

Shape:  Round  Square  Tombstone

Hatch security:  Lock  Rope/Wire  Bolt  None

Dry interior:  N/A

**Bolted ventilation hatch:**

N/A

**Roof vent:**

Number:  1  2

Type:  Standard  Screened pressure-vacuum  Copula

Neck diameter: 24 inches

Vent Material:  Aluminum  Steel

Metal condition:  Good  Fair  Poor

Screen condition:  Good  Fair  Poor  Missing

Percent of screen open: 100

Vent comments: Sidewall soffit vents not accessible for inspection.

**Aviation lights:**

Condition:  Good  Fair  Poor

Functioning:  Yes  No

Design:  Double red  Beacon  Single Strobe

Photoelectric Cell:  Yes  No

Items higher than lights:  Yes  No

Aviation light comments: Unable to test.

**Removable cathodic caps:**

N/A

**Rigging points:**

N/A

**EXTERIOR APPURTENANCES**

**Antennas:**

N/A

**WET INTERIOR COATING**

**Roof:**

Aluminum

**Sidewall:**

Topcoat condition:  Good  Fair  Poor

Primer coating condition:  Good  Fair  Poor

Describe coating:  Delaminating  Spot coating breaks to substrate  Rust bleed through  Blisters  Erosion  Rust undercutting  No significant coating deterioration

Mineral deposits:  Light  Moderate  Heavy

Metal condition:  Good  Fair  Poor

Active pitting:  Yes  No

Previous pitting:  Yes  No

Previous pit filling:  Yes  No  Unknown

Sidewall comments: 12-15 spot coating breaks below water line.

**Tank bottom:**

Topcoat condition:  Good  Fair  Poor

Primer coating condition:  Good  Fair  Poor

Describe coating:  Delaminating  Spot coating breaks to substrate  Rust bleed through  Blisters  Erosion  Rust undercutting  No significant coating deterioration

Mineral deposits:  Light  Moderate  Heavy

Metal condition:  Good  Fair  Poor

Active pitting:  Yes  No

Bottom comments: Greater than 1/4 inch sediment.

**WET INTERIOR APPURTENANCES**

**Tank ladder:**

N/A

**Cathodic protection:**

Clips and pressure fitting present:  Yes  No

**WET INTERIOR APPURTENANCES**

Type:  Floating ring  Hanging wire/rod

Cathodic comments: Rectifier red light non working. Rope tied connections intact.

**Fill pipe:**

Diameter: 12 inches

Height above floor: 12 inches

Deflector plate/grate/bar:  Yes  No

Removable silt ring:  Yes  No

Recirculation line in pipe:  Yes  No

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

**Separate draw pipe:**

N/A

**Overflow pipe:**

Type:  Weir box  Vortex break  Funnel  Elbow

Coating condition:  Good  Fair  Poor

Metal condition:  Good  Fair  Poor

**Roof beams:**

Aluminum dome

**Columns:**

N/A

**Sidewall beams:**

N/A

**Baffle wall:**

N/A

**Interior balcony:**

N/A

**Spider:**

N/A

**RECOMMENDATIONS:**

**Foundation:** Seal cracks to eliminate water migration.

Complete work:  Immediately  In 1-2 years  In 2-5 years  After next 5 year inspection  With exterior paint project

**Coating:**

**Exterior:** Budget for exterior overcoat in 2016

**Wet Interior:**  No work

**Health:** Replace vent screens on roof perimeter, install padlock on center hatch.

Complete work:  Immediately  In 1-2 years  In 2-5 years  After next 5 year inspection  With next paint project

**Safety:** Install platform grating clips.

Complete work:  Immediately  In 1-2 years  In 2-5 years  After next 5 year inspection  With next paint project

**Repairs:** Next inspection perform a wash out to remove sediment and check floor coating conditions.

Field Inspection Report is prepared from the contractor's viewpoint. It contains information the contractor needs to prepare his bid for any repair or recoating. The engineer uses it to prepare the engineering report. Cost estimates are more accurate if the contractor's problems can be anticipated. While prepared from the contractor's viewpoint, the only intended beneficiary is the owner. These reports are completed with diligence, but the accuracy is not guaranteed. The contractor is still advised to visit the site.



Lynchburg, Virginia 500,000 Gallon Wingate Tank dive inspection inspected May 18, 2011



1. Tank sits on top of leveled site at top of the hill.



2. Site has its own power meter and disconnect.



3. Access around tank is good.



4. Overflow and drain valve exits via storm drain.



5. Drain valve is chained and padlocked.



6. Algae/mildew growth is on lower sidewall.



7. Cathodic protection rectifier has a red light indicating the cathodic is not working.



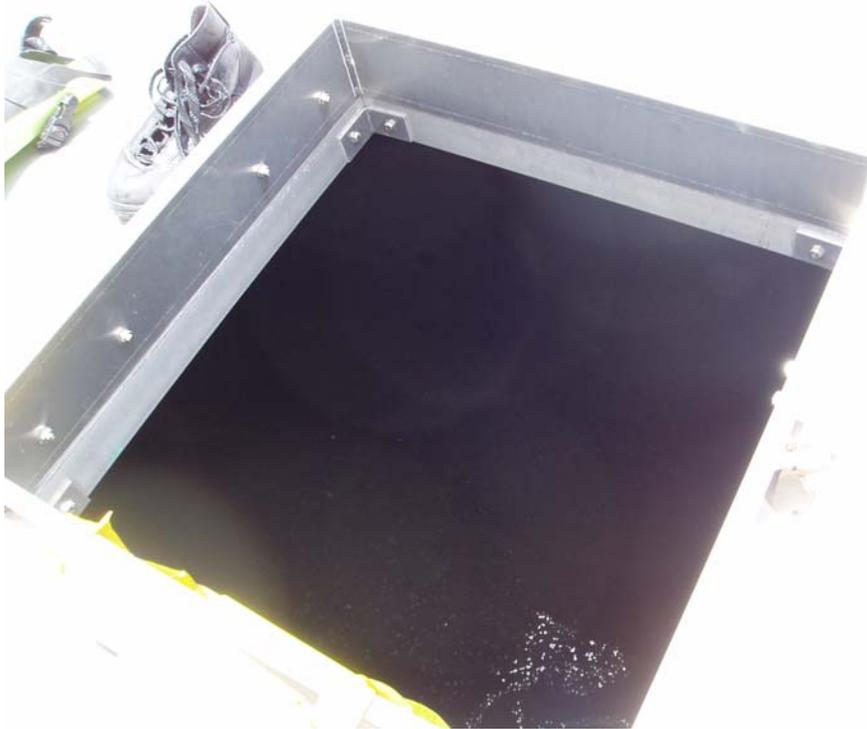
8. Mechanical level control is operating.



9. Bolted manway is intact and leak free.



10. Tank has a step off platform.



11. One of five manways. Tank does not have wet interior ladder.



12. Platform grating does not have any clips to secure grating.



13. Roof contains roof that is intact.



14. Overflow weir box is intact.



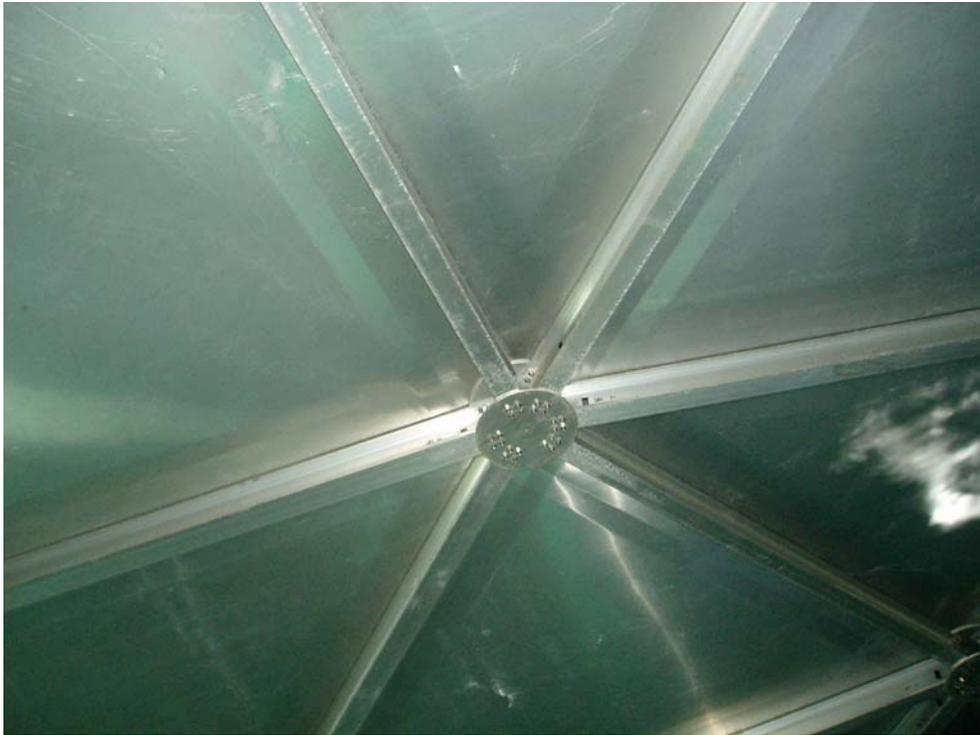
15. Geodesic dome appears intact.



16. All aluminum connections appear intact.



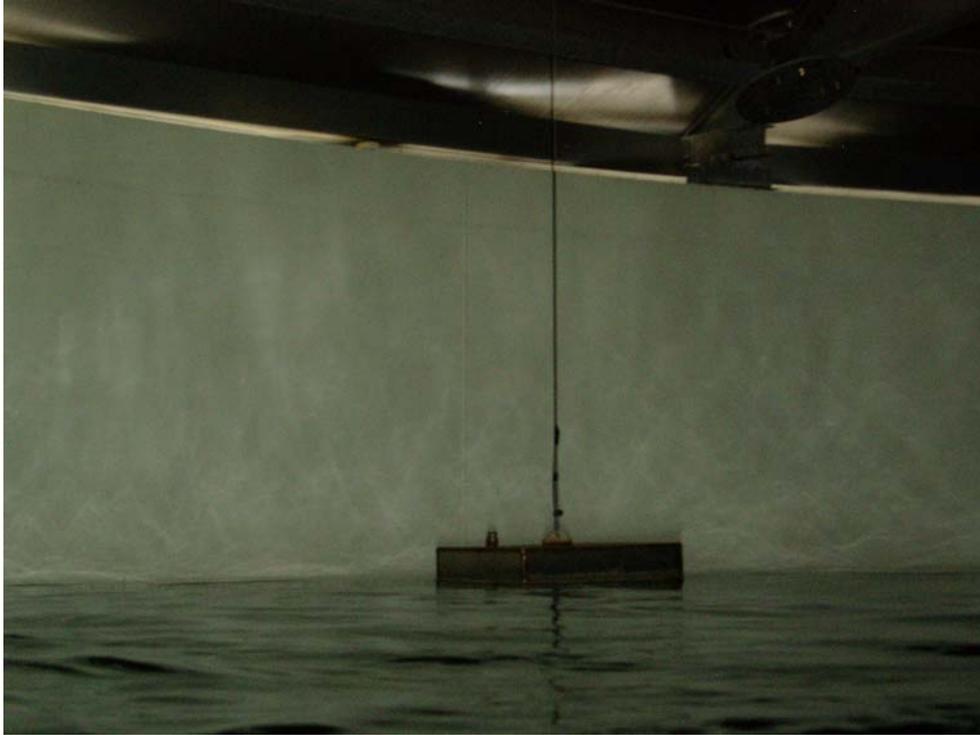
17. We were unable to verify screen condition.



18. No light was observed through aluminum panels.



19. A bit of organic material similar to pollen was observed on the surface. The City filled to overflow to remove.



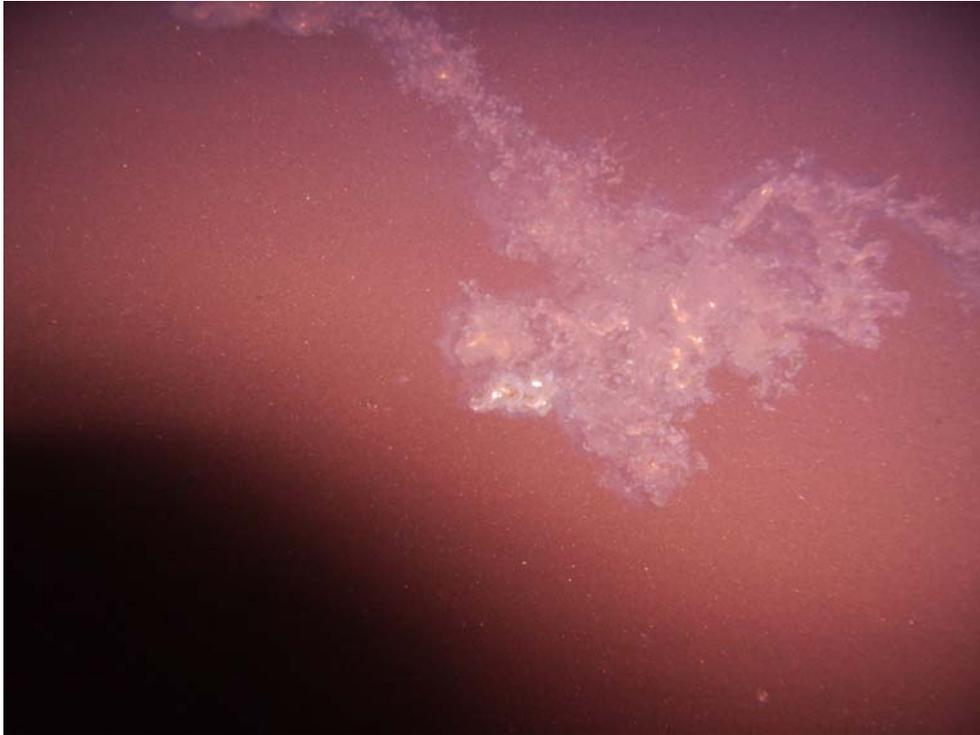
20. Mechanical float level indicator is intact and functional.



21. Underwater visibility is good.



22. Cathodic system appears intact.



23. A thin covering of mineral deposits cover floor.



24. Influent pipe intact.



25. Cathodic anode connection intact.



26. A few small spot failures on the weld seams were observed.



27. All rope connections are intact.



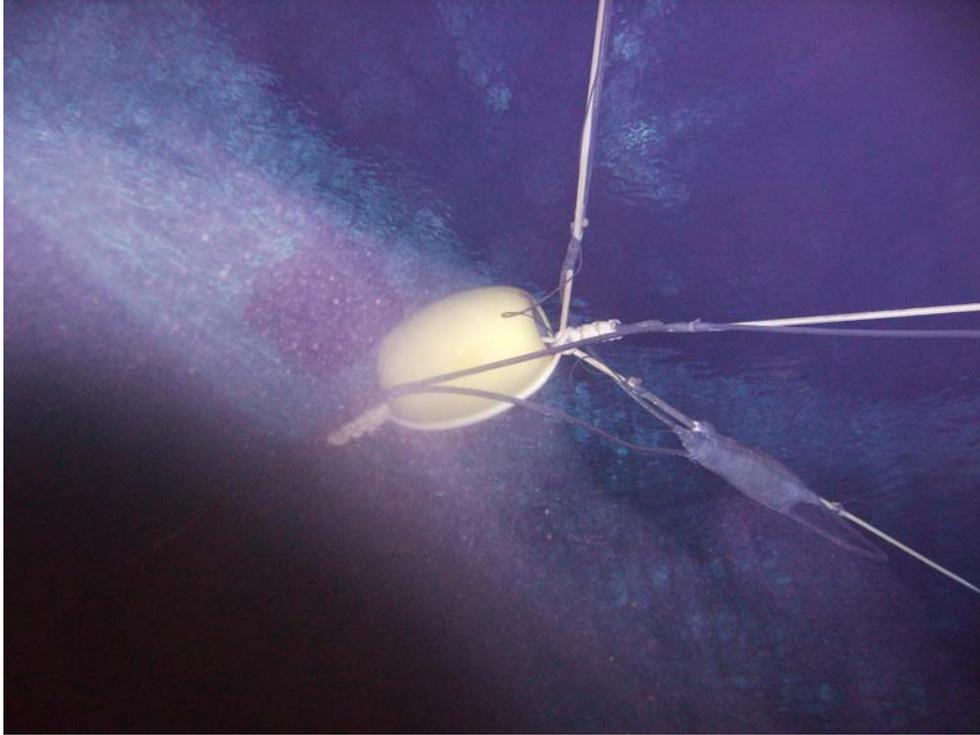
28. Less than 1/8 inch of sediment.



29. Light sediment on floor.



30. Few spot failures. Cathodic system will protect once operational.



31. Cathodic floats are intact.



32. Spot failure.



**DIXON**

ENGINEERING AND  
INSPECTION SERVICES  
FOR THE COATING INDUSTRY

July 11, 2012

1104 Third Avenue  
Lake Odessa, MI 48849  
Telephone 1-616-374/3221  
Fax 1-616-374/7116

Scott J. Parkins, PE  
Utilities Engineer  
City of Lynchburg  
Department of Utilities  
525 Taylor Street  
Lynchburg, VA 24501

Re: College Hill 1.4 Million gallon

Scott

Dixon Engineering conducted a warranty inspection on the 1.4 million gallon College Hill tank on June 26, 2012 for the purpose of verifying product and workmanship of the one year warranty period.

The 1.4 million gallon standpipe was overcoated in 2011 by New Kent Coatings and completed in mid June 2011.

The work included

Exterior: High pressure water clean (5,000-10,000 psi), spot power tool clean to a SSPC-SP11 standard, apply a three (3) coat epoxy urethane system (work includes hand railing next to tank and ladder on the concrete wall).

Concrete foundation and wall: High pressure water clean (5,000-10,000) psi, apply a two (2) coat waterborne acrylate.

Grout repair

Foundation crack repair

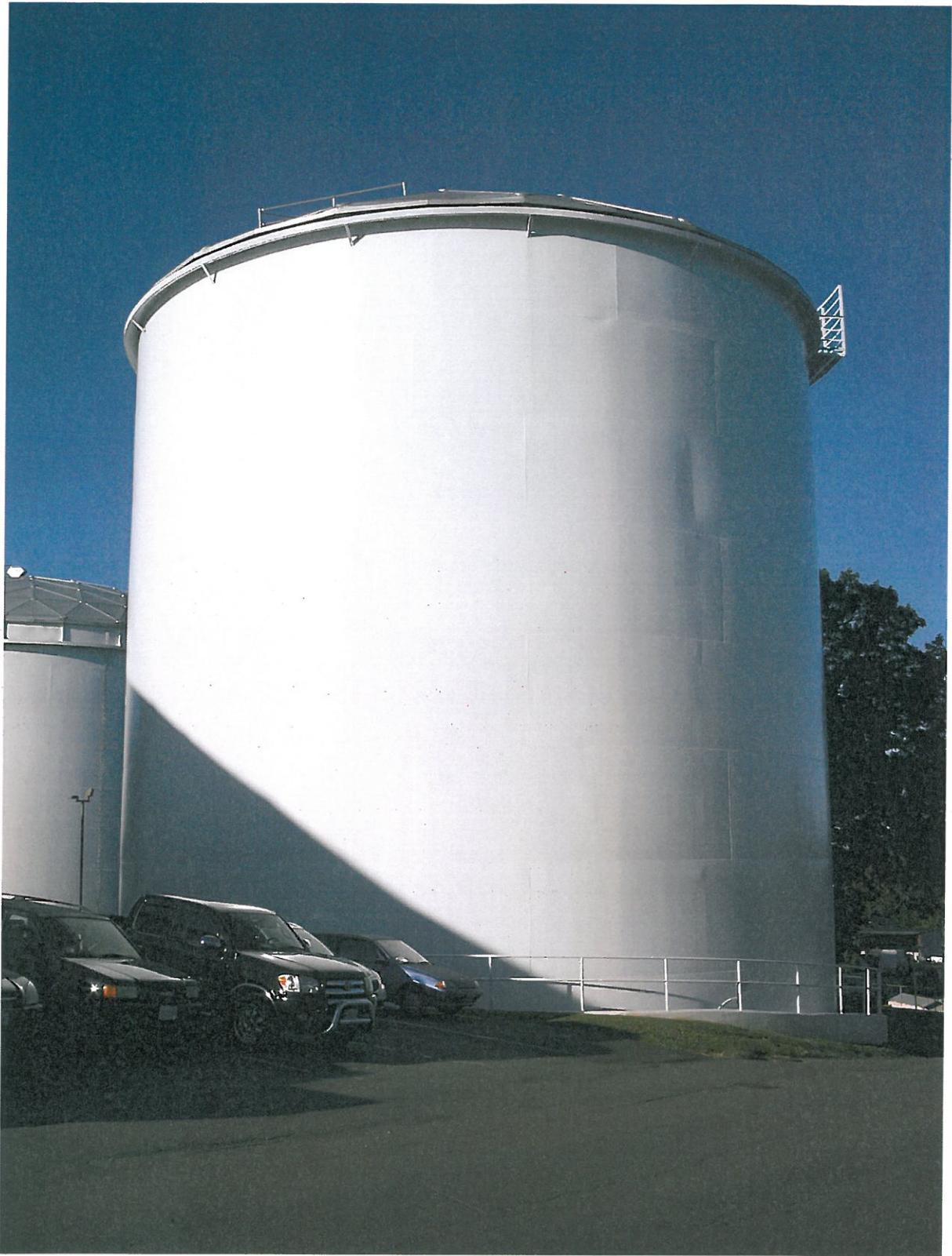
Replace confined space notification stickers

The tank was pressure washed; spot power tool cleaned and a three coat Tnemec epoxy urethane system applied. Replacement of the vent screens were removed from the contract. The tank coatings are performing as required with no noted coating failures. The coatings retain excellent gloss.

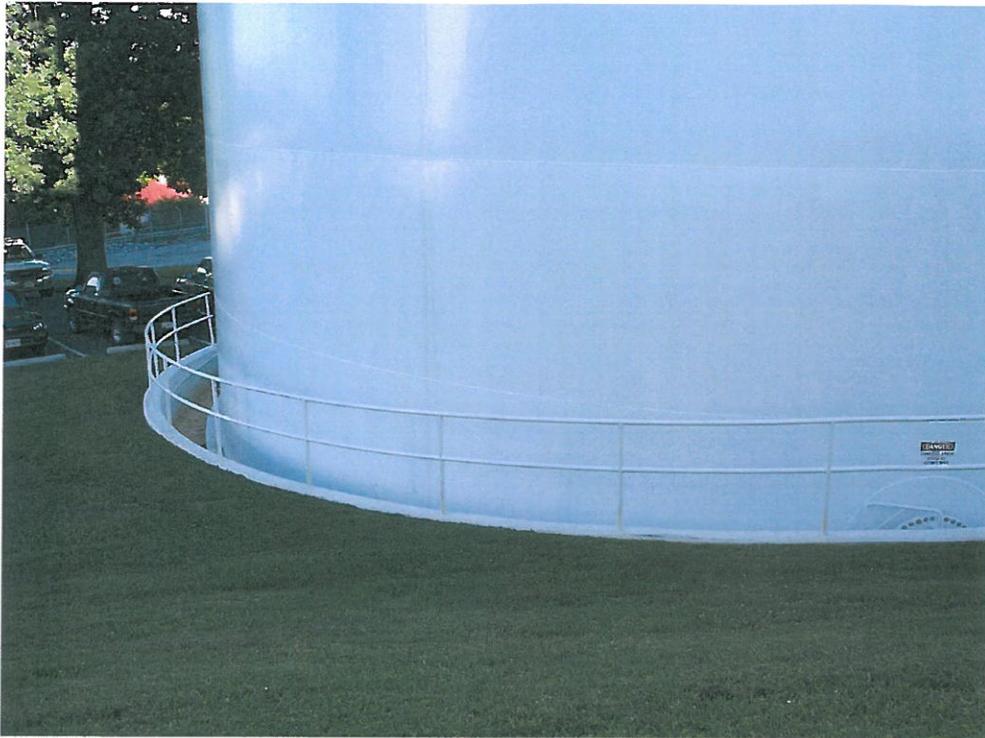
FOR DIXON ENGINEERING, INC.,

Thomas Rounds  
Project Manager

Members: Steel Structures Painting Council  
American Water Works Association  
Consulting Engineers Council



City of Lynchburg Virginia College Hill 1.4 Million Standpipe Warranty inspection 6/26/12



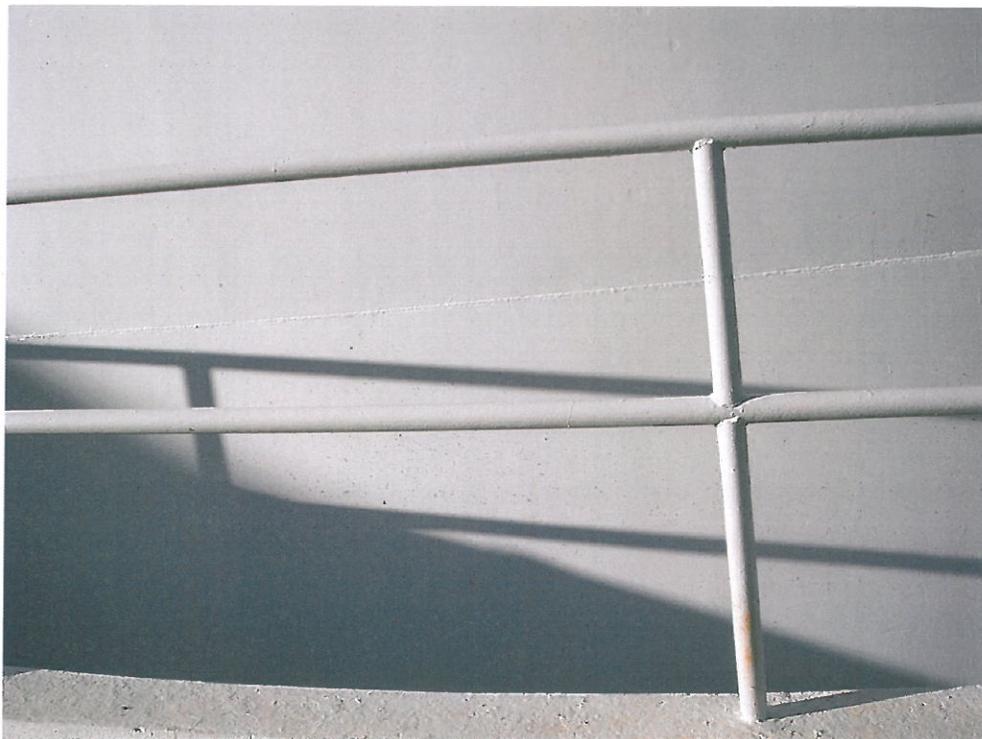
Tank had an exterior overcoat completed by New Kent Coatings in June 2011



Tank had a Tnemec epoxy/urethane system applied and retains excellent gloss.



Coating was free from any product or workmanship failures.



The tank has grass clippings adhered, landscape crews should mow away from tanks



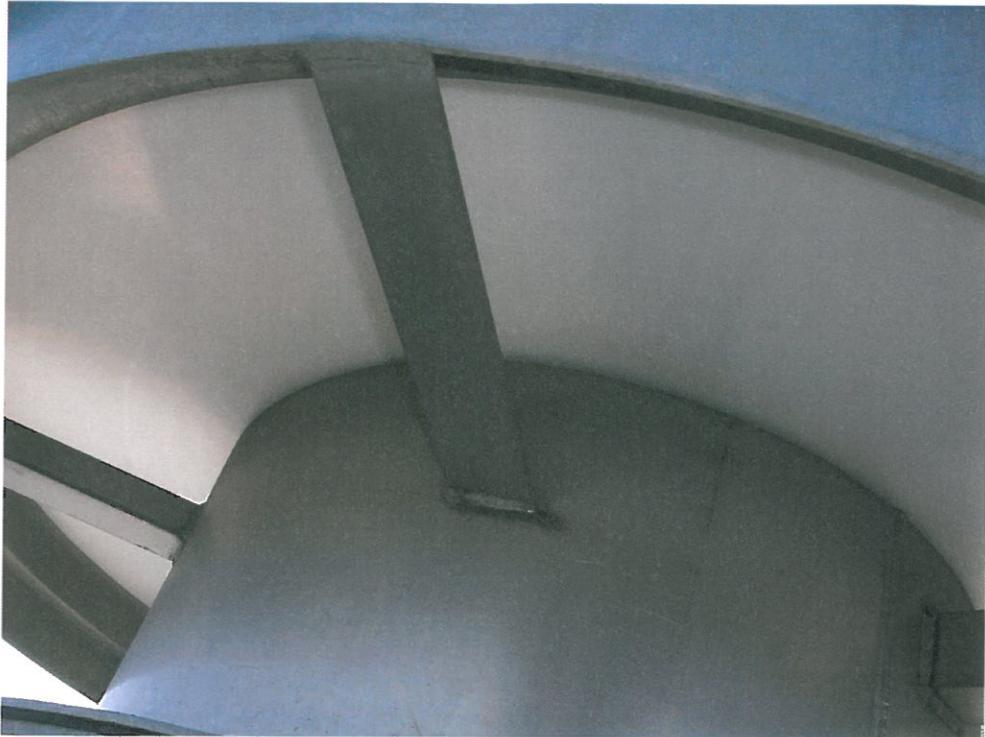
The cathodic rectifier is in the process of being wired to power up rectifier.



The birds still like to hang out



The vent is intact



Vent plate intact



One cathodic cap is cracked



Platform handrail is intact



Rail needs to be adjusted so the glide operates properly .



Grating is intact.



Some discoloration on stiffener angle is adhered atmospheric grime..



Some atmospheric grime around drain holes



Platform grating is intact.

July 17, 2012

Scott J. Parkins, PE  
Utilities Engineer  
City of Lynchburg  
Department of Utilities  
525 Taylor Street  
Lynchburg, VA 24501

Re: Leesville Road 3 Million Gallon Reservoir

Dear Scott:

Dixon Engineering conducted a warranty inspection on the 3,000,000 gallon Leesville Road tank on June 26, 2012 for the purpose of verifying product and workmanship for the one year warranty period.

Our remote operated vehicle was utilized for the inspection, and the video along with still photos are included for your review.

The 3,000,000 gallon standpipe exterior was recoated in 2011 by Spensieri Diversified and completed in mid June, 2011. The tank was originally specified for an overcoat, install a Tideflex mixing system and cathodic repair in 2010. A change in scope occurred in late 2010 and a change in scope occurred for the exterior coating to be completely removed and a four coat epoxy urethane system applied that was completed in 2011.

The work included:

*Exterior:* Wet abrasive blast (WAB 6) all exterior steel surfaces and apply a four coat epoxy urethane system. Contractors utilized Induron products.

*Interior:* Tideflex system installed, provide a cathodic protection system (ice-free) that is to be a suspended or floating ring-type system.

The tanks exterior coatings are performing as required with no noted coating failures. The coatings retain excellent gloss.

The interior flange bolts on the tideflex system appear to be mixed carbon, galvanized, or stainless material. One valve appears to be partially open. One cathodic rope is broken.

Dixon Engineering recommends contacting the contractor and once it is convenient to remove the tank from service performing repairs.

FOR DIXON ENGINEERING, INC.,

Thomas Rounds  
Project Manager



Lynchburg, Virginia Leesville Road 3,000,000 gallon standpipe warranty inspection conducted June 26, 2012.



1) Tank maintains excellent gloss and coatings are free from any visible defects.



2) Manways are leak free.



3) Overflow is intact and free from any observed defect.



4) Pit piping was not done with this project.



5) Overflow screened vent is intact.



6) Cathodic rectifier.



7) Overflow diverter piping intact and coatings are intact.



8) Excellent gloss retention on entire structure.



9) Vandal guard is intact.



10) Safety rail system is intact, although in one area the galvanizing is removed.



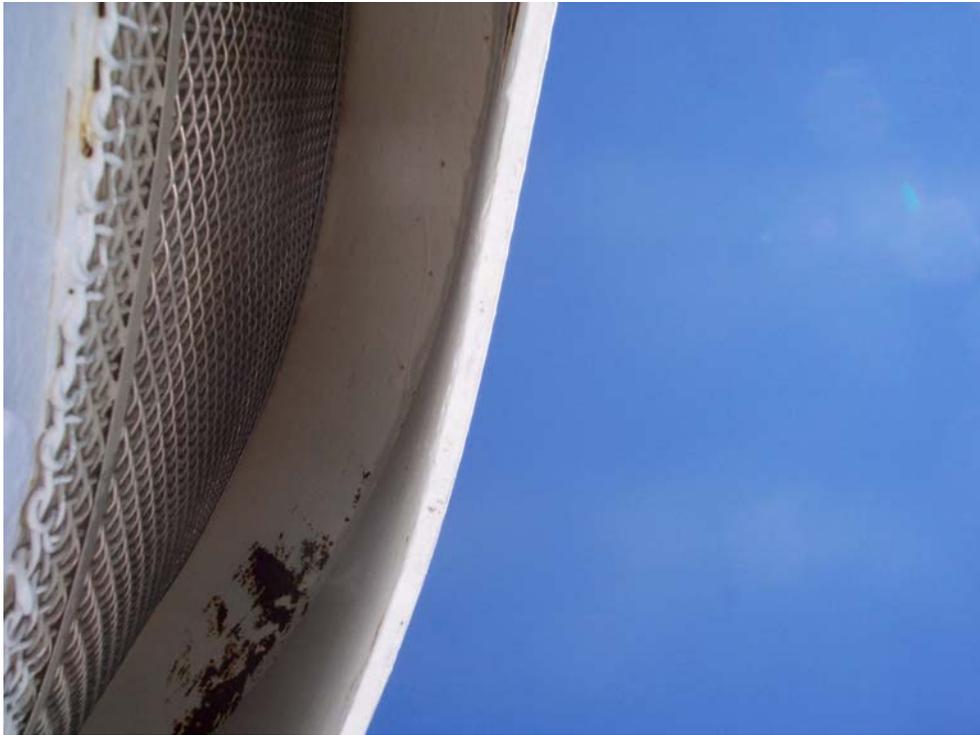
11) Screened vent is intact.



12) Vent is intact.



13) Screened baffle plate is intact.



14) Small spot inside vent uncoated.



15) Stiffener drainage hole dirt adhering to moisture.



16) Handrail is intact.



17) Cathodic system reference electrode.



18) System is a Corpro floating cathodic with floats.



19) Tideflex system installed with the exterior painting.



20) Light covering of silt/sediment on floor.



21) Outlet assembly is intact.



22) Sidewall coatings are intact.



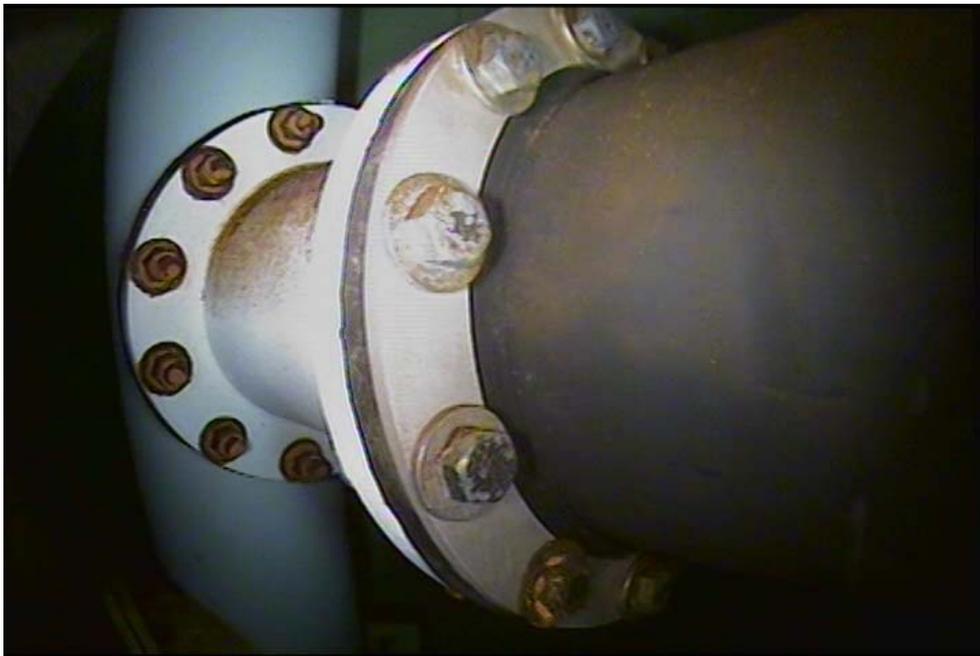
23) Influent valve.



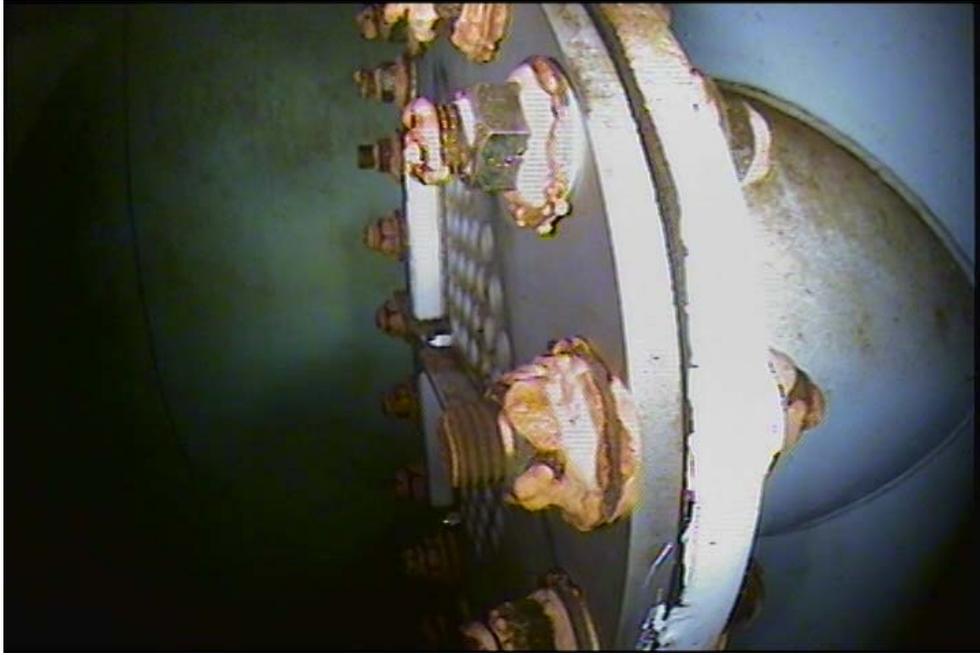
24) Valve is partially open.



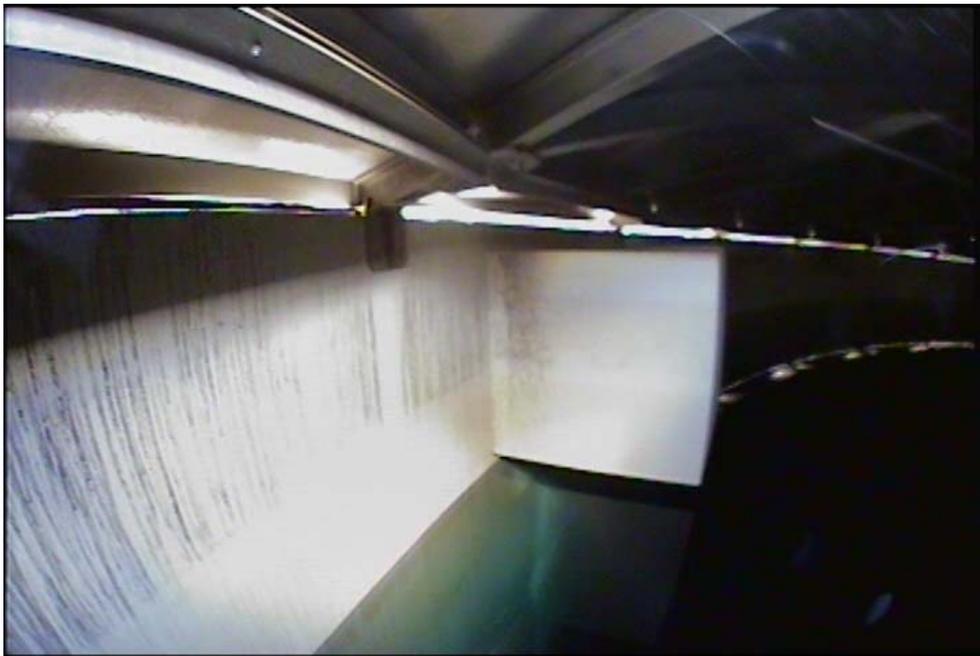
25) Cathodic system rope is broken.



26) Some flange bolts are plated, some are carbon steel.



27) Flange studs appear to be carbon steel, uncoated.



28) Intact overflow weir box.