

# WATER STORAGE TANK 2016 ANNUAL INSPECTION REPORT IN COMPLIANCE WITH MASS DEP CHAPTER 8 REQUIREMENTS

## PLUS COATING EVALUATION

### WELLFLEET MUNICIPAL WATER TANK

Name of Tank: *Wellfleet Municipal Water Tank*

Location: *95 Lawrence Road*

Owner: *Town of Wellfleet*

Inspection Dates: *Nov. 21 & Dec. 14, 2016*

Inspector: *Leo R. Yuskus*



#### TANK DATA

Style of Tank: *Steel Hydrospheroid* Construction Date: *2010*

Tank Dimensions: *56' dia. by 125' hgt.* Constructed By: *CB&I*

Tank Capacity: *500,000 Gallon* Date of Last Maintenance: *October 2016*

Tank Contract No: *166940* Date of Last Inspection: *July 23, 2015*

#### EXECUTIVE SUMMARY

**SPECIFICS** – The tank was constructed by CB&I in 2010. The tank is an elevated 500,000 gallon waterspheroid, 125-feet high by 56-feet bowl diameter. The base pedestal is 29-feet in diameter by 36-feet in height, and contains eighteen 2-inch anchor bolts and an access door that is locked. The shaft is 10-feet in diameter and 44-feet in height, and includes two sets of painter’s rails and an access hatch.

A 42-inch access tube extend through the bowl to the roof and includes a 30-inch diameter hatch cover. The roof includes a 30-inch hatch to the wetted area of the tank, and a 24-inch diameter finial (vent) collar. The tank includes an 8-inch overflow piping system and a TideFlex mixing system.

The original construction specifications called for shop surface preparation on the steel to a SSPC SP-6 standard on the exterior surfaces and the interior non-wetted surfaces. The surface preparation for the interior wetted surfaces was to meet the SSPC SP-10 standard.

The specifications called for the use of Tnemec products for coating the structure. On the exterior, the shop primer was to be Series V140-1255 Poto-Pox Plus or V140-F Poto-Pox Plus (fast cure). Field touchup was to be Series 20-1255 Poto-Pox or Series FC20 Poto-Pox (fast cure). Field intermediate coat was to be Series 66 Hi-Build Epoxyline or Series 161 Tnemec-Fascure (fast cure). The field finish coat was to be Series 1075 Endura-Shield.

On the interior dry surfaces, field touchup was to be Series 20-1255 Poto-Pox or Series Series FC20 Poto-Pox (fast cure). The finish coat was to be Series 20-1255 Poto-Pox or Series FC20 Poto-Pox (fast cure).

On the interior wet surfaces, field touchup and stripe coating was to be Series 20-1255 Poto-Pox or Series FC20 Poto-Pox (fast cure). Field intermediate coat was to be Series 66 Hi-Build Epoxyline or Series 161 Tnemec-Fascure (fast cure). The field finish coat was to be Series 20 Poto-Pox or Series FC20 Poto-Pox (fast cure).

**HISTORY** – During 2015 it was discovered that there was delamination of the exterior coating system on the bowl area, generally starting at the mid-bowl level and extending to near the center circumferential handrail system. A full inspection was performed by Underwater Solutions, Inc. on July 25, 2015. It was determined that the delamination was mainly on the radial weld joints and on some small sections of the circumferential weld joints. A contract was let in 2016 to perform coating repairs in these areas, and the work was completed in late October of 2016. We are not aware of the surface preparation performed on these spot coating repairs, or the coatings utilized.

**INSPECTION** – Our exterior site inspection phase was conducted from the ground surface on November 21, 2016, and the interior and roof inspection was conducted on December 14, 2016. The intent of the inspection was compliance with MassDEP Annual Inspection requirements, and while in and on the structure, observations of the condition of the coating on the interior and the exterior surfaces was made, with particular attention to the coating repairs completed in October of this year on the areas that could be accessed on the roof.

**SANITARY CONDITIONS** – From a sanitary prospective, this tank is in good condition with no conditions observed that require immediate attention. The final design is such that storm driven rain should not enter, (see photo 3) the screen is in good condition (see photo 4) and the screened vacuum pallet is in good condition and positioned properly. (see photo 5) The hatches were closed, (see photos 1 and 2) weather protected and secured, and any roof openings such as erection couplings were sealed with rubber caps. (see photo 6)

**SECURITY CONDITIONS** – From a security prospective, this tank is well protected as the site is surrounded by a chain link fence which is in good condition and locked, (see photos 10 and 11) and the base pedestal has an access door that is locked. (see photo 9) There were no tangible signs of unauthorized entry or vandalism.

### **EXTERIOR STEEL TANK COMPONENTS**

**PEDESTAL BASE** – The coatings on the exterior surfaces of the pedestal base appear to be in very good condition. (see photo 17) There is the start of a light buildup of grime on these surfaces.

**PEDESTAL BASE ACCESSORIES** – The coating on the access door and frame is in good condition. The coating on the anchor bolt assemblies is in good condition, with the very start of corrosion staining and spot corrosion break through at the nuts and top chair plate. (see photo 18 and 19)

The coating on the overflow piping is in good condition, but the outlet fabrication has active corrosion and associated metal loss. (see photos 7 and 8) The screen appears to be galvanized and shows signs of deterioration, and there appears to be debris inside the overflow screen. (see photo 8)

***RECOMMENDATIONS*** – *We recommend that the condition of the coating on the anchor bolt assemblies be monitored during each annual inspection. There is minimal clearance between the anchor chair assembly and the anchor bolts, thus you do not want any corrosion within that assembly that could result in metal loss as it will be quite difficult to repair.*

*We recommend that the outlet screen fabrication be disassembled and any debris within the screen area be removed. It is recommended that consideration be given to replacement of the overflow outlet fabrication in the near future. We recommend that the existing outlet flange be removed and a new standard steel flat face open flange be welded in its place. To this flange a full face gasket can be installed, a stainless steel 4 mesh screen put in place, another gasket installed with a steel flat face open flange, all connected with stainless steel bolts. The flanges should be surface prepared and coated with similar coating products as used on the tank prior to assembly.*

*MassDEP guidelines call for an additional swing away device to be utilized with a 24 mesh screen on the overflow. Due to the type of receiver to collect this overflow, we are not sure how this additional screen would perform.*

## EXTERIOR STEEL TANK COMPONENTS- CONT'D

PEDESTAL COLUMN – The coating on the pedestal column appeared to be in very good condition. (see photo 20)

PEDESTAL COLUMN ACCESSORIES – The pedestal column contains two painter's rails, the coating system on the painter's rails is in poor condition with coating deterioration, corrosion bleed through and active corrosion in some areas. (see photos 21 and 22) The access manway to reach the painter's rail also has coating deterioration and the start of corrosion on the hinges. (see photo 23)

**RECOMMENDATIONS** – We recommend that the condition of the coating on the painter's rail and the hinges for the manway be monitored during each annual inspection. These fabrications are not structural components of the tank but do assist in accessing portions of the tank for maintenance purposes.

LOWER PORTION OF BOWL – The coating system in the lower portion of the bowl appears to be in very good condition. (see photo 20)

UPPER PORTION OF BOWL – The area of the upper portion of the bowl where coating delamination occurred was mainly on the radial welds and on some of the circumferential welds. (see photo 24) The coating system on the upper portion of the bowl now appears to be in good condition. (see photos 25 and 26) The color of the repair coatings appear to fairly well match that existing, but the gloss is different as the existing coating has faded. (see photo 27)

The coating repairs were completed on October of this year, and the repaired coatings appear to be in very good condition. Observations were made on the repair coatings applied and there did not appear to be any lifting at the joint transition, the repair coating appeared to satisfactorily over-lapped over existing and well adhered, and thickness measurements appear to indicate that the repair coatings were adequate in thickness, at least on the areas that could be accessed.

**RECOMMENDATIONS** – We recommend that the condition of the coating on the bowl area be monitored during each annual inspection, especially the areas where the coating was repaired.

CENTER ROOF PLATE AREA – The coating on the center of the roof within the circumferential handrail system appears to be in very good condition. (see photo 28) These were only a very few areas that indicated repairs had been performed. There was some corrosion staining at the magnetic mounts for the communication cables. (see photo 29)

## EXTERIOR STEEL TANK COMPONENTS-CONT'D

**CENTER ROOF ACCESSORIES** – The coating condition on the roof accessories appeared to be good in most cases. The handrail system coating appeared to be in good condition with only a very small number of spots with the start of corrosion activity. (see photo 30) There was corrosion bleed through on a small section of the hand rail kick plate. (see photo 31)

The roof finial (vent) is in very good condition as is the screen and vacuum pallet. (see photos 3) The coating on the two roof hatches is in fair condition with spot delamination on the exterior surfaces and also on the interior surfaces. (see photos 1 and 2)

**RECOMMENDATIONS** – We recommend that the condition of the coating on the center roof accessories be monitored during each annual inspection.

*The roof includes rigging opening plugs made of rubber. Over-time rubber may dry out due to UV exposure and could allow contaminants to enter the tank. We recommend monitoring the condition of the rubber plugs and replace when plugs become damaged due to UV exposure.*

## INTERIOR STEEL TANK COMPONENTS

**INTERIOR ACCESS TUBE AND COLUMN**– The coating on the interior of the column and access tube is in good condition, with spot mildew activity in many areas. (see photos 32 and 33)

**TOP BOWL INTERIOR SURFACES** – The roof hatch was opened and the underside of the roof and a portion of the upper bowl was observed. The coating condition on those areas observed was good with the very start of minor spot corrosion. (see photos 34 and 35)

**RECOMMENDATIONS** – We recommend that the condition of the coating on the interior roof and upper bowl be monitored during each annual inspection.

**WELLFLEET MUNICIPAL WATER STORAGE TANK**

**2016 ANNUAL INSPECTION CHECKLIST**

**SANITARY CONDITIONS**

**HATCHES**

Roof Hatches Observed Yes  No  Number of Hatches **2** Hatches Locked Yes  No

Locks Opened and Relocked Yes  No  Observed *One hatch opened to gain access to the interior of the roof (see photos 1 and 2)*

Locks Replaced Yes  No  How Many *Used existing lock*

Covers Overlap Collar Yes  No  Explain *Covers overlap to prevent storm water entry (see photos 1 and 2)*

Roof Access Hatch Yes  No  Explain *Roof access hatch closed and secured from interior (see photo 2)*

**FINIAL (vent)**

Finial Inspected Yes  No  Condition of Finial *Finial in good condition (See photo 3)*

Finial prevents the entry of Storm Driven Rain Yes  No  Explain *Weather skirt around screen (see photo 3)*

Screen Inspected Yes  No  Condition of Screen *Good condition and vacuum pallet in place (see photos 4 and 5)*

Screen prevents the entry of Birds and Animals Yes  No  Explain *Screen openings prevent entry of birds & animals (see photo 4)*

Screen prevents the entry of Insects and Dust Yes  No  Explain *Screen satisfactory (see photo 4)*

**OTHER OPENINGS**

Openings in Roof Yes  No  Explain

*Six rigging couplings in roof sealed with rubber caps (see photo 6)*

Sanitary Defects Observed Yes  No  Explain

*None*

Watertight Seal Defects Observed Yes  No  Explain

*None*

Overflow Screen Observed Yes  No  Explain

*Outlet and screen in poor condition due to corrosion and start of deterioration of screen (see photos 7 and 8)*

Immediate Repairs Required Yes  No  Explain

*Consideration should be given to replacing the overflow discharge flanges and screen.*

**SECURITY CONDITIONS**

Base Pedestal Door Locked Yes  No

*Door is locked (see photo 9)*

Signs of Unauthorized Entry Yes  No  How

*None*

Vandalism Observed Yes  No  Explain

*None*

Site Fenced Yes  No  How

*8' high chain link fence in good condition (see photo 10)*

Fence Gates Locked Yes  No  Condition

*Gates locked (see photo 11)*

**COMMUNICATIONS EQUIPMENT ON TANK:**

Communications Antenna on Tank Yes  No  List

*Fire Department antenna and Open Cape dish and cathodic protection on handrail (see photos 12 and 13)*

Communications Cables on Tank Yes  No  List

*Communications cables mounted in access tube (see photo 14)*

**MIXING SYSTEM**

*Tide-Flex mixing system*

Mixing System in Tank Yes  No  List

Was the Mixing System Operating Yes  No  List *Unknown*

**SAFETY AND ACCESS**

Pedestal and Access Tube Ladders have Safety Climb Systems Yes  No  List

*Steel cable safety climb system on both ladders, cable grab and harness is available for use (see photo 15)*

Access Tube Hatch Secured from Interior Yes  No  List *Secured with a latch*

**FAA EQUIPMENT ON TANK**

FAA Lighting System on tank Yes  No  List *FAA two light system mounted to roof handrail system, one light appeared to be out (see photo 16)*

Particular Conditions to be aware of when climbing tank Yes  No  List *Be sure the light switch is on, and you have a key if the intent is to open roof hatch*

**WATER STORAGE TANK 2016 ANNUAL INSPECTION REPORT**

**PHOTOS FROM WELLFLEET MUNICIPAL WATER TANK**



Photo 1: Roof Hatch to Bowl Opened, Closed and Relocked



Photo 2: Roof Access Hatch Opened and Reclosed upon Leaving



Photo 3: Finial (vent) on Roof with Weather Skirt



Photo 4: Finial Screen in Good Condition



Photo 5: Screened Vacuum Pallet in Good Condition, Positioned Correctly



Photo 6: Rigging Couplings in Roof in Good Condition with Rubber Caps in Place

**WATER STORAGE TANK 2016 ANNUAL INSPECTION REPORT**

**PHOTOS FROM WELLFLEET MUNICIPAL WATER TANK**



Photo 7: Overflow Piping Discharge Fabrication in Poor Condition



Photo 8: Overflow Discharge in Poor Condition with Active Corrosion & Debris Inside



Photo 9: Steel Door in Base Pedestal is Locked



Photo 10: 8' High Chain Link Fence in Good Condition



Photo 11: Chain Link Fence Gate in Good Condition and Locked



Photo 12: Open Cape Antenna (2) Mounted to Roof Handrail

**WATER STORAGE TANK 2016 ANNUAL INSPECTION REPORT**

**PHOTOS FROM WELLFLEET MUNICIPAL WATER**



Photo 13: Communications Equipment Mounted to Roof Handrail



Photo 14: Communications Cables Mounted in Access Tube



Photo 15: Safety Climb Cable on all Interior Ladders in Tank



Photo 16: FAA Lighting System, One Light Appears to be Out



Photo 17: Coating on Pedestal in Very Good Condition, some Grime Deposition



Photo 18: Corrosion Staining from the Upper Portion of the Anchor Bolt

**WATER STORAGE TANK 2016 ANNUAL INSPECTION REPORT**

**PHOTOS FROM WELLFLEET MUNICIPAL WATER TANK**

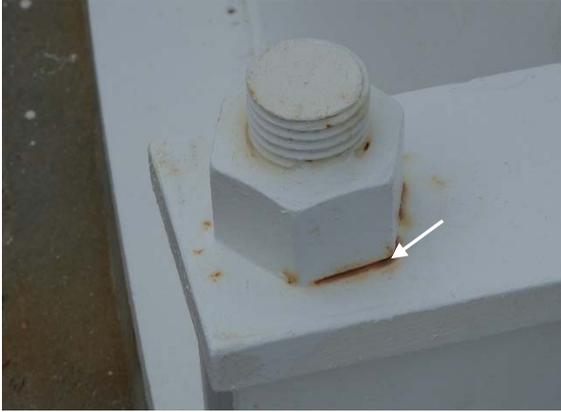


Photo 19: Start of Spot Corrosion on the Anchor Bolt Nut and Top of Chair



Photo 20: Coating on the Column and Lower Bowl Appears to be in Very Good Condition



Photo 21: Coating on Painter's Rails in Poor Condition with Active Corrosion



Photo 22: Coating on Painter's Rails in Poor Condition with Active Corrosion Activity



Photo 23: Start of Corrosion on Painter's Rail Manway Hinge Assemblies



Photo 24: Coating Repairs Underway on Upper Bowl

**WATER STORAGE TANK 2016 ANNUAL INSPECTION REPORT**

**PHOTOS FROM WELLFLEET MUNICIPAL WATER TANK**



Photo 25: Coating on Upper Bowl appears to be in Good Condition after Repairs



Photo 26: Coating on Upper Bowl appears to be in Good Condition after Repairs



Photo 27: Repair Coating Difference in Gloss as Existing Coating has Faded



Photo 28: Coating on Center of Roof in Very Good Condition



Photo 29: Corrosion Staining in Areas Where Magnetic Mountings Used



Photo 30: Coating on the Roof Handrail Generally in Good Condition.

# WATER STORAGE TANK 2016 ANNUAL INSPECTION REPORT

## PHOTOS FROM WELLFLEET MUNICIPAL WATER TANK



Photo 31: Very Start of Corrosion Break Through on Roof Handrail Kick Plate



Photo 32: Interior Coating on Column in Good Condition, Spot Mildew Activity Present



Photo 33: Interior Coating on Access Tube in Good Condition, some Spot Mildew



Photo 34: Coating on Interior Roof in Good Condition, Start of Spot Corrosion



Photo 35: Coating on Interior Upper Bowl in Good Condition, Minor Corrosion