

Dixon Engineering, Inc.

Preliminary Maintenance Inspection

Wastewater Treatment Plant
Secondary Clarifier B

Leesburg, Virginia

Inspection Performed: August 17, 2016
Report Prepared: September 19, 2016
Reviewed by Ira M. Gabin, P.E.: September 27, 2016

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CONCLUSIONS:

1. The concrete on the exterior is in good condition overall with several cracks. The cracking consisted of mostly hairline cracks with efflorescence present.
2. The concrete on the interior is in good condition overall with a few cracks on the sidewalls. The cracking consisted of mostly hairline cracks with efflorescence present. There was one area of spalling on the interior sidewall with rebar exposed.
3. The concrete on the tank exterior has no coating.
4. The interior coating on the concrete is an unknown elastomeric system that is in poor condition. The primary reason for coating failures is delamination to concrete and blistering.

RECOMMENDATIONS:

1. Complete the recommended work in 1-2 years. The coating work is the greatest cost and largest part of the recommendations. The repairs and upgrades should be completed during the next major tank rehabilitation process when coating repairs are made.
2. Abrasive blast clean the catwalk steel support beams to a near white metal (SSPC-SP10) condition and apply an epoxy polyamide. The estimated cost is \$15,000.
3. Abrasive blast clean the wet interior concrete floor and sidewalls to remove old coating and create a profile and apply a plural component polyurea system. The estimated cost is \$150,000.
4. Clean out cracks on the exterior by routing to a u-shape and fill with a mortar repair system. The estimated cost is \$3,000.
5. Remove the spalling concrete on the interior by cutting around the failures and repair with a mortar repair system. Abrasive blast clean the exposed rebar to a near white metal (SSPC-SP10) condition and apply an epoxy system. The estimated cost is \$1,000.

COST SUMMARY:

Repaint Wet Interior Concrete	\$150,000
Repaint Catwalk Support Beams	15,000
Repair Exterior Cracks	3,000
Repair Wet Interior Spalling	<u>1,000</u>
Subtotal	\$169,000
Engineering and Contingencies	<u>\$25,000</u>
Total	\$194,000

INSPECTION:

On August 17, 2016, Dixon Engineering, Inc. (DIXON) performed a preliminary maintenance inspection on the Secondary Clarifier B owned by the City of Leesburg, Virginia. Purposes of the inspection were to evaluate the interior and exterior coating's performance and life expectancy; assess the condition of concrete and metal surfaces and appurtenances; review safety and health aspects; and make budgetary recommendations for continued maintenance of the clarifier. All recommendations, with budgeting estimates for repairs are incorporated in this report. The inspection was performed by Lee Jamison, Project Manager. The inspector was assisted by John Watson and Dustin Houghton, Staff Technicians. Scheduling and arrangements for the inspection were completed through Russell Chambers.

CLARIFIER INFORMATION:

The clarifier is 40 feet wide, 156 feet long, and 19 feet deep. The exterior concrete is not coated. The wet interior concrete is coated with what appears to be an elastomeric system.

CONDITIONS AND RECOMMENDATIONS:

EXTERIOR CONCRETE STRUCTURE CONDITIONS:

Approximately 5 to 10 feet of the exterior walls are exposed. There was no major damage noted on the exterior concrete. Cracking is present at random locations. The cracks are tight with the edges in place. The cracks are vertical and horizontal with slight efflorescence on the cracks.

EXTERIOR CONCRETE STRUCTURE RECOMMENDATIONS:

Clean out cracks where efflorescence is present by routing the crack to a u-shape and fill with a mortar repair system. The estimated cost is \$3,000.

INTERIOR CONCRETE STRUCTURE:

The concrete walls are in good condition below the high water line and in good condition above it. A few cracks are present. They are tight with the edges in place. The cracks are vertical with slight efflorescence on the cracks. One area of spalling is occurring at the top of the sidewall with rebar exposed. The concrete is cracked around the deteriorating rebar and it is moderately corroded.

The concrete floor structure is in good condition with no significant failures. The floor is coated the same as the walls.

INTERIOR STRUCTURE RECOMMENDATIONS:

Remove damaged concrete by cutting around the spalled areas to sound concrete, chipping out the loose concrete and repair the spalled sidewall areas with a mortar repair system. Abrasive blast clean the rebar and apply an epoxy system. The estimated cost is \$1,000.

EXTERIOR CONCRETE COATING CONDITIONS:

The exterior of the clarifier has no coating on the concrete.

WET INTERIOR CONCRETE COATING CONDITIONS:

The walls and floor are coated with an elastomeric coating system. The coating is in poor condition overall. The sidewall and floor coating has extensive deterioration in the form of delaminated topcoat and blisters throughout most areas.

WET INTERIOR CONCRETE COATING RECOMMENDATIONS:

Remove the mineral encrustation and sediment on the surfaces by high-pressure water cleaning. Remove the old coating system and create a profile in the concrete by abrasive blast cleaning. Apply a plural component polyurea coating system.

The plural component system has good adhesion and a fast cure time. It is applied in one coat. Within several days of completing the cleaning and blasting, the tank can be returned to service. The estimated cost to apply the plural component urea system is \$150,000.

PIPING CONDITION:

There are wash lines at each corner of the clarifier with nozzles that spray water to keep sludge down on the bottom of the clarifier. The wash lines are in good condition. The brackets holding the lines are in good condition.

Two influent pipes penetrate through the sidewall and stub just inside of the tank.

Four pipes exit the sidewall and run across the clarifier to the sump area. All piping in the interior is made of PVC.

SITE CONDITIONS:

The clarifier is located at the wastewater treatment plant. The size of the site is average and is fenced with a locking gate.

RAKE ARM CONDITIONS:

There are rake arms that scrape the bottom of the clarifier and are constructed of fiberglass channels that are in good condition.

LAUNDERS CONDITIONS:

There are launders that runs across the clarifier at the high water line. The launders are in good condition and made out of fiberglass with triangle weirs. The weirs are intact and in good condition.

CATWALK AND RAILING CONDITIONS:

There is a catwalk running on the outer edges and down the middle of the clarifier. The catwalk is supported by a series of I-beams that are in good condition but the coating is in poor condition.

The catwalk platform is made of concrete and is in good condition.

There is a railing on either side of the catwalk that is in good condition. The railing has a top rail, mid rail and kick plate and is constructed of aluminum.

CATWALK AND RAILING RECOMMENDATIONS:

Abrasive blast clean the catwalk steel support beams to a near white metal (SSPC-SP10) condition and apply an epoxy polyamide coating system. The estimated cost is \$15,000.

**FIELD INSPECTION REPORT
CLARIFIER**

DATE: August 17, 2016

I. TANK DATA

OWNER: Town of Leesburg

CLIENT CODE: 46-55-01-38

STRUCTURE NAME: Secondary Clarifier B

LOCATION: Street: Market St.

City: Leesburg

State: Virginia

CLARIFIER SIZE:

Diameter: 40 feet wide x 156 feet long x 19 feet deep

Height to effluent: 16 feet

Sidewall height: 19 feet

CONSTRUCTION:

Type of structure: Wastewater clarifier

Layout: Partially buried and open air

DATE CONSTRUCTED: Unknown

COATING HISTORY	<u>ABOVE HWL</u>	<u>BELOW HWL</u>	<u>CONCRETE</u>
DATE LAST COATED	<u>Unknown</u>	<u>Unknown</u>	<u>Unknown</u>
CONTRACTOR	<u>Unknown</u>	<u>Unknown</u>	<u>Unknown</u>
COATING SYSTEM	<u>Unknown</u>	<u>Unknown</u>	<u>Unknown</u>
SURFACE PREPARATION	<u>Unknown</u>	<u>Unknown</u>	<u>Unknown</u>
COATING MANUFACTURER	<u>Unknown</u>	<u>Unknown</u>	<u>Unknown</u>
COATING SAMPLES	<u>Unknown</u>	<u>Unknown</u>	<u>Unknown</u>
HEAVY METAL	<u>Unknown</u>	<u>Unknown</u>	<u>Unknown</u>

PERSONNEL: Inspector John Watson, Ground person Dustin Houghton and Lee Jamison

TYPE OF INSPECTION: Preliminary Maintenance

METHOD OF INSPECTION: Dry

DATE LAST INSPECTED: Unknown

II. INSPECTION DATA

SITE CONDITIONS

Fenced: **Yes**
Controls Location: **In control room**
Site conditions: **Well maintained**
Neighborhood: **Wastewater plant property**
Power lines within 50 feet: **No**
Site drainage: **Away from clarifier**
Indications of underground leakage: **No**
Shrub, tree, etc. encroachment: **No**

Perimeter Railing:

Type: **Aluminum**
Coating condition: **N/A**
Metal condition: **Good**
Height: **43 inches**
Mid-rail height: **29 inches and 16 inches**
Toe plate height: **4 inches**
Perimeter railing comments: **2 mid rails**

CONCRETE STRUCTURE

Exterior Sidewall:

Access hatch: **No**
Topcoat condition: **Not coated**
Exterior wall comments: **5-10 feet above grade; exposed concrete**

Interior Sidewall:

Topcoat condition: **Poor**
Previous coat condition: **Fair**
Describe coating: **Spot coating failures to substrate**
Interior wall comments: **Covered with residue**

Bridge/Catwalk:

Width: **4 feet** Length: **156 feet**
Walkway material: **Aluminum and concrete**
Walkway shape: **Grating and flat concrete**
Handrail: **Yes**
Railing material: **Aluminum**
Railing Shape: **Tube**

CONCRETE STRUCTURE

Railing height: **43 inches**

Mid-rail height: **29 inches and 16 inches**

Toe plate height: **4 inches**

Access: **Stairway**

Support Beams:

Design: **I-Beam under concrete catwalk**

Size: **30.5 inches x 12 inches**

Number: **1**

Length: **156 feet**

Topcoat condition: **Fair**

Previous coat condition: **Fair**

Describe coating: **Delaminating, spot coating failures to substrate, and rust bleedthrough**

Dry film thickness: **4-7 mils**

Metal condition: **Good**

Influent Pipe (x2):

Penetration: **Through wall** Diameter: **24 inches**

Supported from catwalk: **No**

Scum Arms:

Topcoat condition: **N/A Fiberglass**

Condition: **Good**

Scum arm comments: **2 ½ x 7 inches**

CONCRETE STRUCTURE

Exterior Sidewall:

Concrete condition: **Good**

Concrete deterioration: **Cracks**

Cracking severity: **Moderate**

Crack length: **2-8 feet**

Number of cracks: **Approximately 30**

Estimated total crack length: **160 feet**

Describe crack pattern: **Downward 35 feet needs repair**

Coating present: **No**

Interior Sidewall:

Concrete condition: **Good**

Concrete deterioration: **Cracks**

CONCRETE STRUCTURE

Cracking severity: **Minor**

Estimated total crack length: **135 feet**

Describe crack pattern: **Random; 0 feet need repair**

Interior Floor:

Concrete condition: **Good**

Concrete deterioration: **None**

Coating present: **Yes**

Topcoat condition: **Poor**

Previous coat condition: **Poor**

Describe coating: **Delaminating**

Sludge Pit:

N/A

Outer Trough:

N/A

ROOF:

N/A

CATHODIC PROTECTION :

N/A

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.

Secondary Clarifier WWTP



1) Secondary clarifier with catwalk and support steel.

2) Same.



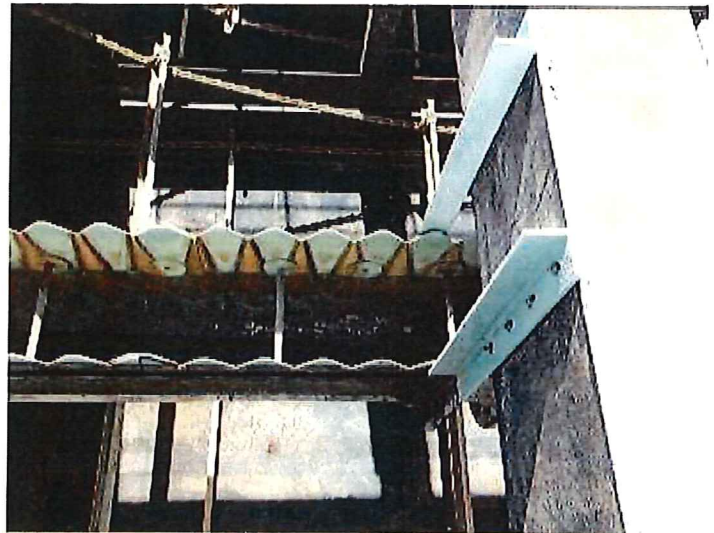
3) Same.

Secondary Clarifier WWTP



4) Fiberglass launders with weirs.

5) Same.



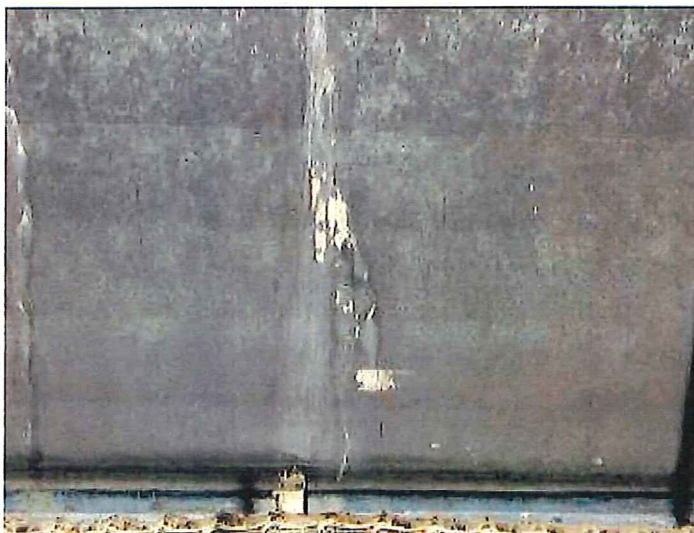
6) Same.



7) Cracking and spalling at top of interior sidewall.



8) Cracking on interior sidewall.



9) Interior wall cracking and coating delamination.



10) Coating failures on the floor.

11) Same.



12) Same.



13) Coating blistering on interior sidewalls.

14) Same.



15) Coating delamination on interior sidewalls.

Secondary Clarifier WWTP



16) The piping is in good condition.



17) The corner diffusers are in good condition.



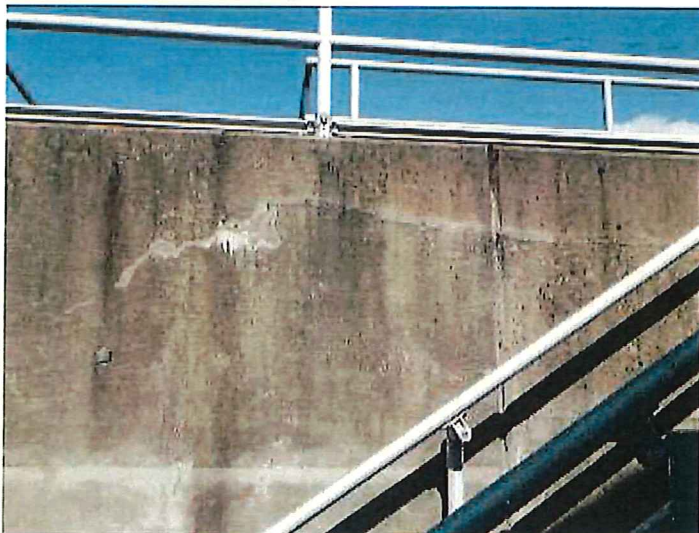
18) The sludge scrapers are in good condition.

Secondary Clarifier WWTP



19) Exterior concrete with cracking and efflorescence.

20) Same.



21) Same.