



Manatee County  
Lake Manatee WTP Basin A Inspection

## SUMMARY REPORT

DRAFT | March 2021







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## Section 1

# INTRODUCTION

Manatee County (County) owns and operates the Lake Manatee Dam and the Lake Manatee Water Treatment Plant (LMWTP), a facility with two surface-water treatment trains, permitted for 54 million gallons per day (MGD). LMWTP's surface-water treatment system draws and treats raw water from Lake Manatee, a water body that was created by an earthen dam constructed on the Manatee River. LMWTP also has a groundwater treatment train permitted for 30 MGD that receives groundwater from a wellfield located east of LMWTP.

The County retained Carollo Engineers (Carollo) to inspect and evaluate the structural integrity of the first treatment train, Basin A. The County discovered leaks and other signs of damage over the years. Carollo's scope of services includes documenting the condition, estimating the remaining useful life and repair recommendations. This evaluation does not include any assessment of the mechanical equipment inside Basin A, as the County already has a Capital Improvements Plan (CIP) project (PW01600) planned to start in FY2022 to replace the existing sludge collection mechanisms.

Based on a review of the construction document records provided to Carollo, the existing Basin A construction dates to February of 1965 with modifications that occurred in the year 1987. Carollo is not aware of any other modification or maintenance projects up to the date of this report.

On February 9, 2021, Carollo inspected Basin A to determine the condition and expected useful life of the structure. This report summarizes the findings of the inspection.

## Section 2

# STRUCTURAL CONDITION

The existing train consists of 16'-6" tall and 16" thick, reinforced concrete walls. The perimeter wall is supported on a 14'-0" wide x 16" deep concrete foundation and extends 16" beyond the exterior face of the wall. The interior slab foundation varies in thickness from 8" to 16". A sump pit is present along the West side of the tank wall. The top of walls consists of an elevated cantilevered 12" thick concrete slab which is shared as a walkway and/or track supports for the traveling bridge. The existing drawings show ½" expansion joints through the floor slab and appear to divide the floor slab into 6 areas along the East-West direction and at 20'-4" on center along the North-South direction.

The walls, and floor of the basin were observed to be generally in good condition. Appendix A includes photographs of each condition issue. Appendix B includes an aerial indicating the location of each photograph.

After the inspection of Basin A the following conditions were noted:

- **Condition A and H:** In the South-West corner of Basin A and near the main divider wall, there are several cracks in the concrete walkway that run diagonally across the width of the walkway.
- **Condition B:** Localized spalling of concrete overlay material (wearing surface) and crack formations were observed at the south section of the basin, along the divider curb at locations matching with the N-S expansion joints on the slab. It appears that the spalling of concrete and the formation of cracks were caused due to restrained thermal movements at these locations, since there were not expansion joints observed across the curbs at the locations of the N-S expansion joint.
- **Condition C:** At the North-East corner of the train, there is a crack formation at the corner of the baffle wall.
- **Condition D:** Damage of expansion joints surrounding concrete. This condition typically occurred at all vertical expansion joint wall locations.
- **Condition E and J:** All expansion joints appear to be damaged and deteriorated.
- **Condition F:** All interior wall surfaces appear to have coating decay.
- **Condition G:** Slab appears to have a spalled concrete surface area of 7 ft x 7 ft approximately where the depth of spall appears to be about 1". Carollo was unable to fully observe the extent of the damage due to rainwater ponding and mud covering the floor slab area.
- **Condition I:** At the perimeter of the North wall, there is a crack formation on the outside face of the wall.
- **Condition K:** At the junction of Filter A and B, a crack is actively leaking through the expansion joint. Carollo was unable to determine the origin of the leak while the channel was in service.
- **Condition L:** Expansion joint material deterioration over the entire floor slab.

## Section 3

# REPAIR RECOMMENDATIONS

Since the tank walls, columns, and floor slabs appear to be in relatively good condition, there are no major structural concerns except for the leakage at the junction of Filter A and B. To extend the life of the basin, Carollo recommends the following repairs:

In general, the structural repairs will consist of:

1. **Concrete cracks (Conditions A, C, H, I):** Repair cracked concrete with an epoxy injection to prevent it from deteriorating further. Clean the area in the vicinity of the cracks that will be injected with epoxy, so they are free from dirt and any other loose matter. Leave the area in a generally clean condition after the epoxy injection is complete. Refer to Appendix B for condition locations.

2. **Damaged concrete cover (Condition D):** Remove loose material and high-pressure water wash down the entire damaged surface area. Saw cut and remove to ½" thickness minimum, and repair damaged concrete with concrete repair mortar. At the time of application of concrete repair material, substrate shall be saturated to a surface dry condition.
3. **Expansion joints (Conditions E, J, and L):** Provide high-pressure water wash down of walls and slabs around expansion joints, and clean existing concrete surfaces to bare concrete. Remove and replace the sealant, backer rod, and existing expansion joint material in its entirety. Where necessary repair damaged concrete by bonding mortar with an epoxy bonding agent. As per the installation of new expansion joint material in the slab running underneath the divider curbs (**Condition B**), see next sub-section.
4. **Spalling of overlay concrete (Condition B) and Installation of expansion joints across divider curbs:** Saw cut and remove sections of concrete curb. The cut sections of concrete along the curb will be 4-inch long each centered at each location of the expansion joints in the slab to allow for the removal of existing expansion joint material and installation of new expansion joint material in the slab [see **Condition L** depicting concrete curb straddling over the expansion joints in the slab].
  - a. After installation activities of new expansion joints in the slab get completed, new ½" expansion joints across the curbs, along with new formed concrete on both sides of the expansion joint to fill the 4" gap of removed concrete will be installed. The new concrete will be cast against existing concrete surface in saturated surface dry conditions. Additionally, saw cut and remove spalled concrete area to a minimum depth of ½", epoxy inject existing cracks with grout as required, and fill damaged perimeter area of the curb with structural repair mortar to be cast and bonded to the existing surface in saturated surface dry conditions with an epoxy bonding agent.
  - b. Refer to Appendix B for locations of the curb.
5. **Damaged Concrete surface (Condition G):** Removed loose material of spalled concrete. After removal of spalled area which appears to be 1" in depth, saw cut, chip and remove to ½" thickness minimum, within the perimeter, rectangular in shape, of the damaged area. Prepare new surface to surface-dry-condition and fill with concrete repair mortar.
6. **Coating decay (Condition F):** Provide high-pressure water wash down of walls and clean existing concrete surfaces to bare concrete. Remove existing coating, repair any cracks as necessary and install new coating as directed by the manufacturer. Carollo will consult with a coating consultant to determine the appropriate coating, and will provide additional information in the final version of this TM.

## Section 4

# ENGINEER OPINION OF PROBABLE COST

Table 1 presents the cost estimate to make the recommended modifications and repairs to keep the basin in operation. The costs in Table 1 are current for 2020 and would have to be adjusted to the years of actual construction.

Table 1 Cost Estimate

Description		Total
Concrete Repair		\$5,000
Mortar Repair		\$25,350
Coating		\$1,032,500
Epoxy Injection		\$6,500
Expansion Joint Repair		\$376,860
Mortar Resurfacing		\$50,000
<b>TOTAL DIRECT COST</b>		<b>\$1,496,210</b>
Contingency	30%	\$448,863
Subtotal		<b>\$1,945,073</b>
General Contractor Overhead, Profit & Risk	15%	\$291,761
Subtotal		<b>\$2,236,834</b>
Sales Tax	7%	\$78,289
Subtotal		<b>\$2,315,123</b>
<b>TOTAL ESTIMATED CONSTRUCTION COST</b>		<b>\$2,315,123</b>
Engineering, Legal & Admin Fees	10%	\$231,512
<b>TOTAL ESTIMATED PROJECT COST</b>		<b>\$2,546,635</b>

Notes:

- (1) The cost estimate herein is based on our perception of current conditions at the project location. This reflects our professional opinion of accurate costs at the time and is subject to change as the project design matures. Carollo Engineers, Inc. have no control over variances in the cost of labor, materials, and equipment; nor services provided by others, contractor’s means and methods of executing work or of determining prices, or bidding strategies. Carollo Engineers, Inc. cannot and does not warrant or guarantee that proposals, bids or actual construction costs will not vary from the costs presented as shown.

## Section 5

# CONCLUSION

Based upon the observations made during the inspection, Carollo estimates the remaining useful life of the train to be 10 years. Basin A appears to be in good condition where the County can continue its use as long as maintenance and the recommended repairs are performed to keep the structural integrity and water-tightness of the basin.

Appendix A  
CONDITION PHOTOS

Table 2

CONDITIONS	OBSERVATION
A	Cracks on walkway slab.
B	Spalling of overlay concrete (wearing surface) at curbs.
C	Formation of diagonal crack on baffle walls.
D	Damage of expansion joints surrounding concrete.
E	Wall expansion joint material deterioration.
F	Coating decay at walls.
G	Slab appears to show concrete degradation over South-West of south train.
H	Cracks on walkway slab.
I	Crack formation on the outside face of perimeter wall.
J	Expansion joint material deterioration.
K	Leak through expansion joint.
L	Slab expansion joint material deterioration.



Condition A – Location: cracks on walkway slab.



Condition B – Location: spalling of mortar (wearing surface) at curbs.



Condition C – Location: formation of diagonal cracks on baffle walls.



Condition D – Location: damage of expansion joints surrounding concrete.



Condition E – Location: wall expansion joint material deterioration.



Condition F – Location: coating decay at walls.



Condition G – Location: slab appears to show concrete degradation over South-West corner of South Train.



Condition H – Location: cracks on walkway slab.



Condition I – Location: crack formation on the outside face of perimeter wall.



Condition J – Location: expansion joint material deterioration.



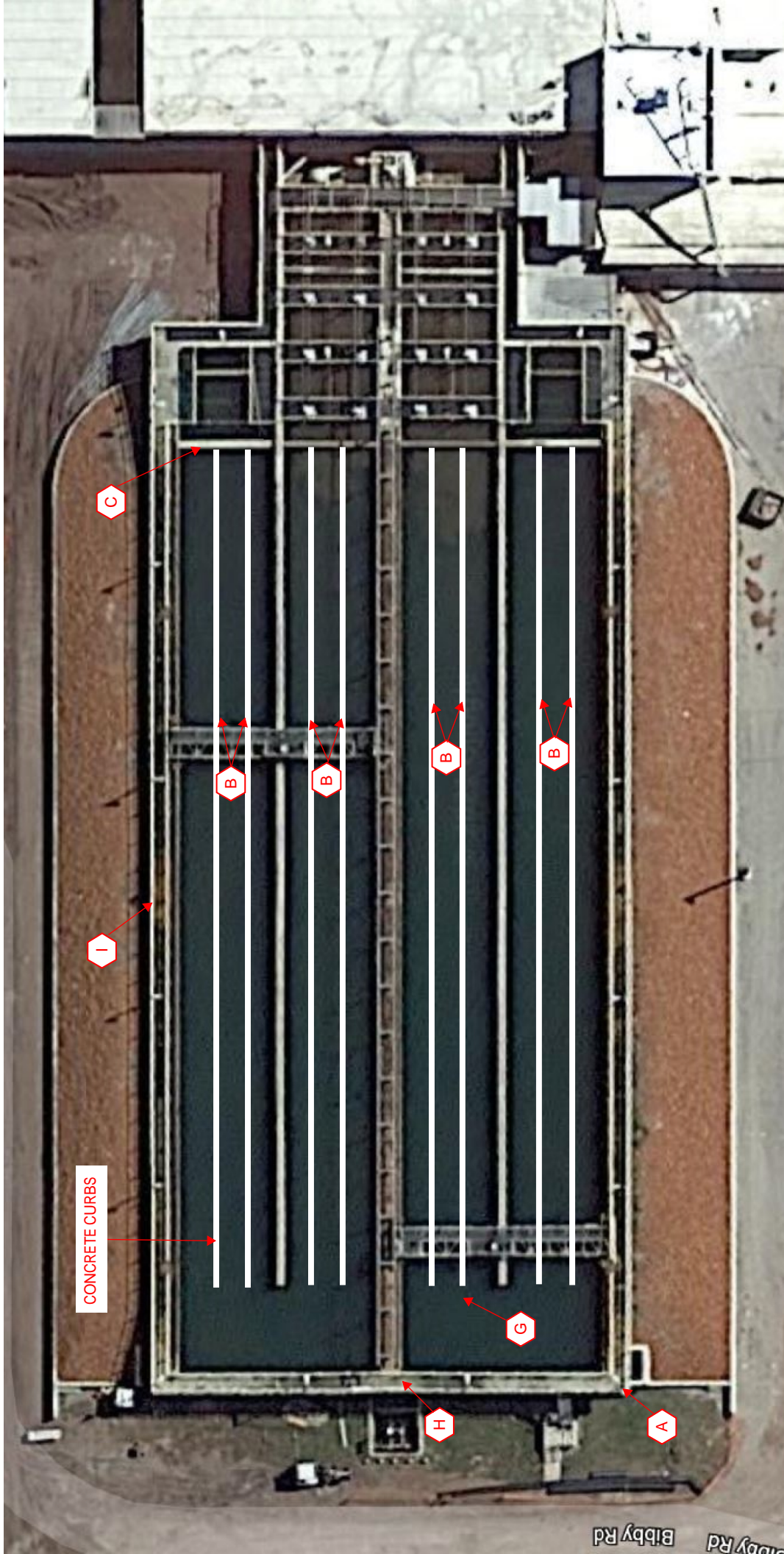
Condition K – Location: leak through expansion joint.



Condition L – Location: slab expansion joint material deterioration.

## Appendix B

# AERIAL



CONCRETE CURBS

C

B

B

B

B

I

G

H

A

Bibby Rd  
Candy Rd