Dixon Engineering, Inc.

Preliminary Maintenance Inspection

1,250,000 Equalization Basin B

Leesburg, Virginia

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

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CONCLUSIONS:

1. Equalization basin B is below ground and consists of a concrete floor and sloped dirt walls.

2. The basin is lined with a rubber liner on the walls, which is attached along the floor by aluminum strips and anchor bolts. Some of the bolts have come out of the floor. The liner is in fair condition with several rips and holes at the aluminum strips and at other random areas.

3. The concrete on the interior floor is in good condition. There are no signs of cracking or spalling.

4. One interior pipe coating sample was taken and analyzed for metal content. Test results indicated that the coating is a lead and chrome bearing coating.

RECOMMENDATIONS:

1. Complete the recommended work in 1 to 2 years. The coating work is the greatest cost.

2. Install a new 45 mil thick rubber liner on the interior sloped dirt walls. Secure edges of the liner at the concrete floor with aluminum strips and anchor bolts. Liner seams on slope should be heated and fused together with liquid sealant. Liner edges at the top of the walls should be buried. The estimated cost is $50,000.

3. Abrasive blast clean to a commercial grade (SSPC-SP10) the catwalks, support structures, and piping. Apply an epoxy urethane system to steel surfaces above the high water line and zinc epoxy system to steel surfaces below the high water line. The estimated cost is $50,000.

COST SUMMARY:

Install a new rubber liner	$50,000
Repaint catwalks and piping	50,000
Subtotal	$100,000
Engineering and Contingencies	$20,000
Total	$120,000

Note: Better prices will be obtained if combined with another major project.

INSPECTION:

On August 17, 2016, Dixon Engineering, Inc., performed a preliminary maintenance inspection on the 1,250,000 gallon Basin B owned by the Town of Leesburg, Virginia. Purposes of the inspection were to evaluate the interior coatings and liner performance and life expectancy; assess the condition of concrete surfaces and the tank's 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 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.

TANK INFORMATION:

The tank was built in 1988 and is underground. The tank is 124 feet by 179 feet with 21 foot long sloped dirt walls that are covered with a rubber liner. The floor is poured in place. The catwalk and piping were last painted in 1988.

CONDITIONS AND RECOMMENDATIONS:

WET INTERIOR LINER CONDITIONS:

The wet interior is lined with a rubber liner that covers the sidewalls and is in fair condition with numerous rips and other damage. The bottom edge of the liner is secured with aluminum strips and bolted into the concrete. There are a few of the bolts that are missing. The vertical seams of the liner have been heated and sealed together. The top edge of the liner has been buried.

WET INTERIOR LINER RECOMMENDATIONS:

Install a new 45 mil thick rubber liner on the interior sloped dirt walls. Secure edges of the liner at the concrete floor with aluminum straps and anchor bolts. Liner seams on the slope should be heated and fused together with a liquid sealant. Liner edges at the top of the walls should be buried. The estimated cost is $50,000.

INTERIOR STRUCTURE CONDITIONS:

The floor is poured in-place concrete with cold joints. There are no signs of cracking or spalling. The catwalk platforms are supported by concrete columns that are in good condition with no significant cracking or spalling.

INTERIOR STRUCTURE RECOMMENDATIONS:

The interior floor has not deteriorated to the point of needing repairs.

SITE CONDITIONS:

The basin site is at the wastewater treatment plant with an average sized staging area and is fenced.

METAL CONDITIONS:

Two catwalks run from the edge of the basin to the center and are constructed of steel beams and supports. The catwalks are in good condition but the coating is in poor condition with extensive surface corrosion on the support steel.

The piping in the interior runs along the catwalks to the center of the basin and extends down to the floor. The piping is in good condition but the coating is in fair condition. The pipes have general surface rust with delamination.

The coating was tested at 1.6 percent (16,000 ppm) lead by weight, 0.28 percent (2,800 ppm) chromium by weight. Special considerations will be needed during maintenance to avoid contamination of workers, and prevent generation of a hazardous waste.

METAL RECOMMENDATIONS:

Abrasive blast clean to a commercial grade (SSPC-SP6) the steel catwalk beams, support structure, and piping. Apply an epoxy urethane system to steel surfaces above high water line and zinc epoxy system to steel surfaces below the high water line. The estimated cost is $50,000.

ANALYTICAL LABORATORY REPORT

Tuesday, August 30, 2016

CUSTOMER: Dixon Engineering
1104 3rd Ave.
Lake Odessa, MI 48849

DATE RECEIVED: Thursday, August 25, 2016
PO/PROJECT #:
SUBMITTAL #: 2016-08-25-011

LAB NUMBER: AC18434

Sampled By: Dustin Houghton
Job Location: Leesburg, VA 1.25MM Basin B (East)
Sample Identification: 1: Leesburg, VA 1.25MM Basin B (East) - Wet Interior

Date Sampled: Wednesday, August 17, 2016
Sample Description: Paint Chips

Preparation Method: EPA 3050B-P-M (Acid Digestion for Paints)
Analysis Method: EPA 6010C-M (ICP-AES Method for Determination of Metals)
Date Analyzed: Monday, August 29, 2016

ELEMENT	RESULT (by dry weight)	REPORTING LIMIT (RL)
Cadmium	< RL	0.00075 %
Chromium	0.0057 %	0.0013 %
Lead	< RL	0.0025 %

ANALYTICAL LABORATORY REPORT

Tuesday, August 30, 2016

CUSTOMER: Dixon Engineering
1104 3rd Ave.
Lake Odessa, MI 48849

DATE RECEIVED: Thursday, August 25, 2016
PO/PROJECT #:
SUBMITTAL #: 2016-08-25-012

LAB NUMBER: AC18435

Sampled By: Dustin Houghton
Job Location: Leesburg, VA 1.25MM Basin B (East)
Sample Identification: 1: Leesburg, VA 1.25MM Basin B (East) - Catwalk

Date Sampled: Wednesday, August 17, 2016
Sample Description: Paint Chips

Preparation Method: EPA 3050B-P-M (Acid Digestion for Paints)
Analysis Method: EPA 6010C-M (ICP-AES Method for Determination of Metals)
Date Analyzed: Monday, August 29, 2016

ELEMENT	RESULT (by dry weight)	REPORTING LIMIT (RL)
Cadmium	**< RL**	0.00075 %
Chromium	**0.28 %**	0.0013 %
Lead	**1.6 %**	0.0025 %

DIXON ENGINEERING, INC.
CONCRETE TANK FIELD INSPECTION REPORT

DATE: **August 17, 2016**

OWNER: **Town of Leesburg**
CLIENT CODE: **46-55-01-36**
TANK NAME: **Equalization Basin B (east)**
LOCATION: Street: **1391 E. Market St.**
City: **Leesburg**
State: **Virginia**
TANK SIZE: Capacity: **1,250,000 gallons**
Length: **179 feet** Width: **124 feet (measured)**
Height to overflow (HWL): **19 feet (estimated)**
Sidewall Height: **21 feet**
CONSTRUCTION: **Cast in Place**
Type of Roof: **No roof**
Tank Layout: **Below grade**
DATE CONSTRUCTED: **1988**
MANUFACTURER: **Unknown**
CONTRACT NUMBER: **Unknown**

COATING HISTORY:	EXTERIOR	WET INTERIOR
DATE LAST COATED	**1988**	**1988**
CONTRACTOR	**Unknown**	**Unknown**
PAINT SYSTEM	**Unknown**	**Unknown**
SURFACE PREPARATION	**Unknown**	**Unknown**
PAINT MANUFACTURER	**Unknown**	**Unknown**
PAINT SAMPLES	**Yes**	**NA**
HEAVY METAL COATING	**Yes 1.6% Lead 0.28% Chrome**	

PERSONNEL: Inspector **John Watson**, Top person **Dustin Houghton**,
Ground person **Lee Jamison**
TYPE OF INSPECTION: **Preliminary Maintenance**
METHOD OF INSPECTION: **Dry**
DATE LAST INSPECTED: **N/A**

SITE CONDITIONS:

Fenced: **Yes**
Control building: **Yes**
Location: **Adjacent to tank**
Site conditions: **Well maintained**
Neighborhood: **Wastewater Plant**
Shrub, tree, etc. encroachment: **No**
Site Comments: **Inside wastewater plant property**

EXPOSED PIPING:

Location: **Adjacent to tank**
Condition of pipe coating: **Poor**
Describe coating: **Delaminating, spot coating failures to substrate, and rust bleedthrough**
Condition of metal: **Good**
Piping comments: **Piping runs along catwalks, extends from edge of basin to the center**

FOUNDATION:

Foundation exposed: **No**
Separate foundation: **Not visible**
Indications of settlement: **No**
Surface drainage: **Away from foundation**
Footing drains: **Unknown**
Indications of underground leakage: **No**
Undermining of tank: **No**

CRACK GRADES

Crack Grade	Width
1	Tight, no separation - dormant
2	Tight to up to fingernail width
3	Fingernail width up to 1/8 inch
4	1/8 up to 1/4 inch
5	Greater than 1/4 inch

EXTERIOR:

SIDEWALL:

Not exposed

EXTERIOR APPURTENANCES:

Overflow pipe: (2)

Inside diameter: **12 inches**
Coating condition: **Not coated**
Metal condition: **Good**
Condition of screen: **None present**
Flap gate: **No**
Air gap: **No**
Splash pad: **No**
Overflow comments: **Overflow pipe is in sidewall of basin, joining both basins; 2 feet down from top of sidewall; second overflow on southwest corner, funnel shaped**

Sidewall manway:

N/A

Exterior ladder:

N/A

CRACK GRADES

Crack Grade	Width
1	Tight, no separation - dormant
2	Tight to up to fingernail width
3	Fingernail width up to 1/8 inch
4	1/8 up to 1/4 inch
5	Greater than 1/4 inch

WET INTERIOR:

Tank Sidewall:

Concrete condition: **Unknown**
Rusting at surface: **Unknown**
Liner Present: **Yes**
Location: **Entire sidewall**
Type of coating: **Rubber liner**
Coating condition: **Poor**

WET INTERIOR:

Describe coating: **Random rips and tears in liner at top 2-3 feet of sidewall, below high water line; cracks, rips, and tears around concrete supports for catwalks; shrubs growing in rips and seams; dirt berm under liner**

Tears/rips (interior sidewall):

Number of tears: **5-6**

Total length of cracking: **5+ feet**

Rips/tears Descriptions:

Location: **Northwest corner halfway up liner; 2-3 feet length total; shrubs growing out**

Grade: **5**

Length: **5+ feet**

Orientation: **Vertical and horizontal**

Location: **Around concrete supports for catwalks**

Grade: **4**

Length: **2 feet**

Orientation: **Horizontal and vertical**

Location: **Random to 2 feet of all 4 sidewalls (patched)**

Grade: **4**

Length: **2-3 feet**

Orientation: **Horizontal and vertical**

Tank floor:

Concrete condition: **Fair**

Rusting at surface: **No**

Coating Present: **No**

Interior Floor comments: **Tank floor dimensions 52 x 103 feet with two 2 inch x 21 feet sump pits joined by a 30 ½ feet x 20 inch x 30 inch channel**

Wall to Floor Junction:

Floor to wall separation: **No**

Curb present: **Yes**

Size: **6 inches x 103 feet**

Curb sealed: **Yes**

Describe sealing material: **Sidewall liner bolted to floor curb**

WET INTERIOR:

Sediment and Sump:

Sediment depth: **> ½ inches**
Sediment distribution: **Uniform**
Could sediment distribution indicate a leak: **No**
Sump present: **Yes**
Size: **21 feet x 21 feet x 30 inches**
This sump is used for: **Pumps**
Sediment and sump comments: **Six 5 inch flap gates in sump and channel**

WET INTERIOR ACCESSORIES:

Tank ladder:

N/A

Draw pipe:

Diameter: **12 inches**
Height above floor: **12 inches**
Configuration: **Stubs at wall**
One way valves present: **No**
Deflector on end: **No**
Removable silt ring: **No**
Mixing system: **Yes**
Type: **Power mixer**
Metal condition: **Good**

Fill pipe: (2)

Diameter: **8 inches**
Height above floor: **42 inches**
Deflector over end: **Yes**
Removable silt ring: **No**
Coating condition: **Poor**
Metal condition: **Good**

Overflow: (2)

Type of inlet: **Funnel and straight pipe**
Condition: **Good**
Coating condition: **No coating**
Overflow comments: **Two overflows - one funnel and 1 straight pipe; straight pipe joins basins**

WET INTERIOR ACCESSORIES:

Columns: (Catwalk)

Number: **16**
Dimensions: **21 feet x 24 inch diameter**
Shape: **Round**
Condition: **Good**
Base flare: **No**
Roof flare: **No**
Column comments: **Eight 24 inch columns run from sump to catwalk**

Columns: (fill pipe deflector)

Number: **16**
Dimensions: **16 inches x 3 feet tall**
Shape: **Round**
Condition: **Good**
Base flare: **No**
Roof flare: **No**
Column comments: **Eight 16 inch columns run from sump to fill pipe deflector**

Baffle walls:

N/A

Roof penetrations:

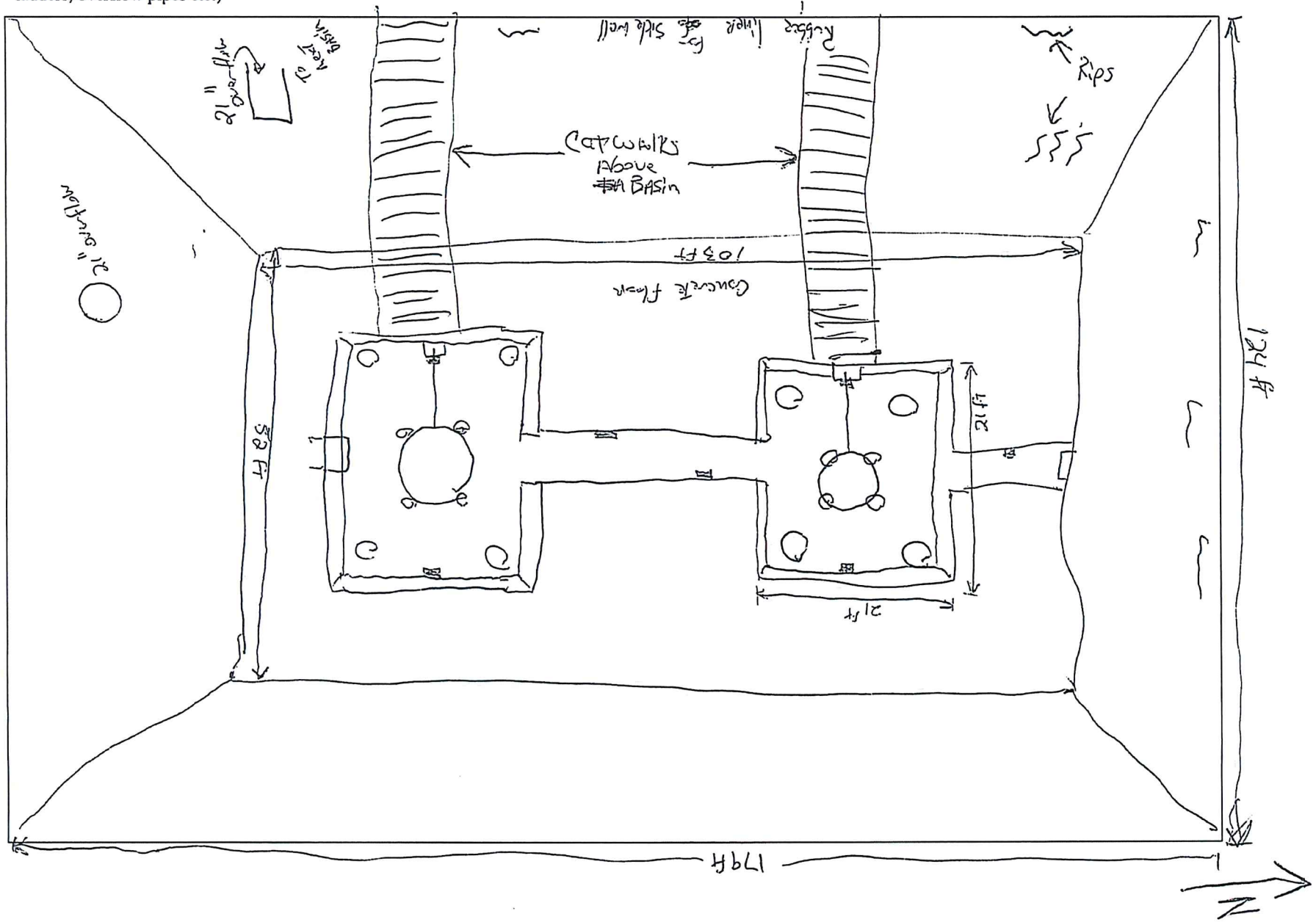
N/A

Sidewall penetrations:

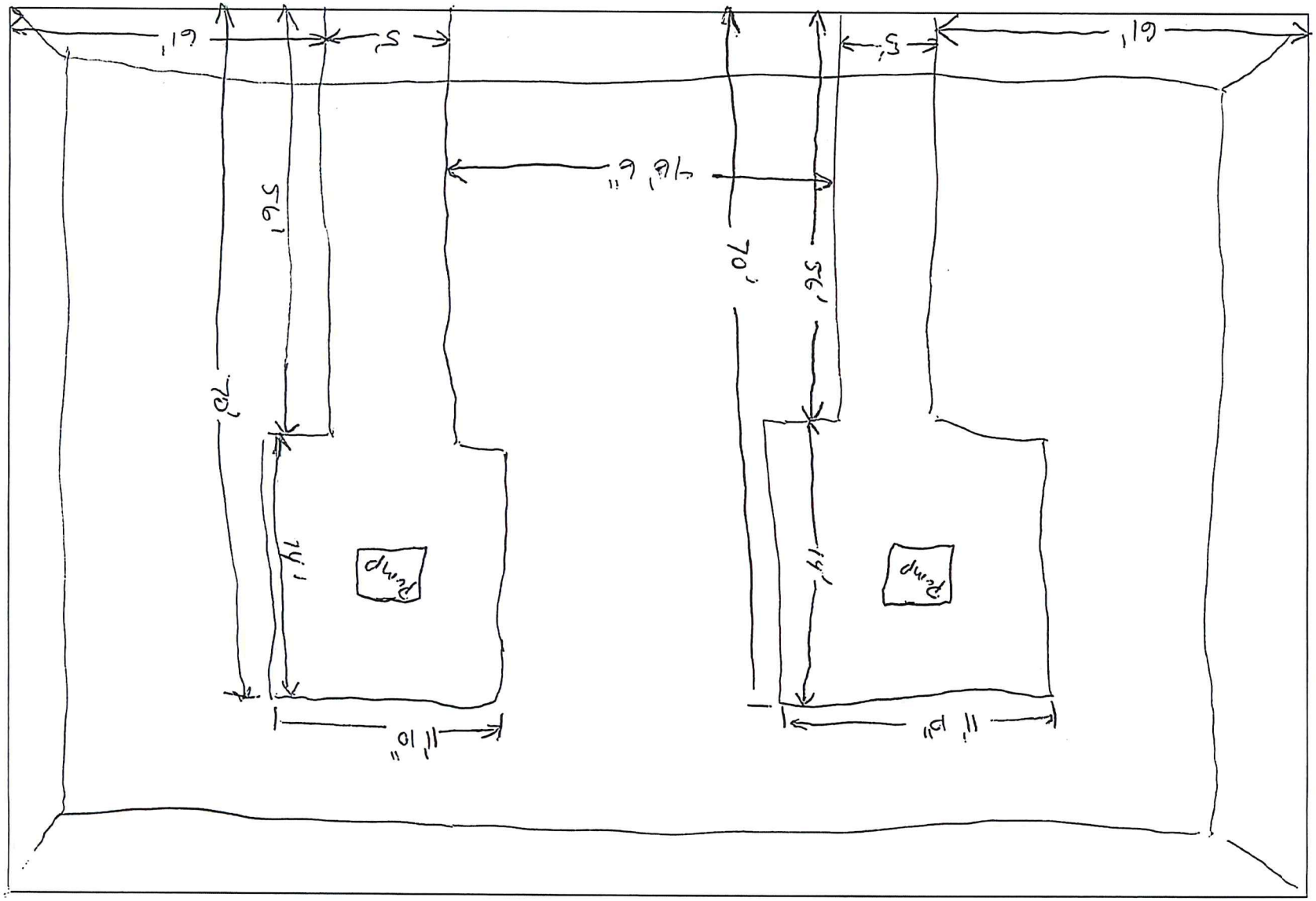
Number: **2**
Purpose: **Overflow pipes**
Condition: **Good**

Field Inspection Report is prepared from the contractor's viewpoint. It contains most of the information the contractor needs to prepare his bid for any repairs or repainting. The Engineer uses it to prepare the engineering report. Cost estimates are more accurate if contractor 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.

~~EXTERIOR SIDEWALL~~ BOTTOM SECTION: Sketch cracking (label side if rectangle shaped, label quadrant if round, sketch markers such as manways, ladders, overflow pipes etc.)



~~EXTERIOR SIDEWALL~~ Top Section Catwalks SECTION: Sketch cracking (label side if rectangle shaped, label quadrant if round, sketch markers such as manways, ladders, overflow pipes etc.)

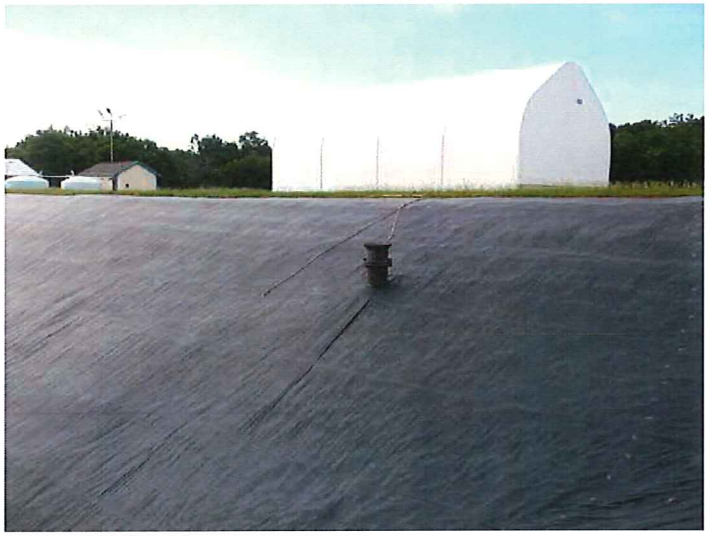


2 →

Basin B EAST

1) Equalization basin B with rubber liner

2) Same.

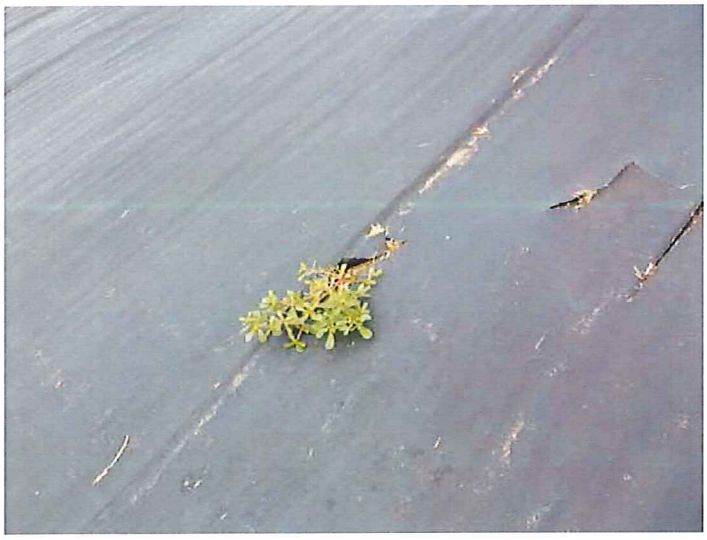


3) Same.

Basin B EAST

4) Pipe penetration in liner with vegetation growth.

5) Same.

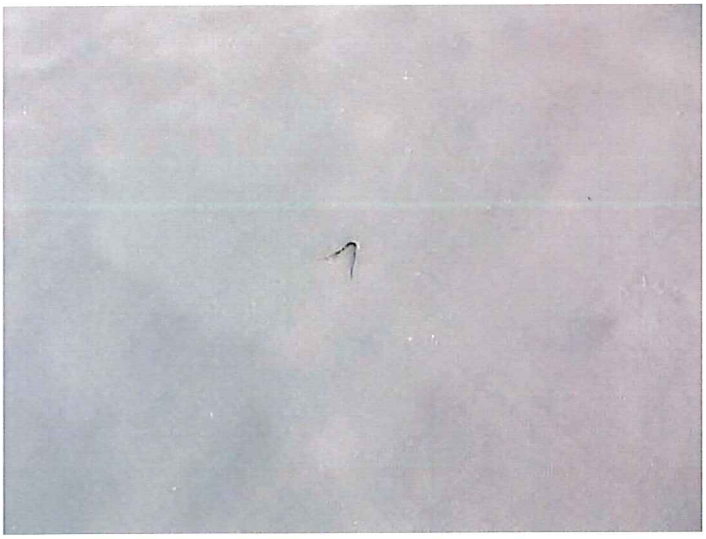


6) Tears in liner.

Basin B EAST

7) Same.

8) Holes in liner.



9) Same.

Basin B EAST

10) Aluminum strip securing bottom of liner.

11) Same.

12) Same.

Basin B EAST

13) Concrete floor slab is in good condition.

14) Same.

15) Same.

Basin B EAST

16) The catwalk structural steel and piping coating is in poor condition.

17) Same.

18) Same.

Basin B EAST

19) Catwalk supports have general surface rusting.

20) Same.

21) Same.