Community Assistance Planning Report No. 330

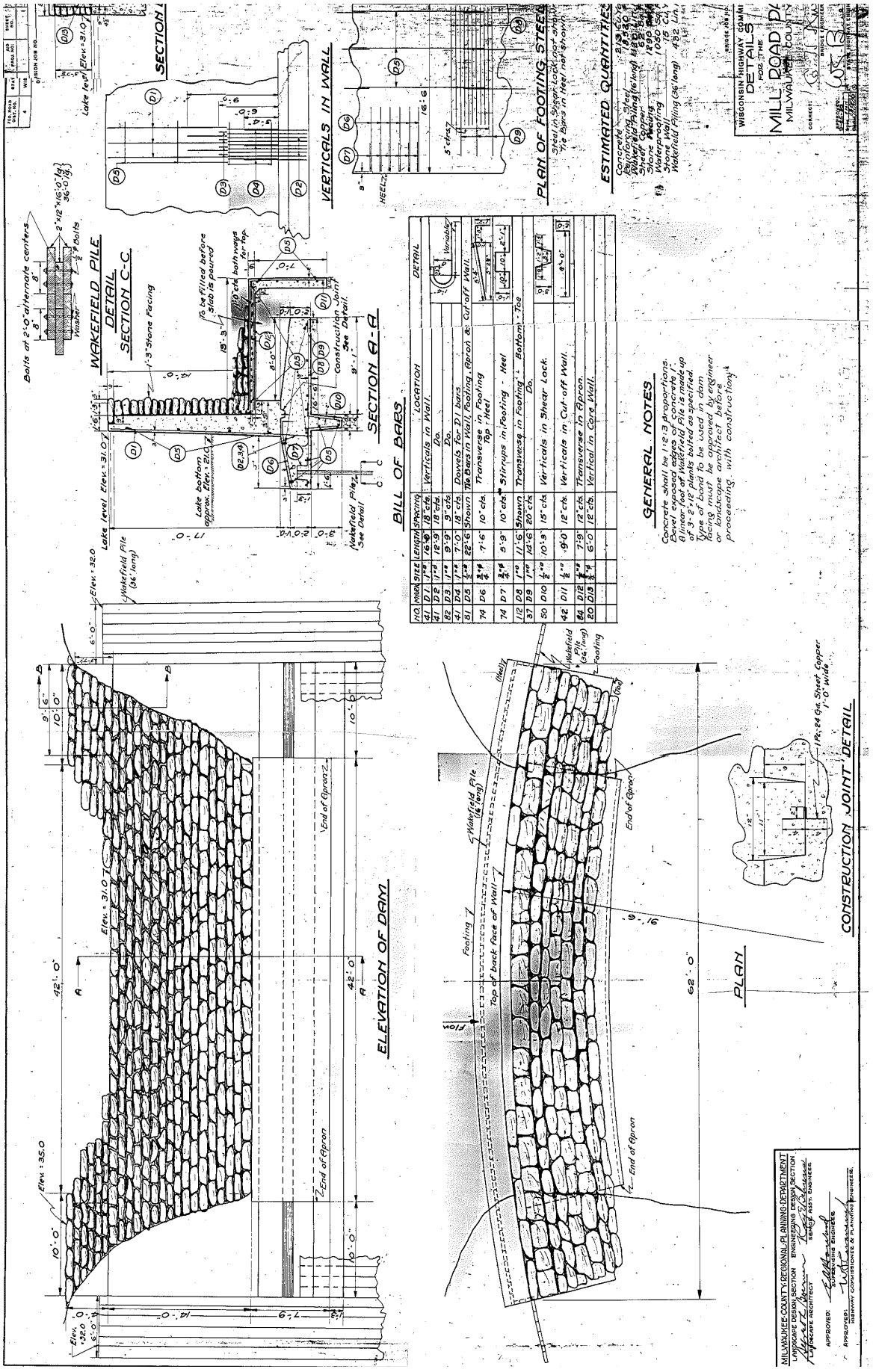
A RESTORATION PLAN FOR THE OAK CREEK WATERSHED

## Chapter 4

# INVENTORY FINDINGS

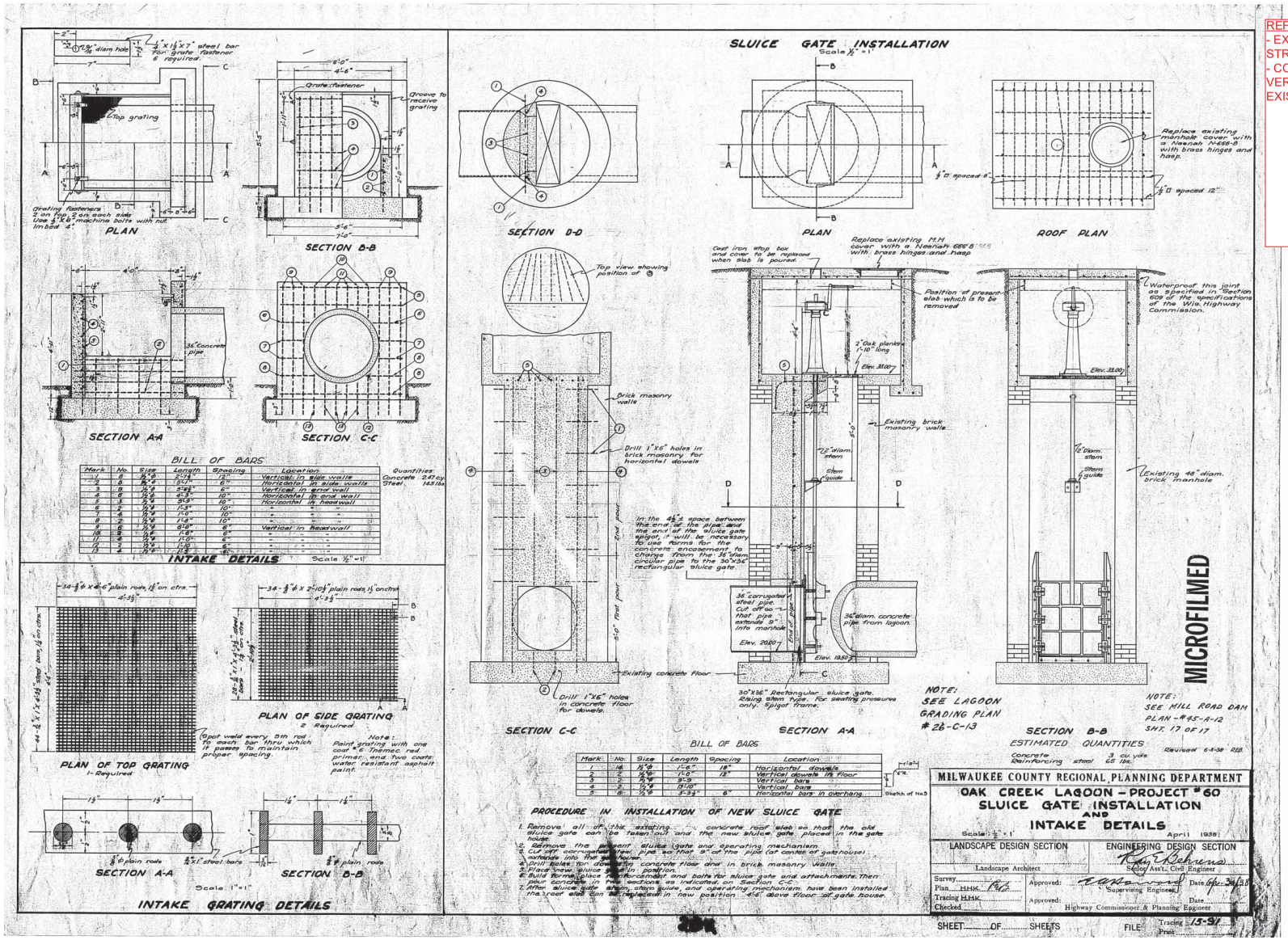
APPENDIX DAM

**Figure Appendix.Dam-1**
**1932 Construction Plans for the Oak Creek Mill Pond Dam**




*Source: Milwaukee County*

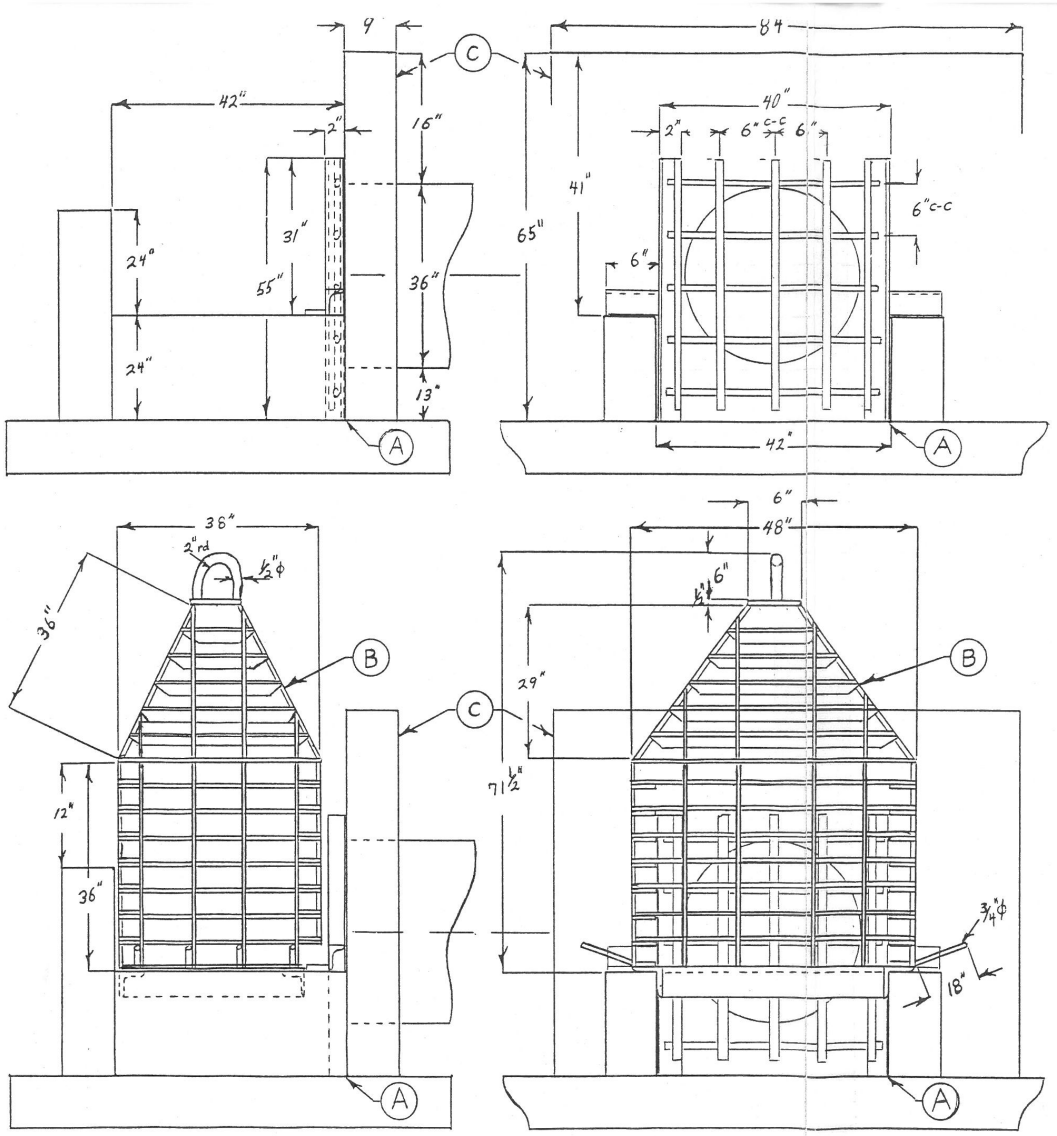
## Figure Appendix.Dam-2
## 1938 Construction Plans for the Sluice Gate for the Oak Creek Mill Dam




REFERENCE DRAWING #1
- EXISTING MANHOLE STRUCTURE DRAWINGS
- CONTRACTOR TO FIELD VERIFY CONDITION OF EXISTING STRUCTURE

*Source: Milwaukee County*

## Figure Appendix.Dam-3
## 1989 Design Plan for the Sluice Gate Intake Grate




FILE

Oak Creek Lagoon
Sluice Gate Intake Grating

(A) 2 pcs. 3/8" x 2" x 2" angel x 55"
6 pcs. 5/8"ϕ x 50"
8 pcs. 5/8"ϕ x 38"
2 pcs. 3/8" x 2" x 2" angel x 6"

(B) Heavy-Weld Steel Grating
Bar grating 2½" x 3/8" HW3-E-250, 19.4 p.s.f.
2 pcs. 36" x 38" } TOP cut to siz.
2 pcs. 36" x 48" }
2 pcs. 36" x 38"
2 pcs. 36" x 48"
1 pcs. ½" x 6" x 6" plate
1 pcs. ½"ϕ x 15"
18 pcs. 3/4"ϕ x 20"

(C) Concrete Foundation

Milwaukee County Parks Service
# MGA-G04-WS 8302

Drawn By Gary H. Stewart
Welding Sup. December 19, 1989

Not to scale

RECEIVED
DEC 20 1989
ARCH. & ENG. DIV.
MILWAUKEE COUNTY

*Source: Milwaukee County*

**State of Wisconsin**
**DEPARTMENT OF NATURAL RESOURCES**
**Waukesha Service Center**
**141 NW Barstow St. Room 180**
**Waukesha, WI 53188**

**Scott Walker, Governor**
**Cathy Stepp, Secretary**
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711

June 1, 2015

John Dargle, Director
Milwaukee County Department of Parks, Recreation and Culture
9480 Watertown Plank Road
Wauwatosa, WI 53226-3560

Subject: Time Extension for South Milwaukee Mill Dam (Field File 40.05, Milwaukee County)

Dear Mr. Dargle:

We received your letter which provides an update on Milwaukee County's actions related to the South Milwaukee Mill Dam and requests a time extension for the completion of directives. The Department of Natural Resources (Department) is extending the deadline for the directives with several conditions described below.

**Timeline History**

On November 19, 2012, the Department conducted an inspection of the South Milwaukee Mill Dam. The inspection report includes timeframes for addressing deficiencies and improving the safety and structural integrity of the dam. The timeframe for completing the gate repairs, investigation of masonry, benchmark installation and tree and brush removal was set for June 1, 2014.

On December 4, 2013 Steven A. Elver, P.E., S.E., of AECOM performed a field inspection of the masonry. The inspection report addressed repairs to the masonry stone. At that time Milwaukee County requested an extension to December 31, 2014 to allow time for additional funding to be acquired.

In late 2014 the County performed an in-depth evaluation of the sluice gate to determine why it was inoperable. At that time it was found that the lake drain inlet was covered with approximately 10' feet of sediment. Also the manhole containing the sluice gate makes the repair or replacement difficult in the confined space. At that time Milwaukee County requested an extension to December 31, 2015. The trees and brush have been removed and the directive modified to address the remaining stumps and roots greater than 1 inch.

Preliminary design plans were submitted to the Department in March 2015. The preliminary plans involved removing the existing manhole and constructing a new manhole with a new sluice gate. The manhole and gate would be connected to the existing lake drain intake pipe and the existing outfall pipe. The Department identified concerns with sediment management. Sediment sampling completed in 2001 identified Polycyclic Aromatic Hydrocarbons (PAHs). The Department is concerned that if the gate would be replaced and operated a significant amount of contaminated sediment would be transported downstream and into Lake Michigan.

On April 7, 2015 a conference call was held between Department staff, Milwaukee County staff and Chris Lewis of AECOM.

**Extension and Conditions**

The Department is extending the deadline for repairs to accommodate the preparation and findings of the Southeastern Wisconsin Regional Planning Commission (SEWRPC) Report of the Oak Creek Watershed. By December 31, 2018, the County shall complete the following:

- Submit Inspection, Operation and Maintenance plan (IOM).

- Inspect the dam regularly, monitoring for seepage and stability of masonry stone. Submit documentation of inspections yearly to the Department.
- Submit the published SEWRPC report.
- Identify long term costs associated with maintaining the dam and impoundment.
- Hold a public information meeting.
- Determine the long term disposition of the dam.

**DIRECTIVES**

The following deficiencies must be corrected by the dates given:

| | | |
|---|---|---|
| 1. | Replace the two missing capstones and reset the shifted capstone on the left abutment. | September 1, 2019 |
| 2. | Establish benchmarks | September 1, 2019 |
| 3. | Removal of stumps and roots greater than one inch along embankments | September 1, 2019 |
| 4. | Repair or reconstruct sluice gate | September 1, 2019 |

**Please note that repairs required under items 3 and 4 above must be designed by an engineer registered in the State of Wisconsin and plans must be submitted to this Department for review and approval before any work is performed on the dam.**

If you are unable to meet the schedule proposed above, submit your own schedule, in writing, for completing the required modifications and repairs. In order for us to consider a schedule other than the one we have determined, you must submit your alternative schedule by **September 1, 2015**. If we do not hear from you by then, the schedule we have determined will be in effect.

If you have questions concerning this letter or the operation and maintenance of your dam, or are uncertain how to precede with the directives, please contact me at Nathan.Zoch @wisconsin.gov or (262) 574-2188.

Sincerely,

Nathan Zoch
Water Management Engineer

cc: Bill Sturtevant, P.E., State Dam Safety Engineer – DNR GEF II, WT/3 (via email)
Michelle Scott, South District Waterways Supervisor – DNR (via email)
Karl Stave, Milwaukee County (via email)
Jim Keegan, Milwaukee County Department of Parks and Rec. (via email)

**State of Wisconsin**
**DEPARTMENT OF NATURAL RESOURCES**
**Waukesha Service Center**
**141 NW Barstow St. Room 180**
**Waukesha, WI 53188**

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Toll Free 1-888-936-7463
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December 29, 2014

John Dargle, Director
Milwaukee County Department of Parks
9480 Watertown Plank Road
Wauwatosa, WI 53226-3560

Subject: South Milwaukee Mill Dam, Directive Extension, Field File # 40.05, Milwaukee County

Dear Mr. Dargle:

We received your letter request for a time extension to be used for the completion of directives. Milwaukee County has requested a time extension from December 31, 2014 to **December 31, 2015** to allow the county time to obtain funding and to perform the necessary repairs to the South Milwaukee Mill Pond Dam.

The county has made significant progress toward completing the directives. The first step of the Tree and Brush removal has been completed. Removal of stumps and roots greater than one inch is needed to complete this directive. The sluice gate and inlet structure have been more closely inspected. Possible construction techniques and alternative methods for the repairs have been evaluated.

**DIRECTIVES**

The following deficiencies must be corrected by the dates given:

| | | |
|---|---|---|
| 1. | Replace the two missing capstones and reset the shifted capstone on the left abutment. | December 31, 2015 |
| 2. | Establish Benchmarks | December 31, 2015 |
| 3. | Removal of Stumps and Roots greater than one inch along embankments | December 31, 2015 |
| 4. | Repair or reconstruct sluice gate | December 31, 2015 |

**Please note that repairs required under items 3 and 4 above must be designed by an engineer registered in the State of Wisconsin and plans must be submitted to this Department for review and approval before any work is performed on the dam.**

If you are unable to meet the schedule proposed above, submit your own schedule, in writing, for completing the required modifications and repairs. In order for us to consider a schedule other than the one we have determined, you must submit your alternative schedule by **December 1, 2015**. If we do not hear from you by then, the schedule we have determined will be in effect.

If you have questions concerning this letter or the operation and maintenance of your dam, or are uncertain how to precede with the directives, please contact me at Nathan.Zoch @wisconsin.gov or (262) 574-2188.

Sincerely,

Nathan Zoch
Water Management Engineer

cc: Bill Sturtevant, State Dam Safety Engineer – DNR (WT/3)
Michelle Scott, South District Waterways Supervisor – DNR (via email)
Jill Organ, Milwaukee County Department of Parks and Rec. (via email)
Jim Keegan, Milwaukee County Department of Parks and Rec. (via email)

**State of Wisconsin**
**DEPARTMENT OF NATURAL RESOURCES**
**2300 N. Dr. Martin Luther King, Jr. Drive**
**Milwaukee WI 53212-3128**

**Scott Walker, Governor**
**Cathy Stepp, Secretary**
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711

WISCONSIN
DEPT. OF NATURAL RESOURCES

November 27, 2012

James Keegan, Interim Director
Milwaukee County Department of Parks, Recreation and Culture
9480 Watertown Plank Road
Wauwatosa, WI 53226-3560

Subject: Dam Inspection Report for South Milwaukee Mill Dam
Field File 40.05, Key Sequence 1332, Milwaukee County

Dear Mr. Keegan:

This is the Department of Natural Resources' (Department) Dam Safety Report based on our inspection of the South Milwaukee Mill Dam on October 26 and November 19, 2012. This report identifies work that needs to be done on the dam and a schedule for when that work is to be completed. Please contact me if you have questions about the needed repairs or are uncertain how to proceed.

The South Milwaukee Mill Dam is classified as a small dam. It is located in the northeast one-quarter of the northeast one-quarter of U.S. Public Land Survey Section 11, Township 5 North, Range 22 East, in Oak Creek at the City of South Milwaukee, Milwaukee County. It consists of dolomite blocks to form a masonry-type retaining wall for a 35-foot long overflow spillway. The dam also has an earthen embankment which extends approximately 30 feet on either side of the spillway, from the impoundment to the downstream slopes to the channel. The dam also has a 36-inch drain pipe with a sluice gate that was designed to lower water levels for maintenance, as needed.

Wisconsin has an excellent record of safety regarding dams. Our safety standards are meant to protect the public and reduce the likelihood of dam failures; therefore, past failures have not resulted in death, injury, or significant property damage. However, I would like to caution you on one potential liability issue. Unfortunately, every year accidents are reported on or near code-compliant dams. My safety inspection does not address injury that could result from trespass or other inappropriate behavior on the dam site. Your insurance carrier may be able to assist you in protection from this type of liability.

**EMBANKMENT REPAIRS** **June 1, 2014**

Trees and brush were noted growing on several portions of the embankment. Removal of vegetation is important for a number of reasons and I have included our Fact Sheet on "Vegetation Control on Dams" for your information. All the trees and brush are to be removed from either side of the spillway, the side slopes between the spillway and Mill Road bridge, and the side slopes downstream of the Mill Road bridge.

**The tree removal is extensive enough to require that plans and specifications be submitted by an engineer registered in the State of Wisconsin. The plans and specifications must be approved by this Department prior to initiation of the removal process.** The plans shall include the complete removal of stumps and roots over one inch in diameter, filling of the holes with firmly compacted tight soils, and adding topsoil and grass seed to establish grass growth.

The embankment should then be mowed on a regular basis so that the growth does not exceed 6 inches at any time. Foot traffic has caused erosion and sparse grass at several locations on the embankment. Efforts should be made to maintain dense/healthy grass cover on the embankments.

**INVESTIGATION OF "MASONRY"** **June 1, 2014**

During the inspection, some deterioration and loss of the masonry-type section was observed at both abutments. The Department does not have adequate safety equipment to thoroughly inspect the condition of these components.

The extent of the investigation requires that an engineer registered in Wisconsin complete a structural evaluation of the spillway abutments and determine whether "masonry" repairs are required. The Department may establish additional timelines related to "masonry" repairs following the structural evaluation. If it is determined that repairs are necessary, submit the plans and specifications to this office for approval prior to initiating any work on the dam.

**GATE REPAIRS** **June 1, 2014**

The dam has a 36-inch drain pipe with a sluice gate that was designed to lower water levels for maintenance, as needed. The gate was not operated during the inspection and it is my understanding that the sluice gate is inoperable. Please ensure the gate is operable by the date shown. The operating mechanism for the gate must be kept in a secure yet accessible location.

It is important that the gate be "exercised" annually to ensure that it will work in the event of emergency or routine maintenance. Operation of the valve should be performed with great caution to avoid accidentally draining the impoundment. Open the valve a little and close it. Then open it a little more and close it. Keep this up until the valve is at least half open. This will be a sufficient test. Please test the valve and document its completion in writing by the date shown.

**BENCHMARK INSTALLATION** **June 1, 2014**

For the purpose of future surveys, at least two benchmarks should be established for the dam with one benchmark at a location off the dam and one at a location on the dam. The benchmarks must be tied to each other, in either National Geodetic Vertical Datum of 1929 (NGVD29) or North American Vertical Datum of 1988 (NAVD88). Benchmark 481-E which is located on the dam is still intact. I would like you to establish one benchmark at a location off the dam. After completing the work, please provide me with documentation from a registered land surveyor regarding the location and elevations. Documentation of an existing benchmark for nearby roads or bridges would also be sufficient.

| **SUMMARY OF REQUIREMENTS** | **DATE** |
|---|---|
| Embankment Repairs | June 1, 2014 |
| Investigation of "Masonry" | June 1, 2014 |
| Gate Repairs | June 1, 2014 |
| Benchmark Installation | June 1, 2014 |

If you are unable to meet the schedule proposed above, submit your own schedule, in writing, for completing the required modifications and repairs. In order for us to consider a schedule other than the one we have determined, you must submit your alternative schedule by **April 1, 2014**. If we do not hear from you by then, the schedule we have determined will be in effect.

**SUFFICIENCY RATING**

Based upon the Department's Dam Safety Inspection, I completed a Sufficiency Rating for South Milwaukee Mill Dam. The Sufficiency Rating is a snapshot of the dam's physical condition. The dam is classified as **Conditionally Fair** because of the vegetation on the embankment, inoperable valve, and deterioration of the "masonry". By completing these items, it may be possible to change the classification to Satisfactory or Fair. The Sufficiency Rating helps the Dam Safety Program track progress of the dam and whether the Program is meeting its goal of promoting safe dams. The rating has no direct consequence of enforcement; however, not completing directives listed above could trigger enforcement.

Wisconsin Statutes prohibit the sale of real estate containing a dam unless the Department issues a permit for a transfer for the dam. There are limitations on the transfers of dams owned by a municipality or county. Please contact me if you are considering the sale of your property and dam.

If you have any questions concerning this report or the operation and maintenance of your dam, please call me at (414) 263-8641, email me at Tanya.Lourigan@wisconsin.gov, or write to the address above.

Thank you for your continued cooperation in maintaining safe dams in Wisconsin.

Sincerely,

Tanya L Lourigan

Tanya L. Lourigan, P.E.
Water Management Engineer
Milwaukee Service Center

cc: Milwaukee County Supervisor Patricia Jursik
Mayor Tom Zepecki – City of South Milwaukee
Mary Nelson
Bill Sturtevant – Department State Dam Safety Engineer

**South Milwaukee Mill Dam (Field File # 40.05)**
**Photo Log**
Inspection Report (November 27, 2012)

Photo #1 – Principal spillway
(November 19, 2012)

Photo #2 – Downstream stone apron
(November 19, 2012)

1

**South Milwaukee Mill Dam (Field File # 40.05)**
**Photo Log**
Inspection Report (November 27, 2012)

Photo #3 – Location of sluice gate and benchmark 481-E on right side of embankment
(October 26, 2012)

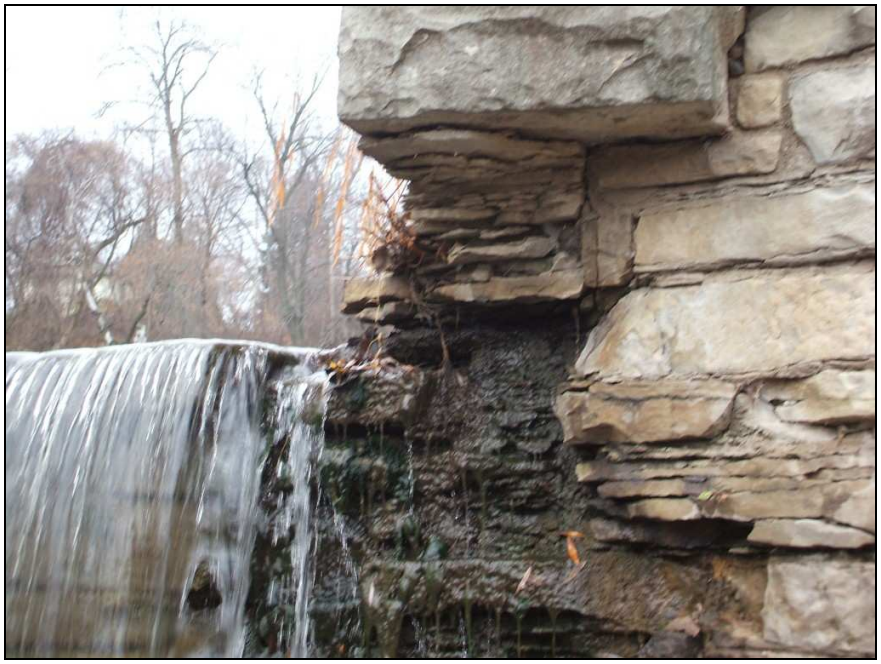

Photo #4 – Deterioration of dolomite stone near left abutment
(November 19, 2012)

**South Milwaukee Mill Dam (Field File # 40.05)**
**Photo Log**
Inspection Report (November 27, 2012)

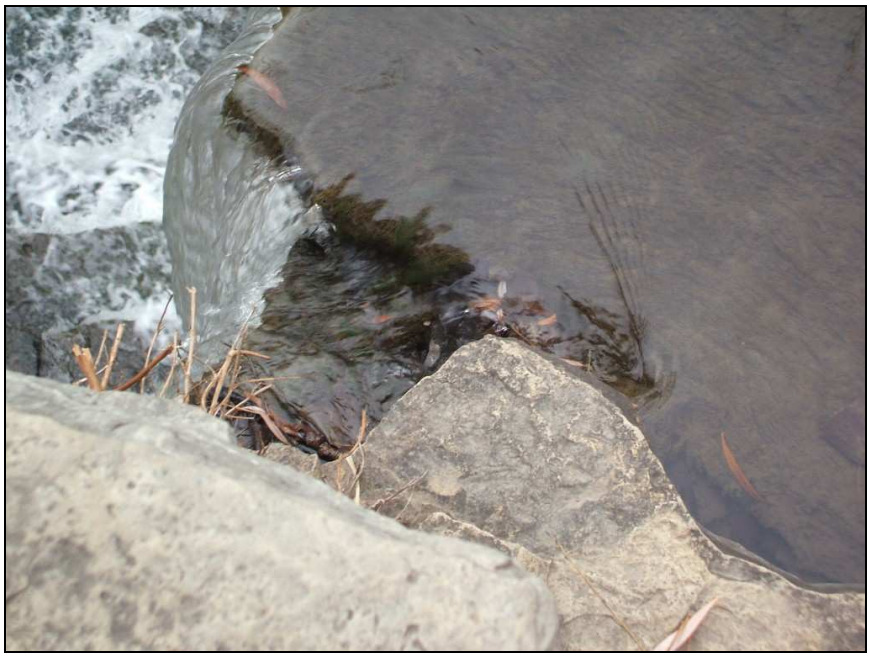

Photo #5 – Deterioration of dolomite stone near left abutment
(November 19, 2012)

Photo #6 – Deterioration of dolomite stone near right abutment
(November 19, 2012)

3

**South Milwaukee Mill Dam (Field File # 40.05)**
**Photo Log**
Inspection Report (November 27, 2012)

Photo #7 – Deterioration of dolomite stone near right abutment
(November 19, 2012)

Photo #8 – Deterioration of dolomite stone on ride side of retaining wall
(November 19, 2012)

**South Milwaukee Mill Dam (Field File # 40.05)**
**Photo Log**
Inspection Report (November 27, 2012)

Photo #9 – Deterioration of dolomite stone on left side of retaining wall
(October 26, 2012)

Photo #10 – Trees and brush on right embankment
(October 26, 2012)

5

**South Milwaukee Mill Dam (Field File # 40.05)**
**Photo Log**
Inspection Report (November 27, 2012)

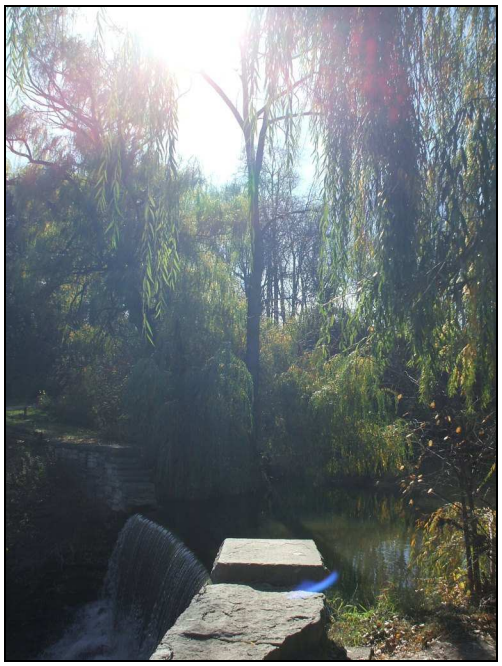

Photo #11 – Trees and brush on right embankment
(October 26, 2012)

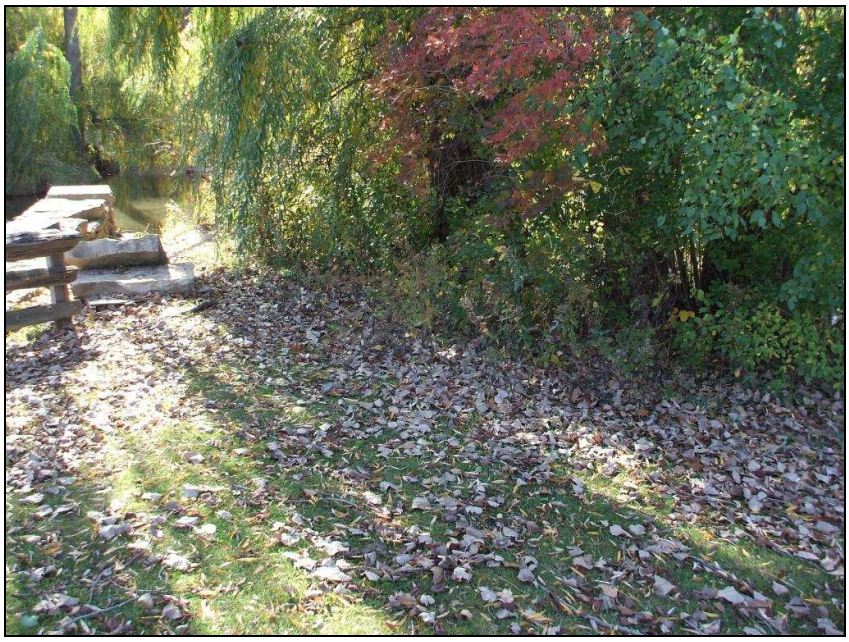

Photo #12 – Trees and brush on left embankment
(October 26, 2012)

**South Milwaukee Mill Dam (Field File # 40.05)**
**Photo Log**
Inspection Report (November 27, 2012)

Photo #13 – Trees and vegetation on right side slope (embankment) between spillway and bridge (November 19, 2012)

Photo #14 – Trees and vegetation on left side slope (embankment) between spillway and bridge (November 19, 2012)

**South Milwaukee Mill Dam (Field File # 40.05)**
**Photo Log**
Inspection Report (November 27, 2012)

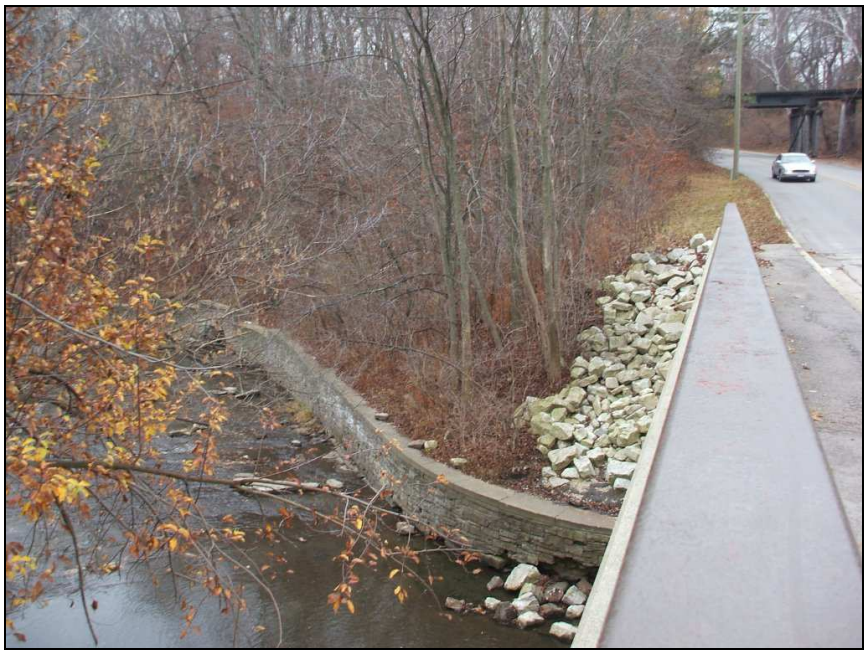

Photo #15 – Trees and brush on right downstream slope of embankment
(November 19, 2012)

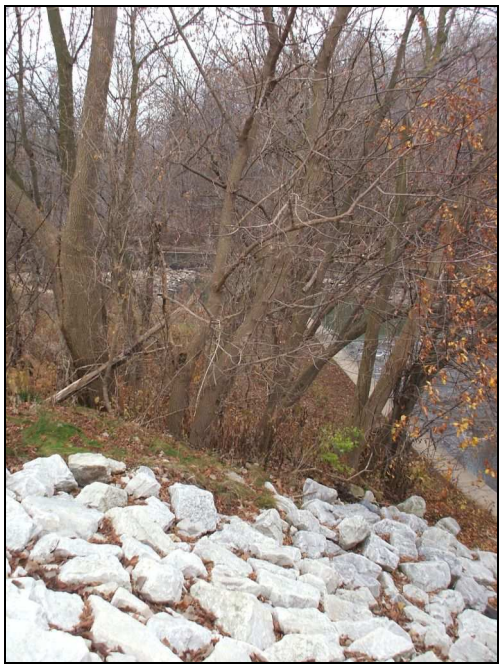

Photo #16 – Trees and brush on left downstream slope of embankment
(November 19, 2012)

**South Milwaukee Mill Dam (Field File # 40.05)**
**Photo Log**
Inspection Report (November 27, 2012)

Photo #17 – Sparse grass on embankment caused by foot traffic
(October 26, 2012)

## Figure Appendix.Dam-4 (Continued)

| | |
|---|---|
| **Name of Dam:** SOUTH MILWAUKEE MILL DAM | **Date:** 10/26/12 |
| **Inspectors:** TANYA LOURIGAN | **F.F #:** 40.05 |
| **Owner's Name:** MILWAUKEE COUNTY PARKS (JIM CIHA) | **Key Seq #:** 1332 |
| **Street:** 9480 WATERTOWN PLANK RD | |
| **City, State, Zip Code:** WAUWATOSA, WI 53226-3560 | |
| **County:** MILWAUKEE | **Phone:** (414) 257-4884 |
| **Weather and Site conditions:** | **Email:** Jim.ciha@milwcnty.com |

**GENERAL**

| | Item | N | P | Notes/ Observations | Action M | I | R |
|---|---|---|---|---|---|---|---|
| 1 | **Monuments/Benchmarks** | ✓ | ✓ | | | | ✓ |
| | Location: Elevation: Datum: | | | 481E - LOCATED (101.05 FT PSC DATUM; 619.18 FT MSL DATUM)<br>481F - NOT LOCATED | | | |
| 2 | **Pool Level** | | | | | | |
| | Normal/Operating: Maximum: Minimum: | | | NO ESTABLISHED / REQUIRED POOL LEVELS<br>NO SURVEY DONE FOR WATER LEVEL READINGS | | | |
| | Staff Gage | | | NONE LOCATED | | | |
| 3 | **Access Road** | ✓ | ✓ | | | | |
| | | | | MILL ROAD BRIDGE | | | |
| 4 | **Signage/ Security** | | | | | | |
| | Portage/route: | | | NONE PRESENT - NOT REQUIRED | | | |
| | Dam Warning: | | | NONE PRESENT - NOT REQUIRED (UNLESS ICE SKATING RESUMES) | | | |
| | Downstream Hazard: | ✓ | | MILL RD BRIDGE / STEEP SIDESLOPES | | | |
| | Fencing/Railings/Catwalks: | ✓ | | AESTHETIC FENCING; NOT FOR SECURITY/SAFETY | | | |

**Additional Comments:**

CONSIDERED BARRIER STRUCTURE FOR AQUATIC INVASIVE SPECIES (AIS)/ VIRAL HEMORRHAGIC SEPTICEMIA (VHS)

481E - BRONZE TABLET TOP NW CORNER OF VALVE PIT 45FT SW OF RT U/S ABUTMENT TO DAM. NEED 2ND BENCHMARK.

FORMER MILLRACE ABANDONED YEARS AGO

N= Noted; **P**= Photo; **M**= Monitor
**I**= Investigate; **R**= Repair
**F.F.**= Field File; **RT** = Right; **LT** = Left
**U/S** = Upstream; **D/S** = Downstream

**Action Suggestion** 1. Requires immediate action
2. Plan to do soon
3. Do when convenient

**Dam Name:** SOUTH MILWAUKEE MILL DAM **Dam Inspection Checklist** **F.F. #:** 40.05 **Date:** 10/26/12 **Page** 1 **of** 7

## Figure Appendix.Dam-4 (Continued)

**GENERAL (Cont.)**

**5 Hazard Section**

**A. D/S Development** ✓✓

Density: LOW DENSITY

Distance: DIS CHANNEL IN GRANT PARK; APPROX 1 MILE TO MOUTH @ LAKE MICHIGAN

Type (Residential, Commercial, Industrial): WATER FILTRATION PLANT, YACHT CLUB, AND PEDESTRIAN BRIDGE AT MOUTH

**B. Channel Crossing** ✓✓

Type: Bridge, Ford, Culvert, Trestle, Other (Explain) (Circle One) MILL ROAD BRIDGE CONCRETE ARCH

Dimensions: DATA NOT COLLECTED

D/S distance: APPROX 50 FT

Traffic Level (Local, CTH, Rail Road, STH, Interstate, etc): LOCAL (FLOOD DAMAGE TO BRIDGE SLOPES IN 2008)

2 ADDTL CROSSINGS D/S OAK CREEK PARKWAY DATA NOT COLLECTED

**C. Distance to nearest D/S community/impoundment:** ✓

Name: CITY OF SOUTH MILWAUKEE (GRANT PARK TO LAKE MIGHIGAN)

**D. Anticipated Hazard** (based on landuse and zoning): ✓ LOW

**E. Dam Failure Analysis**

Date Completed/Approved

Is map available?

Are map & profile adopted?

List adoption date:

Verify validity of failure mode:

Verify validity of DFA conclusions:

NOT REQUIRED

| F. Emergency Action Plan | Y | N | Comments, Explanation, and Description | M | I | R |
|---|---|---|---|---|---|---|
| 1. Current plan posted? | | | NOT REQUIRED | | | |
| 2. Understood by Operator? | | | | | | |
| 3. Warning systems? | | | | | | |
| 4. Certification of last test? | | | | | | |
| 5. Remote operation? | | | | | | |
| 6. Revision Date? | | | | | | |
| 7. Habitable structures? | | | | | | |
| 8: Recreation areas? | | | | | | |
| 9. Changed hazard potential? | | | | | | |
| 10. New development? | | | | | | |
| 11. Other comments? | | | | | | |

**Additional Comments:**

**N**= Noted; **P**= Photo; **M**= Monitor
**I**= Investigate; **R**= Repair
**F.F.**= Field File; **RT** = Right; **LT** = Left
**U/S** = Upstream; **D/S** = Downstream

**Action Suggestion** 1. Requires immediate action
2. Plan to do soon
3. Do when convenient

**Dam Name:** SOUTH MILWAUKEE MILL DAM **F.F. #:** 46.05 **Dam Inspection Checklist** **Date:** 10/26/12 **Page** 2 **of** 7

| SPILLWAY--PRINCIPAL - FIXED CREST | | | | Action | | |
|---|---|---|---|---|---|---|
| Item | N | P | Notes/ Observations | M | I | R |
| 1 Fixed Crest | | | No problem ☐ Not applicable ☐ Could not inspect | | | |
| A. Dimensions<br>Top Width: | ✓ | ✓ | APPROX 36 IN ; CREST LENGTH 22 FT | | | |
| B. Materials | ✓ | ✓ | DOLOMITE STONE - SOME DETERIORATION | ✓ | ✓ | ✓ |
| C. Shape (sharp-crested, broad-crested, ogee, chute, gated, overflow, morning glory, dropbox, labyrinth) | ✓ | ✓ | BROAD CRESTED WEIR | | | |
| D. Debris<br>Prevention (racks, booms, etc.): | | | NO DEBRIS COLLECTION DEVICES | | | |
| E. Concrete Condition * | ✓ | ✓ | U/S FACE - NOT ABLE TO INSPECT<br>D/S FACE - NO MAJOR DETERIORATION OBSERVED | ✓ | ✓ | ✓ |
| F. Flashboards (none, number):<br>Type (Metal, wood):<br>Dimensions:<br>Operability: | | | NONE | | | |
| G. Abutments<br>Condition: *<br>Seepage/wetness: | ✓ | ✓ | SOME DETERIORATION OF DOLOMITE STONE<br>NONE OBSERVED<br>(1986 INSPECTION NOTED SEEPAGE @ RT ABUTMENT) | ✓ | ✓ | ✓ |
| H. Drains<br>Type: Weep holes, Relief drains, Other:_____<br>Flow Rate: | ✓ | ✓ | No problem ☐ Not applicable ☐ Could not inspect<br>DRAIN PIPES - D/S LT (CHANNEL) BANK<br>DO NOT APPEAR TO BE FUNCTIONING | | | |
| I. Other<br>FLOWWAY | ✓ | ✓ | NO OBSERVED PROBLEMS | | | |

N= Noted; P= Photo; M= Monitor
I= Investigate; R= Repair
F.F.= Field File; RT = Right; LT = Left
U/S = Upstream; D/S = Downstream

**Action Suggestion**
1. Requires immediate action
2. Plan to do soon
3. Do when convenient

**Controlled** = Gated **Uncontrolled** = Overflow

**Additional Comments:** FURTHER INVESTIGATION AND POSSIBLE REPAIRS NEEDED TO DETERIORATION OF SOME DOLOMITE STONE

* **Type of Concrete Problems:** Spalling, cracks, exposed rebar, misalignment, joints, bug holes, efflorescence, popouts, honeycombing, scaling, craze/map cracks, isolated crack, disintegration, other

**Dam Name:** SOUTH MILWAUKEE MILL DAM **Dam Inspection Checklist** **F.F.#:** 40.05 **Date:** 10/26/12 3 of 7

**SPILLWAY--PRINCIPAL - OUTLET EROSION CONTROL & UNDERMINING**

| | Item | N | P | Notes/ Observations | Action M | I | R |
|---|---|---|---|---|---|---|---|
| 1 | **Outlet Erosion Control** | ✓ | | No problem ☐ Not applicable ✓ Could not inspect VERY WELL | | | |
| | **A. Type** (none, endwall, plunge pool, energy dissipation structure rock lined channel, apron) | | | DOLOMITE STONE APRON APPEARS OKAY | | | |
| | **B. Scour** | | | NONE APPARENT | | | |
| | **C. Material** | ✓ | ✓ | | | | |
| | **a. Riprap**: Avg Diameter: Condition (adequate, sparse, displaced, weathered): Bedding fabric- (Yes/ No): | | | DOLOMITE STONE PLACED IN D/S CHANNEL CONDITION - APPEARS ADEQUATE | | | |
| | **b. Concrete *** Dimensions/Location: | | | | | | |
| | **D. Sidewall/Headwall** | ✓ | ✓ | | ✓ | ✓ | ✓ |
| | Misalignment: Location: Description: | | | SIDEWALL - SOME DETERIORATION OF DOLOMITE STONE | | | |
| | **E. Separated Joint** / Loss of Joint Material: | ✓ | ✓ | | ✓ | ✓ | ✓ |
| | Location: Description: | | | SOME LOSS OF JOINT MATERIAL BETWEEN DOLOMITE | | | |
| | **F. Natural** | | | N/A | | | |
| 2 | **Undermining** | ✓ | | No problem ☐ Not applicable ☐ Could not inspect | | | |
| | Location: Description: | | | NONE OBSERVED | | | |

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**I**= Investigate; **R**= Repair
**F.F.**= Field File; **RT** = Right; **LT** = Left
**U/S** = Upstream; **D/S** = Downstream

**Action Suggestion** 1. Requires immediate action 2. Plan to do soon 3. Do when convenient

**Controlled** = Gated **Uncontrolled** = Overflow

**Additional Comments:**

FURTHER INVESTIGATION AND POSSIBLE REPAIRS NEEDED TO DETERIORATION OF DOLOMITE STONE

*** Type of Concrete Problems:** Spalling, cracks, exposed rebar, misalignment, joints, bug holes, efflorescence, popouts, honeycombing, scaling, craze/map cracks, isolated crack, disintegration, other

**Dam Name:** SOUTH MILWAUKEE MILL DAM **Dam Inspection Checklist** **F.F.#:** 40.05 **Date:** 10/26/12 **Page** 4 **of** 7

**LAKE DRAINS**

**(Low level outlet, not a principle or aux. spillway)**

| | Item | N | P | Notes/ Observations | Action M | Action I | Action R |
|---|---|---|---|---|---|---|---|
| 1 | **General** | | None found | Does not have one | | | |
| | **A. Type of lake drain** (isolated control/intake tower, valve vault with outlet conduit valve in riser/drop inlet siphon): | ✓ | ✓ | VALVE VAULT WITH OUTLET CONDUIT | | | ✓ |
| | Size: | | | 36 INCH DIAMETER | | | |
| | **B. Operated (Yes/ No)** | ✓ | ✓ | NOT ABLE TO OPERATE | | ✓ | ✓ |
| 2 | **Lake drain components** | | | | | | |
| | **A.Concrete structure** | | | | | | |
| | Location: | | | — | | | |
| | Description:* | | | | | | |
| | Condition:* | | | | | | |
| | **B. Valve control** (operating device): | ✓ | | | | ✓ | ✓ |
| | No operating device; No stem Bent/Broken Stem; Access | | | DO NOT HAVE PLANS FOR VALVE CONTROL | | | |
| | Other: | | | NOT ABLE TO OPERATE | | | |
| | Operability: | | | | | | |
| | **C. Valve/Sluice gate** | ✓ | | | | ✓ | ✓ |
| | Quantity: | | | ONE MANUAL SLUICE GATE | | | |
| | a. Metal deterioration (surface rust, minor, moderate, extensive, other): | | | NOT ABLE TO OBSERVE | | | |
| | Location: | | | NOT ABLE TO OPERATE | | | |
| | Flow rate: | | | | | | |
| | b. Misalignment | | | | | | |
| | c. Leakage - Flow rate | | | | | | |
| | **D. Outlet conduit** | | | | | ✓ | |
| | Size: | | | NOT LOCATED | | | |
| | Material: | | | | | | |
| | Condition: | | | | | | |
| | **E. Energy dissipater** | ✓ | ✓ | | | | |
| | Type (endwall, plunge pool impact basin, stilling basin, rock-lined channel, none): | | | DOLOMITE STONE APRON | | | |
| | Condition:* | | | APPEARS OKAY | | | |

**N**= Noted; **P**= Photo; **M**= Monitor
**I**= Investigate; **R**= Repair
**F.F.**= Field File; **RT** = Right; **LT** = Lei
**U/S** = Upstream; **D/S** = Downstream

**Action Suggestion** 1. Requires immediate action
2. Plan to do soon
3. Do when convenient

**Additional Comments:**
INVESTIGATE AND REPAIR VALVE CONTROL

* **Type of Concrete Problems:** Spalling, cracks, exposed rebar, misalignment, joints bug holes, efflorescence, popouts, honeycombing, scaling, craze/map cracks, isolated crack, disintegration, other

SOUTH MILWAUKEE **Dam Inspection Checklist**
**Dam Name:** MILL DAM **F.F.#:** 40.05 **Date:** 10/26/12 **Page:** 5 of 7

## Figure Appendix.Dam-4 (Continued)

**EMBANKMENTS**

| Description: | | | | Action M | Action I | Action R |
|---|---|---|---|---|---|---|
| **Item** | **N** | **P** | **Location on Embankment and Deficiency** | | | |
| **1 Vegetation:** | | | No problem | | | |
| **A. Trees**<br>Quantity (<5,sparse,dense):<br>Diameter:<br>Location: | ✓ | ✓ | LARGE WILLOWS ON EMBANKMENT - U/S SLOPE<br>TREES ON D/S SLOPE, D/S OF MILL RD BRIDGE | | | ✓ |
| **B. Brush**<br>Quantity (sparse,dense):<br>Location: | ✓ | ✓ | NOTABLE AMOUNT OF BRUSH ON EMBANKMENT<br>D/S SLOPES (D/S OF MILL RD BRIDGE) & D/S (CHANNEL) BANKS | | | ✓ |
| **C. Ground cover**<br>Type (grass, crown vetch,other):<br>Quantity (bare, sparse,adequate, dense):<br>Appearance (too tall, too short, good): | ✓ | ✓ | GRASS ADEQUATE ON CREST<br>CHANNEL BANKS / SLOPES - GRASS, VEGETATION & DOLOMITE STONE<br>VEGETATION NEEDS TO BE REMOVED)<br>ADDRESS EROSION FROM FOOT TRAFFIC | | | ✓ |
| **2 Erosion** | | | No problem / Not applicable / Could not inspect | | | |
| **A. Wave erosion** (Beaching):<br>Scarp: Length/ Width:<br>Location: | ✓ | ✓ | CHANNEL<br>SOME BANK EROSION D/S RT TOE<br>MONITOR FOR EVENTUAL REPAIRS | ✓ | ✓ | |
| **B. Runoff Erosion** (Gullies)<br>Quantity:<br>Length/ Width/ Depth:<br>Location: | ✓ | ✓ | SOME BANK EROSION, INCLUDING RIPRAP<br>ON U/S & D/S SIDES OF MILL RD BRIDGE<br>MONITOR FOR EVENTUAL REPAIRS | ✓ | ✓ | |
| **3 Instabilities** | ✓ | | No problem / Not applicable / Could not inspect | | | |
| **A. Slides**<br>Transverse:<br>Longitudinal:<br>Scarp: Length/ Width:<br>Crack Length/ Width: | | | NONE OBSERVED | | | |
| **B. Cracks:**<br>Transverse:<br>Longitudinal:<br>Length/ Width/ Depth:<br>Location:<br>Other: | | | NONE OBSERVED | | | |
| **C. Bulges/ Depressions**<br>Size:<br>Height/ Depth: | | | NONE OBSERVED | | | |
| **D. Slope (Too Steep)**<br>U/S, D/S | | | OK | | | |

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**F.F.**= Field File; **RT** = Right; **LT** = Left
**U/S** = Upstream; **D/S** = Downstream

**Action Suggestion**
1. Requires immediate action
2. Plan to do soon
3. Do when convenient

**Additional Comments:**
TREE AND BRUSH REMOVAL NEEDED; ADDRESS MINOR EROSION FROM FOOT TRAFFIC

**Dam Name:** SOUTH MILWAUKEE MILL DAM **Dam Inspection Checklist** **F.F. #:** 40.05 **Date:** 10/26/12 **P** 6 **of** 7

## Figure Appendix.Dam-4 (Continued)

**EMBANKMENTS (Cont.)**

| Item | N | P | Notes/ Observations | Action M | I | R |
|---|---|---|---|---|---|---|
| 4 **Slope Protection** | | | No problem ☐ Not applicable ☐ Could not inspect ☐ | | | |
| **A. Type** (none, riprap, wave berm, concrete slabs, loose formed concrete/asphalt): | ✓ | ✓ | U/S SLOPE @ IMPOUNDMENT - NONE<br>SOME LOCATIONS OF CHANNEL BANKS - RIPRAP | | | |
| **B. Condition:** | ✓ | ✓ | U/S SLOPE @ IMPOUNDMENT - OKAY<br>SOME EROSION @ CHANNEL BANKS | | ✓ | |
| 5 **Other** | | ✓ | No problem ☐ Not applicable ☐ Could not inspect ☐ | | | |
| **A. Rodent burrows** (few, many) Location: | | | NONE OBSERVED | | | |
| **B. Ruts** Length/ Width/ Depth: Location: | | | NONE OBSERVED | | | |
| **C. Other** | | | NONE OBSERVED | | | |
| 6 **Alignment** | | ✓ | No problem ☐ Not applicable ☐ Could not inspect ☐ | | | |
| **A. Vertical** Low area: Elevation Difference: Location: | | | NO OBSERVED PROBLEMS | | | |
| **B. Horizontal** | | | NO OBSERVED PROBLEMS | | | |
| **C. Width** Too narrow: Location: | | | NO OBSERVED PROBLEMS | | | |
| 7 **Toe** | | ✓ | No problem ☐ Not applicable ☐ Could not inspect ☐ | | | |
| Cracks/Slumps: | | | NONE OBSERVED | | | |
| Embankment drains: Type/Flow: Location: | | | D/S LEFT BANK - DO NOT APPEAR TO BE FUNCTIONING | | | |
| Seepage/ Wetness: Hummocky: | | | NONE OBSERVED | | | |
| 8 **Seepage** | | ✓ | No problem ☐ Not applicable ☐ Could not inspect ☐ | | | |
| Wet area: Boil: Sinkhole: Aquatic vegetation: Rust colored deposits: Other: Sediment in Flow: Flowrate: Location: | | | NONE OBSERVED | | | |

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**F.F.**= Field File; **RT** = Right; **LT** = Left
**U/S** = Upstream; **D/S** = Downstream

**Action Suggestion**
1. Requires immediate action
2. Plan to do soon
3. Do when convenient

**Additional Comments:**

—

**Dam Name:** SOUTH MILWAUKEE MILL DAM **Dam Inspection Checklist** **F.F. #:** 40.05 **Date:** 10/26/12 **Page** 7 **of** 7

AECOM
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February 3, 2014 Revised

Mr. Karl Stave
Project Manager
Milwaukee County
Department of Administrative Services
AE & ES Division
City Campus, Second Floor
2711 West Wells Street
Milwaukee, WI 53208

Subject: **Masonry Inspection Report of Mill Pond Dam in South Milwaukee, WI**
**WDNR Dam Key Seq. No. 1332, Field File #40.05**
**AECOM Project Number 60313323**

Dear Mr. Stave:

At your request, AECOM Technical Services, Inc. (AECOM) representative Steven A. Elver, P.E., S.E. completed a Masonry Inspection of Milwaukee Counties' Mill Pond Dam, as requested by the Wisconsin Department of Natural Resources (WDNR) in a letter dated November 27, 2012. The letter is addressed to James Keegan, Milwaukee County Parks Department. The Masonry Inspection included review of available records and a site inspection. A Site Location Plan and a Photographic Log are included in the attachments.

**Dam Description**

The Mill Pond Dam is located in Milwaukee Counties' Oak Creek Parkway, close to Lake Michigan, near Milwaukee Counties' Grant Park. The dam and spillway are just upstream of Mill Road, South Milwaukee, at Lat.42.91238930 and Long. -87.85333540. The dam was constructed in approximately 1930. That makes the dam over 80 years old.

There is a Warming House approximately 150 feet upstream of the dam. The warming house and surrounding area are being partially supported by a non-profit group called Friends of the Mill Pond & Oak Creek Watercoarse, Inc. www.smfomp.org They envision increased use of the pond as proposed maintenance and dredging are accomplished in the area.

The dam and curved spillway were constructed across Oak Creek not far upstream of Lake Michigan. The spillway drop is listed as 14 feet feet over the 22 foot long spillway. The exposed dam abutment walls and spillway are faced with dolomite stones. The spillway is a concrete retaining wall design, behind the stone masonry face. Original construction drawings for the dam show this concrete and stone face construction, including wood "wakefield" sheeting as a seepage cutoff underneath.

This dam is considered low hazard by the Wisconsin Department of Natural Resources (WDNR) and impounds 15 acre-feet of water. The dam has an estimated low hazard rating.

**Prior Inspection Report Review, Recommendations and Follow Up**

The most recent inspection of South Milwaukee Mill Pond Dam was led by WDNR staff Tanya Lourigan, P.E. on October 26 and November 19, 2012. I reviewed the WDNR Dam Inspection Report and Photographs, dated November 27, 2012. That report identifies Four Requirements, namely:

- Embankment repairs,
- Investigation of "Masonry",
- Gate Repairs, and
- Benchmark Installation.

This task addresses Investigation of "Masonry" only. We understand that Milwaukee County is addressing the other three WDNR requirements.

**Field Inspection**

Steven A. Elver, P.E., S.E., of AECOM performed a field inspection of South Milwaukee Mill Pond Dam masonry on December 4, 2013. After an early freeze across late November, 2013, the weather warmed up to 45 degrees F on December 4 and the inspection was completed with minimal snow and ice cover.

The inspection was visual in nature, with no sample gathering or testing of materials. Water was flowing over the spillway during the inspection, so observation of the downstream face of the spillway was limited.

**Findings and Recommendations**

Water was flowing approximately 6 inches deep in the tailrace below the dam, between the spillway and Mill Road Bridge. While walking across the creek below the spillway, I observed the riverbed. It appeared to be solid bedrock, with some gravel patches and dislodged stones on it.

The historic construction drawing of the dam shows plans for installing wakefield wood sheeting below the dam and spillway. It is not known if the sheeting was installed to the lengths listed on the drawings, or even at all. If the base of the spillway is on bedrock, the wakefield sheeting may have been left off and the details of bearing the footing may have been redesigned. Either way, this would not affect the masonry facing of the structure.

The masonry, both on the dam abutments and on the downstream embankment slopes, is constructed of a fairly durable dolomitic stone. However, in the harsh wet environment with freeze-thaw cycles, some of the stone is showing its age after 80 years of exposure. Refer to the photos attached for more information.

The spillway section was designed as an arched concrete dam, with masonry facing on the exposed surfaces. See photographs 4 and 22, plus the historic construction drawing attached. The structure looks as if it is well constructed and well founded, with no noticeble settlement cracking or leakage through the downstream face of either abutment. The stone masonry is a non-structural element of the dam.

Missing and weathered stones were observed in certain locations, including both ends of the spillway. Capstones on the abutment walls step down to blend in with capstone elevation across the spillway. The end capstones on top of the spillway were missing on both sides. On the left abutment (as viewed facing downstream), just above waterline, a large capstone has been partially displaced toward downstream, likely due to impact from floating debris passing over the spillway during high flow events in the past. Also on the left abutment, further from the spillway, two capstones are removed from the top of the

masonry wall and stacked on a wood pallet nearby. The reason for these stones being set to the side is not apparent.

Several stones show signs of freeze-thaw weathering, wherein the stones get saturated with water, then freeze. The water expands and causes ever increasing cracks in the stone until it becomes smaller pieces and washes away.

The missing and deteriorated stonework should eventually be repaired by tuckpointing and replacing missing/weathered stones. This will slow down weathering where water is entering both the mortar joints and the cracked stones. Note that these repairs are to maintain the integrity of the masonry veneer, but not required for dam safety.

As an alternate to replacing damaged and missing stones, concrete could be used. For this to be a durable solution, each area needs to be properly cleaned out and prepared, with all loose material removed. Non-corrosive, drilled-in pins should be used to provide a positive bond to the sound concrete structure behind. Note that this will not have the same aesthetic appeal as the original stonework, which must be considered in any determination of this type of repair.

**Summary and Conclusions**

AECOM found the dam to be in good structural condition, with no serious leakage or cracking, scour or signs of imminent failure. The stone masonry abutment walls and spillway veneer show signs of weathering and should be repaired as part of regular maintenance.

In general, missing and weathered stones should be replaced and the masonry should be tuckpointed and rebuilt at some time within the next 10 years. We recommend replacing the missing cap stones and resetting the shifted capstone on the left abutment in year 2014. Tuckpointing of the abutment walls should be considered to be performed at the same time, as budget allows.

Please feel free to contact the undersigned at 414.944.6137 or Don Pirrung at 920.251.2822 should you require any clarification of the information presented herein. Two hard copies of these documents and one C-D of the documents should be forwarded to Tonya Lourigan of the WDNR Milwaukee office.

Yours Sincerely,

Steven A. Elver, P.E., S.E.
Principal Engineer

copy: Don Pirrung, AECOM Sheboygan
Jerry Krueger, AECOM Middleton

Attachments: Aerial View of Site
Photo Log

## Figure Appendix.Dam-5 (Continued)

South Milwaukee Mill Pond Dam Masonry Inspection
AECOM Project No. 60313323
Photos Taken December 4, 2013 by S. Elver

Photo 1: Mill Pond Dam and Spillway

Photo 2: Mill Pond Dam and Spillway

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South Milwaukee Mill Pond Dam Masonry Inspection
AECOM Project No. 60313323
Photos Taken December 4, 2013 by S. Elver

Photo 3: Left Embankment between Spillway and Mill Road Bridge

Photo 4: Right Embankment between Spillway and Mill Road Bridge. Note concrete wall at curved spillway, arrow.

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South Milwaukee Mill Pond Dam Masonry Inspection
AECOM Project No. 60313323
Photos Taken December 4, 2013 by S. Elver

Photo 5: Looking across Mill Pond toward Spillway between large trees

Photo 6: Dam Spillway at arrow. Crank for low level gate operation in concrete pad, foreground.

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South Milwaukee Mill Pond Dam Masonry Inspection
AECOM Project No. 60313323
Photos Taken December 4, 2013 by S. Elver

Photo 7: Right embankment with stone abutment

Photo 8: Right embankment with stone abutment. Mill Road Bridge over tailwater, beyond.

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Photo 9: Right embankment at end of spillway. Note missing stone on end of spillway and top of concrete under water (arrow)

Photo 10: Right embankment with stone and mortar

South Milwaukee Mill Pond Dam Masonry Inspection
AECOM Project No. 60313323
Photos Taken December 4, 2013 by S. Elver

Photo 11: Right abutment stone and mortar, downstream. Note deteriorating and cracked stones.

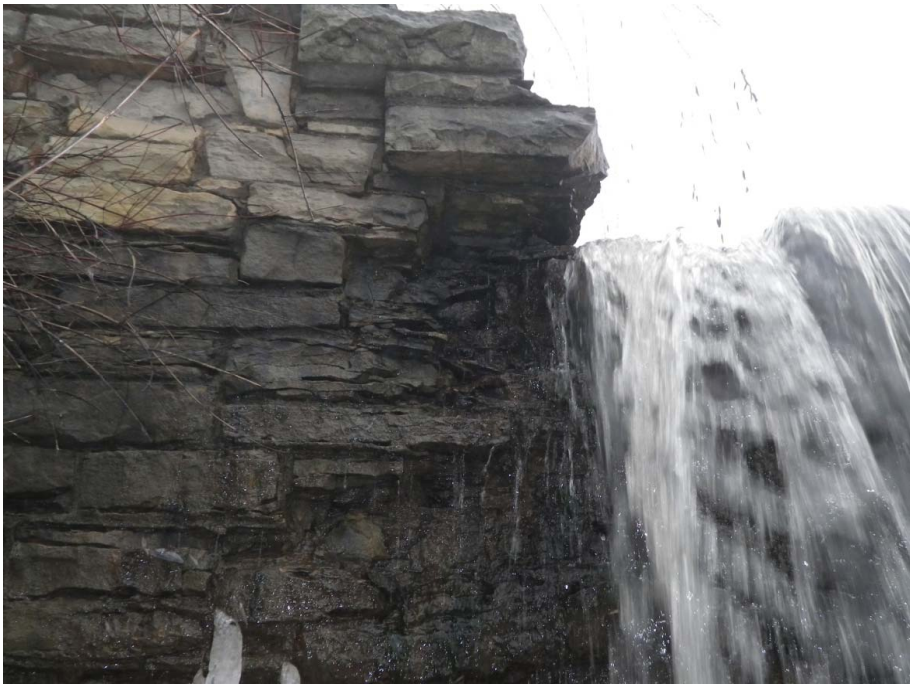

Photo 12: Right abutment downstream face at end of spillway. Note missing stone on spillway and weathered stone along edge

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South Milwaukee Mill Pond Dam Masonry Inspection
AECOM Project No. 60313323
Photos Taken December 4, 2013 by S. Elver

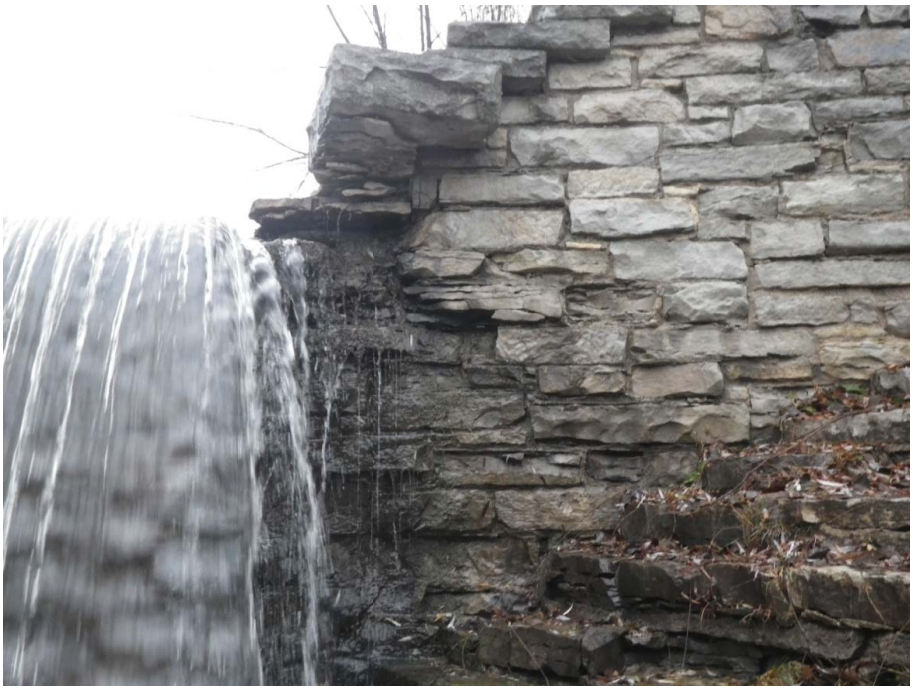

Photo 13: Left abutment downstream face at end of spillway. Note missing stone on spillway end and deteriorated stone off spillway

Photo 14: Left abutment downstream face and stone paving on downstream slope

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South Milwaukee Mill Pond Dam Masonry Inspection
AECOM Project No. 60313323
Photos Taken December 4, 2013 by S. Elver

Photo 15: Left abutment downstream face. Note deteriorating stonework.

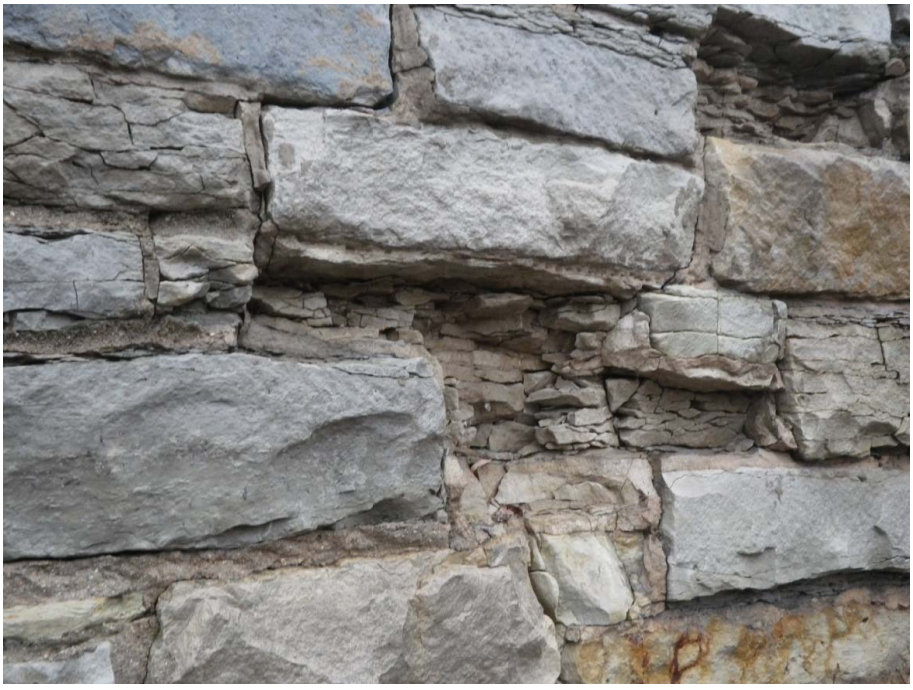

Photo 16: Left abutment downstream face. Note weathered stonework.

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Photo 17: Spillway as viewed from left abutment. Note missing stones at corners.

Photo 18: Top of left abutment. Note missing capstone and shifted stone (arrow).

Photo 19: Left abutment at spillway, upstream side. Note shifted stone (arrow).

Photo 20: Left abutment, upstream side, showing cracking and shifting of joints near missing capstone. Note several cracked stones.

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Photo 21: Left abutment at spillway. Note concrete wall at arrow.

Photo 22: Left abutment upstream face. Note two missing capstones, stacked beyond.

## Figure Appendix.Dam-5 (Continued)

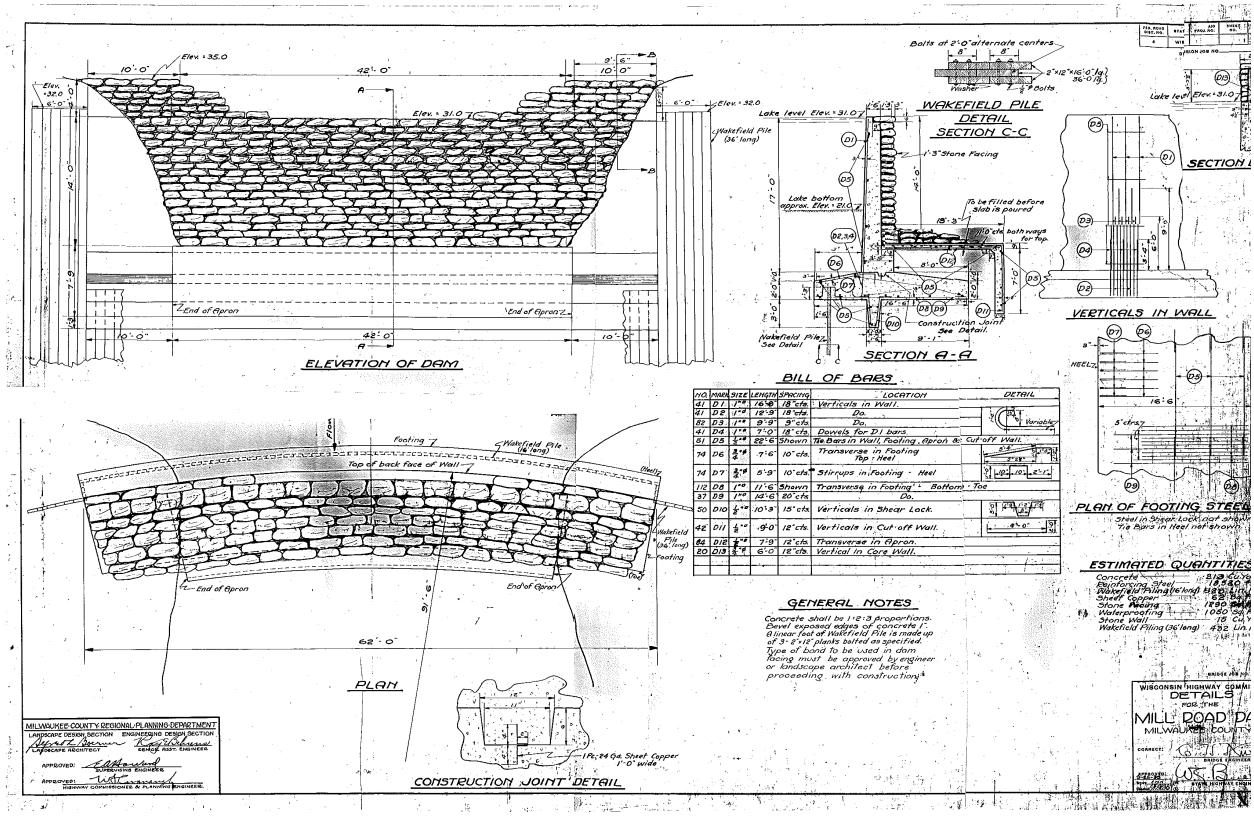
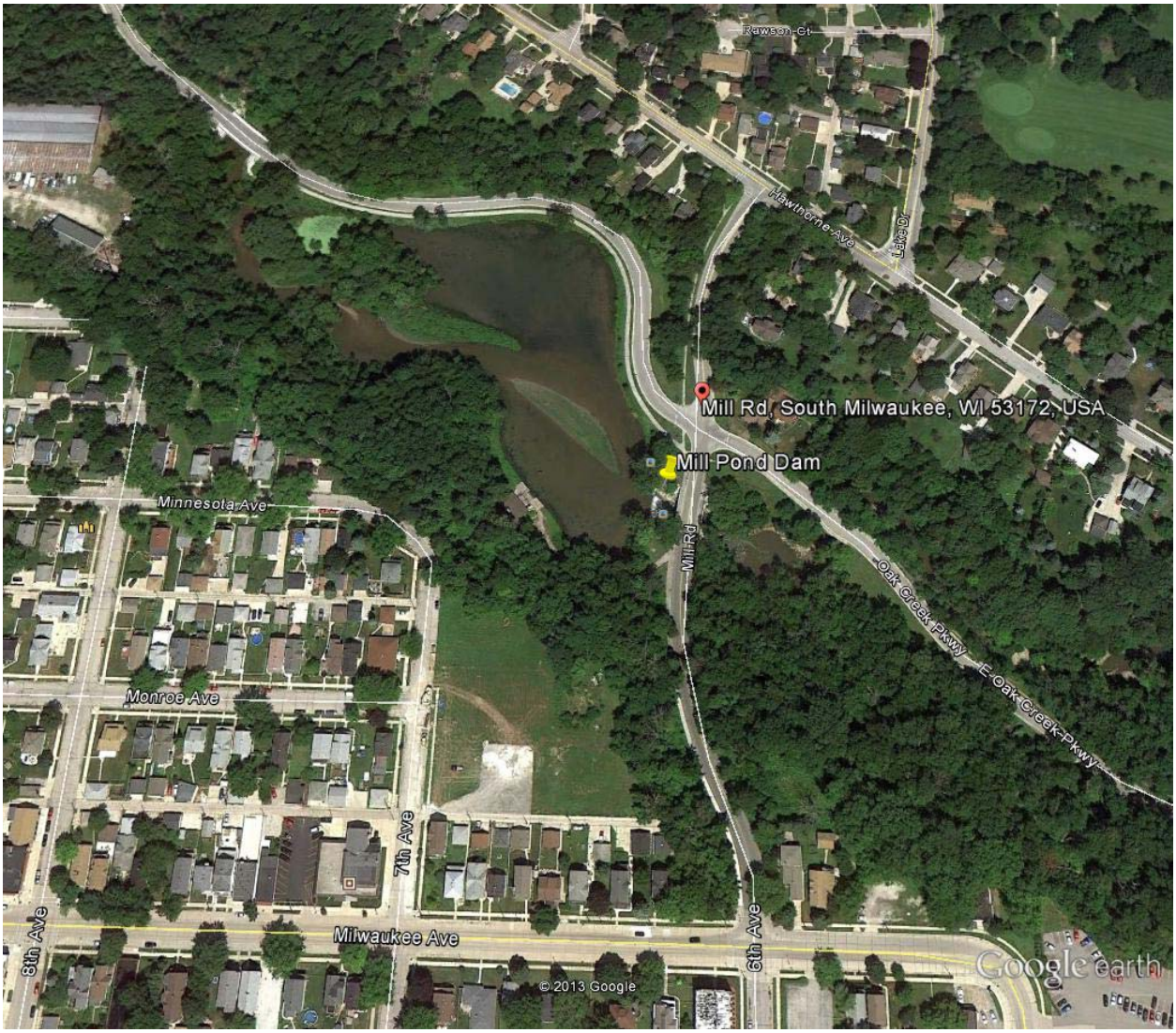


**Figure Appendix.Dam-5 (Continued)**



## Figure Appendix.Dam-6
## Repair Plans for the Oak Creek Mill Pond Dam Slide Gate



# MILWAUKEE COUNTY DEPT. OF PARKS, RECREATION & CULTURE

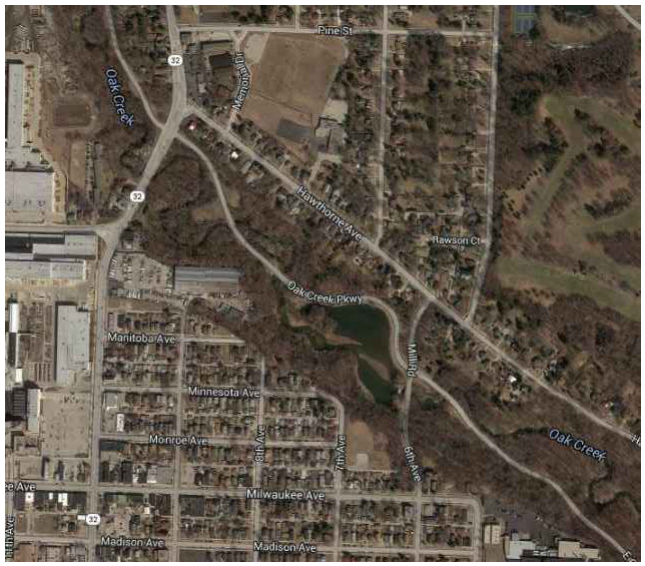
# MILL POND DAM SLIDE GATE REHABILITATION

MILL ROAD & OAK CREEK PARKWAY, SOUTH MILWAUKEE, WISCONSIN

Project : 9155-14650
Site: 687
Building: N/A
Date: 05/07/ 2015

***DRAWINGS***


| | |
|---|---|
| COVER - SITE | CVR |
| EXISTING SITE CONDITIONS & GENERAL NOTES | C100 |
| PROPOSED SITE PLAN | C101 |
| STRUCTURE PLAN | C102 |
| SITE DETAILS | C200 |
| SITE DETAILS | C201 |
| SOIL EROSION AND SEDIMENT CONTROL DETAILS | C202 |


**CLIENT**

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**CIVIL / STRUCTURAL**

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**OWNER**

MILWAUKEE CO. DEPT OF ADMIN SERVICES - AE & ES SECTION
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Waumatosa, Wisconsin 53226

AECOM
WWW.AECOM.COM
AECOM TECHNICAL SERVICES, Inc.
414-944-6080

PROJECT NUMBER: 60338307
SCALE: AS SHOWN
DRAWN: CHK'D/APP'D: JJH
DATE: 05/07/2015
DATE: 05/07/2015

DIRECTOR OF PARKS: _____

DAS DIRECTOR : _____

PROJECT MANAGER : _____

**CVR**

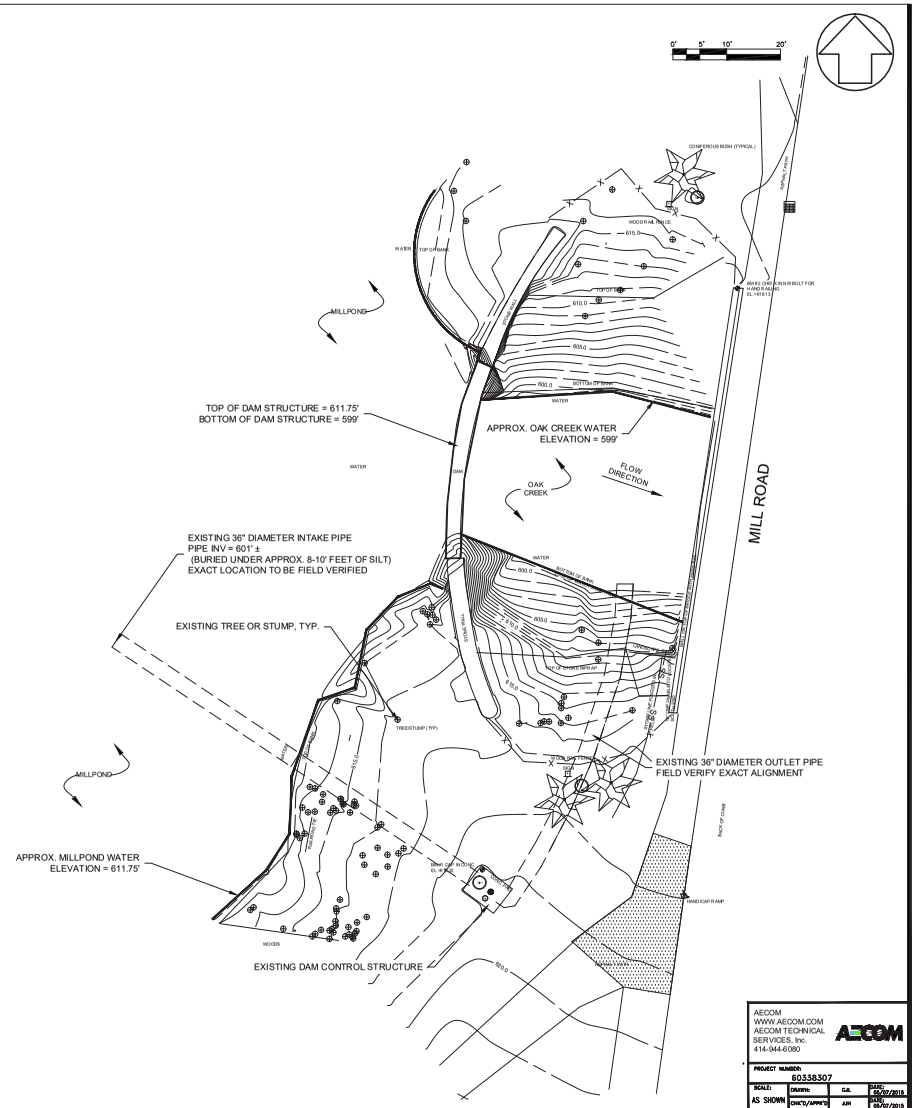
## Figure Appendix.Dam-6 (Continued)

**GENERAL**

1. ALL WORK SHALL BE PERFORMED PER THE STATE OF WISCONSIN COMMERCIAL BUILDING CODE (CURRENT EDITION) AND OTHER STATE, LOCAL AND REGIONAL REGULATIONS.
2. INSTALLATION OF EROSION CONTROLS AS SHOWN ON DRAWINGS AND PER THE SPECIFICATIONS. IF SITE WILL BE INACTIVE FOR MORE THAN 14 DAYS, TEMPORARY STABILIZATION OF SITE WILL BE REQUIRED.
3. SITE RESTORATION AFTER THE WORK IS COMPLETED TO CONSIST OF REPAIR TO EXISTING PAVEMENTS, GRADING, SEEDING AND MULCHING DISTURBED/DAMAGED AREAS DURING THE COURSE OF THE PROJECT. FOR SEEDING AND MULCHING SEE SPECIFICATIONS.
4. ALL OTHER WORK AS SHOWN ON DRAWINGS AND PER SPECIFICATIONS

**CIVIL NOTES**

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE WISCONSIN DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, LATEST EDITION, WHICH ARE REFERENCED AS STANDARD SPECIFICATIONS. CONTRACTOR SHALL OBSERVE THE SCOPE OF WORK, CONTROL OF WORK, CONTROL OF MATERIALS, LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC, AND PROSECUTION AND PROGRESS. CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS AND FEES REQUIRED BY FEDERAL, STATE, OR MUNICIPAL CODE
2. ALL WORK SHALL BE COORDINATED WITH THE OWNER.
3. CONTRACTOR SHALL NOTIFY UTILITY DIGGERS HOTLINE AT (800)-242-8811 AND THE MILWAUKEE COUNTY PARKS MAINTENANCE AT (414)-258-2322 FOR PRIVATE UTILITIES AND PROVIDE WRITTEN DOCUMENTATION OF CLEARANCE TO OWNER PRIOR TO COMMENCING WORK.
4. CONTRACTOR SHALL IMPLEMENT AND MAINTAIN ALL EROSION AND SEDIMENTATION CONTROL MEASURES IN CONFORMANCE WITH THE STANDARD SPECIFICATIONS.
5. EXISTING SITE TOPOGRAPHY, UTILITIES, LEGAL DESCRIPTION, RIGHT-OF-WAY, AND HORIZONTAL CONTROL SHOWN ON THE DRAWINGS WERE OBTAINED FROM RECORD DRAWINGS AND A SURVEY PREPARED BY OTHERS. AECOM DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION SHOWN.
6. NO BURNING OR INCINERATION OF RUBBISH WILL BE PERMITTED ON THE SITE.
7. FACILITIES TO REMAIN SHALL BE PROTECTED FROM DAMAGE AND, IF DAMAGED, SHALL BE REPLACED TO THE SATISFACTION OF THE OWNER. ANY EXISTING FACILITY WHICH IS REMOVED TO ACCOMMODATE CONSTRUCTION ACTIVITY OR DAMAGED DURING CONSTRUCTION SHALL BE REPLACED IN KIND.
8. THE CONTRACTOR SHALL PERFORM AND BE RESPONSIBLE FOR ALL CONSTRUCTION LAYOUT AND STAKING.
9. ALL WORK SHALL BE COMPLETED TO THE SATISFACTION OF THE OWNER AND THE ENGINEER.
10. CONTRACTOR IS SOLELY RESPONSIBLE FOR QUALITY CONTROL OF THE WORK. INSPECTION AND TESTING BY THE ENGINEER OR THE OWNER'S TESTING AGENCY ARE SOLELY AT THE DISCRETION OF THE OWNER, AND IN NO WAY RELIEVE THE CONTRACTOR OF SOLE RESPONSIBILITY FOR MAINTAINING A QUALITY CONTROL PROGRAM.
11. CONTRACTOR SHALL USE ADEQUATE NUMBERS OF SKILLED WORKMEN WHO ARE THOROUGHLY TRAINED, QUALIFIED, AND EXPERIENCED IN THE NECESSARY CRAFT AND WHO ARE COMPLETELY FAMILIAR WITH THE SPECIFIED REQUIREMENTS AND METHODS NEEDED FOR PROPER PERFORMANCE OF THE WORK.
12. CONTRACTOR SHALL PROVIDE ALL NECESSARY SUPERVISION, PLANNING, SCHEDULING, COORDINATION, INSPECTION, TESTING, AND CONTROL TO PERFORM THE WORK.
13. CONTRACTOR SHALL MAINTAIN AREAS FREE FROM ACCUMULATIONS OF WASTE, DEBRIS, AND RUBBISH CAUSED BY CONTRACTOR OPERATIONS.
14. CONTRACTOR SHALL REMOVE ALL CONSTRUCTION RELATED DEBRIS FROM AREAS OUTSIDE THE LIMITS OF THE CONTRACTOR'S WORK AREA ON A DAILY BASIS.
15. CONTRACTOR SHALL LEGALLY DISPOSE OF ALL WASTE DEBRIS, SOIL AND RUBBISH AT DUMP AREAS OFF OWNER'S PROPERTY.
16. THE ELEVATIONS SHOWN ON PLANS REFLECT PROPOSED FINISHED GRADES, UNLESS OTHERWISE INDICATED.
17. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ASCERTAIN EXISTING FIELD CONDITIONS BEFORE BIDDING ON THE PROJECT, SPECIFICALLY AS THEY RELATE TO LUMP SUM ITEMS.
18. ALL GROUND SURFACE DRAINAGE THAT EXISTED PRIOR TO CONSTRUCTION SHALL BE RESTORED AS SHOWN ON THE PLANS AND/OR AS DIRECTED BY THE ENGINEER.
19. THE STANDARD SPECIFICATIONS, THESE CONSTRUCTION PLANS, AND SUBSEQUENT DETAILS ARE ALL TO BE CONSIDERED AS PART OF THE CONTRACT DOCUMENTS. INCIDENTAL ITEMS OR ACCESSORIES NECESSARY TO COMPLETE THIS WORK MAY NOT BE SPECIFICALLY NOTED BUT ARE TO BE CONSIDERED A PART OF THE CONTRACT.
20. NO PLANS SHALL BE USED FOR CONSTRUCTION UNLESS SPECIFICALLY MARKED "FOR CONSTRUCTION". THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS AFFECTING THEIR WORK WITH THE ACTUAL CONDITIONS AT THE JOB SITE. IF THERE ARE ANY DISCREPANCIES FROM WHAT IS SHOWN ON THE CONSTRUCTION PLANS, HE MUST IMMEDIATELY REPORT SAME TO THE ENGINEER BEFORE DOING ANY WORK, OTHERWISE THE CONTRACTOR ASSUMES FULL RESPONSIBILITY. IN THE EVENT OF DISAGREEMENT BETWEEN THE CONSTRUCTION PLANS, STANDARD SPECIFICATIONS AND/OR SPECIAL DETAILS, THE CONTRACTOR SHALL SECURE WRITTEN INSTRUCTIONS FROM THE ENGINEER PRIOR TO PROCEEDING WITH ANY PART OF THE WORK AFFECTED BY OMISSIONS OR DISCREPANCIES. FAILING TO SECURE SUCH INSTRUCTION, THE CONTRACTOR WILL BE CONSIDERED TO HAVE PROCEEDED AT HIS OWN RISK AND EXPENSE. IN THE EVENT OF ANY DOUBT OR QUESTION ARISING WITH RESPECT TO THE TRUE MEANING OF THE CONSTRUCTION PLANS OR SPECIFICATIONS, THE DECISION OF THE ENGINEER SHALL BE FINAL AND CONCLUSIVE.
21. ALL WORK PERFORMED UNDER THIS CONTRACT SHALL BE GUARANTEED AGAINST ALL DEFECTS IN MATERIALS AND WORKMANSHIP OF WHATEVER NATURE BY THE CONTRACTOR AND HIS SURETY FOR A PERIOD OF 12 MONTHS FROM THE DATE OF FINAL ACCEPTANCE OF THE WORK BY THE OWNER AND OTHER APPLICABLE GOVERNMENTAL AGENCIES.
22. BEFORE ACCEPTANCE BY THE OWNER AND FINAL PAYMENT, ALL WORK SHALL BE INSPECTED AND APPROVED BY THE OWNER OR HIS REPRESENTATIVE. FINAL PAYMENT WILL BE MADE AFTER ALL OF THE CONTRACTOR'S WORK HAS BEEN APPROVED AND ACCEPTED, AND IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
23. WHENEVER, DURING CONSTRUCTION OPERATIONS, ANY LOOSE MATERIAL IS DEPOSITED IN THE FLOW LINE OF DRAINAGE STRUCTURES, DITCHES, ETC. SUCH THAT THE NATURAL FLOW LINE OF WATER IS OBSTRUCTED, THIS LOOSE MATERIAL SHALL BE REMOVED AT THE CLOSE OF EACH WORKING DAY BY THE RESPONSIBLE PARTY. AT THE CONCLUSION OF CONSTRUCTION OPERATIONS, ALL DRAINAGE STRUCTURES AND FLOW LINES SHALL BE FREE FROM DIRT AND DEBRIS. THIS WORK SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT.
24. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION AND MAINTENANCE OF ADEQUATE SIGNS, TRAFFIC CONTROL DEVICES AND WARNING DEVICES TO INFORM AND PROTECT THE PUBLIC DURING ALL PHASES OF CONSTRUCTION. BARRICADES AND WARNING SIGNS SHALL BE PROVIDED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS. ALL TRAFFIC CONTROL WORK SHALL BE DONE IN ACCORDANCE WITH THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".
25. WHERE OVERHANGING BRANCHES INTERFERE WITH OPERATIONS OF CONSTRUCTION, SAID BRANCHES SHALL BE TRIMMED AND SEALED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS, AND THE COST OF SAME SHALL BE INCIDENTAL TO THE CONTRACT. TREES SHALL BE REMOVED ONLY AFTER RECEIVING APPROVAL OF THE OWNER.
26. DURING CONSTRUCTION OPERATIONS, THE CONTRACTOR SHALL INSURE POSITIVE SITE DRAINAGE AT THE CONCLUSION OF EACH DAY. SITE DRAINAGE MAY BE ACHIEVED BY DITCHING, PUMPING OR ANY OTHER ACCEPTABLE METHOD. THE CONTRACTOR'S FAILURE TO PROVIDE THE ABOVE WILL PRECLUDE ANY POSSIBLE ADDED COMPENSATION REQUESTED DUE TO DELAYS OR UNSUITABLE MATERIALS CREATED AS A RESULT THEREOF.
27. THE ENGINEER AND OWNER ARE NOT RESPONSIBLE FOR THE CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES, TIME OF PERFORMANCE, PROGRAMS OR FOR ANY SAFETY PRECAUTIONS USED BY THE CONTRACTOR. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR SAFE EXECUTION OF HIS / HER WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND SPECIFICATIONS.
28. THE CONTRACTOR SHALL COMPLY WITH ALL STATE AND FEDERAL SAFETY REGULATIONS AS OUTLINED IN THE LATEST REVISIONS OF THE FEDERAL CONSTRUCTION SAFETY STANDARDS (SERIES 1926) AND WITH APPLICABLE PROVISIONS AND REGULATIONS OF THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS OF THE WILLIAMS STELGER OCCUPATIONAL HEALTH STATE SAFETY ACT OF 1970 (REVISED). THE CONTRACTOR, ENGINEER AND OWNER SHALL EACH BE RESPONSIBLE FOR HIS OWN RESPECTIVE AGENTS AND EMPLOYEES.
29. THE CONTRACTOR SHALL KEEP A SET OF "APPROVED" CONSTRUCTION PLANS ON THE JOB SITE, AND SHALL MAINTAIN (AS INDICATED HEREIN AND ELSEWHERE WITHIN THESE CONSTRUCTION NOTES, SPECIFICATIONS, AND PLANS) A LEGIBLE RECORD ON SAID PLANS OF ANY FIELD TILE ENCOUNTERED, ANY MODIFICATIONS/ALTERATIONS TO ALIGNMENT AND/OR TO PLANS AND SPECIFICATIONS OF PROPOSED IMPROVEMENTS, ETC. UPON COMPLETION OF THE CONTRACTOR'S WORK, SAID PLANS AND INFORMATION SHALL BE PROVIDED TO ENGINEER. FINAL CONTRACT PAYMENT SHALL NOT COME DUE UNTIL THIS INFORMATION IS RECEIVED BY THE ENGINEER.
30. OWNER WILL PROVIDE THE CONSTRUCTION PLANS TO THE CONTRACTOR AS ELECTRONIC FILES (AUTOCAD FORMAT).
31. ALL ELECTRONIC FILES TRANSFERRED BY AECOM ARE PROVIDED SOLELY FOR THE CONVENIENCE OF THE CONTRACTOR AND ARE WARRANTED ONLY TO THE EXTENT THAT THEY CONFORM TO THE ORIGINAL, HARD COPY PLOT(S) OR OTHER ORIGINALLY SEALED DOCUMENT(S) PRODUCED BY AECOM. DEVIATION IN ANY RESPECT SHALL RENDER THE ENTIRE CONTENTS VOID AND ALL ELECTRONIC FILE(S) ARE TRANSMITTED IN TRUST FOR THE SOLE USE OF THE CONTRACTOR AND ACCEPTANCE CONSTITUTES ASSUMPTION OF RESPONSIBILITY FOR IT'S USE AND SAFEKEEPING. ANY USE BY THIRD PARTIES SHALL BE AT THE SOLE RISK OF THE CONTRACTOR. ANY ALTERATIONS TO OR TAMPERING WITH THE FILES SHALL CONSTITUTE THE AGREEMENT OF THE CONTRACTOR TO RELEASE DEFEND AND HOLD HARMLESS AECOM, FROM ALL CLAIMS AND CAUSES OF ACTION BY SAID CONTRACTOR AND THIRD PARTIES.

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CHK'D/APPR'D: A.H. DATE: 05/07/2015

**EXISTING SITE CONDITIONS & GENERAL NOTES**

**OAK CREEK MILLPOND**
**SLIDE GATE REHABILITATION**
Milwaukee, Wisconsin
4400 N. ESTABROOK DRIVE

MILWAUKEE COUNTY DEPT. OF ADMIN
SERVICES - AE & ES SECTION
CITY CAMPUS 2711 W. WELLS ST - 2ND FLOOR MILWAUKEE, WI 53208

REVISIONS:

DATE: 05/07/2015
PROJECT: 9155-14650
SITE NO: N/A
BUILDING NO: N/A

**C100**

PRELIMINARY DRAFT

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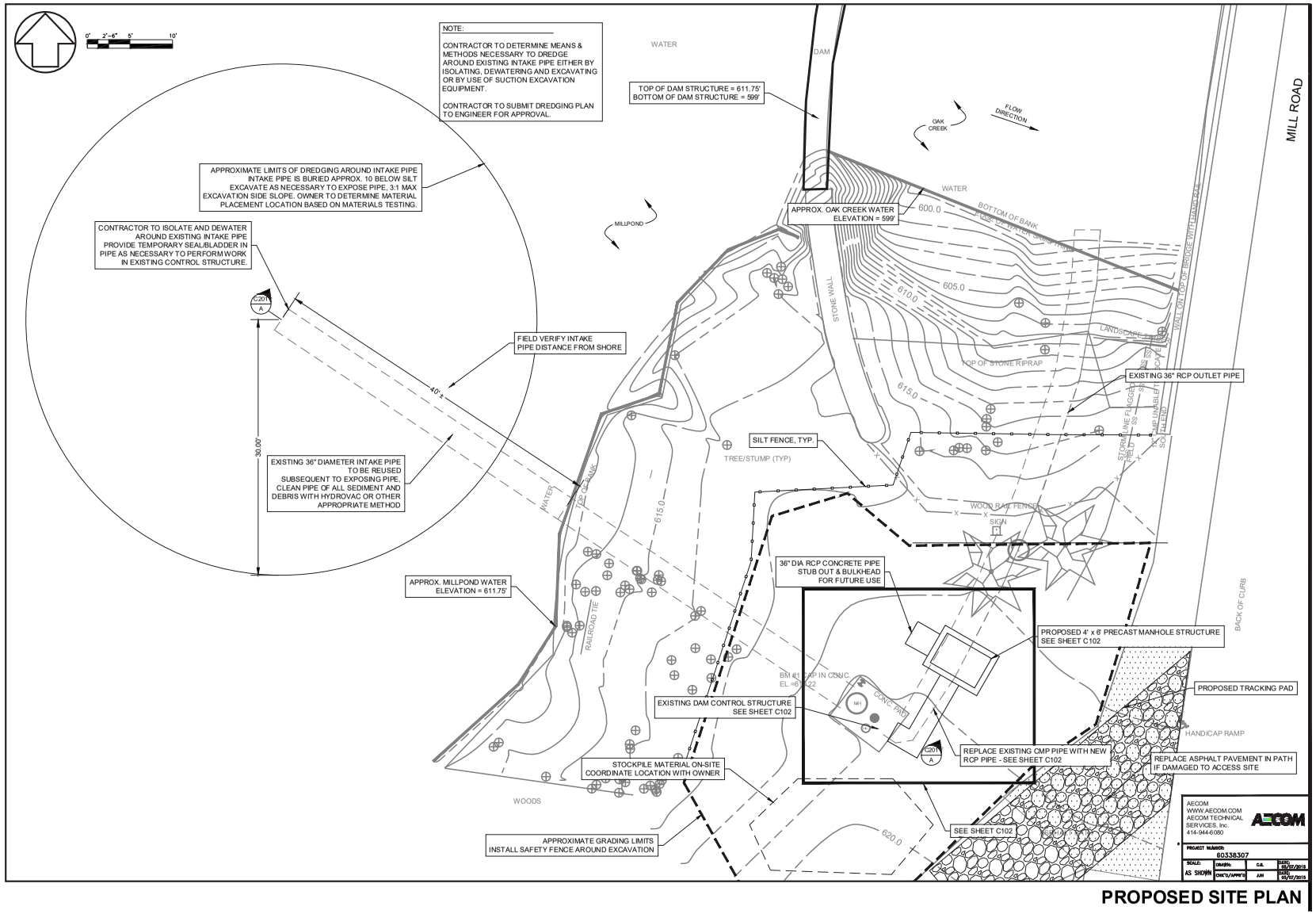
## Figure Appendix.Dam-6 (Continued)




PROPOSED SITE PLAN

**OAK CREEK MILLPOND**
**SLIDE GATE REHABILITATION**
Milwaukee, Wisconsin
4400 N. ESTABROOK DRIVE

MILWAUKEE COUNTY DEPT. OF ADMIN
SERVICES - AE & ES SECTION
CITY CAMPUS 2711 W. WELLS ST - 2ND FLOOR MILWAUKEE, WI 53208

REVISIONS:

DATE: 05/07/2015
PROJECT: 9155-14650
SITE NO: N/A
BUILDING NO: N/A

**C101**

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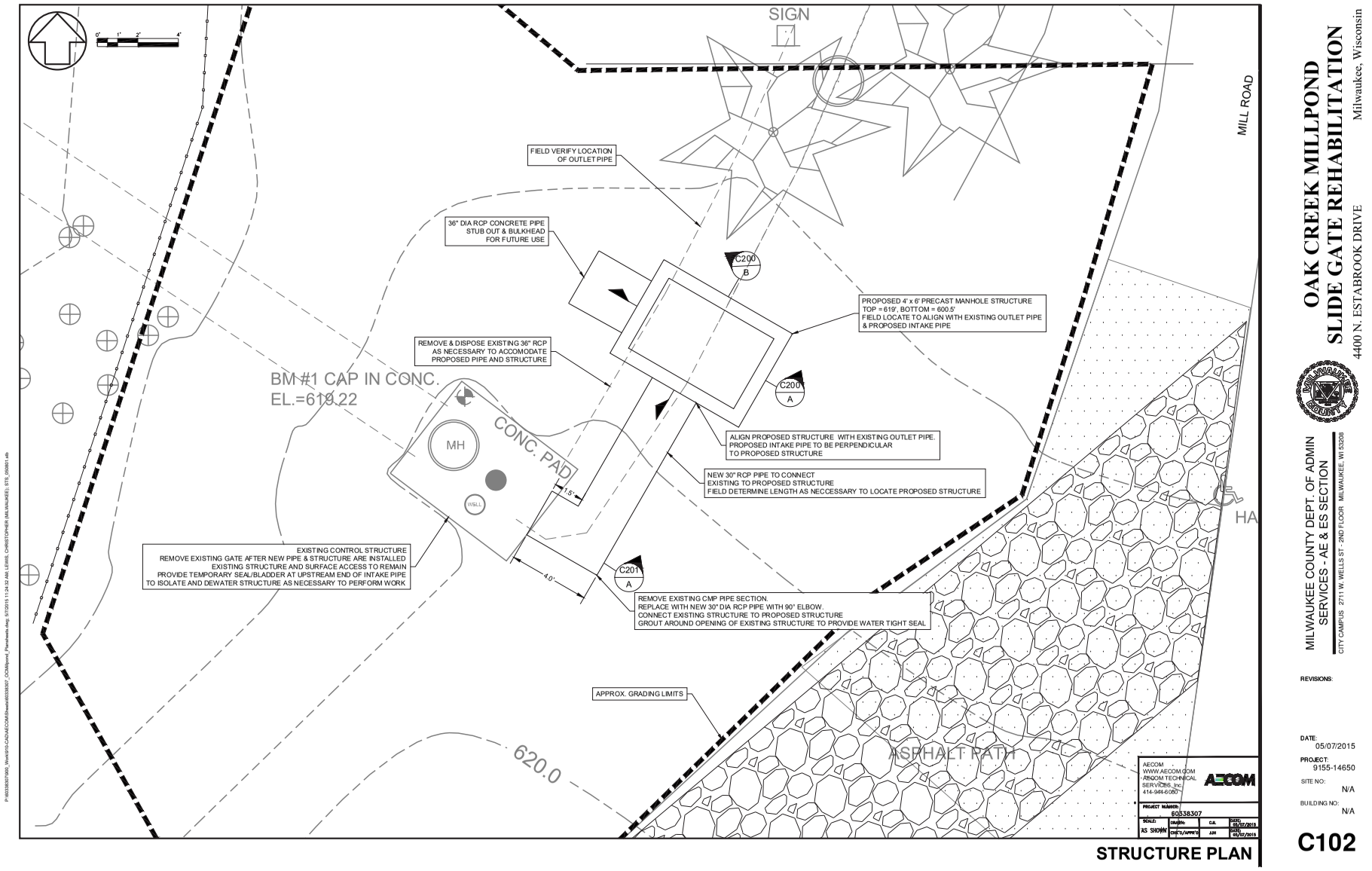
## Figure Appendix.Dam-6 (Continued)




**STRUCTURE PLAN**

**OAK CREEK MILLPOND**
**SLIDE GATE REHABILITATION**
Milwaukee, Wisconsin
4400 N. ESTABROOK DRIVE

MILWAUKEE COUNTY DEPT. OF ADMIN
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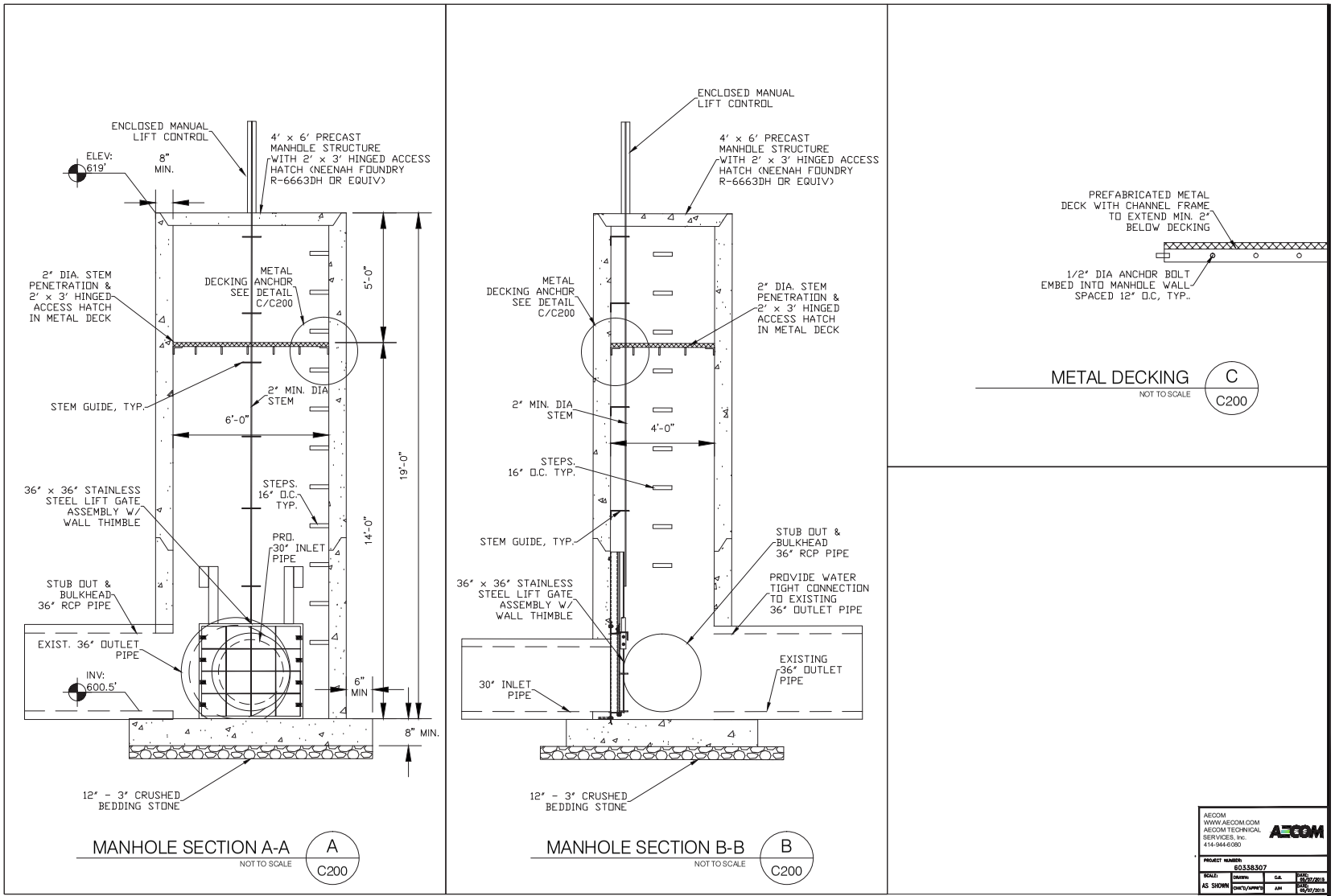
REVISIONS:

DATE: 05/07/2015
PROJECT: 9155-14650
SITE NO: N/A
BUILDING NO: N/A

**C102**

## Figure Appendix.Dam-6 (Continued)

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**SITE DETAILS**

**OAK CREEK MILLPOND SLIDE GATE REHABILITATION**
Milwaukee, Wisconsin
4400 N. ESTABROOK DRIVE

MILWAUKEE COUNTY DEPT. OF ADMIN SERVICES - AE & ES SECTION
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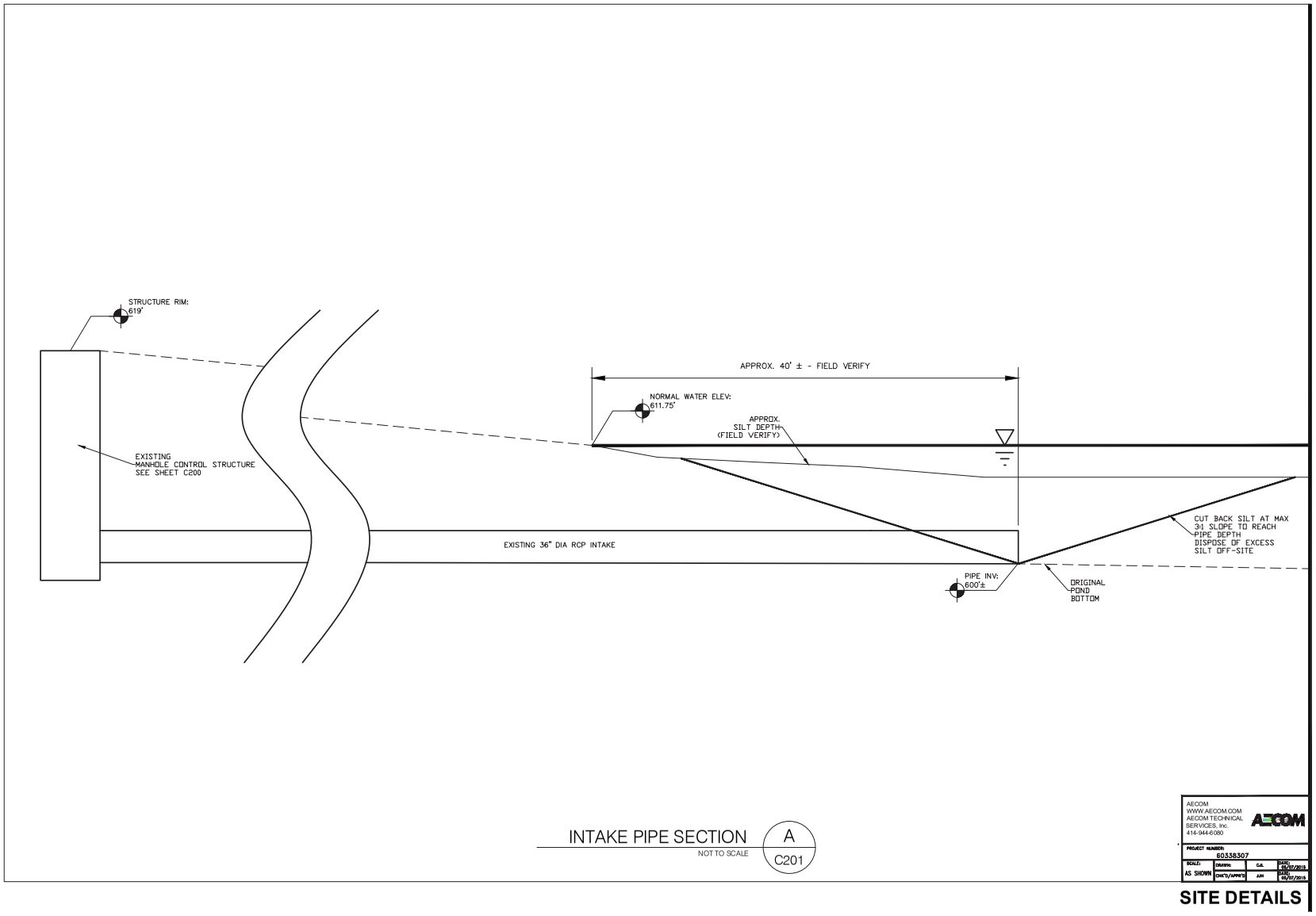
REVISIONS:

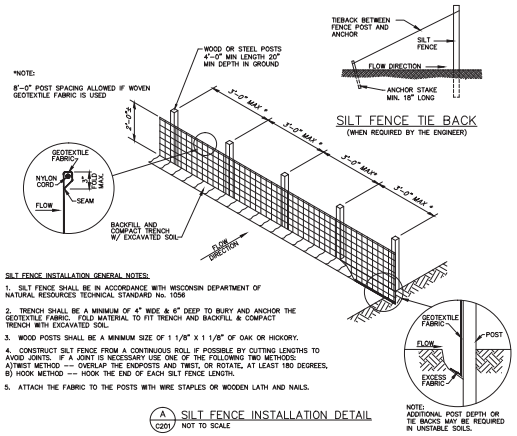
DATE: 05/07/2015
PROJECT: 9155-14650
SITE NO: N/A
BUILDING NO: N/A

**C200**

## Figure Appendix.Dam-6 (Continued)



## Figure Appendix.Dam-6 (Continued)



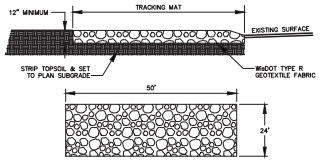

SILT FENCE TIE BACK
(WHEN REQUIRED BY THE ENGINEER)

SILT FENCE INSTALLATION GENERAL NOTES:

1. SILT FENCE SHALL BE IN ACCORDANCE WITH WISCONSIN DEPARTMENT OF NATURAL RESOURCES TECHNICAL STANDARD No. 1056
2. TRENCH SHALL BE A MINIMUM OF 4" WIDE & 6" DEEP TO BURY AND ANCHOR THE GEOTEXTILE FABRIC. FOLD MATERIAL TO FIT TRENCH AND BACKFILL & COMPACT TRENCH WITH EXCAVATED SOIL.
3. WOOD POSTS SHALL BE A MINIMUM SIZE OF 1 1/8" X 1 1/8" OF OAK OR HICKORY.
4. CONSTRUCT SILT FENCE FROM A CONTINUOUS ROLL IF POSSIBLE BY CUTTING LENGTHS TO AVOID JOINTS. IF A JOINT IS NECESSARY USE ONE OF THE FOLLOWING TWO METHODS:
   A) TWIST METHOD --- OVERLAP THE ENDPOSTS AND TWIST, OR ROTATE, AT LEAST 180 DEGREES,
   B) HOOK METHOD --- HOOK THE END OF EACH SILT FENCE LENGTH.
5. ATTACH THE FABRIC TO THE POSTS WITH WIRE STAPLES OR WOODEN LATH AND NAILS.

NOTE: ADDITIONAL POST DEPTH OR TIE BACKS MAY BE REQUIRED IN UNSTABLE SOILS.

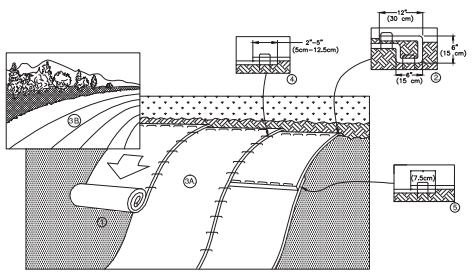
A C201 SILT FENCE INSTALLATION DETAIL
NOT TO SCALE




EROSION CONTROL TRACK PAD GENERAL NOTES:

1. CONTRACTOR SHALL PROVIDE THE STONE TRACKING PAD IN ACCORDANCE WITH THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES TECHNICAL STANDARD No. 1057.
2. TRACKING PAD SHALL BE INSTALLED PRIOR TO ANY TRAFFIC LEAVING THE SITE. IF CONDITIONS ARE SUCH THAT SEDIMENT IS NOT REMOVED FROM TIRES BY THE TRACKING PAD, THEN TIRES SHALL BE WASHED IN ACCORDANCE WITH WDNR TECHNICAL STANDARD No. 1057.
3. USE 3 TO 6 INCH CLEAR OR WASHED STONE. ALL MATERIAL TO BE RETAINED ON A 3-INCH SIEVE. MINIMUM 50' LENGTH, MINIMUM 12" THICK, AND SHALL BE THE FULL WIDTH OF THE EGRESS POINT.
4. SITES WITH A HIGH WATER TABLE, OR WHERE SATURATED CONDITIONS ARE EXPECTED, THE STONE TRACKING PAD SHALL BE UNDERLAIN WITH A WisDOT TYPE R GEOTEXTILE FABRIC TO PREVENT MIGRATION OF UNDERLYING SOIL INTO THE STONE.
5. SURFACE WATER MUST BE PREVENTED FROM PASSING THROUGH THE TRACKING PAD. FLOWS SHALL BE DIVERTED AWAY FROM TRACKING PADS OR CONVEYED UNDER AND AROUND THEM BY USING A VARIETY OF PRACTICES, SUCH AS CULVERTS, WATER BARS, OR OTHER SIMILAR PRACTICES.
6. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND/OR CLEANING OF ANY MEASURES USED TO TRAP SEDIMENT.
7. WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTERING PUBLIC RIGHT-OF-WAYS. WHEN WASHING IS DONE, IT SHALL BE DONE IN AN AREA STABILIZED WITH AND WHICH DRAINS TO AN APPROVED SEDIMENT TRAPPING DEVICE.
8. ALL SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO A PUBLIC RIGHT-OF-WAY SHALL BE REMOVED IMMEDIATELY.
9. ACCESS PERMIT TO PUBLIC ROADS MUST BE OBTAINED PRIOR TO CONSTRUCTION.
10. EASEMENTS ARE SHOWN AT APPROXIMATE LOCATIONS.
11. CONTRACTOR SHALL REMOVE AND DISPOSE OF TRACK PAD MATERIAL AND STABILIZE THE AREA AT PROJECT COMPLETION. SOLID WASTE CAP, LOCATED WITHIN SITE LIMITS.

B C201 TRACKING PAD DETAIL
NOT TO SCALE




1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. NOTE: WHEN USING CELL-O-SEED DO NOT SEED PREPARED AREA. CELL-O-SEED MUST BE INSTALLED WITH PAPER SIDE DOWN.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET IN A 6" (15cm) DEEP X 6" (15cm) WIDE TRENCH WITH APPROXIMATELY 12" (30cm) OF BLANKET EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30cm) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30cm) PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30cm) APART ACROSS THE WIDTH OF THE BLANKET.
3. ROLL THE BLANKETS (A.) DOWN OR (B.) HORIZONTALLY ACROSS THE SLOPE. BLANKETS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING OPTIONAL DOT SYSTEM , STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 2"-5" (5cm-12.5cm) OVERLAP DEPENDING ON BLANKET TYPE. TO ENSURE PROPER SEAM ALIGNMENT, PLACE THE EDGE OF THE OVERLAPPING BLANKET (BLANKET BEING INSTALLED ON TOP) EVEN WITH THE COLORED SEAM STITCH ON THE PREVIOUSLY INSTALLED BLANKET.
5. CONSECUTIVE BLANKETS SPLICED DOWN THE SLOPE MUST BE PLACED END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" (7.5cm) OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" (30cm) APART ACROSS ENTIRE BLANKET WIDTH.

NOTE:
*IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15cm) MAY BE NECESSARY TO PROPERLY SECURE THE BLANKETS.

SLOPE EROSION MAT SHALL BE IN ACCORDANCE WITH WISCONSIN DEPARTMENT OF NATURAL RESOURCES TECHNICAL STANDARD No. 1052.

C C201 SLOPE EROSION MAT
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**SOIL EROSION AND SEDIMENT CONTROL DETAILS**

**OAK CREEK MILLPOND**
**SLIDE GATE REHABILITATION**
Milwaukee, Wisconsin
4400 N. ESTABROOK DRIVE

MILWAUKEE COUNTY DEPT. OF ADMIN SERVICES - AE & ES SECTION
CITY CAMPUS 2711 W. WELLS ST - 2ND FLOOR MILWAUKEE, WI 53208

REVISIONS:

DATE: 05/07/2015
PROJECT: 9155-14650
SITE NO: N/A
BUILDING NO: N/A

**C202**

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## Chapter 4

# INVENTORY FINDINGS

APPENDIX OUTFALLS

## Appendix xx Table xx
## Known Stormwater Outfalls Within the Oak Creek Watershed

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 1 | RHDOF37 | Unknown | Oak Creek Mainstem | Grant Park Ravine | 42.90676 | -87.84205 | - - | - - | Corrugated metal pipe |
| 2 | MC27; RDFOF38 | Milwaukee County | Oak Creek Mainstem | Grant Park Ravine | 42.90693 | -87.84300 | - - | 12 | North side of Creek; Near manhole L6 |
| 3 | RHDOF39 | Unknown | Oak Creek Mainstem | Grant Park Ravine | 42.90697 | -87.84346 | - - | - - | Corrugated metal pipe |
| 4 | MC26; RHDOF40 | Milwaukee County | Oak Creek Mainstem | Grant Park Ravine | 42.90721 | -87.84353 | - - | 12 | Oak Creek Parkway, north side of Creek; Near manhole L4B |
| 5 | RHDOF41 | Unknown | Oak Creek Mainstem | Grant Park Ravine | 42.90742 | -87.84390 | - - | - - | Outfall submerged; Concrete endsection |
| 6 | RHDOF42 | Unknown | Oak Creek Mainstem | Grant Park Ravine | 42.90771 | -87.84495 | - - | - - | - - |
| 7 | RHDOF43 | Unknown | Oak Creek Mainstem | Grant Park Ravine | 42.90767 | -87.84518 | - - | - - | - - |
| 8 | SM46 | City of South Milwaukee | Oak Creek Mainstem | Grant Park Ravine | 42.90741 | -87.84550 | - - | 10 | Near manhole J13E |
| 9 | OSWO1; MC25 | Milwaukee County | Oak Creek Mainstem | Grant Park Ravine | 42.90779 | -87.84659 | Good | 12 | Right bank; Concrete pipe with riprap protection; Near manhole J22A |
| 10 | OSWO2; SM45; RHDOF44 | City of South Milwaukee | Oak Creek Mainstem | Grant Park Ravine | 42.90788 | -87.84675 | Poor | 18 | Left bank; Concrete pipe built into WPA wall; Near manhole J19 |
| 11 | MC22; RHDHAW | Milwaukee County | Oak Creek Mainstem | Grant Park Ravine | 42.91047 | -87.84890 | - - | 36 | Near manhole M1A |
| 12 | OSWO3; MC24 | Milwaukee County | Oak Creek Mainstem | Grant Park Ravine | 42.90790 | -87.84675 | Good | 12 | Left bank; Concrete pipe built into WPA wall; Emergency sewage overflow pipe from wastewater pumping station up bank; Near manhole J20A |
| 13 | MC23 | Milwaukee County | Oak Creek Mainstem | Grant Park Ravine | 42.90940 | -87.84734 | - - | 18 | Near manhole M1A |
| 14 | OSWO4 | Unknown | Oak Creek Mainstem | Grant Park Ravine | 42.91027 | -87.84763 | Failed | 24 | Right bank; Sections of pipe have disconnected due to eroding bank |
| 15 | OSWO5; MC21; RHDOF45 | Milwaukee County | Oak Creek Mainstem | Grant Park Ravine | 42.91088 | -87.84894 | Good | 12/18 | Left bank; One foot diameter PVC pipe set back from creek about 50 feet; 18 inch pipe closer to road; Near manhole M2B |
| 16 | OSWO6; SM44; RHDOF48 | City of South Milwaukee | Oak Creek Mainstem | Grant Park Ravine | 42.91132 | -87.84866 | Fair | 24 | Right bank; Concrete pipe with riprap protection; Near manhole P23 |
| 17 | OSWO7; SM43 | City of South Milwaukee | Oak Creek Mainstem | Grant Park Ravine | 42.91163 | -87.85024 | Good | 12 | Left bank; Concrete pipe; Near manhole M4A |
| 18 | OSWO8 | Unknown | Oak Creek Mainstem | Grant Park Ravine | 42.91155 | -87.85094 | Good | - - | Left bank; Concrete pipe was within wall that has since been rebuilt |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 19 | OSWO9 | Unknown | Oak Creek Mainstem | Grant Park Ravine | 42.91190 | -87.85159 | Good | 12 | Right bank; Was on top of wall that has since been rebuilt |
| 20 | SM41 | City of South Milwaukee | Oak Creek Mainstem | Grant Park Ravine | 42.91219 | -87.85299 | - - | 24 | Near manhole KK244 |
| 21 | OSWO10; SM42; RHDOF49 | City of South Milwaukee | Oak Creek Mainstem | Grant Park Ravine | 42.91210 | -87.85287 | Fair | 120 | Left bank; Near manhole KK37; Large concrete arch culvert, may have other outfalls draining inside of culvert |
| 22 | OSWO11; SM40: RHDOF50 | City of South Milwaukee | Oak Creek Mainstem | Grant Park Ravine | 42.91235 | -87.85302 | Fair | 15 | Right bank; Concrete pipe built in WPA wall; Near manhole P1 |
| 23 | OSWO12 | Unknown | Oak Creek Mainstem | Grant Park Ravine | 42.91226 | -87.85309 | Good | 6 | Left bank; Green PVC pipe |
| 24 | OSWO13 | Unknown | Oak Creek Mainstem | Grant Park Ravine | 42.91235 | -87.85306 | Good | 12 | Right bank; Corrugated metal pipe resting on top of wall |
| 25 | OSWO14 | Unknown | Oak Creek Mainstem | Grant Park Ravine | 42.91229 | -87.85329 | Fair | 36/12 | Left bank; Two outfalls |
| 26 | MC20; RHDOF51 | Milwaukee County | Oak Creek Millpond | Lower Oak Creek—Mill Pond | 42.91299 | -87.85362 | - - | 12 | PVC pipe; Flows into south side of Mill Pond; Near manhole P2B |
| 27 | MC19; RHDOF52 | Milwaukee County | Oak Creek Millpond | Lower Oak Creek—Mill Pond | 42.91382 | -87.85398 | - - | 12 | Corrugated metal pipe; Flows into south side of Mill Pond; Near manhole P10B |
| 28 | MC18 | Milwaukee County | Oak Creek Millpond | Lower Oak Creek—Mill Pond | 42.91392 | -87.85565 | - - | 12 | Flows into south side of Mill Pond; Near manhole P10C |
| 29 | OSWO15; MC17; RHDOF104 | Milwaukee County | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.91467 | -87.85641 | Good | 24 | Left bank; Concrete metered pipe with riprap protection; Oak Creek Parkway |
| 30 | OSWO16; MC16; RHDOF103 | Milwaukee County | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.91535 | -87.85731 | Good | 12 | Right bank; PVC pipe with riprap protection; Near manhole O3; Oak Creek Parkway |
| 31 | OSWO17; SM39 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.91489 | -87.85850 | Good | 18 | Left bank; Corrugated metal pipe built into rock gabion wall; Near manhole O3; 10th Avenue on west side of Creek |
| 32 | SM37; RHDOF99 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.91624 | -87.85933 | - - | 24 | Under N. Chicago Avenue bridge; North side of Creek; Near manhole T1 |
| 33 | SM38; RHDOF100 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.91605 | -87.85947 | - - | 18 | Under N. Chicago Avenue bridge; South side of Creek; Near manhole Z12 |
| 34 | RHDOF101 | Unknown | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.91621 | -87.85941 | - - | - - | Under N. Chicago Avenue bridge |
| 35 | SM36; RHDOF102 | Unknown | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.91619 | -87.85969 | - - | 24 | South side of Creek near Rawson Avenue |
| 36 | CAT1; RHDOF98 | Unknown | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.91709 | -87.85986 | - - | - - | - - |
| 37 | OSWO18; MC15; RHDOF97 | Milwaukee County | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.91837 | -87.86036 | Failed | 18 | Right bank; Near manhole U2F; Bank erosion causing at least six sections of concrete pipe to split |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 38 | OSWO19; MC14; RHDOF96 | Milwaukee County | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.91991 | -87.86072 | Failed | 18 | Right bank; Four foot concrete end section has separated from pipe |
| 39 | OSWO20; MC13 | Milwaukee County | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.92083 | -87.86079 | Poor | 18 | Right bank; Concrete pipe with end section separated from pipe; Near manhole U8B; Bank erosion occurring around outfall |
| 40 | OSWO21; SM35; RHDOF95 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.92133 | -87.86116 | Failed | 27 | Right bank; Concrete pipe; End section with wingwalls and a pipe section has separated; Bank eroding at pipe; Near manhole U26A and Aspen Street |
| 41 | OSWO22 | Unknown | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.92220 | -87.86098 | Fair | 12 | Left bank; Concrete pipe |
| 42 | OSWO24; RHDOF91 | Unknown | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.92237 | -87.86076 | Fair | 12 | Right bank; Concrete pipe |
| 43 | OSWO23; RHDOF91B | Unknown | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.92237 | -87.86075 | Poor | 12 | Right bank; Corrugated metal pipe rusted through; Bank has eroded around pipe |
| 44 | OSWO25; SM34; RHDOF92 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.92240 | -87.86077 | Poor | 27 | Right bank; Concrete pipe with two sections separated; Near manhole CC41 |
| 45 | OSWO26; RHDOF93 | Unknown | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.92249 | -87.86070 | Poor | 18 | Left bank; Concrete sections of pipe are separated within wall |
| 46 | OSWO27; RHDOF94 | Unknown | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.92251 | -87.86070 | Poor | 12 | Right bank; Clay pipe is 50% plugged with debris |
| 47 | OSWO28;SM33; RHDOF89; RHDOF90 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.92320 | -87.86199 | Fair | 21 | Right bank; Near manhole J2E; Corrugated metal pipe is rusted through, bent, and protruding about 5.5 feet from bank; MC12 is directly above outfall |
| 48 | CUD33 | City of Cudahy | Offline | Lower Oak Creek—Mill Pond | 42.93043 | -87.86358 | - - | 30 | Likely connects to South Milwaukee's storm sewer system and eventually flows to Oak Creek's mainstem via outfall SM32 |
| 49 | CUD32 | City of Cudahy | Offline | Lower Oak Creek—Mill Pond | 42.93022 | -87.86460 | - - | 24 | Likely connects to South Milwaukee's storm sewer system and eventually flows to Oak Creek's mainstem via outfall SM32 |
| 50 | CUD20 | City of Cudahy | Offline | Lower Oak Creek—Mill Pond | 42.93069 | -87.86601 | - - | 48 | Likely connects to South Milwaukee's storm sewer system and eventually flows to Oak Creek's mainstem via outfall SM32 |
| 51 | CUD21 | City of Cudahy | Offline | Lower Oak Creek—Mill Pond | 42.93103 | -87.86655 | - - | - - | Likely connects to South Milwaukee's storm sewer system and eventually |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | flows to Oak Creek's mainstem via outfall SM32 |
| 52 | CUD18 | City of Cudahy | Offline | Lower Oak Creek—Mill Pond | 42.93497 | -87.86305 | - - | - - | Likely connects to South Milwaukee's storm sewer system and eventually flows to Oak Creek's mainstem via outfall SM32 |
| 53 | CUD25 | City of Cudahy | Offline | Lower Oak Creek—Mill Pond | 42.93716 | -87.86292 | - - | - - | Likely connects to South Milwaukee's storm sewer system and eventually flows to Oak Creek's mainstem via outfall SM32 |
| 54 | CUD24 | City of Cudahy | Offline | Lower Oak Creek—Mill Pond | 42.93717 | -87.86272 | - - | - - | Likely connects to South Milwaukee's storm sewer system and eventually flows to Oak Creek's mainstem via outfall SM32 |
| 55 | CUD27 | City of Cudahy | Offline | Lower Oak Creek—Mill Pond | 42.94470 | -87.86271 | - - | - - | Likely connects to South Milwaukee's storm sewer system and eventually flows to Oak Creek's mainstem via outfall SM32 |
| 56 | CUD52 | City of Cudahy | Offline | Lower Oak Creek—Mill Pond | 42.93059 | -87.88007 | - - | - - | Likely connects to South Milwaukee's storm sewer system and eventually flows to Oak Creek's mainstem via outfall SM32 |
| 57 | OTRIB1; SM32 | City of South Milwaukee | Tributary to Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.92349 | -87.86417 | - - | 102 | Major outfall; Likely drains Cudahy storm sewers in addition to South Milwaukee; Near Southtowne Apartments; Underground sewer daylights for about 700 feet and flows into Oak Creek's mainstem from the north |
| 58 | OSWO29; MC11; RHDOF88 | Milwaukee County | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.92388 | -87.86603 | Poor | 12 | Left bank; Near manhole J14D; Corrugated metal pipe is rusted through |
| 59 | OSWO30; SD1; RHDOF87 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.92336 | -87.86843 | Failed | 12 | Left bank; Near manhole J15B; Corrugated metal pipe is rusted through; Located just downstream of larger outfall |
| 60 | OSWO31; RHDOF86 | Unknown | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.92337 | -87.86847 | Poor | 27 | Left bank; Corrugated metal pipe is rusted through and protruding from the bank about 12 feet due to erosion |
| 61 | OSWO31a; MC10 | Milwaukee County | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.92369 | -87.86884 | Failed | 12 | Left bank; Near manhole J15D; Corrugated metal pipe is rusted though |
| 62 | OSWO32 | Unknown | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.92384 | -87.86881 | Poor | 24 | Right bank; Corrugated metal pipe is protruding about 12 feet from bank; |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | End section is nearly detached and is becoming embedded into bottom of stream channel |
| 63 | SM31; RHDOF85 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek—Mill Pond | 42.92482 | -87.86892 | - - | 21 | Right bank; Near manhole K3D |
| 64 | CUD36 | City of Cudahy | Offline | Lower Oak Creek | 42.92983 | -87.86914 | - - | 12 | Likely connects to South Milwaukee's storm sewer system and eventually flows to Oak Creek's mainstem via outfall SM30 |
| 65 | CUD34 | City of Cudahy | Offline | Lower Oak Creek | 42.93019 | -87.86937 | - - | 8 | Likely connects to South Milwaukee's storm sewer system and eventually flows to Oak Creek's mainstem via outfall SM30 |
| 66 | CUD35 | City of Cudahy | Offline | Lower Oak Creek | 42.93015 | -87.87285 | - - | 48 | Likely connects to South Milwaukee's storm sewer system and eventually flows to Oak Creek's mainstem via outfall SM30 |
| 67 | CUD52 | City of Cudahy | Offline | Lower Oak Creek | 42.93059 | -87.88007 | - - | 15 | Likely connects to South Milwaukee's storm sewer system and eventually flows to Oak Creek's mainstem via outfall SM30 |
| 68 | CUD19 | City of Cudahy | Offline | Lower Oak Creek | 42.93374 | -87.87034 | - - | 24 | Likely connects to South Milwaukee's storm sewer system and eventually flows to Oak Creek's mainstem via outfall SM30 |
| 69 | CUD28 | City of Cudahy | Offline | Lower Oak Creek | 42.94223 | -87.86217 | - - | 36 | Likely connects to South Milwaukee's storm sewer system and eventually flows to Oak Creek's mainstem via outfall SM30 |
| 70 | CUD10 | City of Cudahy | Offline | Lower Oak Creek | 42.94229 | -87.86202 | - - | - - | Likely connects to South Milwaukee's storm sewer system and eventually flows to Oak Creek's mainstem via outfall SM30 |
| 71 | CUD11 | City of Cudahy | Offline | Lower Oak Creek | 42.94232 | -87.86213 | - - | 27 | Likely connects to South Milwaukee's storm sewer system and eventually flows to Oak Creek's mainstem via outfall SM30 |
| 72 | OSWO33; SM30; RHDOF69 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.92484 | -87.87098 | Good | 54 | Major outfall; Right bank; Concrete outfall; Likely drains Cudahy storm sewers in addition to South Milwaukee Near manhole LL17 |
| 73 | OSWO34; MC9 | Milwaukee County | Oak Creek Mainstem | Lower Oak Creek | 42.92446 | -87.87208 | Fair | 30 | Left bank; Near manhole J15J; Corrugated metal pipe |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 74 | OSWO35; SM29; RHDOF68 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.92398 | -87.87273 | Good | 36 | Right bank; Concrete outfall; Near manhole NN50E |
| 75 | SM28; RHDOF67 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.92424 | -87.87397 | - - | 30 | Right bank, setback 300 feet off Creek channel |
| 76 | OSWO 36; MC8; RHDOF66 | Milwaukee County | Oak Creek Mainstem | Lower Oak Creek | 42.92302 | -87.87411 | Failed | 12 | Left bank; Corrugated metal pipe is rusted through; Near outfall OO6B |
| 77 | OSWO 37; SM27; RHDOF65 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.92219 | -87.87508 | Good | 30 | Right bank; Concrete pipe; Near manhole OO3 |
| 78 | OSWO 38; MC7 | Milwaukee County | Oak Creek Mainstem | Lower Oak Creek | 42.92132 | -87.87473 | Fair | 12 | Left bank; Corrugated metal pipe; Near manhole OO1I; Beech Street |
| 79 | RHDOF64 | Unknown | Oak Creek Mainstem | Lower Oak Creek | 42.92070 | -87.87464 | - - | - - | Cement outfall is blocked |
| 80 | OSWO 39; SM26; RHDOF63 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.92062 | -87.87445 | Good | 12 | Left bank; Corrugated metal pipe is protruding from bank into channel and end section is bent; Near manhole UU2; Walnut Street |
| 81 | OSWO 40; MC6; RHDOF61 | Milwaukee County | Oak Creek Mainstem | Lower Oak Creek | 42.91974 | -87.87432 | Good | 42 | Right bank; Concrete pipe; Near manhole TT1C; Cherry Street |
| 82 | OSWO41;SM25; RHDOF62 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.91970 | -87.87428 | Good | 15 | Left bank; Corrugated metal pipe; Near manhole TT1C; Cherry Street |
| 83 | OSWO42; SM24; RHDOF60 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.91897 | -87.87422 | Fair | 48 | Major outfall; Right bank; Concrete pipe with metered end section; Some undercutting occurring; Effluent has about two foot drop to channel; Near manhole TT6; Pine Street |
| 84 | MC5 | Milwaukee County | Oak Creek Mainstem | Lower Oak Creek | 42.91870 | -87.87417 | - - | 12 | Left bank; Near manhole Q3D; Pine Street |
| 85 | OSWO43; MC4; RHDOF59 | Milwaukee County | Oak Creek Mainstem | Lower Oak Creek | 42.91809 | -87.87410 | Failed | 12 | Left bank; Corrugated metal pipe is plugged with sediment and debris; Near manhole Q1C; Chestnut Street |
| 86 | OSWO44; SM23; RHDOF58 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.91800 | -87.87409 | Good | 18 | Left bank; Corrugated metal pipe; Near manhole Q1A; Chestnut Street |
| 87 | SM22; RHDOF57 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.91794 | -87.87418 | - - | 12 | Right bank; Corrugated metal pipe; Near manhole SS9E; Chestnut Street |
| 88 | OSWO45; MC3 | Milwaukee County | Oak Creek Mainstem | Lower Oak Creek | 42.91748 | -87.87404 | Fair | 12 | Left bank; Corrugated metal pipe; Near manhole Q1E; Cedar Street |
| 89 | OSWO46; SM21; RHDOF56 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.91721 | -87.87409 | Poor | 18 | Right bank; Concrete pipe has been undercut by erosion forming a 2.5 foot drop to channel bottom; Near manhole SS6D; Cedar Street |
| 90 | OSWO47; SM20 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.91714 | -87.87403 | Poor | 12 | Right bank; Corrugated metal pipe has rusted through and is protruding |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | about 3.5 feet from bank; Near manhole SS6C; Cedar Street |
| 91 | OSWO48; SM19; RHDOF55 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.91630 | -87.87375 | Failed | 12 | Right bank; Corrugated metal pipe has rusted through and is protruding from bank by about 4.5 feet; End section is bent almost shut; Near manhole R2D; Maple Street |
| 92 | OSWO49; MC2; RHDOF54 | Milwaukee County | Oak Creek Mainstem | Lower Oak Creek | 42.91623 | -87.87365 | Failed | 15 | Left bank; Corrugated metal pipe is badly crushed and bent and is protruding from the bank by about eight feet; Near manhole NN1-1; Maple Street |
| 93 | SM18; RHDOF53 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.91579 | -87.87336 | - - | 12 | Left bank; Clay pipe with concrete apron; Near manhole PP14E; Rawson Avenue |
| 94 | MC1 | Milwaukee County | Oak Creek Mainstem | Lower Oak Creek | 42.91557 | -87.87321 | - - | - - | Right bank; Rawson Avenue |
| 95 | SM17 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.91496 | -87.87304 | - - | 27 | Right bank; Rawson Avenue |
| 96 | OSWO50; SM16; RHDOF70 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.91413 | -87.87135 | Good | 15 | Left bank; Concrete pipe built into 15th Avenue bridge structure; About 5 feet above channel; Near manhole JJ1 |
| 97 | OSWO51 | Unknown | Oak Creek Mainstem | Lower Oak Creek | 42.91398 | -87.87127 | Fair | 12 | Right bank; Built into 15th Avenue bridge structure; Pipe may be separated inside wall |
| 98 | OSWO52; SM15; RHDOF71 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.91354 | -87.87051 | Good | 12 | Left bank; Corrugated metal pipe with a concrete block apron that carries effluent down bank to channel; Erosion is undercutting concrete apron; Near manhole UU5-2; Manitoba Avenue |
| 99 | OSWO53 | Unknown | Oak Creek Mainstem | Lower Oak Creek | 42.91323 | -87.87036 | Failed | 6 | Left bank; Metal pipe angle down from bank and is submerged into water; Pipe has disconnected up-bank and percolates through bank |
| 100 | OSWO54; SM14; RHDOF72 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.91249 | -87.87027 | Fair | 12 | Left bank; Corrugated metal pipe; Metered with a concrete block apron carries effluent down bank to channel; Near manhole RR1; Minnesota Avenue |
| 101 | OSWO55; SM13; RHDOF73 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.91223 | -87.87045 | Good | 18 | Right bank; Corrugated metal pipe with a concrete block apron that carries effluent down bank to channel; Near manhole SS3; Monroe Avenue |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 102 | OSWO56; SM12; RHDOF75 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.91175 | -87.87055 | Fair | 12 | Left bank; Corrugated metal pipe metered with a concrete block apron that carries effluent down bank to channel; Bank is eroding underneath apron; Near manhole QQ1; Monroe Avenue |
| 103 | SM11; RHDOF77 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.91112 | -87.87073 | - - | 12 | Left bank; Near manhole KK227; Milwaukee Avenue |
| 104 | SM10; RHDOF76 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.91115 | -87.87102 | - - | 15 | Right bank; Corrugated metal pipe built into concrete side slope; Near manhole SS2-1F |
| 105 | OSWO57 | Unknown | Oak Creek Mainstem | Lower Oak Creek | 42.91073 | -87.87109 | Fair | 18 | Right bank; Corrugated metered metal pipe build into concrete side slope; Bottom of pipe is rusted through slightly and collecting some sediment |
| 106 | OSWO58; SM9; RHDOF78 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.90998 | -87.87193 | Good | 21 | Left bank; Corrugated metered metal pipe build into concrete side slope near upstream terminus of concrete side slope; Concrete side slope is experiencing undercutting at terminus; Near manhole FF1-1; Michigan Avenue |
| 107 | OSWO59; SM8 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.90996 | -87.87223 | Poor | 18 | Right bank; Corrugated metal pipe metered with a concrete block apron that carries effluent down bank to channel; Pipe end is rusted through completely; Some erosion undercutting end of apron;Near manhole G4; Madison Avenue |
| 108 | OSWO60; SM7; OF79 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.90955 | -87.87289 | Poor | 18 | Right bank; Corrugated metal pipe metered with a concrete block apron that carries effluent down bank to channel; Pipe end is beginning to rust through; Concrete apron is cracked in middle and bank is eroding under upstream side; Near manhole EE8; Michigan Avenue |
| 109 | OSWO61 | Unknown | Oak Creek Mainstem | Lower Oak Creek | 42.90935 | -87.87291 | Fair | 12 | Left bank; Corrugated metal pipe metered with a concrete block apron that carries effluent down bank to channel; Set back about 20 feet from channel |
| 110 | OSWO62; SM6; RHDOF80 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.90917 | -87.87303 | Fair | 15 | Left bank; Corrugated metal pipe metered with a concrete block apron that carries effluent down bank to channel; Set back about 20 feet from |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | channel; Near manhole FF3-1H; Michigan Avenue |
| 111 | OSWO63 | Unknown | Oak Creek Mainstem | Lower Oak Creek | 42.90871 | -87.87348 | Fair | - - | Left bank; Outfall has a rubber flap that is closed on the end section; Pump house directly up-bank from outfall; Possibly an emergency sanitary sewer outfall |
| 112 | OSWO64; SM5; RHDOF82 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.90818 | -87.87390 | Good | 24 | Left bank; Corrugated metal pipe with a one foot diameter pvc pipe inside main pipe; Protected by boulder rip-rap; Near manhole CC35; Marquette Avenue |
| 113 | OSWO65; SM4; RHDOF81 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.90801 | -87.87424 | Good | 24 | Right bank; Corrugated metal pipe metered with a concrete block apron that carries effluent down bank to channel; Near manhole BB2; Marquette Avenue |
| 114 | OSWO66 | Unknown | Oak Creek Mainstem | Lower Oak Creek | 42.90714 | -87.87487 | Poor | 12 | Left bank; Corrugated metal pipe with metal apron; Pipe is protruding from bank about seven feet; Roughly two foot drop from pipe end section to channel |
| 115 | OSWO67; SM3; RHDOF83 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.90682 | -87.87496 | Good | 108 | Major outfall; Left bank; Concrete culvert with 75 foot long concrete channel leading to Oak Creek; Near manhole WW158; City Hall |
| 116 | OSWO68; SM2 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.90685 | -87.87535 | Good | 18 | Left bank; Corrugated metal pipe with concrete block apron; Near manhole WW270; Marshall Court |
| 117 | OSWO69; SM1; RHDOF84 | City of South Milwaukee | Oak Creek Mainstem | Lower Oak Creek | 42.90621 | -87.87797 | Good | 18 | Right bank; Corrugated metal metered pipe with concrete block apron that carries effluent to channel; Near manhole W2; Marshall Avenue |
| 118 | OSWO70; 10-1-1 | City of Oak Creek | Oak Creek Mainstem | Lower Oak Creek | 42.90531 | -87.88210 | Fair | 48 | Major Outfall; Right bank; Concrete pipe with poured cement apron; Channel has a four foot scour pool at outfall; Drains subbasins O23-1 through O23-5, an area of about 95 acres; 7651 S. Pennsylvania Avenue |
| 119 | 3-1-1 | City of Oak Creek | Offline | Lower Oak Creek | 42.92248 | -87.88225 | - - | 27 | 2307 E. Oak Street; Drains subbasin L1-1, a total of about 25 acres |
| 120 | 3-3-1 | City of Oak Creek | Offline | Lower Oak Creek | 42.91893 | -87.88106 | - - | 42 | S. Pennsylvania Avenue and E. Chestnut Drive; Drains subbasins L1-1, L1-2, L2- |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 1, L2-2, and L2-3, a total area of about 81 acres |
| 121 | 15-4-1 | City of Oak Creek | Offline | Lower Oak Creek | 42.90140 | -87.88181 | - - | 29 x 45 | 7887 S. Pennsylvania Avenue, Drains subbasin OC499B, an area of about 17 acres |
| 122 | 14-1-1 | City of Oak Creek | Offline | Lower Oak Creek | 42.89340 | -87.86926 | - - | 48 | 3331 E. Forest Hill Avenue, Drains subbasins L3-1 through L3-12, an area of about 323 acres |
| 123 | 14-5-1 | City of Oak Creek | Offline | Lower Oak Creek | 42.88728 | -87.86528 | - - | 58 x 91 | 3480 E. Puetz Road; Drains subbasin L3-1, an area of about 129 acres |
| 124 | 9-2-1 | City of Oak Creek | Unnamed Tributary to Mitchell Field Drainage Ditch | Lower Mitchell Field Drainage Ditch | 42.90707 | -87.89613 | - - | 54 | S. Clement Avenue and E. Montana Avenue; Drains subbasins M5-1 through M5-6, an area of about 134 acres |
| 125 | 9-1-1 | City of Oak Creek | Unnamed Tributary to Mitchell Field Drainage Ditch | Lower Mitchell Field Drainage Ditch | 42.91169 | -87.90108 | - - | 42 | S. Shepard Avenue and E. Monroe Avenue; Drains subbasins M5-1 and M5-2, an area of about 55 acres |
| 126 | MFSWO1 | Unknown | Mitchell Field Drainage Ditch | Lower Mitchell Field Drainage Ditch | 42.91509 | -87.89247 | - - | - - | Outfall is mostly submerged under water with sediment accumulation |
| 127 | M4-1-1 | City of Oak Creek | Unnamed Tributary to Mitchell Field Drainage Ditch | Lower Mitchell Field Drainage Ditch | 42.92276 | -87.90247 | - - | 30 | 709 E. Oak Street; Drains part of subbasin M4-1, an area of about 12 acres |
| 128 | 3-2-1 | City of Oak Creek | Offline | Lower Mitchell Field Drainage Ditch | 42.91842 | -87.88712 | - - | 36 | 6915 S. Juniper Drive (rear); Drains subbasin MF-15, an area of about 41 acres |
| 129 | MFDD1 | Unknown | Mitchell Field Drainage Ditch | Lower Mitchell Field Drainage Ditch | 42.92260 | -87.89105 | Fair | 24 | Left bank; Corrugated metal pipe protrudes about five feet from the bank; Erosion around pipe; Sediment accumulation in pipe; Likely drains Milwaukee County garden rental plots |
| 130 | MFSWO2 | Unknown | Mitchell Field Drainage Ditch | Lower Mitchell Field Drainage Ditch | 42.92419 | -87.89047 | Good | 38 | Right bank; Corrugated metal pipe outfalls about 15 feet away from channel; Potentially drainage associated with adjacent City of Milwaukee dump used for construction fill |
| 131 | - - | Milwaukee County | Unnamed Tributary to Mitchell Field Drainage Ditch | Lower Mitchell Field Drainage Ditch | 42.92767 | -87.89621 | - - | - - | No additional information available |
| 132 | - - | Milwaukee County | Offline | Lower Mitchell Field Drainage Ditch | 42.92911 | -87.89988 | - - | - - | No additional information available |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 133 | MFSWO3 | Unknown | Mitchell Field Drainage Ditch | Lower Mitchell Field Drainage Ditch | 42.92822 | -87.89028 | Fair | 36 | Right bank; Corrugated metal pipe outfalls about 15 feet away from channel |
| 134 | CUD16 | City of Cudahy | Offline | Lower Mitchell Field Drainage Ditch | 42.93173 | -87.88662 | - - | - - | No additional information available |
| 135 | - - | Milwaukee County | Mitchell Field Drainage Ditch | Upper Mitchell Field Drainage Ditch | 42.93429 | -87.88992 | - - | - - | Milwaukee Mitchell International Airport |
| 136 | - - | Milwaukee County | Mitchell Field Drainage Ditch | Upper Mitchell Field Drainage Ditch | 42.93430 | -87.88991 | - - | - - | Milwaukee Mitchell International Airport |
| 137 | - - | Milwaukee County | Mitchell Field Drainage Ditch | Upper Mitchell Field Drainage Ditch | 42.93433 | -87.88990 | - - | - - | Milwaukee Mitchell International Airport |
| 138 | - - | Milwaukee County | Unnamed Tributary to MFDD | Upper Mitchell Field Drainage Ditch | 42.93442 | -87.89007 | - - | - - | Milwaukee Mitchell International Airport |
| 139 | - - | Milwaukee County | Unnamed Tributary to MFDD | Upper Mitchell Field Drainage Ditch | 42.93443 | -87.89008 | - - | - - | Milwaukee Mitchell International Airport |
| 140 | - - | Milwaukee County | Unnamed Tributary to MFDD | Upper Mitchell Field Drainage Ditch | 42.93458 | -87.89441 | - - | - - | Milwaukee Mitchell International Airport |
| 141 | - - | Milwaukee County | Unnamed Tributary to MFDD | Upper Mitchell Field Drainage Ditch | 42.93897 | -87.89423 | - - | - - | Milwaukee Mitchell International Airport |
| 142 | - - | Milwaukee County | Mitchell Field Drainage Ditch | Upper Mitchell Field Drainage Ditch | 42.93718 | -87.89452 | - - | - - | Milwaukee Mitchell International Airport |
| 143 | - - | Milwaukee County | Mitchell Field Drainage Ditch | Upper Mitchell Field Drainage Ditch | 42.93724 | -87.89451 | - - | - - | Milwaukee Mitchell International Airport |
| 144 | - - | Milwaukee County | Mitchell Field Drainage Ditch | Upper Mitchell Field Drainage Ditch | 42.93730 | -87.89448 | - - | - - | Milwaukee Mitchell International Airport |
| 145 | - - | Milwaukee County | Unnamed Tributary to MFDD | Upper Mitchell Field Drainage Ditch | 42.93950 | -87.89969 | - - | - - | Milwaukee Mitchell International Airport |
| 146 | - - | Milwaukee County | Unnamed Tributary to MFDD | Upper Mitchell Field Drainage Ditch | 42.93951 | -87.89967 | - - | - - | Milwaukee Mitchell International Airport |
| 147 | - - | Milwaukee County | Mitchell Field Drainage Ditch | Upper Mitchell Field Drainage Ditch | 42.93794 | -87.90618 | - - | - - | Milwaukee Mitchell International Airport |
| 148 | - - | Milwaukee County | Mitchell Field Drainage Ditch | Upper Mitchell Field Drainage Ditch | 42.93800 | -87.90638 | - - | - - | Milwaukee Mitchell International Airport |
| 149 | - - | Milwaukee County | Unnamed Tributary to MFDD | Upper Mitchell Field Drainage Ditch | 42.93991 | -87.91035 | - - | - - | Milwaukee Mitchell International Airport |
| 150 | - - | Milwaukee County | Mitchell Field Drainage Ditch | Upper Mitchell Field Drainage Ditch | 42.93849 | -87.91176 | - - | - - | Milwaukee Mitchell International Airport |
| 151 | RHDOF36 | City of Milwaukee | Unnamed Tributary to Mitchell Field Drainage Ditch | Upper Mitchell Field Drainage Ditch | 42.93658 | -87.91950 | - - | 54 | Concrete metered pipe |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 152 | - - | Milwaukee County | Offline | Upper Mitchell Field Drainage Ditch | 42.93141 | -87.90012 | - - | - - | No additional information available |
| 153 | - - | Milwaukee County | Offline | Upper Mitchell Field Drainage Ditch | 42.93262 | -87.90008 | - - | - - | No additional information available |
| 154 | - - | Milwaukee County | Offline | Upper Mitchell Field Drainage Ditch | 42.94058 | -87.89987 | - - | - - | No additional information available |
| 155 | - - | Milwaukee County | Offline | Upper Mitchell Field Drainage Ditch | 42.94033 | -87.90538 | - - | - - | No additional information available |
| 156 | - - | Milwaukee County | Offline | Upper Mitchell Field Drainage Ditch | 42.94038 | -87.90823 | - - | - - | No additional information available |
| 157 | - - | Milwaukee County | Offline | Upper Mitchell Field Drainage Ditch | 42.94063 | -87.91929 | - - | - - | No additional information available |
| 158 | OTRIB4; 9-3-1 | City of Oak Creek | Unnamed Tributary to Oak Creek | Middle Oak Creek | 42.90311 | -87.89364 | - - | 42 | S. Clement Avenue and E. Manitowoc Avenue; Outfall is about 750 feet west of Oak Creek's mainstem and flows to Creek as a tributary; Drains subbasin O21-1, an area of about 63 acres |
| 159 | OSWO71 | Unknown | Oak Creek Mainstem | Middle Oak Creek | 42.90117 | -87.89290 | Fair | 24 | Left bank; Concrete metered pipe |
| 160 | OSWO72; OC498B-1 | City of Oak Creek | Oak Creek Mainstem | Middle Oak Creek | 42.90109 | -87.89325 | Fair | 36 | 1442 E. Drexel; Right bank; Concrete metered pipe slightly splitting at seam; Drains subbasin OC498B, an area of about 18 acres |
| 161 | 16-1-1 | City of Oak Creek | Unnamed Tributary to Oak Creek | Middle Oak Creek | 42.89973 | -87.89411 | - - | 96 | 1321 E. Drexel Avenue; Flows to SEWRPC's OTRIB3; Drains subbasins O20-1 through O20-10, an area of about 342 acres |
| 162 | 16-2-1 | City of Oak Creek | Unnamed Tributary to Oak Creek | Middle Oak Creek | 42.89736 | -87.90292 | - - | 34 x 54 | 640 E. Lakeview Drive; Drains subbasin O20-11, an area of about 62 acres |
| 163 | 21-4-1 | City of Oak Creek | Unnamed Tributary to Oak Creek | Middle Oak Creek | 42.88568 | -87.90191 | - - | 54 | 8734 S. Shepard Avenue; Drains subbasins O19-1 through O19-10, O19-10A, and O19-11, an area of about 180 acres |
| 164 | 15-5-1 | City of Oak Creek | Oak Creek Mainstem | Middle Oak Creek | 42.88656 | -87.88503 | - - | 60 | E. Puetz Road and Oak Creek; Located off channel; Drains subbasins 18-1 through O18-5, an area of about 114 acres |
| 165 | OTRIB8 | - - | Oak Creek Drainage Ditches | Middle Oak Creek | 42.88613 | -87.88550 | - - | - - | Confluence of Oak Creek Drainage Ditches with Oak Creek's Mainstem; Just upstream of E. Puetz Road |
| 166 | 23-5-1 | City of Oak Creek | Unnamed Drainage Ditch | Middle Oak Creek Drainage Ditches | 42.87403 | -87.87314 | - - | 29 x 45 | S. 15th Avenue and E. Woodview Avenue; Drains subbasin O17-3, an area of about 30 acres |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 167 | 15-6-1 | City of Oak Creek | Offline | Middle Oak Creek | 42.88685 | -87.87894 | - - | 48 | 2630 E Sharon Drive; Drains subbasin O18-3, an area of about 50 acres |
| 168 | OSWO73 | Unknown | Oak Creek Mainstem | Middle Oak Creek | 42.88149 | -87.89227 | Good | 12 | Right bank; Downstream side of Nicholson Road crossing; Corrugated plastic pipe with metal apron; About 15 feet up embankment |
| 169 | OSWO74 | Unknown | Oak Creek Mainstem | Middle Oak Creek | 42.88140 | -87.89227 | Good | 12 | Left bank; Downstream side of Nicholson Road crossing; Corrugated plastic pipe with metal apron; About 15 feet up embankment |
| 170 | OSWO75 | Unknown | Oak Creek Mainstem | Middle Oak Creek | 42.88147 | -87.89250 | Good | 12 | Right bank; Upstream side of Nicholson Road crossing; Corrugated plastic pipe with metal apron; About 15 feet up embankment |
| 171 | OSWO76 | Unknown | Oak Creek Mainstem | Middle Oak Creek | 42.88135 | -87.89252 | Good | 12 | Left bank; Upstream side of Nicholson Road crossing; Corrugated plastic pipe with metal apron; About 15 feet up embankment |
| 172 | 28-1-1 | City of Oak Creek | Offline | Middle Oak Creek | 42.87038 | -87.90441 | - - | 36 | S. Veronica Street extended; Drains subbasins O10-1, O10-2, and O10-3, an area of about 42 acres |
| 173 | OSWO77 | Milwaukee County | Oak Creek Mainstem | Middle Oak Creek | 42.87536 | -87.90483 | Fair | 36 | Left bank; Corrugated metal pipe protruding about eight feet from the bank |
| 174 | OSWO78; 21-9-1 | City of Oak Creek | Oak Creek Mainstem | Middle Oak Creek | 42.87538 | -87.90484 | Good | 36 x 48 | 9220 S. Howell Ave (County Park); Left Bank; Concrete culvert with apron and riprap channel running about 17 feet to Creek; Drains subbasin OC-472, an area of about 26 acres |
| 175 | OSWO79 | Unknown | Oak Creek Mainstem | Middle Oak Creek | 42.87715 | -87.90512 | Good | 12 | Left bank; White PVC pipe located about 8 feet off channel; Erosion occurring around pipe |
| 176 | 21-5-1 | City of Oak Creek | Unnamed Tributary to Oak Creek | Middle Oak Creek | 42.88115 | -87.91199 | - - | 42 | 9000 S. Howell Avenue; Drains subbasins O8-11 and O8-12, an area of about 55 acres |
| 177 | 21-1-1 | City of Oak Creek | Unnamed Tributary to Oak Creek | Middle Oak Creek | 42.88522 | -87.91132 | - - | 48 x 96 | 8770 S. Howell Avenue; Drains subbasins O8-1 through O8-8, O8-9A, and O8-9B, an area of about 178 acres |
| 178 | 21-2-1 | City of Oak Creek | Unnamed Tributary to Oak Creek | Middle Oak Creek | 42.88527 | -87.91130 | - - | 42 | 8770 S. Howell Avenue; Drains subbasin O8-10 an area of about 30 acres |
| 179 | OSWO81 | Unknown | Oak Creek Mainstem | Middle Oak Creek | 42.87681 | -87.91252 | Fair | - - | Right bank; Underneath Howell Avenue bridge, between northbound and southbound lanes |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 180 | OSWO80 | Unknown | Oak Creek Mainstem | Middle Oak Creek | 42.87668 | -87.91252 | Fair | 72 | Left bank; Concrete pipe with trash rack; Underneath Howell Avenue bridge |
| 181 | NBTRIB3; 20-1-1 | City of Oak Creek | North Branch Oak Creek | Lower North Branch Oak Creek | 42.88502 | -87.92291 | - - | 42 | Right Bank; Drains subbasin NB-58, an area of about 19 acres; Outfall is about 175 feet off of North Branch Oak Creek; Effluent flows in tributary channel to the North Branch |
| 182 | NBSWO1 | Unknown | North Branch Oak Creek | Lower North Branch Oak Creek | 42.88705 | -87.92429 | Good | 12 | Left Bank; Corrugated plastic pipe; About 5.5 feet up bank; On City of Oak Creek Streets Division property |
| 183 | NBSWO2 | Unknown | North Branch Oak Creek | Lower North Branch Oak Creek | 42.88714 | -87.92430 | Good | 30 | Left Bank: Concrete pipe; About 18 feet up bank; On City of Oak Creek Streets Division property |
| 184 | NBSWO3 | Unknown | North Branch Oak Creek | Lower North Branch Oak Creek | 42.88741 | -87.92409 | Good | 30 | Right Bank; Concrete pipe about 10 feet up bank; On City of Oak Creek Streets Division property |
| 185 | NBSWO4 | Unknown | North Branch Oak Creek | Lower North Branch Oak Creek | 42.88773 | -87.92409 | Failed | 15 | Left Bank; Concrete pipe protruding about 7 feet from bank due to bank erosion |
| 186 | NBSWO5 | Unknown | North Branch Oak Creek | Lower North Branch Oak Creek | 42.88836 | -87.92349 | Good | 18 | Right Bank; Concrete pipe with apron; Setback about five feet from bank; About 1.5 foot drop from outfall to channel |
| 187 | NBSWO6 | Unknown | North Branch Oak Creek | Lower North Branch Oak Creek | 42.89278 | -87.92567 | Good | 24 | Left Bank; Outlet for stormwater pond about 100 feet up bank; Outfall is about 26 feet off channel; Riprap protection |
| 188 | NBSWO7 | Unknown | North Branch Oak Creek | Lower North Branch Oak Creek | 42.89468 | -87.92549 | Poor | 24 | Right Bank; Corrugated plastic pipe protruding from bank |
| 189 | NBSWO8 | Unknown | North Branch Oak Creek | Lower North Branch Oak Creek | 42.89667 | -87.92781 | Fair | 24 | Left Bank; Concrete pipe about 21 feet removed from channel |
| 190 | NBSWO9 | Unknown | North Branch Oak Creek | Lower North Branch Oak Creek | 42.89700 | -87.92730 | Good | 24 | Right Bank; Concrete pipe with apron; Located about 56 feet up bank from channel; Riprap protection and cattail channel down to North Branch Oak Creek |
| 191 | 17-1-1 | City of Oak Creek | North Branch Oak Creek | Lower North Branch Oak Creek | 42.89951 | -87.92567 | - - | 42 | 7975 S. Wildwood Drive; Drains subbasin NB-43, an area of about 60 acres |
| 192 | NBSWO10, 17-2-0 | City of Oak Creek | North Branch Oak Creek | Lower North Branch Oak Creek | 42.90035 | -87.92417 | Poor | 36 | Right Bank; 8020 S. Wildwood Drive; Concrete pipe; End section is splitting at seams; There is a blowout up bank from end section that has created a |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | four foot deep hole that is covered by grass and hard to see; Drains subbasins N6-1 and N6-2, an area of about 49 acres |
| 193 | NBSWO11, 18-10-1 | City of Oak Creek | North Branch Oak Creek | Lower North Branch Oak Creek | 42.90271 | -87.91936 | Poor | 21 | 7815 S. 6th Street; Drains subbasin NB-38, an area of about nine acres; Left Bank; Corrugated metal pipe that is rusted through and protruding from bank; |
| 194 | 8-11-1 | City of Oak Creek | North Branch Oak Creek | Lower North Branch Oak Creek | 42.90298 | -87.91840 | - - | 21 | 7800 S. 6th Street; Drains subbasin NB-36, an area of about four acres |
| 195 | 8-12-1 | City of Oak Creek | North Branch Oak Creek | Lower North Branch Oak Creek | 42.90390 | -87.91514 | - - | 24 | 7625 S. Howell Avenue; Drains subbasin NB-35, an area of about three acres |
| 196 | 17-10-1 | City of Oak Creek | Offline | Lower North Branch Oak Creek | 42.88906 | -87.92251 | - - | 36 | 406 W. Peutz Road; Drains part of N9-3 |
| 197 | N9-4-1 | City of Oak Creek | Offline | Lower North Branch Oak Creek | 42.89226 | -87.91981 | - - | 30 | Drains part of subbasin N9-3 |
| 198 | 17-8-1 | City of Oak Creek | Offline | Lower North Branch Oak Creek | 42.89384 | -87.92201 | - - | 42 | 535 W. Forest Hill Avenue (rear); Drains subbasin N9-1, an area of about 20 acres |
| 199 | N5-14-1 | City of Oak Creek | Rawson Avenue Tributary | Rawson Avenue Tributary | 42.90722 | -87.92014 | - - | 24 | Drains subbasin N5-14, an area of about four acres |
| 200 | RHDOF28 | Unknown | Rawson Avenue Tributary | Rawson Avenue Tributary | 42.90795 | -87.92163 | - - | - - | Concrete pipe with poured concrete apron side slope |
| 201 | 8-5-1 | City of Oak Creek | Rawson Avenue Tributary | Rawson Avenue Tributary | 42.90828 | -87.92219 | - - | 66 | Drains subbasins N5-10 and N5-12, an area of about 80 acres |
| 202 | 8-6-1; RHDOF1 | City of Oak Creek | Rawson Avenue Tributary | Rawson Avenue Tributary | 42.90883 | -87.92708 | - - | 36 | 7481 S. 10th Street; Concrete box culvert exiting concrete wall; Drains subbasin N5-8, an area of about 24 acres |
| 203 | RHDOF3 | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.90924 | -87.92693 | - - | - - | Concrete pipe exiting at concrete lined channel side slopes |
| 204 | RHDOF4 | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.90961 | -87.92710 | - - | - - | Concrete pipe with poured concrete apron |
| 205 | RHDOF14 | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91007 | -87.92704 | - - | - - | Concrete pipe with poured concrete apron |
| 206 | RHDOF7 | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91033 | -87.92696 | - - | - - | Concrete pipe with poured concrete apron |
| 207 | RHDOF8 | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91041 | -87.92694 | - - | - - | Concrete pipe with poured concrete apron |
| 208 | RHDOF10 | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91089 | -87.92703 | - - | - - | Concrete pipe with poured concrete apron |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 209 | RHDOF12 | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91115 | -87.92700 | - - | - - | Concrete pipe with poured concrete apron |
| 210 | RHDOF13 | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91122 | -87.92682 | - - | - - | Concrete pipe with poured concrete apron |
| 211 | RHDOF15 | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91166 | -87.92696 | - - | 12 | Concrete pipe with poured concrete apron |
| 212 | RHDOF16B | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91199 | -87.92695 | - - | - - | Concrete pipe with poured concrete apron |
| 213 | RHDOF16 | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91182 | -87.92699 | - - | - - | Concrete pipe with poured concrete apron |
| 214 | RHDOF18 | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91230 | -87.92694 | - - | - - | Concrete pipe with poured concrete apron |
| 215 | RHDOF17 | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91233 | -87.92695 | - - | - - | Concrete pipe with poured concrete apron |
| 216 | RHDOF19 | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91270 | -87.92692 | - - | - - | Concrete ellipse pipe with poured concrete apron |
| 217 | RHDOF20 | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91274 | -87.92693 | - - | - - | Concrete pipe with poured concrete apron |
| 218 | 8-13-1; RHDOF21 | City of Oak Creek | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91270 | -87.92688 | - - | 36 | Concrete pipe exiting at concrete lined channel side slopes; Entered as same ID as below with 2 different dimensions |
| 219 | 8-13-1; RHDOF24 | City of Oak Creek | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91275 | -87.92685 | - - | 48 | Concrete metered pipe with poured concrete apron; Entered as same ID as above with 2 different dimensions |
| 220 | N4-21-1; RHDOF22 | City of Oak Creek | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91342 | -87.92694 | - - | 24 | Concrete pipe with poured concrete apron; Drains part of subbasin N4-21 |
| 221 | RHDOF23 | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91342 | -87.92694 | - - | - - | Concrete pipe with poured concrete apron |
| 222 | RHDOF24B | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91382 | -87.92680 | - - | - - | Silt and scum present at time of Racine Health Department visits |
| 223 | RHDOF27 | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91403 | -87.92677 | - - | - - | Metered concrete pipe exiting from concrete side slope |
| 224 | RHDOF25 | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91407 | -87.92689 | - - | - - | Concrete pipe exiting from concrete side slope |
| 225 | RHDOF26 | Unknown | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91408 | -87.92689 | - - | - - | Concrete pipe exiting from concrete side slope; End of pipe is chipped exposing metal rebar |
| 226 | 8-1-1 | City of Oak Creek | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91410 | -87.92676 | - - | 144 x 60 | Culvert carrying Tributary to Rawson Ave. Tributary in under S. 10th Street; Drains subbasins N4-1 through N4-20, an area of about 338 acres |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 227 | 6-4-1 | City of Oak Creek | Tributary to Rawson Ave. Tributary | Rawson Avenue Tributary | 42.91844 | -87.93617 | - - | 54 | Near southbound off-ramp I-94 and Rawson; Drains subbasins N4-1 through N4-4 |
| 228 | NBSWO12 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.90761 | -87.91537 | Poor | 18 | Left Bank; Corrugated metal pipe about 17 feet removed from channel; Outlet crushed |
| 229 | NBSWO13; 8-7-1 | City of Oak Creek | North Branch Oak Creek | Upper North Branch Oak Creek | 42.90890 | -87.91521 | Good | 36 | Left Bank; Newly replaced concrete metered pipe with apron; 303 W. Marquette Avenue; Drains subbasin NB-31 (west), an area of about eight acres; Municipality reports pipe as 24 inches but may be measurements before replacement; Riprap protection |
| 230 | NBSWO14; 8-8-1 | City of Oak Creek | North Branch Oak Creek | Upper North Branch Oak Creek | 42.90890 | -87.91512 | Good | 36 | Right Bank; Newly replaced concrete metered pipe with apron; 181 W. Marquette Avenue; Drains subbasin NB-31 (east), an area of about 13 acres; Municipality reports pipe as 30 inches but may be measurements before replacement; Riprap protection |
| 231 | NBSWO15 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.91022 | -87.91507 | Fair | 15 | Right Bank; Concrete metered pipe; About seven feet up bank from channel |
| 232 | NBSWO16 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.91057 | -87.91507 | Poor | 12 | Right Bank; Corrugated metal pipe with some sediment inside |
| 233 | NBSWO17 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.91078 | -87.91511 | Failed | - - | Left Bank; Corrugated metal pipe that is crushed; Pipe is about eight feet up bank; Possible abandoned |
| 234 | NBSWO18 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.91109 | -87.91514 | Failed | - - | Left Bank; Corrugated metal pipe is buried in soil and grass |
| 235 | NBSWD4 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.91141 | -87.91501 | Failed | - - | Plastic pipe |
| 236 | NBSWO19 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.91219 | -87.91493 | - - | 12 | Right Bank; Corrugated plastic pipe about 34 feet up bank |
| 237 | NBSWD5; 8-4-1 | City of Oak Creek | North Branch Oak Creek | Upper North Branch Oak Creek | 42.91347 | -87.91492 | Fair | 30 x 42 | Right Bank; 7195 S. 1st Street (rear); Corrugated metal pipe; Drains subbasin NB-29, an area of about 23 acres |
| 238 | NBSWD6 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.91367 | -87.91490 | Failed | - - | Right Bank; Corrugated plastic pipe; Top has been mowed over and destroyed |
| 239 | NBSWD7 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.91388 | -87.91489 | Failed | - - | Right Bank, Plastic pipe; Top has been mowed over and damaged |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 240 | NBSWO20 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.91405 | -87.91502 | Fair | 24 x 30; 27 | Left Bank; Two outfalls; Outfall closest to channel is a corrugated metal pipe with blacktop on top; Second outfall is a pvc pipe with a concrete apron |
| 241 | NBSWD8 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.91422 | -87.91488 | Failed | - - | Right Bank, Plastic pipe; Top has been mowed over and damaged |
| 242 | NBSWO21 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.91465 | -87.91510 | Failed | - - | Left Bank; Pipe is covered by dirt and grass located about 12 feet up bank; Water present doesn't seem to have path to Creek |
| 243 | NBSWO22 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.91764 | -87.91765 | Poor | - - | Left Bank; Corrugated metal pipe is rusted through; Located about 15 feet up bank; Effluent causing rill erosion to stream |
| 244 | NBSWO23; 5-6-1 | City of Oak Creek | North Branch Oak Creek | Upper North Branch Oak Creek | 42.91782 | -87.91941 | Good | 21 | Right Bank; 7001 S. 6th Street; Concrete pipe outfalls onto concrete lined bank; Drains subbasin NB-25, an area of about five acres |
| 245 | NBSWD11 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.91967 | -87.92084 | Good | 30 | Left bank; Corrugated metal pipe |
| 246 | NB-21-1 | City of Oak Creek | North Branch Oak Creek | Upper North Branch Oak Creek | 42.92013 | -87.92077 | - - | 30 | 6845 S. 6th Street; Drains subbasin NB-21, an area of about nine acres |
| 247 | NBSWO24, NB-20-1; RHDOF106 | City of Oak Creek | North Branch Oak Creek | Upper North Branch Oak Creek | 42.92139 | -87.92064 | Fair | 30 | Right Bank; 8745 S. 6th Street; Concrete pipe with apron; Drains subbasin NB-20, an area of about nine acres |
| 248 | NBSWD12 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.92230 | -87.92055 | Poor | 12 | Left bank; Corrugated metal pipe |
| 249 | NBSWO25; NB-19-1; RHDOF107 | City of Oak Creek | North Branch Oak Creek | Upper North Branch Oak Creek | 42.92280 | -87.92049 | Fair | 24 | Right Bank; 8701 S. 6th Street; Concrete metered pipe; Riprap piled at outlet; Drains subbasin NB-19, an area of about five acres; |
| 250 | N2-7-1 | City of Oak Creek | College Avenue Tributary | College Avenue Tributary | 42.92310 | -87.92421 | - - | 36 | 1010 W. Anderson Court (rear); Drains subbasin N2-7, an area of about 33 acres |
| 251 | RHDOF29 | Unknown | College Avenue Tributary | College Avenue Tributary | 42.92725 | -87.93256 | - - | - - | Small outfall; Overgrown with weeds; Sign reading "Storm Outlet 3" |
| 252 | RHDOF30 | Unknown | College Avenue Tributary | College Avenue Tributary | 42.92778 | -87.93294 | - - | - - | Sign reading "Storm Outlet 4" |
| 253 | 6-1-3 | City of Oak Creek | Offline | Upper North Branch Oak Creek | 42.92881 | -87.93993 | - - | 48 | 8425 S. 20th Street; Drains subbasins N2-2, N2-3, and N2-4, an area of about 86 acres |
| 254 | NBSWO26 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.92355 | -87.92037 | Fair | 18 | Right bank; Corrugated metal pipe with apron; About 15 feet off channel; |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Located on MATC campus property near salt storage facility |
| 255 | NBSWO27 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.92369 | -87.92036 | Good | 24 | Right bank; Corrugated plastic pipe with apron; Located on MATC campus property near salt storage facility |
| 256 | NBSWO28 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.92711 | -87.92180 | Protruding | 12 | Right bank; Corrugated metal pipe; Protruding from bank about five feet and overhanging channel about four feet |
| 257 | RHDOF32 | City of Milwaukee | North Branch Oak Creek | Upper North Branch Oak Creek | 42.93309 | -87.93062 | - - | 15 | PVC pipe |
| 258 | RHDOF31 | City of Milwaukee | North Branch Oak Creek | Upper North Branch Oak Creek | 42.93400 | -87.93129 | - - | 21 | Corrugated metal pipe |
| 259 | i94 sw outfall; RHDOF34 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.93722 | -87.93454 | - - | 24 | Concrete metered pipe |
| 260 | RHDOF33 | Unknown | North Branch Oak Creek | Upper North Branch Oak Creek | 42.93795 | -87.93456 | - - | - - | Concrete metered pipe |
| 261 | RHDOF35 | City of Milwaukee | North Branch Oak Creek | Upper North Branch Oak Creek | 42.94205 | -87.93906 | - - | - - | Concrete pipe; Submerged; Black color appears to converge under bridge and discharge from outfall |
| 262 | US-most Outfall | City of Milwaukee | North Branch Oak Creek | Upper North Branch Oak Creek | 42.94426 | -87.94238 | Poor | 120 x 72 | This is the point at which North Branch Oak Creek daylights; upstream of this outfall the Creek is underground; Large concrete box culvert with wing walls and trash rack; Large crack in apron of endsection |
| 263 | OSWD3 | Unknown | Oak Creek Mainstem | Upper Oak Creek | 42.87007 | -87.92740 | - - | - - | Riprap lined stormwater pond outlet; Outlet channel runs about 500 feet from stormwater pond located on south side of Ryan Road to Oak Creek's main channel |
| 264 | OSWO82 | Milwaukee County | Oak Creek Mainstem | Upper Oak Creek | 42.87040 | -87.93212 | Good | 48 | Left Bank; Concrete pipe with apron; Located up embankment |
| 265 | OSWO83 | Milwaukee County | Oak Creek Mainstem | Upper Oak Creek | 42.87051 | -87.93215 | Good | 48 | Right Bank; Concrete pipe with apron; About 1.5 foot drop from apron to channel |
| 266 | OSWO84 | Unknown | Oak Creek Mainstem | Upper Oak Creek | 42.87046 | -87.93334 | - - | 24 | Concrete pipe with apron and trash rack |
| 267 | 19-3-3 | City of Oak Creek | Unnamed Tributary to Oak Creek Mainstem-Ryan Rd Interchange | Upper Oak Creek | 42.87494 | -87.93589 | - - | 42 | 9401 S. 13th Street (rear); Drains subbasin O5-8, and area of about 24 acres |
| 268 | 19-2-1 | City of Oak Creek | Unnamed Tributary to Oak Creek | Upper Oak Creek | 42.87637 | -87.93766 | - - | 36 | 9206 S. 22nd Street; Drains subbasins O5-1, O5-2, and part of O3-1 |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| | | | Mainstem-Ryan Rd Interchange | | | | | | |
| 269 | OSWO85 | Unknown | Oak Creek Mainstem | Upper Oak Creek | 42.86916 | -87.93678 | - - | - - | Left Bank; Partially buried; Located under Ryan Road off ramp from I-94 |
| 270 | OSWO87 | Unknown | Oak Creek Mainstem | Upper Oak Creek | 42.86924 | -87.93725 | Fair | 24 | Right Bank; Under I-94; Concrete pipe with apron; Plugged with about two feet of sediment |
| 271 | OSWO86 | Unknown | Oak Creek Mainstem | Upper Oak Creek | 42.86910 | -87.93727 | Failed | 24 | Left Bank; Under I-94; Concrete pipe with apron; End section has detached from pipe |
| 272 | 30-2-1 | City of Oak Creek | Unnamed Tributary to Oak Creek Mainstem-Ryan Rd Interchange | Upper Oak Creek | 42.87135 | -87.93993 | - - | 48 | Located near southbound on-ramp to I-94 at Ryan Road; Drains subbasins O3-2; O3-3; O3-1 |
| 273 | OSWO88 | Unknown | Oak Creek Mainstem | Upper Oak Creek | 42.86909 | -87.93888 | Fair | 18 | Left Bank; Concrete pipe |
| 274 | OSWO89 | Unknown | Oak Creek Mainstem | Upper Oak Creek | 42.86897 | -87.93938 | Fair | 12 | Left Bank; Concrete pipe; Buried at stream grade |
| 275 | OSWD4 | Unknown | Oak Creek Mainstem | Upper Oak Creek | 42.86926 | -87.94082 | Poor | 18 | Right Bank; Corrugated plastic pipe; Drains truck stop parking lot up-bank |
| 276 | OSWO90; 30-9-1 | City of Oak Creek | Oak Creek Mainstem | Upper Oak Creek | 42.86884 | -87.94100 | Good | 42 | Left Bank; Corrugated metal pipe with cement apron and trash rack; 75 percent submerged; Drains subbasin O4-2, an area of about 30 acres |
| 277 | OSWD5 | Unknown | Oak Creek Mainstem | Upper Oak Creek | 42.86928 | -87.94173 | Poor | 18 (x2) | Right Bank; Two pipes, one corrugated metal and one corrugated plastic; Drains truck stop up-bank |
| 278 | 30-4-1 | City of Oak Creek | Oak Creek Mainstem | Upper Oak Creek | 42.86911 | -87.94230 | - - | 30 | 9680 S. 20th Street; Drains subbasin OC-451, and area of about 16 acres |
| 279 | 30-7-1 | City of Oak Creek | Unnamed Tributary to Oak Creek Mainstem-U/S of S. 20th Street | Upper Oak Creek | 42.86755 | -87.94383 | - - | 36 | 9775 S. 20th Street; Drains part of O2-2, an area of about 10 acres |
| 280 | 30-8-1 | City of Oak Creek | Unnamed Tributary to Oak Creek Mainstem-U/S of S. 20th Street | Upper Oak Creek | 42.86755 | -87.94382 | - - | 48 x 76 | 9775 S. 20th Street; Drains O2-1 and part of O2-2, and area of about 89 acres |
| 281 | OSWO91; 30-6-1 | City of Oak Creek | Oak Creek Mainstem | Upper Oak Creek | 42.86889 | -87.94599 | Good | 72 | Major outfall; Left Bank; 2300 W. Southbranch Blvd; Concrete pipe with trash rack; Outlet has about two feet of sediment accumulation; Drains subbasins OC-447, OC-448, and an additional 91 acres from Franklin for a total of about 165 acres |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 282 | OSWO92 | Unknown | Oak Creek Mainstem | Upper Oak Creek | 42.87038 | -87.95605 | Fair | 30 | Left Bank; Corrugated metal pipe at S. 31st Street |
| 283 | OSWO93 | Unknown | Oak Creek Mainstem | Upper Oak Creek | 42.87039 | -87.95627 | Fair | 24 | Both Banks; Corrugated metal pipes on both embankments; Drains neighborhood road ditch |
| 284 | OSWO94 | Unknown | Oak Creek Mainstem | Upper Oak Creek | 42.86986 | -87.96102 | Good | 18 | Left Bank; Concrete pipe set back about 30 feet from channel in residential back yard |
| 285 | OSWO95 | Unknown | Oak Creek Mainstem | Upper Oak Creek | 42.87036 | -87.96254 | Failed | 24 | Left Bank; Corrugated metal pipe; Submerged and buried in sediment |
| 286 | OSWO96 | City of Franklin | Oak Creek Mainstem | Upper Oak Creek | 42.87144 | -87.96437 | Good | 29 x45 | Left Bank; Concrete pipe with metered apron; Gravel, sand and cobble inside pipe; Located about seven feet off channel with erosion |
| 287 | 24-03 | City of Franklin | Offline | Upper Oak Creek | 42.87437 | -87.95476 | - - | 48 | Offline; Located on W. Central Avenue near S. 29th Street |
| 288 | Oswo97 | City of Franklin | Oak Creek Mainstem | Upper Oak Creek Headwaters | 42.87488 | -87.96484 | Good | 27 | Left Bank; Concrete metered pipe with apron; While pipe is 27 inches, apron measures 42x48; Outfall is located 35 feet from Creek; Effluent has formed channel to Creek |
| 289 | Oswo98 | Unknown | Oak Creek Mainstem | Upper Oak Creek Headwaters | 42.87526 | -87.96487 | Good | 30 | Right Bank; Concrete metered pipe with trash rack |
| 290 | 24-04 | City of Franklin | Oak Creek Mainstem | Upper Oak Creek Headwaters | 42.87635 | -87.96564 | - - | 42 | - - |
| 291 | RHD Southwood OF West | Unknown | Oak Creek Mainstem | Upper Oak Creek Headwaters | 42.87653 | -87.96590 | - - | - - | - - |
| 292 | RHD Southwood OF East | Unknown | Oak Creek Mainstem | Upper Oak Creek Headwaters | 42.87653 | -87.96590 | - - | - - | - - |
| 293 | 24-01 | City of Franklin | Oak Creek Mainstem | Upper Oak Creek Headwaters | 42.87676 | -87.96590 | - - | 36 | - - |
| 294 | Oswo99 | Unknown | Oak Creek Mainstem | Upper Oak Creek Headwaters | 42.87717 | -87.96639 | Fair | 24 | Left Bank; Concrete pipe located about 10 feet up bank; Pipe is covered with yard waste |
| 295 | Oswo100; RHDOF105 | City of Franklin | Oak Creek Mainstem | Upper Oak Creek Headwaters | 42.87795 | -87.96661 | Fair | 48 | Left Bank; Concrete metered pipe with apron |
| 296 | Oswo101 | Unknown | Oak Creek Mainstem | Upper Oak Creek Headwaters | 42.88196 | -87.96593 | Fair | - - | Right Bank; No outfall but cylinder pipe tower with manhole at edge of channel |
| 297 | Oswo102 | Unknown | Oak Creek Mainstem | Upper Oak Creek Headwaters | 42.88299 | -87.96596 | Fair | - - | Right Bank; No outfall but cylinder pipe tower with manhole at edge of channel |

| Sequence Number [a] | Outfall Identifications [b] | Ownership | Water Body | Assessment Area | Longitude | Latitude | Condition | Dimensions (inches) | Notes |
|---|---|---|---|---|---|---|---|---|---|
| 298 | 23-02 | City of Franklin | Stormwater Pond Draining To Tributary to Oak Creek Headwaters | Upper Oak Creek Headwaters | 42.88188 | -87.97200 | - - | 36 | Drains stormwater pond |
| 299 | 23-01 | City of Franklin | Stormwater Pond Draining To Tributary to Oak Creek Headwaters | Upper Oak Creek Headwaters | 42.88241 | -87.97192 | - - | 30 | Drains stormwater pond |

Note: Right and left bank are determined while oriented upstream.

Outfall conditions were only assessed at outfall sites surveyed by SEWRPC staff. Conditions of these outfalls were based on best professional judgement and were assigned condition assessments of Good, Fair, Poor, and Failed. "Good" condition outfalls were relatively new structures that displayed no damage and were assumed to function as designed. "Fair" condition outfalls may have some slight cosmetic damage, but were still assumed to function at, or very near, designed functionality. "Poor" condition outfalls had moderate to severe structural damage or were experiencing bank erosion near the outfall that may affect the designed functionality of the outfall. "Failed" outfalls had severe structural damage to the structure itself, or to supporting bank and/or channel structure, which does not allow the outfall to function as designed.

[a] *Refers to a sequential number assigned in a downstream to upstrem fashion in sequential order of input into the mainstem of Oak Creek.*

[b] *Outfall identifications originate from SEWRPC's instream surveys conducted from June 2016 through November 2016 and June 2017 through September 2017; Community reporting for MS4 stromwater permits; and the City of Racine Health Department's assessment of the impacts of storm water outfalls in the Oak Creek watershed in 2016.*

*Source: Milwaukee County, City of Cudahy, City of Franklin, City of Greenfield, City of Milwaukee, City of Oak Creek, City of South Milwaukee, the City of Racine Health Department, and SEWRPC.*

## Chapter 4

# INVENTORY FINDINGS

APPENDIX EMERGING POLLUTANTS

## Table [Number]
## Surface Water Quality Monitoring Results for Emerging Pollutants in the Mainstem of Oak Creek at 15th Avenue: 2002-2009

| Compound | Samples Collected | Samples with Detections | Percent of Samples with Detections | Range of Concentrations (µg/l)[a] |
|---|---|---|---|---|
| Antimicrobials | | | | |
| Triclosan | 32 | 1 | 3 | <LOD-0.06[b] |
| Aromatic Organic Compounds | | | | |
| 1,4-Dichlorobenzene | 32 | 2 | 6 | <LOD-0.026[b] |
| 1-Naphthol | 9 | 1 | 11 | <LOD-0.0218[b] |
| 3,4-Dichlorophenyl isocyanate | 20 | 15 | 75 | <LOD-32.5[b] |
| Benzophenone | 32 | 8 | 25 | <LOD-0.09[b] |
| Isopropylbenzene | 32 | 0 | 0 | <LOD |
| *p*-Cresol | 32 | 8 | 25 | <LOD-0.17[b] |
| Phenol | 32 | 9 | 28 | <LOD-0.86 |
| Corrosion Inhibitors | | | | |
| 5-Methyl-1H-benzotriazole | 32 | 11 | 34 | <LOD-0.9[b] |
| Dyes | | | | |
| 9,10-Anthraquinone | 32 | 23 | 72 | <LOD-0.61 |
| Carbazole | 32 | 16 | 50 | <LOD-0.328 |
| Flame Retardants | | | | |
| Polybrominated diphenyl ether congener 47 | 20 | 0 | 0 | <LOD |
| Triphenyl phosphate | 32 | 9 | 28 | <LOD-0.11[b] |
| Tris (2-butoxyethyl) phosphate | 32 | 15 | 47 | <LOD-0.59[b] |
| Tris (2-chloroethyl) phosphate | 32 | 20 | 63 | <LOD-0.42 |
| Tris (dichloroisopropyl) phosphate | 32 | 12 | 38 | <LOD-0.24[b] |
| Flavors and Fragrances | | | | |
| Acetophenone | 32 | 3 | 9 | <LOD-0.2[b] |
| Camphor | 32 | 12 | 38 | <LOD-0.9[b] |
| D-Limonene | 32 | 0 | 0 | <LOD |
| Hexahydrohexamethyl cyclopentabenzopyran | 32 | 1 | 3 | <LOD-0.03[b] |
| Indole | 32 | 4 | 6 | <LOD-0.07[b] |
| Isoborneol | 32 | 0 | 0 | <LOD |
| Menthol | 32 | 8 | 25 | <LOD-0.16[b] |
| Methyl salicylate | 32 | 5 | 16 | <LOD-0.085[b] |
| Food Preservatives | | | | |
| 3-tert-Butyl-4-hydroxyanisole | 29 | 0 | 0 | <LOD |
| Hormone Precursors/Derivatives | | | | |
| 3-beta-Coprostanol | 32 | 6 | 19 | <LOD-3.2[b] |
| beta-Stigmastanol | 32 | 3 | 9 | <LOD-1.2 |
| beta-Sitosterol | 32 | 10 | 31 | <LOD-4.3[b] |
| Cholesterol | 32 | 19 | 59 | <LOD-2.5[b] |
| Polycyclic Aromatic Hydrocarbons | | | | |
| 1-Methylnaphthalene | 35 | 13 | 37 | <LOD-0.04[b] |
| 2,6-Dimethylnaphthalene | 32 | 13 | 41 | <LOD-0.03[b] |
| 2-Methylnaphthalene | 35 | 15 | 43 | <LOD-0.07[b] |
| 9H-Fluorene | 3 | 0 | 0 | <LOD |
| Acenaphthene | 3 | 0 | 0 | <LOD |
| Acenaphthylene | 3 | 0 | 0 | <LOD |

**Table continued on next page.**

| Compound | Samples Collected | Samples with Detections | Percent of Samples with Detections | Range of Concentrations (µg/l)[a] |
|---|---|---|---|---|
| Polycyclic Aromatic Hydrocarbons (continued) | | | | |
| Anthracene | 35 | 13 | 37 | <LOD-0.18[b] |
| Benzo[a]anthracene | 3 | 0 | 0 | <LOD |
| Benzo[a]pyrene | 35 | 13 | 37 | <LOD-0.61 |
| Benzo[b]fluoranthene | 3 | 0 | 0 | <LOD |
| Benzo[g,h,i]peryline | 3 | 0 | 0 | <LOD |
| Benzo[k]fluoranthene | 3 | 0 | 0 | <LOD |
| Chrysene | 3 | 0 | 0 | <LOD |
| Dibenzo[a,h]anthracene | 3 | 0 | 0 | <LOD |
| Fluoranthene | 35 | 26 | 74 | <LOD-1.7 |
| Indeno[1,2,3-cd]pyrene | 3 | 0 | 0 | <LOD |
| Naphthalene | 35 | 14 | 40 | <LOD-0.17[b] |
| Phenanthrene | 35 | 23 | 66 | <LOD-1.32 |
| Pyrene | 35 | 24 | 69 | <LOD-1.15 |
| Pharmaceutically Active Compounds | | | | |
| Caffeine | 32 | 20 | 63 | <LOD-0.56 |
| Cotinine | 32 | 6 | 19 | <LOD-0.360[b] |
| Isoquinoline | 32 | 0 | 0 | <LOD |
| Plasticizers | | | | |
| 4-Cumylphenol | 32 | 4 | 13 | <LOD-0.04[b] |
| Bisphenol A | 26 | 11 | 42 | <LOD-0.18[b] |
| Diethyl phthalate | 20 | 1 | 5 | <LOD-0.2[b] |
| Tributyl phosphate | 32 | 27 | 84 | <LOD-0.69 |
| Triethyl citrate | 32 | 1 | 3 | <LOD-0.03[b] |
| Solvents | | | | |
| Acetylhexamethyl tetrahydronaphthalene | 32 | 0 | 0 | <LOD |
| Isophorone | 32 | 17 | 53 | <LOD-18.2[b] |
| Tetrachloroethene | 32 | 4 | 13 | <LOD-0.01[b] |
| Tribromomethane | 32 | 4 | 13 | <LOD-0.07[b] |
| Surfactants | | | | |
| 4-n-Octophenol | 32 | 0 | 0 | <LOD |
| 4-Nonylphenol | 32 | 10 | 31 | <LOD-2.0[b] |
| 4-Nonylphenol diethoxylate | 32 | 3 | 9 | <LOD-4.5[b] |
| 4-Nonylphenol monoethoxylate | 32 | 20 | 0 | <LOD |
| 4-tert-Octylphenol | 32 | 1 | 3 | <LODc |
| 4-tert-Octylphenol diethoxylate | 32 | 4 | 13 | <LOD-0.5[b] |
| 4-tert-Octylphenol monoethoxylate | 32 | 1 | 3 | <LOD-0.1[b] |
| Unclassified | | | | |
| 3-Methyl-1H-indole | 32 | 3 | 9 | <LOD-0.046[b] |

[a] *<LOD indicates less than the limit of detection.*

[b] *Maximum concentration was estimated.*

[c] *This compound was detected but the concentration was not estimated.*

*Source: U.S. Geological Survey and SEWRPC*