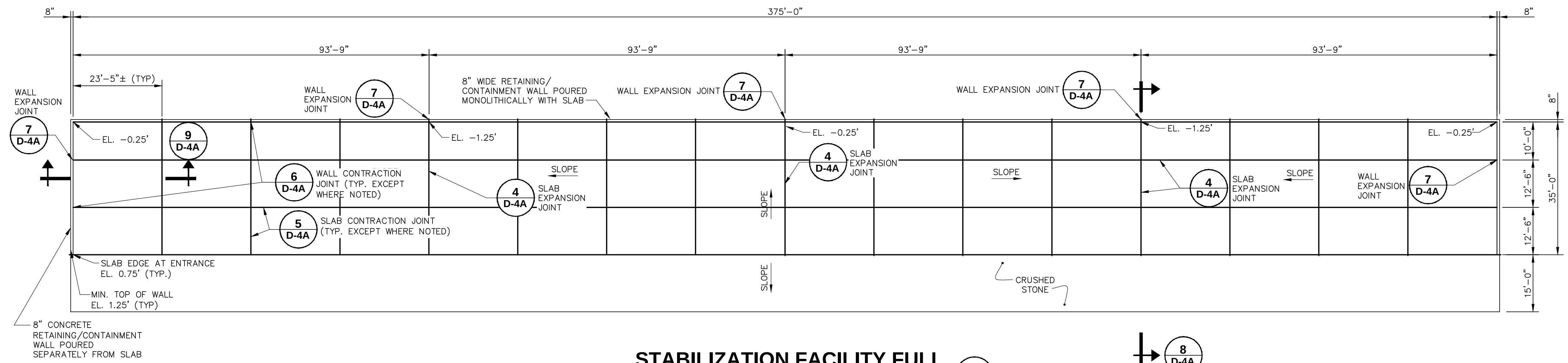
FIGURE D-4A

NEW STABILIZATION FACILITY FULL TRAILER PARKING AREA

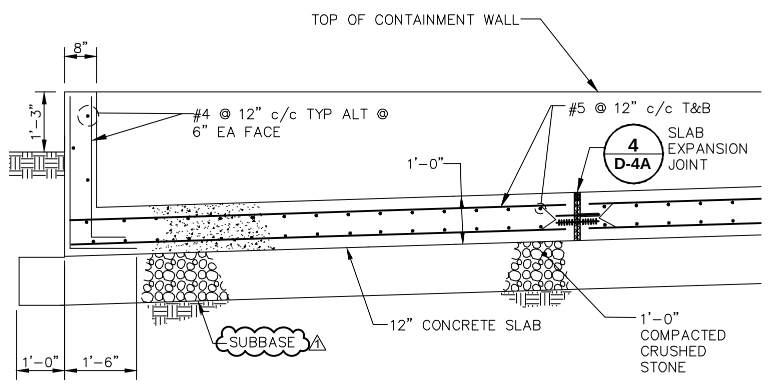
NOTES:

1. CONCRETE MIX SHALL BE 4000 PSI AT 28 DAYS WITH AIR ENTRAINING ADMIXTURE 6±1%. STEEL FIBER REINFORCEMENT SHALL BE ADDED TO MIX AS MANUFACTURED BY MITCHELL FIBERCON, INC., MEETING ASTM A820 TYPE II SPECIFICATIONS.
2. ALL EXPOSED CONCRETE SURFACES TO RECEIVE CHEMTEC ONE CONCRETE PROTECTION SEALANT, OR APPROVED EQUAL.
3. REINFORCED CONCRETE BARS OF NEW BILLET STEEL CONFORMING TO ASTM A615, GRADE 60. LAP REINFORCING BARS MINIMUM 44 BAR DIAMETERS.
4. DESIGN ELEVATIONS ARE RELATIVE. EXISTING GROUND SURFACE IS ASSUMED TO BE ELEVATION 0.0 FOR REFERENCE PURPOSES.
5. STEEL ANGLE SHALL BE FABRICATED IN LENGTHS CORRESPONDING TO JOINT LOCATIONS. STEEL ANGLE SHALL NOT SPAN ANY SLAB JOINT. STRUCTURAL STEEL SHALL CONFORM TO ASTM A36 AND BE GALVANIZED IN ACCORDANCE WITH ASTM A123. WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1.
6. SUBBASE SHALL BE PROOF-ROLLED AND INSPECTED BY ENGINEER PRIOR TO PLACING CRUSHED STONE. IF SOFT SOILS OR AREAS OF PUMPING ARE OBSERVED, SOIL WITHIN THESE AREAS SHALL BE REMOVED AND REPLACED WITH CRUSHED STONE OR STRUCTURAL FILL AND PROOF ROLLED.
7. CRUSHED STONE SHALL BE COMPACTED TO A MINIMUM 95% OF MAXIMUM DRY DENSITY BASED ON MODIFIED PROCTOR.
8. WATERSTOP SHALL BE WESTEC'S ENVIROSTOP™ TPE-R (THERMOPLASTIC ELASTOMERIC RUBBER) 600 SERIES OR APPROVED EQUAL.



STABILIZATION FACILITY FULL TRAILER PARKING AREA (1)

SCALE: 1/16"=1'-0"



SECTION (2)

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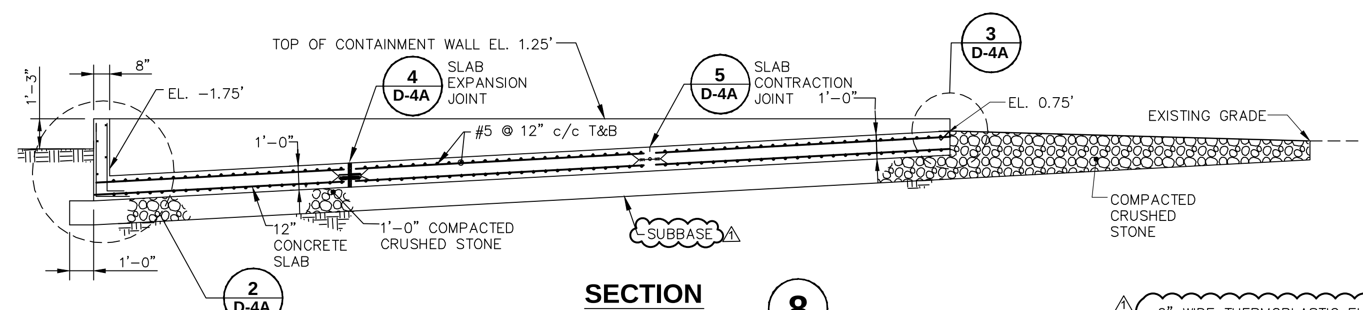
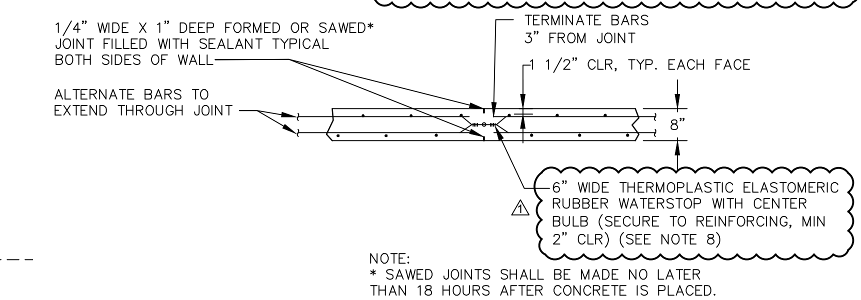


SECTION (8)

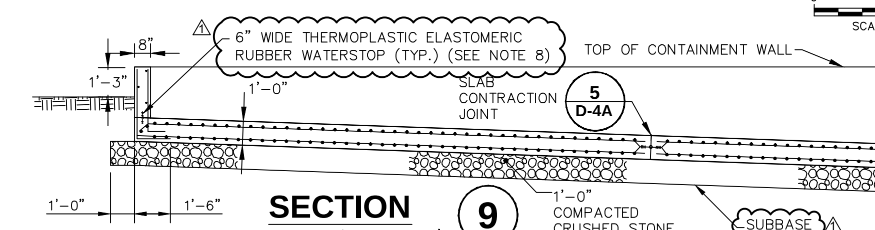
SCALE: 1/4"=1'-0"



SECTION PLAN

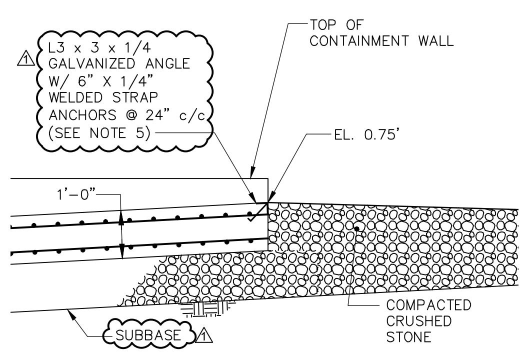
WALL CONTRACTION JOINT DETAIL (6)

SCALE: 1/2"=1'-0"



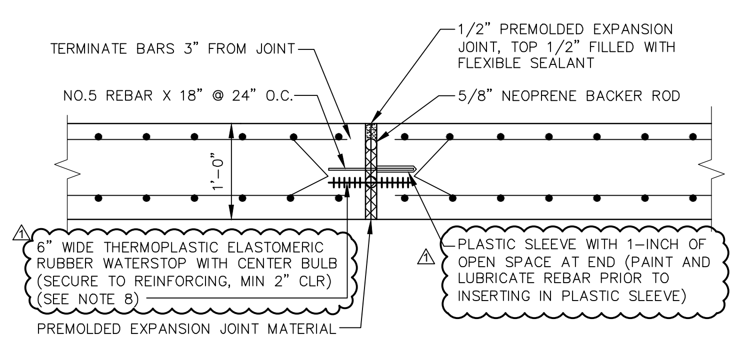
SECTION (9)

SCALE: 1/4"=1'-0"



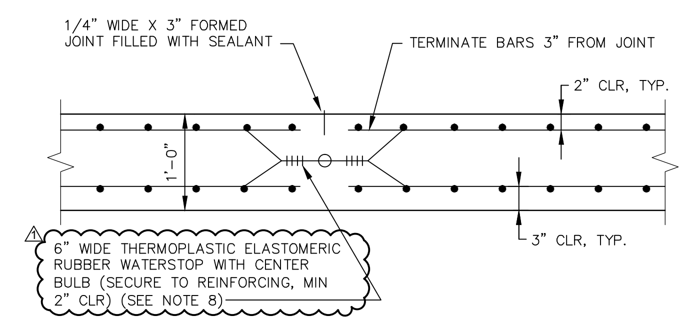
SECTION (3)

SCALE: 1/2"=1'-0"



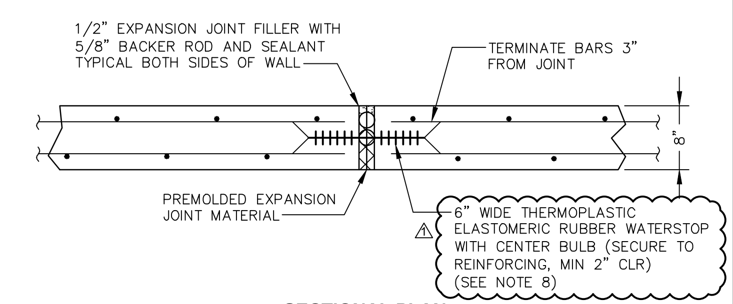
SLAB EXPANSION JOINT (4)

SCALE: 1"=1'-0"



SLAB CONTRACTION JOINT (5)

SCALE: 1"=1'-0"



SECTIONAL PLAN

WALL EXPANSION JOINT (7)

SCALE: 1"=1'-0"

SCALE(S) AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
1	7/2013	GENERAL REVISIONS	NWF	BMS

Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: | Project Mgr.: WAR
Designed by: LAB | Drawn by: SJK | Checked by: BMS

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CWM CHEMICAL SERVICES, LLC • MODEL CITY, NEW YORK
FULL TRAILER PARKING AREA AND LEACHATE TRANSFER RAMP PERMIT DRAWINGS

STABILIZATION FACILITY FULL TRAILER PARKING AREA

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date FEBRUARY 2013

ARCADIS of New York, Inc.
6723 Towpath Road
P.O. Box 66
Syracuse, New York
TEL. 315.446.9120

D-4A

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Calculation Sheet

Client: CWM Chemical Services, LLC

Project Location: Model City, New York

Project: RMU-2 Design Calculations **Project No.: B0023725.2011**

Subject: New Stabilization Full Trailer Parking Area – Secondary Containment Calculations

Prepared By: NWF **Date: August 2013**

Reviewed By: BMS **Date: August 2013**

Checked By: BMS **Date: August 2013**

OBJECTIVE:

Determine the capacity of the new Stabilization Full Trailer Parking Area (new Parking Area) for solids and liquid storage containers. Demonstrate that adequate secondary containment volume exists for management of precipitation within the new Parking Area.

REFERENCES:

1. RMU-2 Permit Drawing No. D-4A entitled "Stabilization Facility Full Trailer Parking Area," contained in Attachment D-1 of the Overall Site/RMU-1 Part 373 Permit, ARCADIS, August 2013.

2. New York State Department of Environmental Conservation Regulations, Subpart 373.2.9 (f).

ASSUMPTIONS:

1. The new Parking Area may contain roll-offs (for solids), tanker trucks (for liquid), or some combination of these containers. Because roll-offs sit much closer to the pavement, they consume secondary containment volume, whereas tankers consume only negligible volume. Thus, when calculating the available secondary containment volume, this analysis assumes that the new Parking Area is filled to capacity with roll-offs. When calculating the required secondary containment volume, this analysis assumes that the new Parking Area is filled to capacity with tankers. Although this scenario cannot physically occur, it provides the most extreme case in terms of assessing secondary containment volume. Any physically possible combination of roll-offs and tankers can therefore be accommodated with adequate secondary containment volume.

2. The secondary containment system must have sufficient capacity to contain 10 percent of the total volume of liquid storage containers or the volume of the largest liquid container, whichever is greater.

3. The precipitation volume considered in this calculation is based on the 25-year, 24-hour storm event which contributes 4-inches or 0.333 feet of runoff.

4. The liquid storage container volume is 2,500 gallons (gal) per container.

5. Roll-offs are assumed to rest on approximately 6-inch-diameter rollers and thus sit 6 inches off the pavement.

Calculation Sheet

CALCULATIONS:

1. Capacity for Solids and Liquid Storage Containers

The capacity of the new Parking Area for solids and liquid storage containers is based on the geometry of the parking area and the typical size of individual storage containers and is calculated as follows:

Solids Storage Container Dimensions

- Width of a typical container = 8 ft
- Aisle space requirement between containers = 2 ft
- Adjusted width of a typical container = 10 ft (8 ft + 2 ft)
- Length of a typical liquid container = 22 ft

Maximum Number of Solids Storage Containers

- Adjusted row length taking into account a required 2 ft distance between the last container in the end row to the edge of the containment area = 375 ft – 2 ft = 373 ft
- Maximum number of rows = 373 ft ÷ 10 ft = 37.3 ≈ 37 rows
- Maximum number of solids storage containers end-to-end in each row = 35 ft ÷ 22 ft (solids storage container length) = 1.6 ≈ 1 container
- Maximum number of solids storage containers = 37 rows x 1 container per row = 37 containers

Liquid Storage Container Dimensions

- Width of a typical container = 8 ft
- Aisle space requirement between containers = 2 ft
- Adjusted width of a typical container = 10 ft (8 ft + 2 ft)
- Length of a typical liquid container = variable (less than 35 ft), thus only one liquid container per row is assumed

Maximum Number of Liquid Storage Containers

- Adjusted row length taking into account a required 2 ft distance between the last container in the end row to the edge of the containment area = 375 ft – 2 ft = 373 ft
- Maximum number of rows = 373 ft ÷ 10 ft = 37.3 ≈ 37 rows
- Maximum number of liquid storage containers end-to-end in each row = 1 container
- Maximum number of liquid storage containers = 37 rows x 1 container per row = 37 containers

2. Secondary Containment Analysis

Total Available Secondary Containment Volume

The new Parking Area consists of a sloped, reinforced concrete pad that measures 35 feet (ft) wide by 375 ft long. Access to the new Parking Area is from the full length of the southern edge (375 ft) where the concrete pad is approximately flush with surrounding grade. The reinforced concrete pad is sloped toward the center and back of the two drain areas within the new Parking Area. Reinforced concrete curbing and the slope of the reinforced concrete pad provide the secondary containment for the new Parking Area. Due to its complex dimensions, the total available secondary containment volume of the new Parking Area was determined based on 3-dimensional surface computations performed using computer aided design software (Terramodel).

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Calculation Sheet

As discussed in Assumption 1, the new Parking Area is assumed to be filled to capacity with roll-offs for the purposes of determining available secondary containment volume. Because the roll-offs sit approximately 6 inches off the pavement, liquid can spread across the pavement for the first 6 inches within the entire footprint of the new Parking Area, except near the entrance edge where the liquid cannot have an elevation greater than the entrance elevation. This volume was modeled with Terramodel and determined to be 43,020 gal. As confirmation, one can multiply 6 inches by the plan dimensions of the new Parking Area (35 ft by 375 ft) to yield 49,091 gal. This slightly larger volume is attributable to the loss at the entrance where liquid cannot be 6 inches above the entrance elevation.

The volume available between rows of containers and above the aforementioned 6-inch-thick layer of storage is calculated manually based on an average depth of 1.00 ft at the back wall, an aisle width of 2 ft, a length of 26.3 ft, and 38 aisles. Using the area formula for a triangle multiplied by the aisle width and the number of aisles, this volume is estimated to be 7,476 gal. Similarly, the volume available along the back wall and above the 6-inch-thick layer of storage is calculated manually based on an average depth of 1.00 ft at the back wall, an aisle width of 2 ft, and a length of 375 ft. Using the area formula for a rectangle multiplied by the aisle width, this volume is estimated to be 5,610 gal.

Summing the above components, a worst-case available secondary containment volume of 56,106 gal is calculated.

Required Secondary Containment Volume

As discussed in Assumption 1, the new Parking Area is assumed to be filled to capacity with tankers for the purposes of determining required secondary containment volume. The required secondary containment volume for liquid storage containers is based on one of two possible conditions. The first condition (Condition 1) provides storage for 10 percent of the total liquid volume of containers stored within the new Parking Area plus the runoff volume resulting from a 25-year, 24-hour storm event. The second condition (Condition 2) provides storage for the entire volume of the single largest liquid container stored within the new Parking Area plus the runoff volume resulting from a 25-year, 24-hour storm event. Calculations for both conditions are presented below.

<u>Condition 1</u>

Total Container Volume (assuming all containers store liquid)

- Total Container Volume: Maximum number of containers x volume per container (Assumption 4) x 0.10 (10 percent) = 37 containers x 2,500 gal/container x 0.10 = 9,250 gal

Precipitation Runoff Volume

- Runoff Volume: 35 ft x 375 ft x 0.333 ft = 4,375 cf or 32,727 gal

Required Secondary Containment Volume

- Total Container Volume + Precipitation Runoff Volume = 9,250 gal + 32,727 gal = 41,977 gal

Calculation Sheet

Condition 2

Single Largest Liquid Storage Container Volume

- The volume of the largest liquid storage container stored within the secondary containment area = 2,500 gal

Required Secondary Containment Volume

- Largest Liquid Storage Container Volume + Precipitation Runoff Volume (from Condition 1 above) = 2,500 gal + 32,727 gal = 35,227 gal

Based on a comparison of the required secondary containment volumes calculated for Conditions 1 and 2 above, the greatest required secondary containment volume is 41,977 gal (Condition 1).

Excess Secondary Containment Volume

The excess secondary containment volume condition is based on the worst-case total secondary volume available within the new Parking Area compared with the required secondary containment volume. The resultant volume condition is as follows:

Total Secondary Containment Volume: 56,106 gal
Required Secondary Containment Volume: 41,977 gal
Excess Volume: 56,106 gal – 41,977 gal = 14,129 gal

It is noted that this is a worst-case scenario because it is based on extremes of all roll-offs for available volume and all tankers for required volume. Any physically possible combination of roll-offs and tankers will yield additional reserve capacity beyond this calculated minimum.

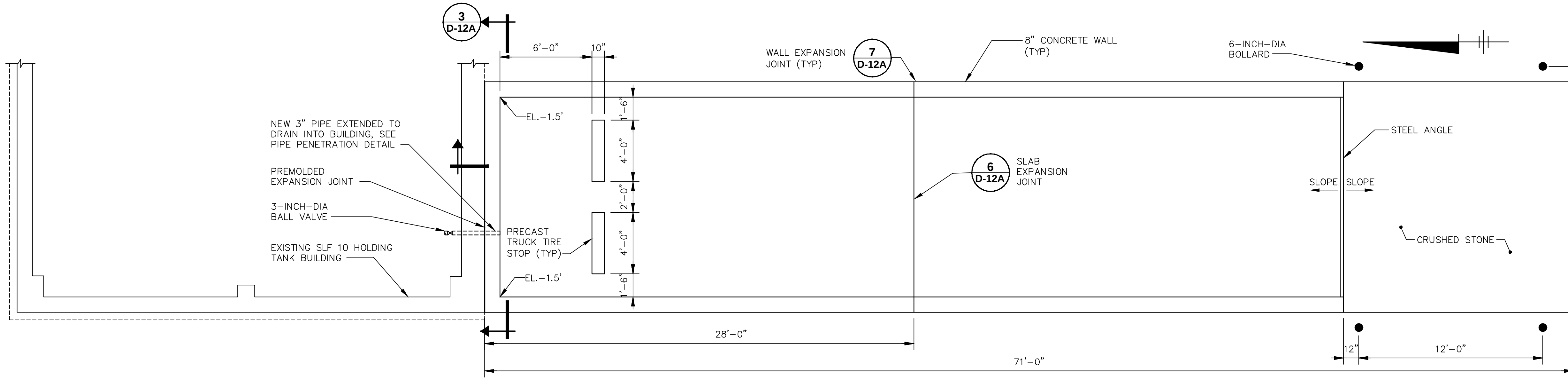
SUMMARY:

The new Parking Area has a worst-case secondary containment volume of 56,106 gal. Based on the required secondary containment volume of 41,977 gal, which accounts for 10 percent of the maximum volume in all liquid storage containers within the new Parking Area plus the runoff volume resulting from a 25-year, 24-hour storm event, the new Parking Area provides adequate secondary containment. A maximum of 37 solids storage containers or 37 liquid storage containers or any combination of the two container types may be stored in the new Parking Area assuming the required aisle spaces considered herein are maintained.

FIGURE D-12A

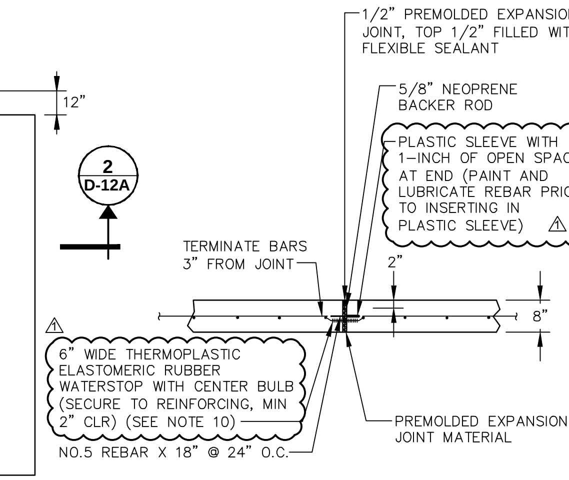
NEW TANK T-109 (SLF 10)

LEACHATE LOADING/UNLOADING PAD



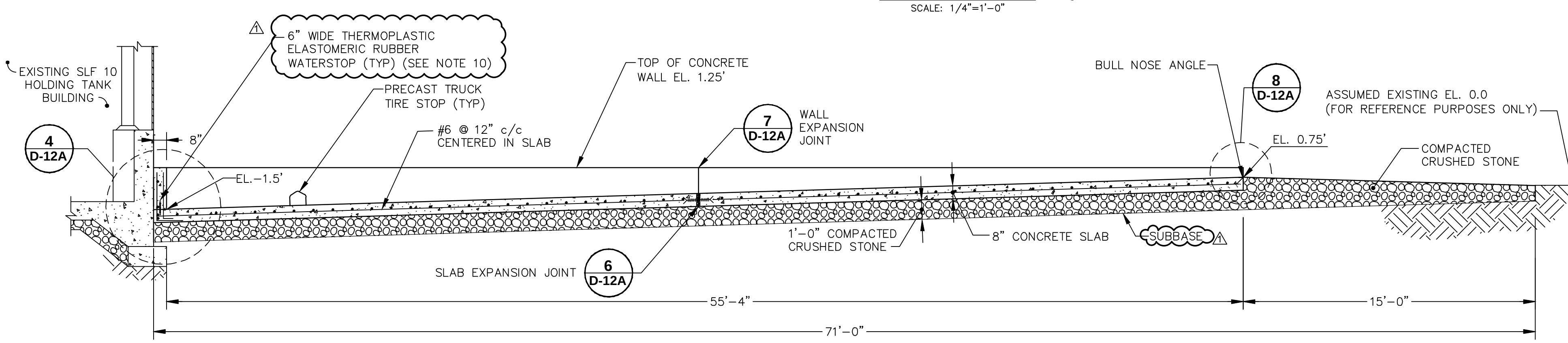
RAMP PLAN 1

SCALE: 1/4"=1'-0"



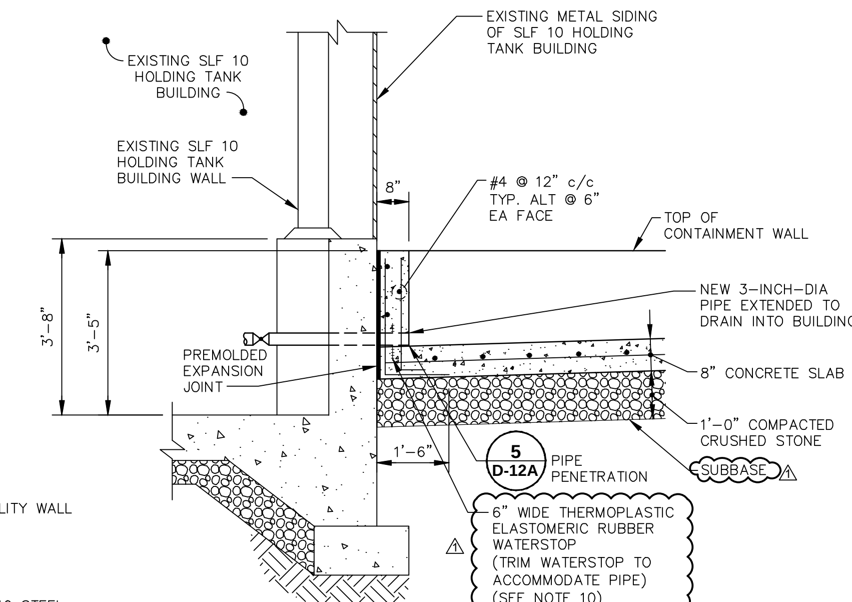
SECTION
SLAB EXPANSION JOINT DETAIL 6

SCALE: 1/2"=1'-0"



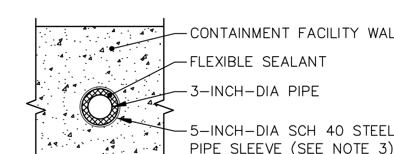
SECTION 2

SCALE: 1/4"=1'-0"



BUILDING WALL/RAMP DETAIL 4

SCALE: 1/2"=1'-0"

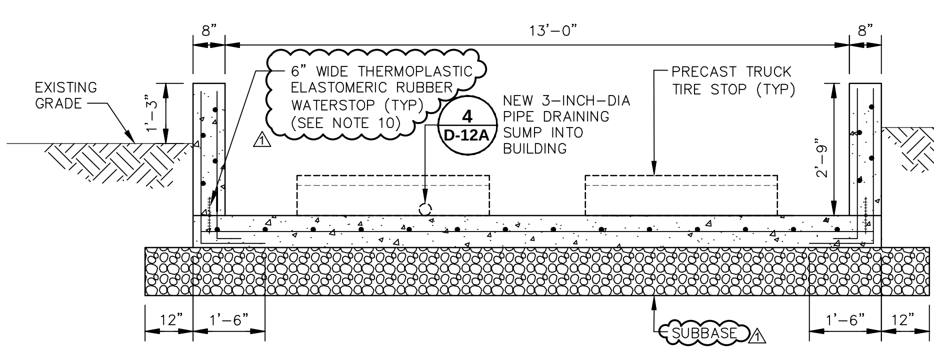


PIPE PENETRATION DETAIL 5

SCALE: 1"=1'-0"

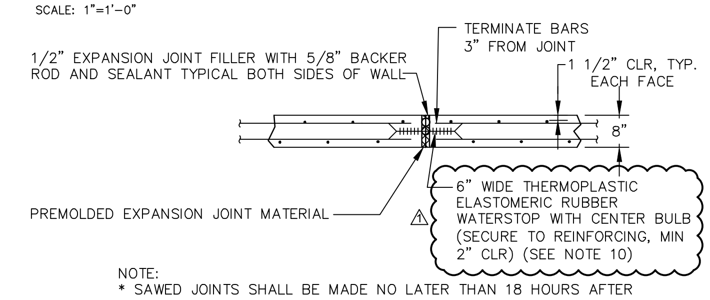
GENERAL NOTES:

1. CONCRETE MIX SHALL BE 4000 PSI AT 28 DAYS WITH AIR ENTRAINING ADMIXTURE 6±1%. STEEL REINFORCEMENT SHALL BE ADDED TO MIX AS MANUFACTURED BY MITCHELL FIBERCON, INC., MEETING ASTM A820 TYPE II SPECIFICATIONS.
2. ALL EXPOSED CONCRETE CONTAINMENT SURFACES TO RECEIVE CHEMTEC ONE CONCRETE PROTECTION SEALANT, OR APPROVED EQUAL.
3. 5" SCHEDULE 40 STEEL SLEEVE SHALL BE INSTALLED AS SHOWN THROUGH CONTAINMENT RAMP WALL. CORRESPONDING 5" CORE DRILLED OPENING SHALL BE PROVIDED IN FOUNDATION WALL OF EXISTING SLF 10 HOLDING TANK BUILDING
4. 3" PIPE TO EXTEND INTO EXISTING SLF 10 HOLDING TANK BUILDING AND BE EQUIPPED WITH VALVE ACCESSIBLE FROM INTERIOR.
5. REINFORCED CONCRETE BARS OF NEW BILLET STEEL CONFORMING TO ASTM A615, GRADE 60. LAP REINFORCING BARS MINIMUM 36 BAR DIAMETERS.
6. DESIGN ELEVATIONS ARE RELATIVE. EXISTING GROUND SURFACE IS ASSUMED TO BE AT ELEVATION 0.0 FOR REFERENCE PURPOSES.
7. STEEL ANGLE SHALL BE FABRICATED IN LENGTHS CORRESPONDING TO JOINT LOCATIONS. STEEL ANGLE SHALL NOT SPAN ANY SLAB JOINT. STRUCTURAL STEEL SHALL CONFORM TO ASTM A36 AND BE GALVANIZED IN ACCORDANCE WITH ASTM A123. WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1.
8. SUBBASE SHALL BE PROOF-ROLLED AND INSPECTED BY ENGINEER PRIOR TO PLACING CRUSHED STONE. IF SOFT SOILS OR AREAS OF PUMPING ARE OBSERVED, SOIL WITHIN THESE AREAS SHALL BE REMOVED AND REPLACED WITH CRUSHED STONE OR STRUCTURAL FILL AND PROOF ROLLED.
9. CRUSHED STONE SHALL BE COMPACTED TO A MINIMUM 95% OF MAXIMUM DRY DENSITY BASED ON MODIFIED PROCTOR.
10. WATERSTOP SHALL BE WESTEC'S ENVIROSTOP™ TPE-R (THERMOPLASTIC ELASTOMERIC RUBBER) 600 SERIES OR APPROVED EQUAL.



SECTION 3

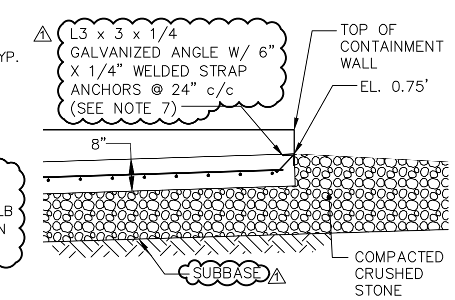
SCALE: 1/2"=1'-0"



NOTE:
* SAWED JOINTS SHALL BE MADE NO LATER THAN 18 HOURS AFTER CONCRETE IS PLACED.

WALL EXPANSION JOINT DETAIL 7

SCALE: 1/2"=1'-0"



SECTION 8

SCALE: 1/2"=1'-0"

SCALE AS NOTED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
⚠	7/2013	GENERAL REVISIONS	NWF	BMS

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644

State	Date Signed	Project Mgr.
NY		WAR
Designed by	Drawn by	Checked by
LAB	SJK	BMS

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CWM CHEMICAL SERVICES, LLC • MODEL CITY, NEW YORK
FULL TRAILER PARKING AREA AND LEACHATE TRANSFER RAMP PERMIT DRAWINGS

SLF 10 HOLDING TANK BUILDING LEACHATE TRANSFER RAMP

GENERAL

ARCADIS Project No. B0023725.2009.00006

Date FEBRUARY 2013

ARCADIS of New York, Inc.
6723 Towpath Road
P.O. Box 66
Syracuse, New York
TEL. 315.446.9120

D-12A

CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K.DAVIS L.FORAKER K.DAVIS LD: PIC: W.POPHAM PM: W.RANKIN TM: B.STONE LYR: ON=*;OFF=*REF* G:\ENVCAD\SYRACUSE\ACT\B0023725\2011\00003\DWG\FULL_TRAILER_PARKING\23725D12A.dwg LAYOUT: D-12A SAVED: 7/8/2013 12:43 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 7/8/2013 12:43 PM BY: SARTORI, KATHERINE
XREFS: 23725X00 IMAGES: PROJECTNAME: ----

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Calculation Sheet

Client: CWM Chemical Services, LLC

Project Location: Model City, New York

Project: RMU-2 Design Calculations **Project No.: B0023725.2011**

Subject: New SLF 10 Leachate Loading/Unloading Ramp – Secondary Containment Calculations

Prepared By: NWF **Date: August 2013**

Reviewed By: BMS **Date: August 2013**

Checked By: BMS **Date: August 2013**

OBJECTIVE:

Calculate the total secondary containment volume for the new SLF 10 Leachate Loading/Unloading Ramp and demonstrate that adequate capacity exists for the anticipated storage quantities.

REFERENCES:

1. Permit Drawing No. D-12A entitled “SLF 10 Holding Tank Building Leachate Transfer Ramp,” contained in Attachment D-1 of the Overall Site/RMU-1 Part 373 Permit, ARCADIS, August 2013.

2. SLF 10 Leachate Building Secondary Containment Calculations, Sitewide 6 NYCRR Part 373 Permit, February 2001.

3. New York State Department of Environmental Conservation Regulations, Subpart 373.2.9 (f).

ASSUMPTIONS:

1. The secondary storage volume consumed by the semi tanker trailer tires and landing gear is assumed to be negligible and is not considered in this analysis.

2. The secondary containment must have sufficient capacity to contain the entire volume of the largest liquid container that will be stored on the ramp (Reference 3).

3. The precipitation volume considered in this calculation is based on the 25-year, 24-hour design storm, which contributes 4 inches of 0.333 feet (ft) of runoff.

4. One tanker truck can be located on the ramp at any one time. The largest liquid storage container volume that will be stored on the ramp is 5,500 gallons (gal).

CALCULATIONS:

The new ramp has interior dimensions of 13-feet-wide by 55.33-feet-long. Access to the ramp is from one end where the concrete is approximately flush with surrounding grade. The ramp slopes downward into the ground, such that the ramp is 2.25 feet lower at the deep end.

The available secondary containment volume within the ramp can be calculated manually using the area of a triangle multiplied by the ramp width as follows:

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Calculation Sheet

[½ (13 ft x 55.33 ft x 2.25 ft)] = 809 cubic feet = 6,053 gal

The new ramp is connected to the SLF 10 Holding Tank Building by a 3 inch pipe. A valve on this pipe is opened whenever liquid containers are on the ramp. As such, an additional 15,709 gallons of secondary containment volume within the SLF 10 Holding Tank Building (Reference 2) is also available. A total secondary containment volume of 21,762 gal is thus provided by the ramp itself and the building.

The required secondary containment volume for the new ramp is equal to the sum of the largest liquid storage container volume (5,500 gal) and the runoff from the design storm. The stormwater runoff volume is calculated as follows:

13 ft x 55.33 ft x 0.333 ft = 240 cubic feet = 1,794 gal

Thus, the required secondary containment volume is 7,294 gal

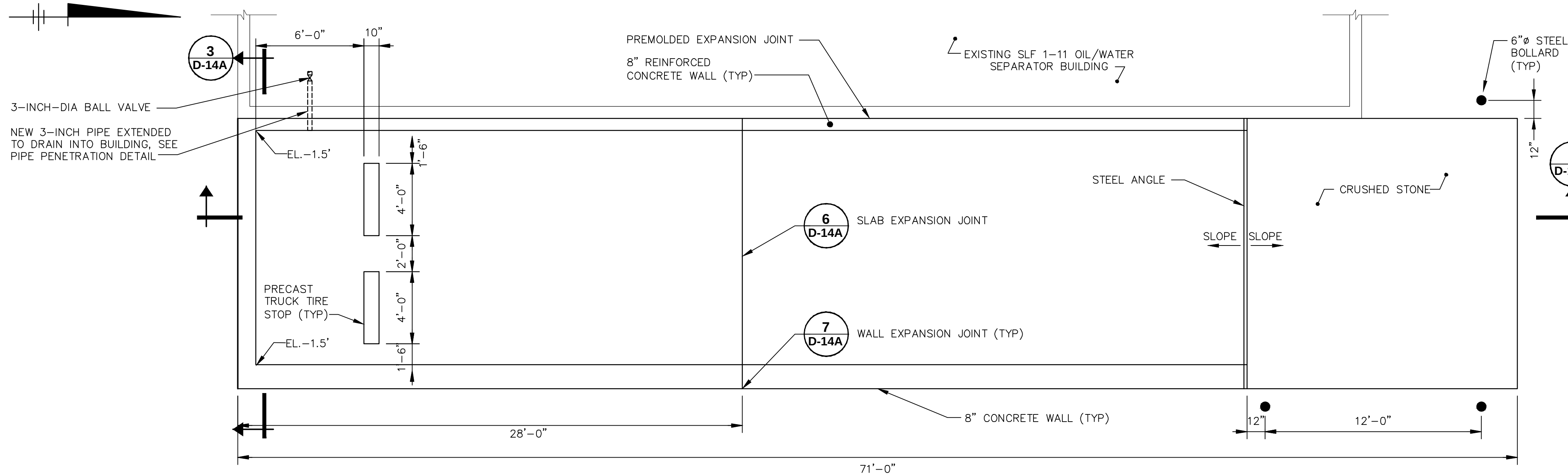
SUMMARY:

The available secondary containment volume for the new SLF 10 Leachate Loading/Unloading Ramp (including the volume provided both by the ramp itself and the SLF 10 Holding Tank Building) exceeds the required secondary containment volume and is therefore acceptable.

FIGURE D-14A

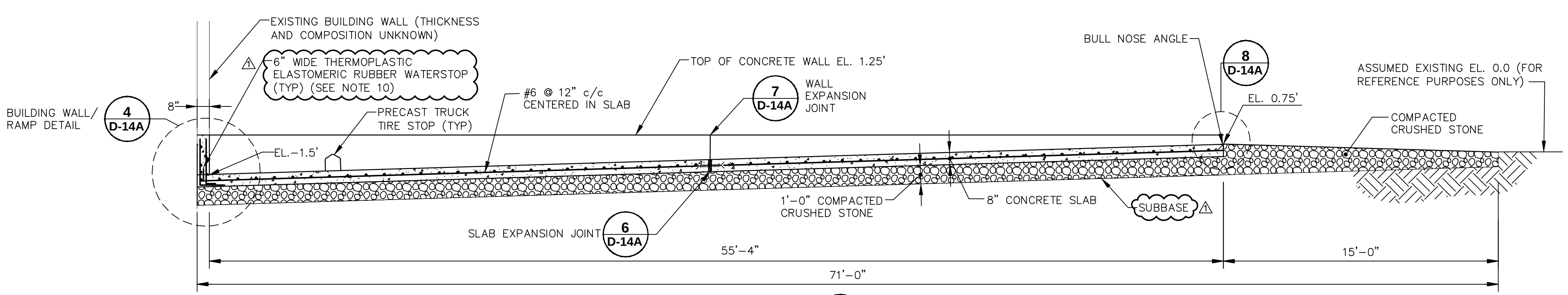
NEW TANK T-158 (SLF 1-11 OWS)

BUILDING LOADING/UNLOADING PAD



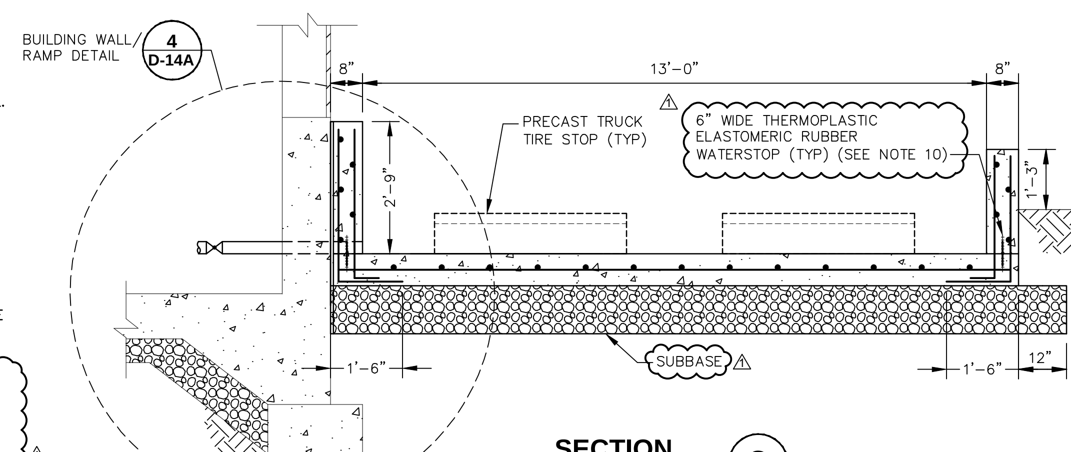
RAMP PLAN (1)

SCALE: 1/4"=1'-0"



SECTION (2)

SCALE: 1/4"=1'-0"

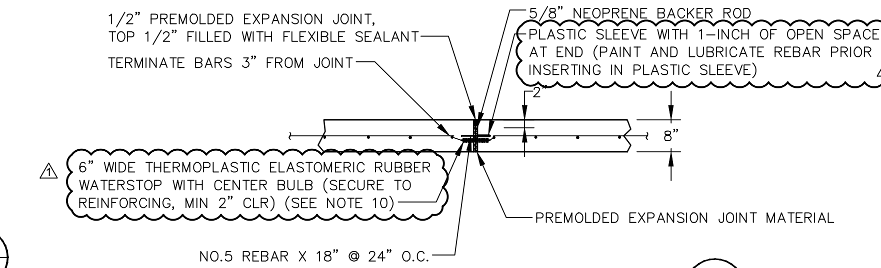


SECTION (3)

SCALE: 1/2"=1'-0"

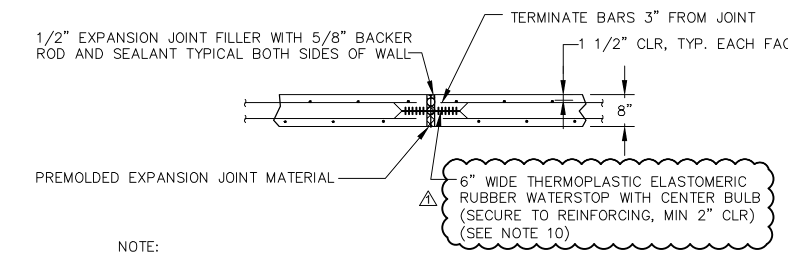
GENERAL NOTES:

1. CONCRETE MIX SHALL BE 4000 PSI AT 28 DAYS WITH AIR ENTRAINING ADMIXTURE 6±1%. STEEL REINFORCEMENT SHALL BE ADDED TO MIX AS MANUFACTURED BY MITCHELL FIBERCON, INC., MEETING ASTM A820 TYPE II SPECIFICATIONS.
2. ALL EXPOSED CONCRETE CONTAINMENT SURFACES TO RECEIVE CHEMTEC ONE CONCRETE PROTECTION SEALANT, OR APPROVED EQUAL.
3. 5" SCHEDULE 40 STEEL SLEEVE SHALL BE INSTALLED AS SHOWN THROUGH CONTAINMENT RAMP WALL. CORRESPONDING 5" CORE DRILLED OPENING SHALL BE PROVIDED IN FOUNDATION WALL OF EXISTING SLF 1-11 OIL/WATER SEPARATOR BUILDING.
4. 3" PIPE TO EXTEND INTO EXISTING SLF 1-11 OIL/WATER SEPARATOR BUILDING AND BE EQUIPPED WITH VALVE ACCESSIBLE FROM INTERIOR.
5. REINFORCED CONCRETE BARS OF NEW BILLET STEEL CONFORMING TO ASTM A615, GRADE 60. LAP REINFORCING BARS MINIMUM 36 BAR DIAMETERS.
6. DESIGN ELEVATIONS ARE RELATIVE. EXISTING GROUND SURFACE IS ASSUMED TO BE ELEVATION 0.0 FOR REFERENCE PURPOSES.
7. STEEL ANGLE SHALL BE FABRICATED IN LENGTHS CORRESPONDING TO JOINT LOCATIONS. STEEL ANGLE SHALL NOT SPAN ANY SLAB JOINT. STRUCTURAL STEEL SHALL CONFORM TO ASTM A36 AND BE GALVANIZED IN ACCORDANCE WITH ASTM A123. WELDING SHALL BE IN ACCORDANCE WITH AWS D1.1.
8. SUBBASE SHALL BE PROOF-ROLLED AND INSPECTED BY ENGINEER PRIOR TO PLACING CRUSHED STONE. IF SOFT SOILS OR AREAS OF PUMPING ARE OBSERVED, SOIL WITHIN THESE AREAS SHALL BE REMOVED AND REPLACED WITH CRUSHED STONE OR STRUCTURAL FILL AND PROOF ROLLED.
9. CRUSHED STONE SHALL BE COMPACTED TO A MINIMUM 95% OF MAXIMUM DRY DENSITY BASED ON MODIFIED PROCTOR.
10. WATERSTOP SHALL BE WESTEC'S ENVIROSTOP™ TPE-R (THERMOPLASTIC ELASTOMERIC RUBBER) 600 SERIES OR APPROVED EQUAL.



SLAB EXPANSION JOINT DETAIL (6)

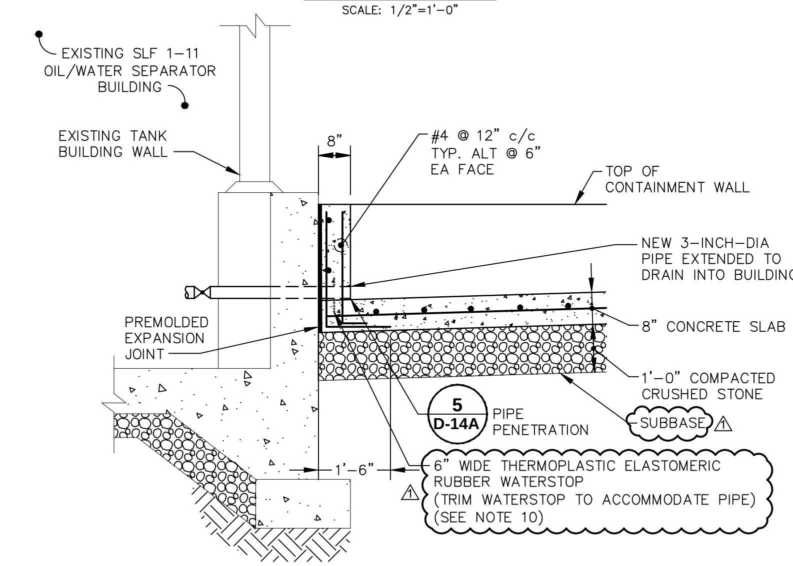
SCALE: 1/2"=1'-0"



NOTE:
* SAWED JOINTS SHALL BE MADE NO LATER THAN 18 HOURS AFTER CONCRETE IS PLACED.

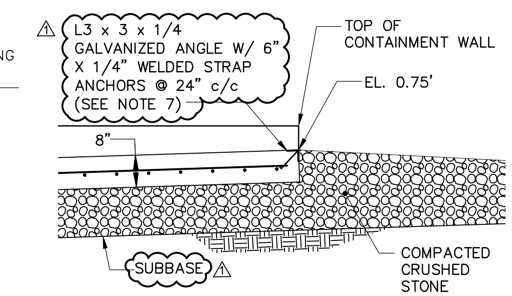
WALL EXPANSION JOINT DETAIL (7)

SCALE: 1/2"=1'-0"



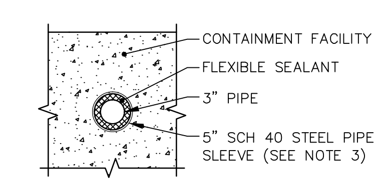
BUILDING WALL/RAMP DETAIL (4)

SCALE: 1/2"=1'-0"



SECTION (8)

SCALE: 1/2"=1'-0"



PIPE PENETRATION DETAIL (5)

SCALE: 1"=1'-0"

SCALE AS NOTED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING: USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
1	7/2013	GENERAL REVISIONS	NWF	BMS

Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: | Project Mgr.: WAR
Designed by: LAB | Drawn by: SJK | Checked by: BMS

ARCADIS
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FULL TRAILER PARKING AREA AND LEACHATE TRANSFER RAMP PERMIT DRAWINGS

SLF 1-11 OIL/WATER SEPARATOR BUILDING LEACHATE TRANSFER RAMP

GENERAL

ARCADIS Project No. B0023725.2009.00006
Date FEBRUARY 2013

ARCADIS of New York, Inc.
6723 Towpath Road
P.O. Box 66
Syracuse, New York
TEL. 315.446.9120

D-14A

ARCADIS
Infrastructure, environment, buildings

Imagine the result

Calculation Sheet

Client: **CWM Chemical Services, LLC**

Project Location: **Model City, New York**

Project: **RMU-2 Design Calculations** **Project No.:** **B0023725.2011**

Subject: **New SLF 1-11 OWS Loading/Unloading Ramp – Secondary Containment Calculations**

Prepared By: **NWF** **Date:** **August 2013**

Reviewed By: **BMS** **Date:** **August 2013**

Checked By: **BMS** **Date:** **August 2013**

OBJECTIVE:

Calculate the total secondary containment volume for the new SLF 1-11 Oil/Water Separator (OWS) Loading/Unloading Ramp (ramp) and demonstrate that adequate capacity exists for the anticipated storage quantities.

REFERENCES:

1. Permit Drawing No. D-14A entitled "SLF 1-11 Oil/Water Separator Building Leachate Transfer Ramp," contained in Attachment D-1 of the Overall Site/RMU-1 Part 373 Permit, ARCADIS, August 2013.

2. SLF 1-11 OWS Building Secondary Containment Calculations, Sitewide 6 NYCRR Part 373 Permit, February 2001.

3. New York State Department of Environmental Conservation Regulations, Subpart 373.2.9 (f).

ASSUMPTIONS:

1. The secondary storage volume consumed by the semi tanker trailer tires and landing gear is assumed to be negligible and is not considered in this analysis.

2. The secondary containment must have sufficient capacity to contain the entire volume of the largest liquid container that will be stored on the ramp (Reference 3).

3. The precipitation volume considered in this calculation is based on the 25-year, 24-hour design storm, which contributes 4 inches of 0.333 feet (ft) of runoff.

4. One tanker truck can be located on the ramp at any one time. The largest liquid storage container volume that will be stored on the ramp is 5,500 gallons (gal).

CALCULATIONS:

The new ramp has interior dimensions of 13-feet-wide by 55.33-feet-long. Access to the ramp is from one end where the concrete is approximately flush with surrounding grade. The ramp slopes downward into the ground, such that the ramp is 2.25 feet lower at the deep end.

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Imagine the result

Calculation Sheet

The available secondary containment volume within the ramp can be calculated manually using the area of a triangle multiplied by the ramp width as follows:

[½ (13 ft x 55.33 ft x 2.25 ft)] = 809 cubic feet = 6,053 gal

The new ramp is connected to the SLF 1-11 OWS Building by a 3 inch pipe. A valve on this pipe is opened whenever liquid containers are on the ramp. As such, an additional 24,876 gallons of secondary containment volume within the SLF 1-11 OWS Building (Reference 2) is also available. A total secondary containment volume of 30,929 gal is thus provided by the ramp itself and the building.

The required secondary containment volume for the new ramp is equal to the sum of the largest liquid storage container volume (5,500 gal) and the runoff from the design storm. The stormwater runoff volume is calculated as follows:

13 ft x 55.33 ft x 0.333 ft = 240 cubic feet = 1,794 gal

Thus, the required secondary containment volume is 7,294 gal

SUMMARY:

The available secondary containment volume for the new SLF 1-11 OWS Loading/Unloading Ramp (including the volume provided both by the ramp itself and the SLF 1-11 OWS Building) exceeds the required secondary containment volume and is therefore acceptable.

Application Appendix D-2 – Surface Impoundments

(proposed modified pages are designated with a November 2013 revision date at the top of the respective page)

APPENDIX D-2
SURFACE IMPOUNDMENTS

TABLE OF CONTENTS

SURFACE IMPOUNDMENTS

I. Introduction

The active surface impoundments, i.e., facultative ponds (FAC Ponds), are comprised of FAC Ponds 1, 2, 3 and 8. These surface impoundments are utilized for biological treatment using aeration and storage of treated wastewater prior to discharge into the Niagara River in accordance with the Model City Facility SPDES Permit.

The FAC ponds receive treated effluent from the Aqueous Wastewater Treatment System only. There are no other inputs to these impoundments with the exception of direct precipitation into the impoundments. Precipitation that accumulates in FAC Pond 8 may be transferred to FAC Pond 1 / 2.

Fac Ponds 3 and 8 will be eliminated as part of site preparation for the construction of the proposed landfill Residuals Management Unit No. 2 (RMU-2). Fac Ponds 3 and 8 will be closed in accordance with the Sitewide Closure Plan. Fac Ponds 3 and 8 lie within the footprint of RMU-2 and upon closure will be filled with structural (as required) and general soil fill to the RMU-2 excavation grades. It is anticipated that Fac Pond 8 will be closed prior to permitting for RMU-2 (it is currently in progress). Fac Pond 3 will be eliminated only after the construction of Fac Pond 5 because of the need to continuously provide storage of treated wastewater prior to discharge.

New Fac Pond 5 will be constructed to compensate for the storage capacity lost due to closure of Fac Ponds 3 and 8. Fac Pond 5 will be constructed to the north of proposed RMU-2 between SLF 12 and SLF 7. The new Fac pond will provide storage lost due to the removal of Fac Ponds 3 and 8. Fac Pond 5 will include a Part 373-compliant liner system.

II. Background

The RCRA Hazardous and Solid Waste Amendments of 1984 (HSWA) specify that surface impoundments which treat or store hazardous waste must have two or more liners, a leachate collection system between these liners, and appropriate groundwater monitoring.

Owners and operators of facilities with interim status surface impoundments were given four years to retrofit impoundments to meet these minimum technology requirements (November 8, 1988). Chemical Waste Management, Inc. applied to the USEPA Region II for a variance to the HSWA double liner requirements for Facultative Ponds No. 1, 2, 3, 8, 9, Fire Pond and the Aggressive Biological Treatment Unit (ABTU) No. 58. On February 17, 1989 CWM was notified by the USEPA of the approval of its request for a variance. In the approval, the

USEPA stated that CWM still qualifies for the exemption should the composition of waste streams handled by CWM change or in the event that a new SPDES Permit was issued.

Moreover, during August of 1993, CWM requested verification from the NYSDEC that its exemption was still valid even though the AWTS had been upgraded and CWM's SPDES Permit had been renewed. In its 1993 request for verification, CWM demonstrated that the conditions upon which the exemption was based had not changed. In December of 1993, the NYSDEC informed CWM that its exemption from minimum technology requirements for the facultative pond system was still valid.[1]

Consequently, the active surface impoundments described herein (FAC Ponds 1, 2, 3 and 8) do not meet the minimum technology requirements and are not double lined impoundments.

The Fire Pond was removed from service, clean closed and certified on March 1, 1990. Fac Pond 9 was removed from service, clean closed and certified on August 7, 1992. These two Fac Ponds no longer exist. ABTU 58 was converted to a RCRA tank in 1993.

III. Description of Active Facultative Ponds 1, 2, 3 and 8

Active Fac Ponds 1, 2, 3 and 8 are clay lined surface impoundments of the following approximate sizes:

Fac Pond	Capacity (gallons)	Area in Acres
1 and 2	22,880,700	7.1
3	51,355,300	13.2
8	43,413,500	6.6

New Fac Pond 5 will be Part 373-compliant surface impoundments of the following approximate size:

Fac Pond	Capacity (gallons)	Area in Acres
5 (new)	24,700,000	7.5

[1]Paul R. Counterman, P.E. to Ms. Jill Knickerbocker, "Aggressive Biological Treatment Exemption", New York State Department of Environmental Conservation letter dated December 21, 1993.

Fac Ponds 1 and 2 were originally two separate adjacent ponds separated by a berm. In recent years, however, the internal berm was encroached. Now Fac Pond 1 and 2 are considered a single surface impoundment with common exterior berms.

The historical purpose of the Fac Ponds was to provide the final step for treated wastewater prior to discharge. This was accomplished by mechanical aeration allowing the continued reduction in TOC, BOD and COD, plus an increase in dissolved oxygen content. Since the inception of Land Disposal Regulations (LDRs), however, the levels of organic and other contaminants in the treated wastewater entering the Fac Ponds are greatly reduced. Aeration is currently used mainly for odor control.

IV. Facultative Pond Construction

A. Construction of Facultative Pond 5

Material that is excavated from the floor area of Fac Pond 5 will be used to initiate construction of the eastern perimeter berm. This will allow a channel to be built between Fac Pond 5 and SLF 7 to divert runoff from SLF 7 around the Fac Pond 5 footprint. Additional fill material will be obtained from on-site stockpiles or be imported from pre-screened off-site sources.

A new liner system will be installed in Fac Pond 5, as described in Section 3.5.2 of the Engineering Report for RMU-2/Fac Ponds. A sideslope riser pipe will allow for monitoring of liquid levels in the sump of the leak detection system and for removal of accumulated liquids. A pre-fabricated weather proof riser house will be installed near the top of the perimeter berm at the sideslope riser pipe location. The sideslope riser pipe will penetrate the wall of the riser house so that transfer piping from the ponds leak detection system submersible pump may discharge into a tank. The riser house will contain a double-walled tank for storage of liquids pumped from the leak detection system. Access to the riser house will be provided by a ramp from an access road on the adjacent SLF 7.

A new at grade transfer line will be installed between Fac Ponds 1 and 2 and Fac Pond 5. The transfer line will include two parallel 6-inch-diameter in 10-inch diameter double-wall HDPE pipes at grade with soil protection cover. Each forcemain (two, in total) will be constructed of double-contained HDPE pipe. The inner carrier pipe will be 6-inches and the outer containment pipe will be 10-inches. The outer, secondary containment pipe will terminate at the penetration into HDPE manholes to allow for leak detection. The treated wastewater forcemains will be sloped so that any liquid in the secondary containment pipe will gravity drain back to a junction or transfer manhole.

As indicated on attached Drawing Nos. 5, 6 and 7, the pipeline will be sloped towards leak detection manholes. At Fac Pond 5, the pipeline will terminate above ground at the riser house. Connective piping will be installed to allow either of the two parallel lines to be used to fill or drain the pond. At Fac Ponds 1 and 2, the pipeline will terminate in a valve house as indicated on attached Drawing Nos. 3, 5, and 13 . Piping from the valve house will lead to Fac Ponds 1 and 2, Fac Pond 5, and the existing discharge manhole to the north of the Fac pond perimeter berm that discharges to the Niagara River. Piping will be installed in the new valve house to allow either of the two parallel lines to be used to transfer liquid from Fac Ponds 1 and 2 to Fac Pond 5 or vice versa, fill Fac Pond 5 with effluent from the site's treatment plant and to discharge liquid from Fac Pond 5 to the existing discharge piping leading to the Niagara River. The existing discharge filter system will be relocated from its current location at Fac Pond 3 to an area north of Fac Ponds 1 and 2.

The Action Leakage Rate (ALR) for Fac Pond 5 was calculated and a Response Action Plan (RAP) was prepared and is attached.

V. Land Disposal Regulations

LDRs have established treatment standards for wastewater discharged to surface impoundments. In November 1998, NYSDEC updated the 6NYCRR Part 376 regulations to adopt recently promulgated USEPA LDRs. The CWM Waste Analysis Plan describes the test procedures and frequency employed to assure that the treated effluent meets established LDRs under the multi-source leachate Waste Code F039.

IV. Operation

After treatment in the carbon adsorption system of the AWTS, the wastewater effluent is discharged into an effluent holding tank. Following qualification, the effluent is transferred to FAC Pond 1 and 2.

Periodically, this volume of treated effluent is pumped from Fac Pond 1 and 2 into Fac Pond 3 to accumulate sufficient quantities for discharge. The final step of the qualification process occurs in Fac Pond 3 where samples are collected and analyzed for comparison to the SPDES Permit limits. Once the effluent qualifies under the SPDES Permit, the wastewater is discharged via the facility's pipeline to the Niagara River. Generally, one batch is qualified and discharged per year. A typical volume is 15-25 million gallons per year.

Fac Ponds 1, 2 and 3 are equipped with mechanical aerators whose main purpose is to minimize odorous emissions from the pond by maintaining a high dissolved oxygen content. Aerators are operated on an as needed basis. The liquid level in each Fac Pond is visually inspected to maintain a freeboard of at least two feet.

Fac Pond 8 was taken out of service in 2004 and emptied in anticipation of closure. Prior to that time, Fac Pond 8 was used as the final qualification pond. Closure of Fac Pond 8 is currently in progress.

Development of the first phase (Cell 20) of RMU-2 will be at the location of current Fac Pond 8. During the development of the first phase of RMU-2 Fac Ponds 1 / 2 and 3 will operate as described above and Fac Pond 5 will be constructed. Fac Pond 3 will be closed in accordance with the Sitewide Closure Plan prior to the development of the second phase of RMU-2 after the final discharge from the pond.

The existing influent and effluent piping will be modified, as necessary, to accommodate the Fac pond construction and reconstruction. Piping will be installed in a new valve house to allow either of the two parallel lines to be used to transfer liquid from Fac Ponds 1 and 2 to Fac Pond 5 or vice versa, fill Fac Pond 5 with effluent from the site’s treatment plant and to discharge liquid from Fac Pond 5 to the existing discharge piping leading to the Niagara River.

Periodically, a volume of treated effluent will be pumped from Fac Pond 1 and 2 into Fac Pond 5 to accumulate sufficient quantities for discharge. The final step of the qualification process will occur in Fac Pond 5 where samples will be collected and analyzed for comparison to the SPDES Permit limits. Once the effluent qualifies under the SPDES Permit, the wastewater will be discharged via the facility's pipeline to the Niagara River. Generally, one batch is qualified and discharged per year, however additional batches may be discharged within a calendar year. A typical volume will be 15-20 million gallons per year.

Fac Ponds 1, 2 and 5 will be equipped with mechanical aerators whose main purpose is to minimize odorous emissions from the pond by maintaining a high dissolved oxygen content. Aerators will be operated on an as needed basis. The liquid level in each Fac Pond will be visually inspected to maintain a freeboard of at least two feet.

Liquids will be pumped from the leak detection system of of Fac Pond 5 to the riser house constructed on the berm. The amount of liquids removed from the leak detection system sump will be recorded at least once each week during the active life and will compared to the Response Rate in the RAP and the ALR.

VII. Maintenance

Erosion protection is predominately provided for the exterior surfaces of all above grade impoundments in the form of a vegetative growth. Inspections of all active surface impoundment embankments are performed at least once each operating day.

A. Control of Overtopping and Maintenance of Dikes

1. Inspections

Specific inspection criteria are described in the facility's Inspection Plan for the following criteria:

1) measurement devices;
2) liquid level in the impoundment (indication whether two feet of freeboard is present);
3) no sudden drop in level of contents not associated with pumping;
4) no signs of severe erosion, deterioration, or instability of dikes;
5) aerators are operable when in use.

The inspections are designed to detect any evidence of deterioration, malfunction or improper operation which would compromise the efficiency of the overtopping control. Level control is accomplished by visual inspections of the measuring device affixed near each impoundment. This will assure that sudden changes in liquid level will be quickly detected.

Liquid losses, due to berm failure, from the FAC Ponds would be contained in the facility surface water drainage collection system until contingency measures were implemented.

Moreover, most of the Fac Ponds are below ground level, with the exception of new Fac Pond 5, making losses very minimal in the event of berm failure.

2. Erosion Protection

The exterior of the containment berms for the surface impoundments are vegetated to reduce the potential for erosion due to precipitation and runoff.

Inspections which indicate a problem with erosion will be handled by initiating the Environmental Work Order System. Restorative construction will consist of removal or reshaping the eroded soils, reseeding and adding additional material with compaction. The area will be monitored during subsequent inspections to ensure its viability.

VIII. Air Emission Standards

Air emission standards for surface impoundments are specified in 6NYCRR 373-2.29 and 40 CFR 264/265.1080-1091 (Subpart CC), which became effective on December 6, 1996. RCRA Subpart CC is applicable to owners and operators of a TSDF which treats, stores or disposes of hazardous waste containing greater than 500 ppmw volatile organics in tanks, surface impoundments and containers. If Subpart CC wastes are managed in a surface impoundment, a floating membrane continuous barrier or a cover vented through a closed vent system to a control device must be installed, unless specified exemptions apply. All surface impoundments at the CWM Model City Facility are exempt from these requirements as described below.

Fac Ponds 1, 2, 3, 8, and new Fac Pond 5 are exempt since the treated wastewater placed in these impoundments meets the applicable numerical organic limits for F039, as specified by the LDR regulations. In addition, all wastewaters are exempt after being treated at the AWTS, and so the effluent from AWTS is exempt.

FACULTATIVE PONDS 1 / 2 AND 5 PERMIT DRAWINGS

PERMIT DRAWINGS

FAC POND 5 PERMIT DRAWINGS

CWM CHEMICAL SERVICES, LLC
MODEL CITY, NIAGARA COUNTY
NEW YORK

FEBRUARY 2013

WASTE MANAGEMENT

INDEX TO DRAWINGS

CITY: SYRACUSE, NY DIV/GROUP: ENVCAD DB: K.DAVIS LD: K.DAVIS PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF*
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XREFS: 23725X00 IMAGES: 23725X01.TIF PROJECTNAME: —

NOT TO SCALE

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING. USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
1	11/2013	REMOVED FAC POND 1/2 RECONSTRUCTION	GND	BMS

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 11/5/13 | Project Mgr.: TJF
Designed by: BMS/PTO | Drawn by: | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA III · 072644 · LICENSED PROFESSIONAL ENGINEER

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FAC POND 5 PERMIT DRAWINGS

TITLE AND INDEX

GENERAL

ARCADIS Project No. B0023725.2013.00003

Date: FEBRUARY 2013

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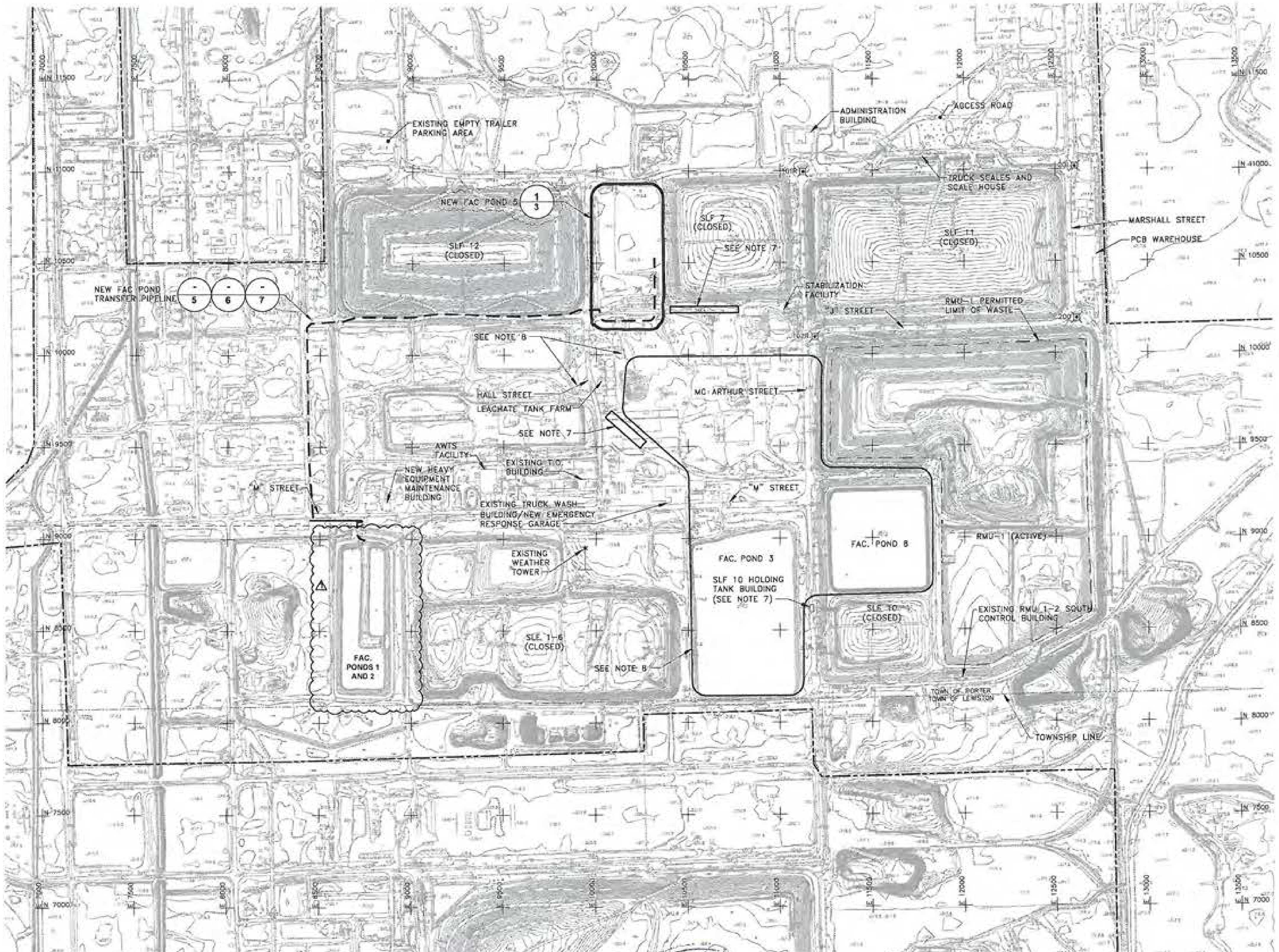
1



LEGEND:

- BRUSHLINE
- CABLE MARKER
- CATCH BASIN
- DROP INLET
- FENCE
- FIRE HYDRANT
- GUARD RAIL
- LIGHT POLE
- MISCELLANEOUS POLE
- MONUMENT
- POST
- RAILROAD TRACKS
- SIGN
- SWAMP
- TRAFFIC LIGHT
- TREE
- TREELINE
- UNIDENTIFIED OBJECT
- UTILITY POLE
- VALVE
- WATER LINE
- EXISTING CONTOUR
- EXISTING GRADEBREAK
- PROPERTY LINE

200 CONTROL MONUMENT (SEE TABLE BELOW)

1 DETAIL REFERENCE NUMBER
3 DRAWING REFERENCE NUMBER

E 13500 N 7000 COORDINATE GRID (SEE NOTE 3)

RMU-1/RMU-2 CONTROL MONUMENTS

MONUMENTS	ELEVATION	CWM PLANT GRID		RMU-1 GRID		NY STATE PLANE COORDINATES (NAD-27)		NGVD-29 ELEVATION
		NORTHING	EASTING	NORTHING	EASTING	NORTHING	EASTING	
102R	319.72	100+94.55	111+87.56	100+94.65	11+87.56	1,175,430.46	396,380.12	319.66
200	318.33	101+89.56	126+13.77	101+89.56	26+13.77	1,175,488.28	397,808.18	318.27
101R	316.01	109+94.28	111+23.09	---	---	1,176,331.436	396,339.034	315.92
201	316.62	110+17.82	126+3.49	---	---	---	---	---

CONTROL MONUMENTS NOTE:

1. RMU-1 EASTING GRID COORDINATES ARE SIMPLIFIED PLANT GRID COORDINATES. SUBTRACTING 10,000 FROM THE CWM PLANT GRID EASTING COORDINATE WILL CONVERT THE CWM PLANT GRID TO THE RMU-1 GRID. NOTE THAT NO CONVERSION IS REQUIRED FOR NORTHING COORDINATES.

NOTES:

1. TOPOGRAPHIC BASE MAP CONSISTS OF COMBINATION OF DATA COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED 5/31/01 BY AIR SURVEY CORP. (PROJECT NO.71010503). AND AN AUGUST 2008 SURVEY BY ENSOL, INC.
2. VERTICAL DATUM BASED ON NGS MEAN SEA LEVEL.
3. GRID COORDINATES SHOWN ARE CWM PLANT GRID.
4. CONTOUR INTERVAL 2 FT.
5. DASHED CONTOURS INDICATE THAT GROUND IS PARTIALLY OBSCURED BY VEGETATION OR SHADOWS. THESE AREAS MAY NOT MEET STANDARD ACCURACY AND REQUIRE FIELD VERIFICATION.
6. PROPERTY LINE IS APPROXIMATE. EASEMENTS AND RIGHT-OF-WAYS NOT SHOWN.
7. REFER TO DRAWINGS IN ATTACHMENT D-1 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.
8. REFER TO DRAWINGS IN ATTACHMENT J FOR FURTHER DETAIL.

CITY: SYRACUSE, NY DIV/GROUP: ENVCAD DB: K. DAVIS PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0023725\2013\00002\DWG\CONTRACT\FACPOND\23725G02.dwg LAYOUT: 2 SAVED: 11/1/2013 11:20 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 11/1/2013 11:20 AM BY: DAVIS, KATHI
XREFS: 23725X02 23725X01 23725X00 IMAGES: PROJECTNAME: ---

300' 0 300' 600'
1"=300'

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING. USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
1	11/2013	REMOVED FAC POND 1/2 RECONSTRUCTION	GNG	BMS

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No: 072644
State: NY Date Signed: 11/5/13 Project Mgr: TJF
Designed by: BMS/PTO Drawn by: SJK Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · LICENSED PROFESSIONAL ENGINEER · 072644

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FAC POND 5 PERMIT DRAWINGS

SITE PLAN

GENERAL

ARCADIS Project No. B0023725.2013.00003
Date FEBRUARY 2013
ARCADIS of New York, Inc. 6723 Towpath Road P.O. Box 66 Syracuse, New York TEL 315 446 9120

2

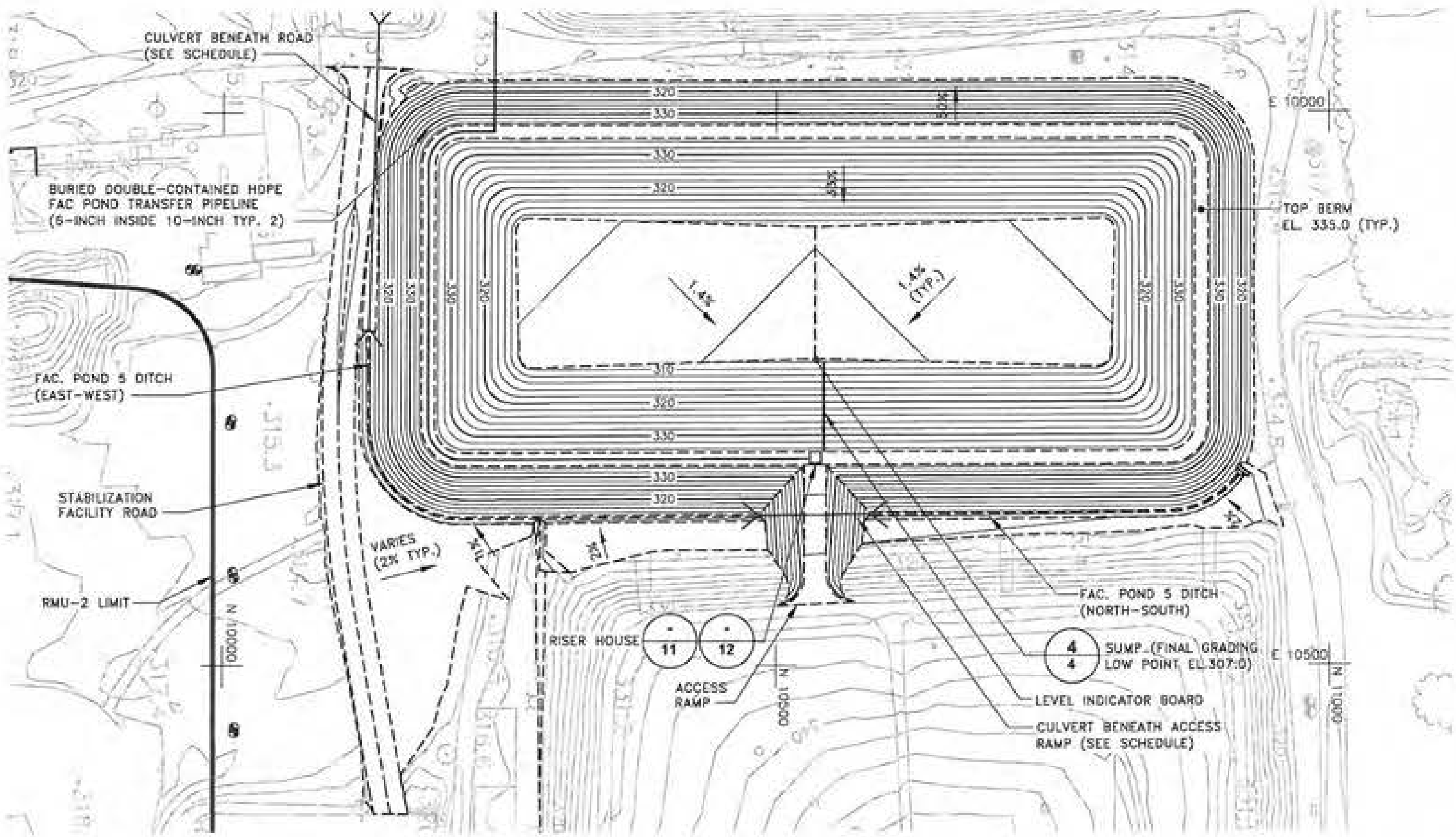
LEGEND:

	WATER LINE
	EXISTING CONTOUR
	EXISTING GRADE BREAK
	PROPERTY LINE
320	PROPOSED INDEX ELEVATION CONTOUR
	PROPOSED INTERMEDIATE ELEVATION CONTOUR
	PROPOSED GRADE BREAK
31	DETAIL REFERENCE NUMBER
3	DRAWING REFERENCE NUMBER
N 8000 E 8500	COORDINATE GRID

NOTES:

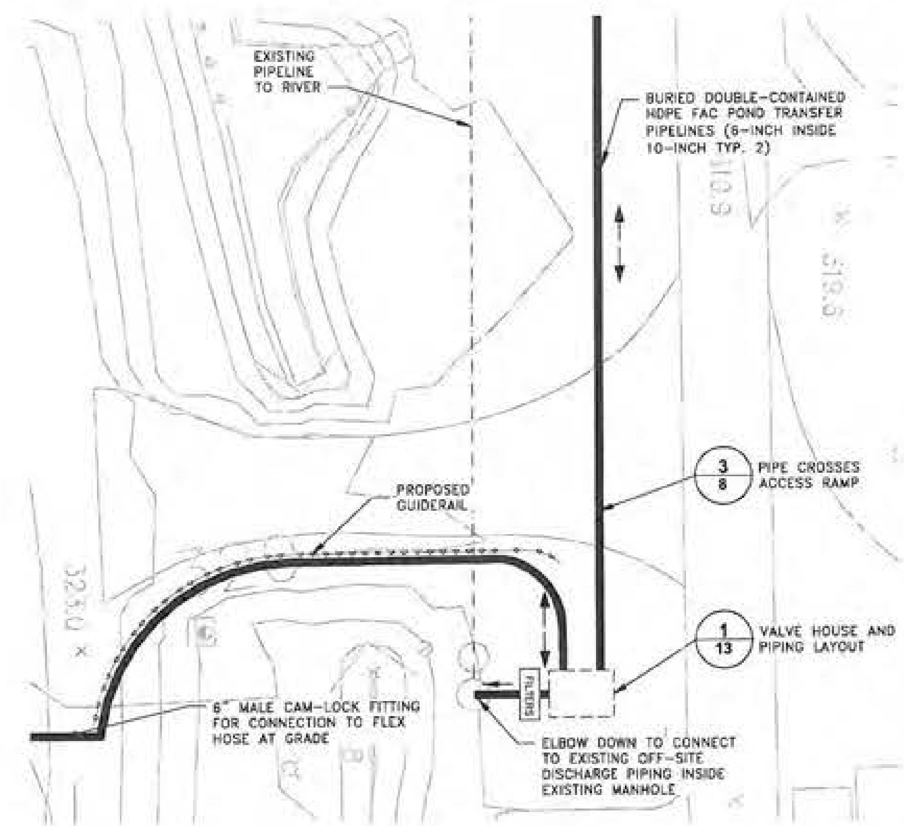
1. SEE DRAWING 2 FOR BASEMAP INFORMATION.
2. PROPOSED GRADES REPRESENT FINAL GRADING (TOP OF BALLAST LAYER ON FLOOR AND TOP OF PRIMARY LINER ON INTERIOR SIDESLOPES).

CULVERT ID	SIZE	SLOPE %
BENEATH ACCESS RAMP	24"	0.3%
BENEATH ROAD	36"	0.3%



FAC POND 5 PLAN (1)

SCALE: 1"=80'



FAC POND 1 TRANSFER PIPELINE CONNECTION TO FILTER AND OFF-SITE DISCHARGE PIPING (2)

SCALE: 1"=20'

SCALE(S) AS INDICATED

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No.	Date	Revisions	By	Ckd
1	11/2013	REMOVED FAC POND 1/2 RECONSTRUCTION	GNC	BMS

Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No: 072644
State: NY | Date Signed: 11/5/13 | Project Mgr: TJR
Designed by: BMS/PTO | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA III · LICENSED PROFESSIONAL ENGINEER · 072644

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FAC POND GRADING PLAN

GENERAL

ARCADIS Project No. B0023725.2013.00003
Date: FEBRUARY 2013
ARCADIS of New York, Inc. 6723 Towpath Road P.O. Box 66 Syracuse, New York TEL. 315.446.9120

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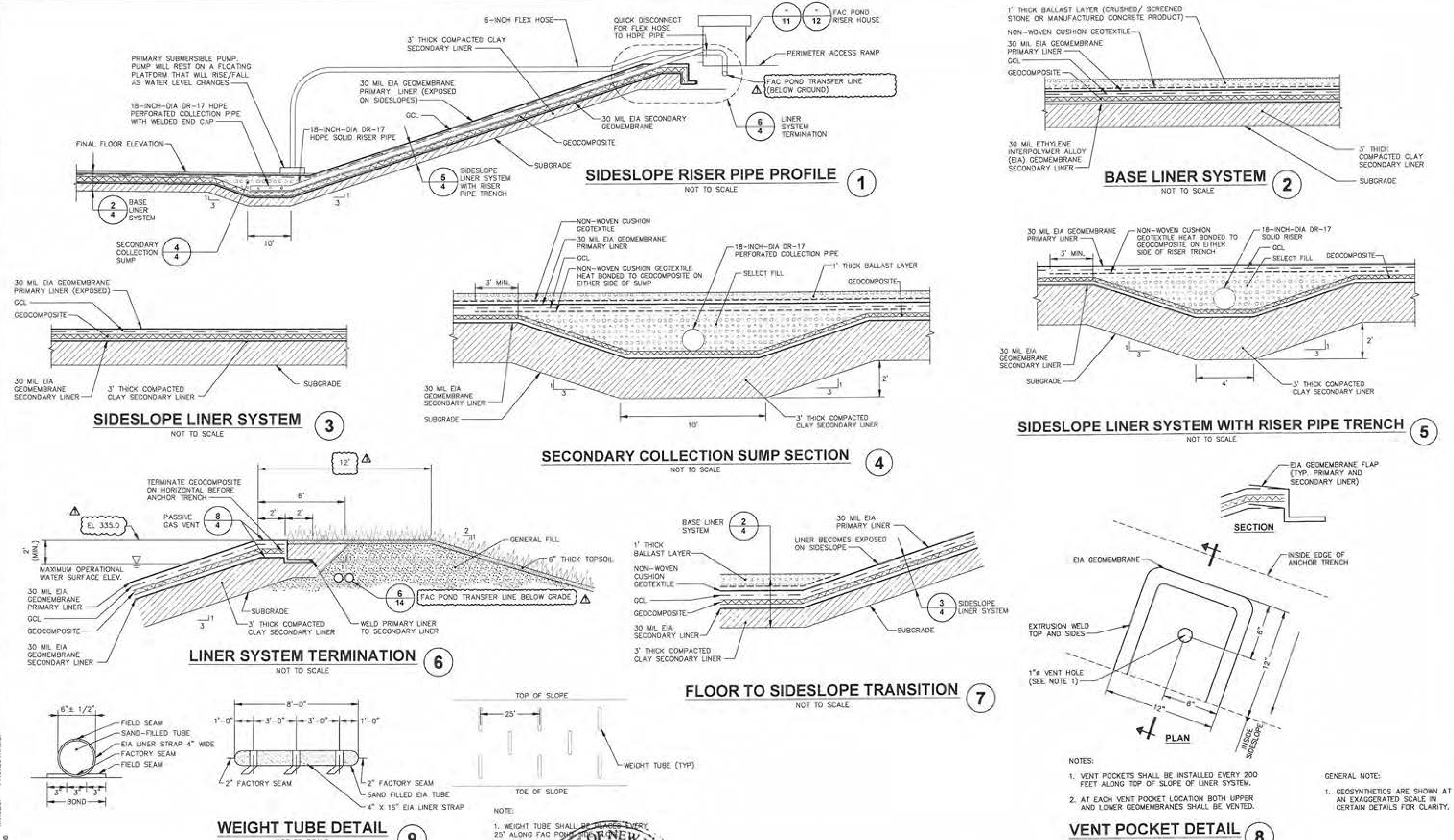

NOTE:

1. WEIGHT TUBE SHALL BE PLACED EVERY 25' ALONG FAC POND SIDESLOPE.

NOTES:

1. VENT POCKETS SHALL BE INSTALLED EVERY 200 FEET ALONG TOP OF SLOPE OF LINER SYSTEM.
2. AT EACH VENT POCKET LOCATION BOTH UPPER AND LOWER GEOMEMBRANES SHALL BE VENTED.

GENERAL NOTE:

1. GEOSYNTHETICS ARE SHOWN AT AN EXAGGERATED SCALE IN CERTAIN DETAILS FOR CLARITY.

NOT TO SCALE

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING. USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
1	11/2013	REMOVED FAC POND 1/2 RECONSTRUCTION	GNG	BMS

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY
Date Signed: 11/5/13
Project Mgr.: TJF
Designed by: GNG
Drawn by: LAF
Checked by: BMS

STATE OF NEW YORK — JOSEPH MOLINA III — LICENSED PROFESSIONAL ENGINEER — 072644

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FAC POND SECTIONS AND DETAILS

GENERAL

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Date FEBRUARY 2013
ARCADIS of New York, Inc.
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Syracuse, New York
TEL. 315.446.9120

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CITY: SYRACUSE, NY DIV/GROUP: ENVCAD DB: K. DAVIS LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 11/4/2013 1:45 PM BY: DAVIS, KATHI
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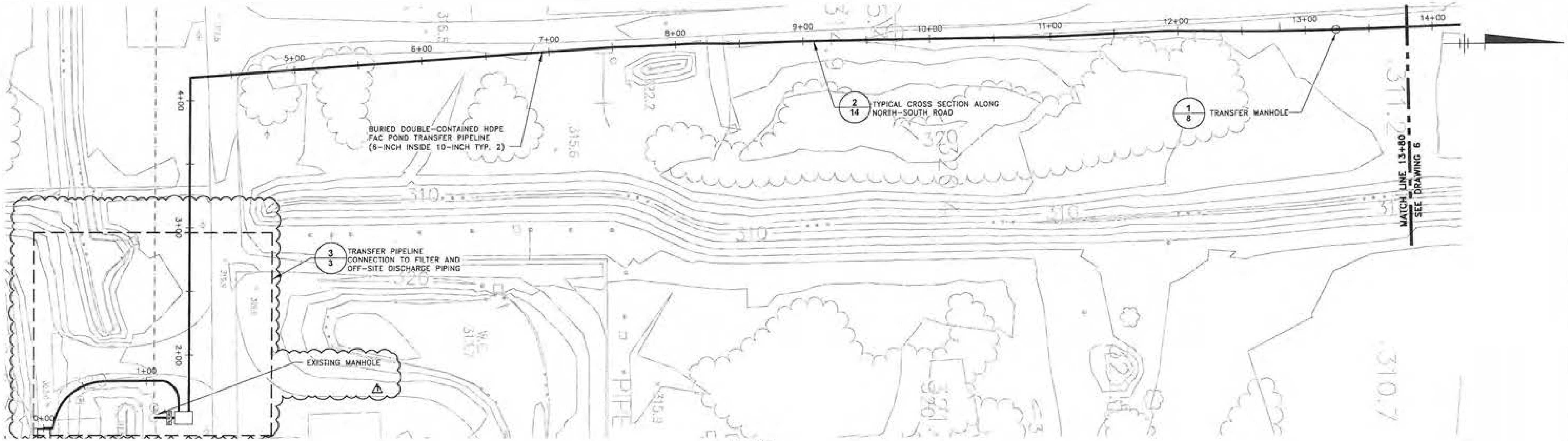
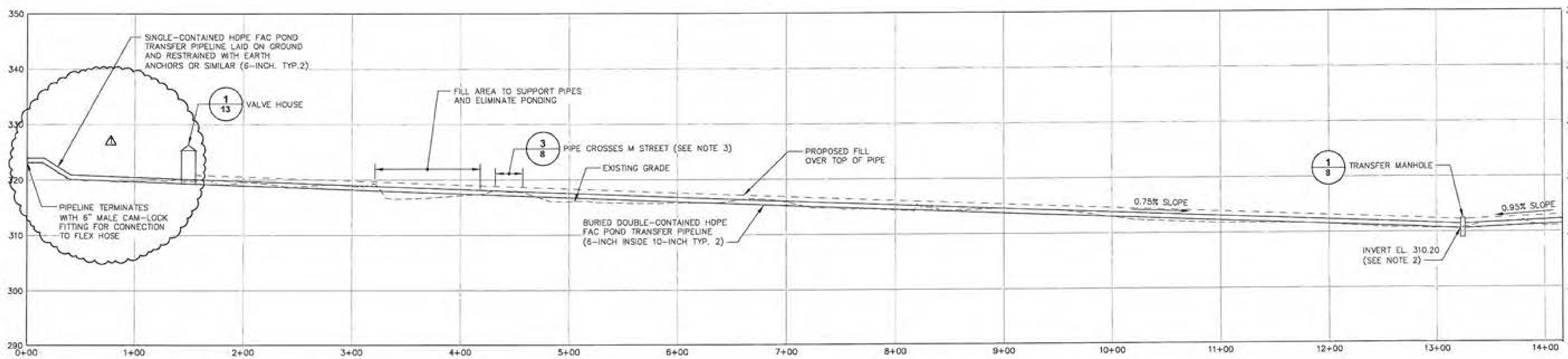


PLAN

SCALE: 1"=40'



PROFILE

HORIZONTAL SCALE: 1"=50'

VERTICAL SCALE: 1"=10'

NOTES:

1. ADDITIONAL PIPING (NOT SHOWN) WILL BE INSTALLED WITHIN EXISTING MANHOLE TO CONNECT NEW TRANSFER PIPELINES TO EXISTING OFF-SITE DISCHARGE PIPING.
2. ELEVATIONS REFERENCED REPRESENT INVERT OF THE CONTAINMENT PIPE (OUTER), EXCEPT WHERE SINGLE-CONTAINED PIPE IS INDICATED.
3. DUCTILE IRON SLEEVE PIPE SHALL BE USED TO PROTECT HDPE PIPE AT ALL ROAD CROSSINGS.

SCALE(S) AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING. USE TO VERIFY FIGURE REPRODUCTION SCALE

No.	Date	Revisions	By	Ckd
1	11/2013	REMOVED FAC POND 1/2 RECONSTRUCTION	GNC	BMS

Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 11/5/13 | Project Mgr.: TJF
Designed by: SJK | Drawn by: SJK | Checked by: BMS

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FAC POND TRANSFER PIPELINE

GENERAL

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CITY: SYRACUSE DIV/GROUP: ENVCAD DB: K. DAVIS L. FORAKER K. DAVIS LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* PAGESETUP: --- PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 11/4/2013 8:52 AM BY: DAVIS, KATHI
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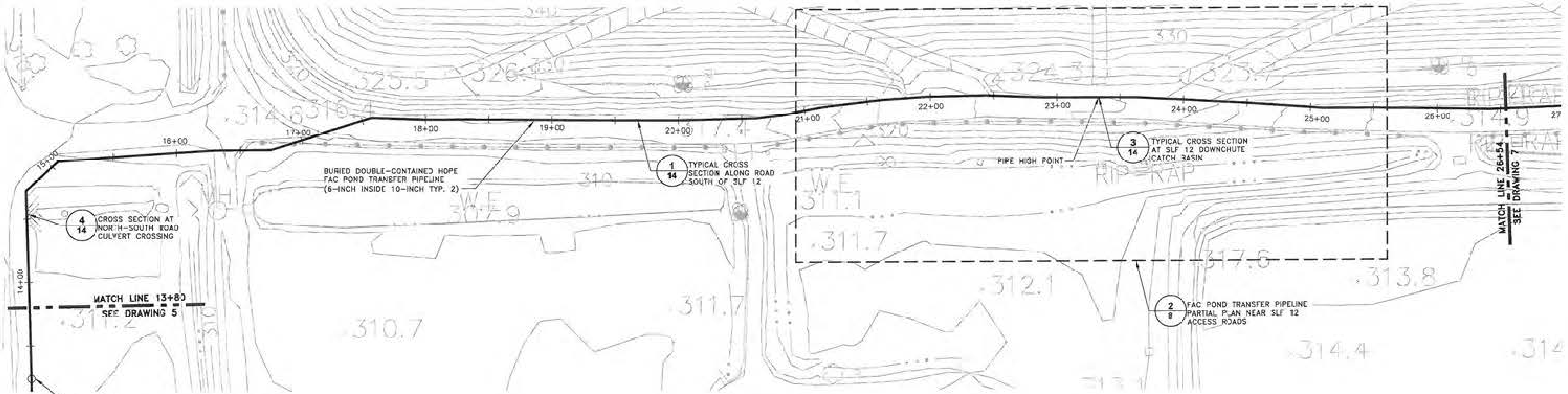
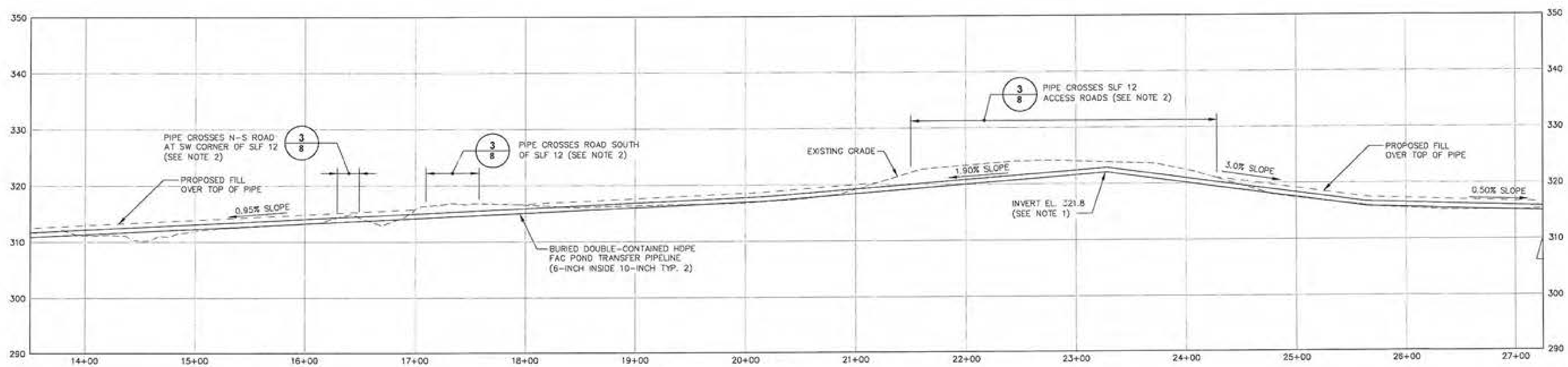


PLAN

SCALE: 1"=40'



PROFILE

HORIZONTAL SCALE: 1"=50'
VERTICAL SCALE: 1"=10'

NOTES:

1. ELEVATIONS REFERENCED REPRESENT INVERT OF THE CONTAINMENT PIPE (OUTER).
2. DUCTILE IRON SLEEVE PIPE SHALL BE USED TO PROTECT HDPE PIPE AT ALL ROAD CROSSINGS.

SCALE(S) AS INDICATED

THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING. USE TO VERIFY FIGURE REPRODUCTION SCALE

No	Date	Revisions	By	Ckd

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Professional Engineer's No.: 072644
State: NY | Date Signed: 11/5/13 | Project Mgr.: TJF
Designed by: | Drawn by: SJK | Checked by: BMS

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FAC POND TRANSFER PIPELINE

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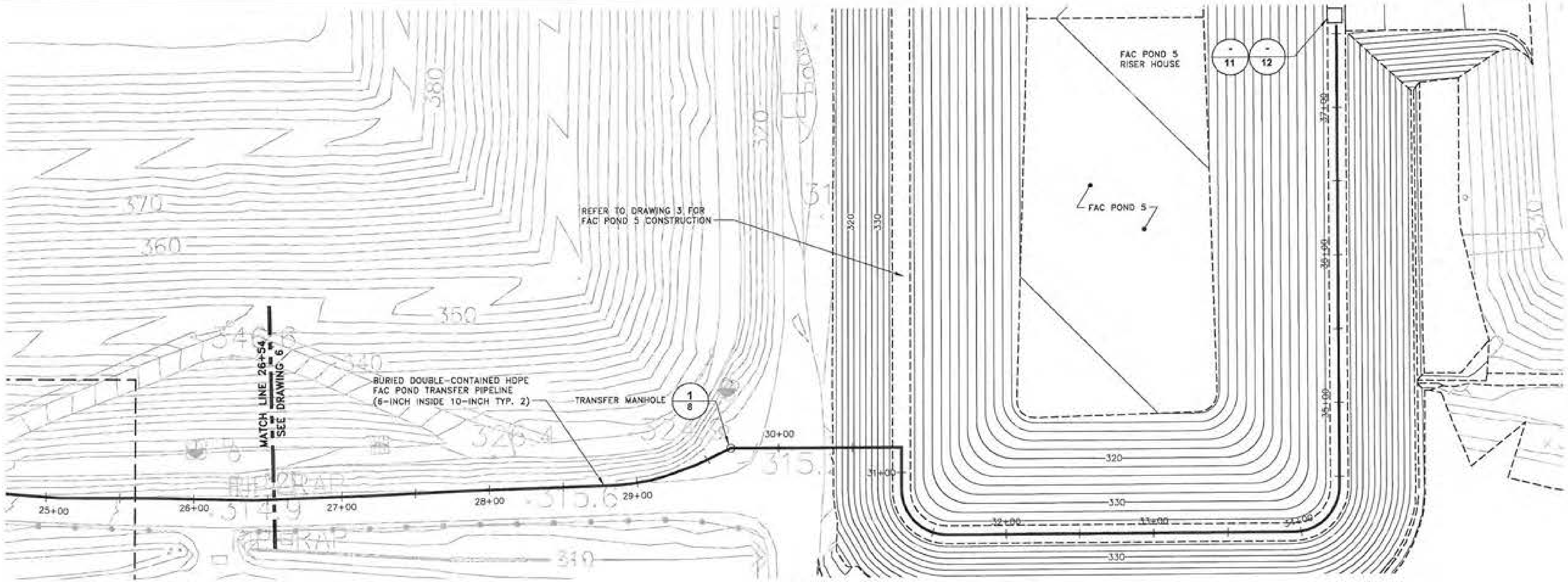
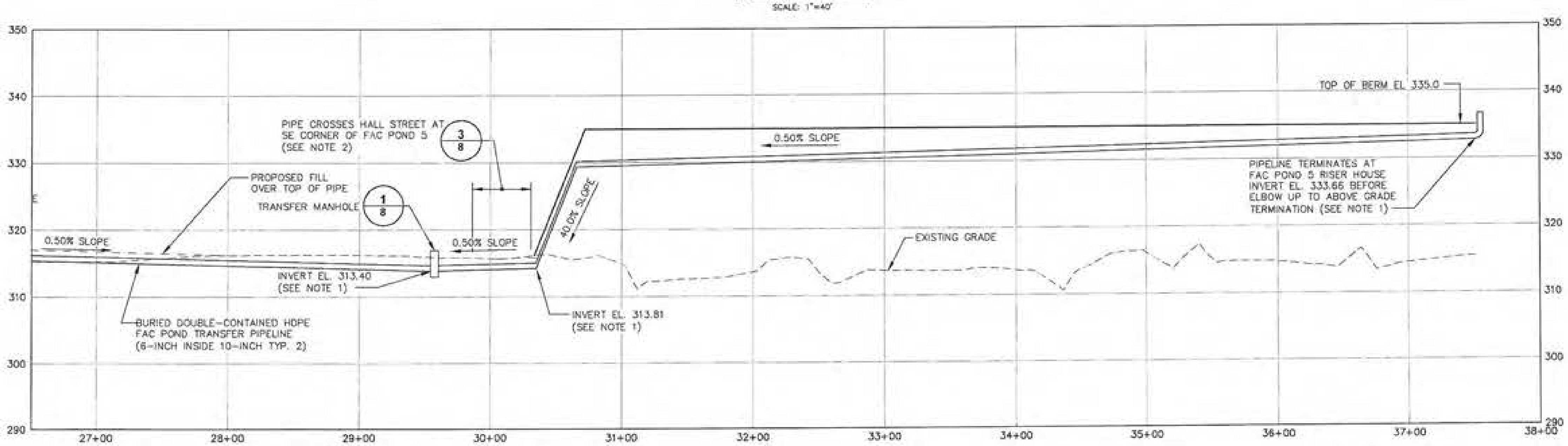


PLAN

SCALE: 1"=40'



PROFILE

HORIZONTAL SCALE: 1"=50' VERTICAL SCALE: 1"=10'

NOTES:

1. ELEVATIONS REFERENCED REPRESENT INVERT OF THE CONTAINMENT PIPE (OUTER).
2. DUCTILE IRON SLEEVE PIPE SHALL BE USED TO PROTECT HDPE PIPE AT ALL ROAD CROSSINGS.

SCALE(S) AS INDICATED

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Professional Engineer's No.: 072644
State: NY
Date Signed: 11/5/13
Designed by: SJK
Drawn by: BMS
Checked by: TJF

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FAC POND TRANSFER PIPELINE

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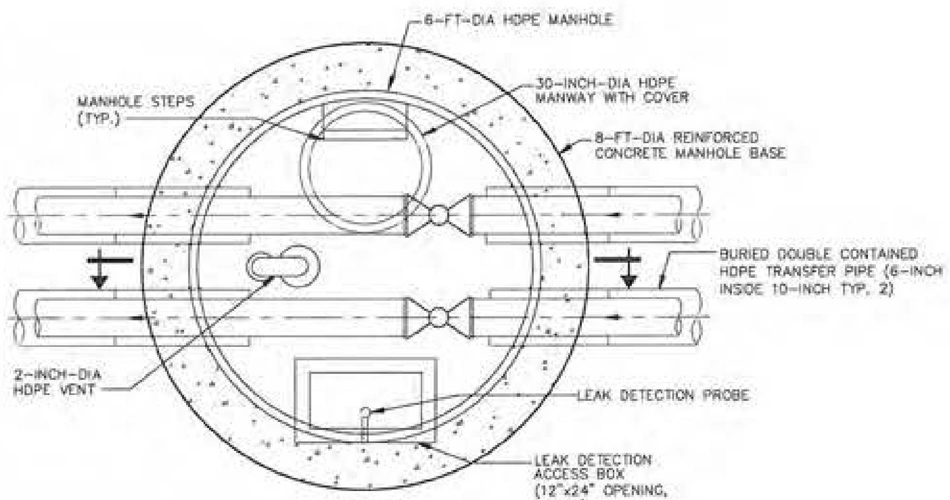
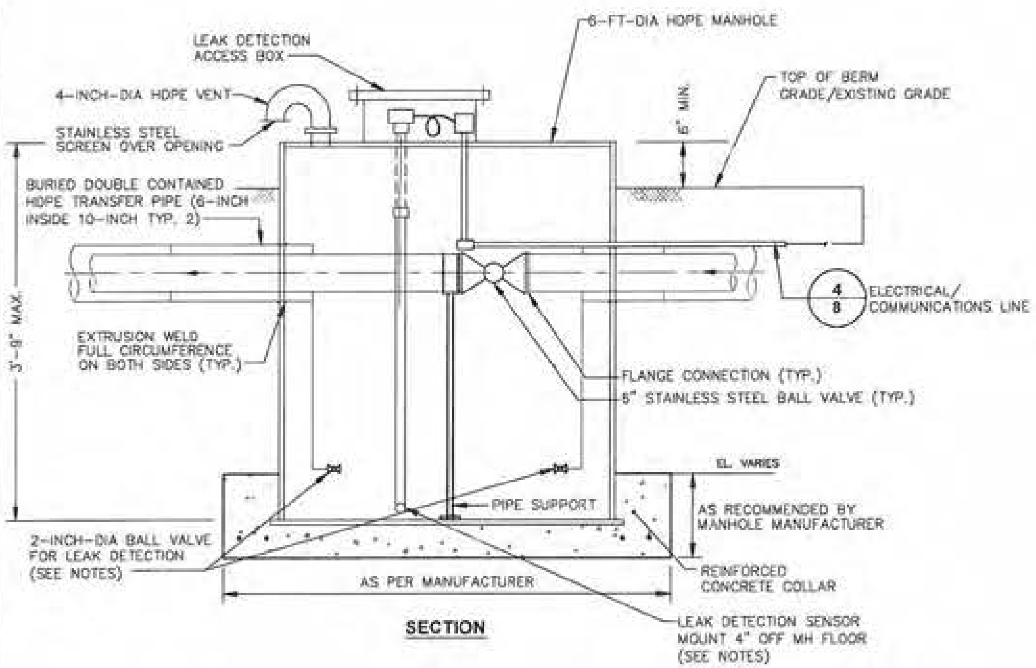


PLAN



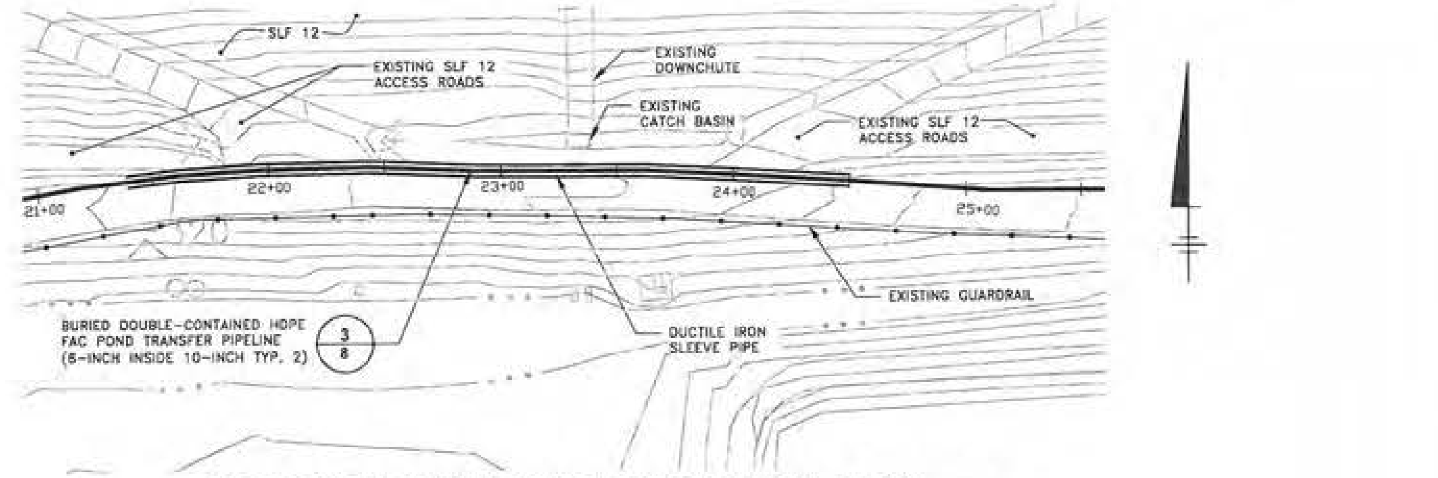
SECTION

NOTES:

1. INSTALL LEAK DETECTION VALVES AT LOW POINTS ONLY.
2. SEAL END OF SECONDARY TRANSFER HDPE PIPE FOR TESTING PURPOSES. 1" THICK FLATSTOCK RING TO BE EXTRUSION WELDED TO BOTH PRIMARY AND SECONDARY PIPES.
3. ELECTRONIC LEAK DETECT SENSORS WIRED TO FAC POND TRANSFER PUMPS TO AUTOMATICALLY SHUT OFF PUMPS WHEN ACTIVATED.

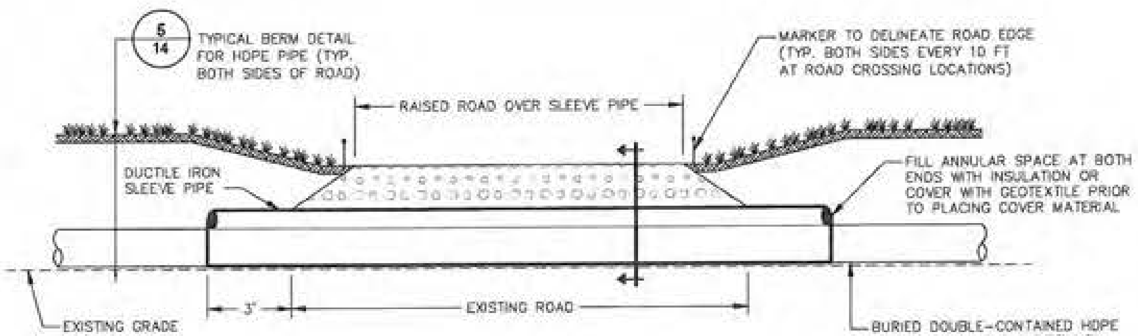
TYPICAL TRANSER MANHOLE (1)

NOT TO SCALE

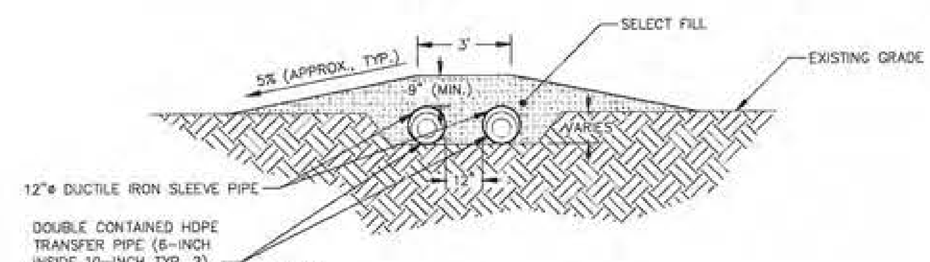


FAC POND TRANSFER PIPELINE PARTIAL PLAN NEAR SLF 12 ACCESS ROADS (2)

0 40' 80'
SCALE: 1"=40'



PROFILE



NOTES:

1. DUCTILE IRON SLEEVE PIPE SHALL BE USED TO PROTECT HDPE PIPE AT ALL ROAD CROSSINGS.
2. DUCTILE IRON PIPE SHALL HAVE MINIMUM WALL THICKNESS OF 0.50 INCHES.
3. PIPE DEPTH BELOW GROUND VARIES DEPENDING ON LOCATION.

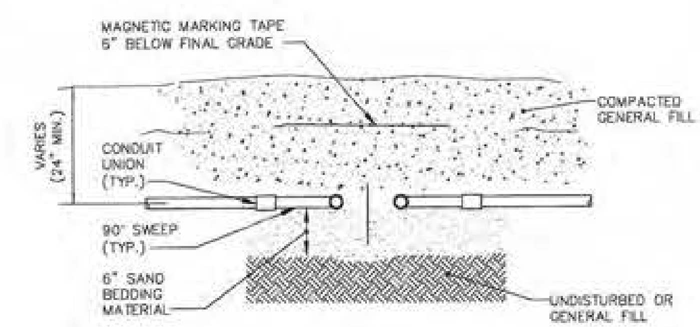
SECTION

FAC POND TRANSFER PIPELINE ROAD CROSSING (3)

NOT TO SCALE

GENERAL NOTE:

1. ALL HDPE PIPING SHALL BE DR-11.



NOTES:

1. NUMBER AND SIZE OF CONDUITS MAY VARY.
2. CONDUITS TO BE SPACED 6" APART MINIMUM.
3. POWER CONDUITS: RIGID STEEL PVC COATED (PLASTI-BOND), SIZE MAY VARY.
4. I/O COMM CONDUIT: 1" RIGID STEEL PVC COATED (PLASTI-BOND).

TYPICAL UNDERGROUND CONDUIT INSTALLATION DETAIL (4)

SCALE(S) AS INDICATED

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Professional Engineer's Name: JOSEPH MOLINA
Professional Engineer's No.: 072644
State: NY | Date Signed: 11/5/13 | Project Mgr.: TJF
Designed by | Drawn by: BKD | Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · LICENSED PROFESSIONAL ENGINEER · 072644

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FAC POND TRANSFER PIPELINE DETAILS

GENERAL

ARCADIS Project No. B0023725.2013.00003
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ARCADIS of New York, Inc.
6723 Towpath Road
P.O. Box 66
Syracuse, New York
TEL. 315.446.9120

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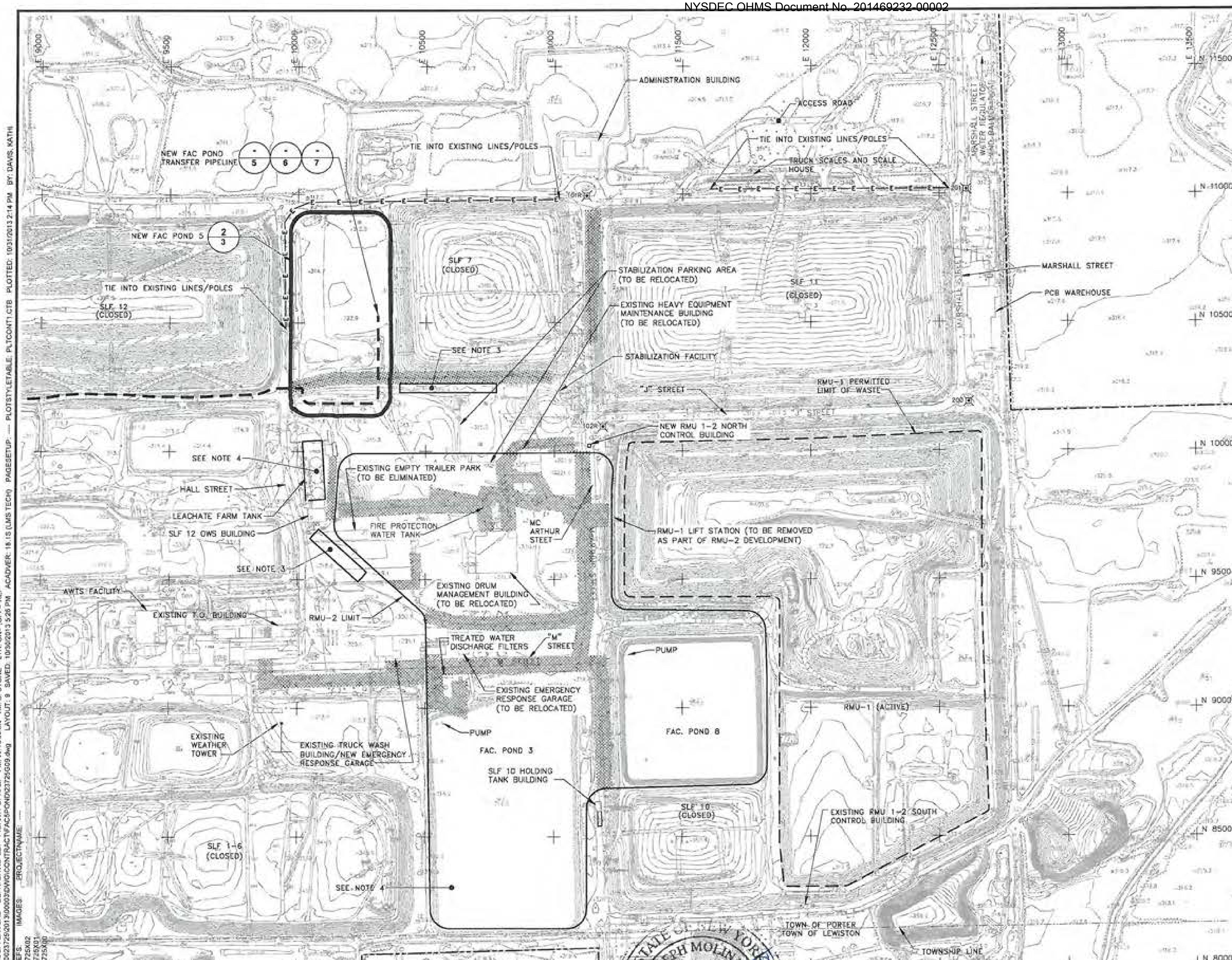

LEGEND:

	BRUSHLINE
	CABLE MARKER
	CATCH BASIN
	DROP INLET
	FENCE
	FIRE HYDRANT
	GUARD RAIL
	LIGHT POLE
	MISCELLANEOUS
	POLE
	MONUMENT POST
	RAILROAD TRACKS
	SIGN
	SWAMP
	TRAFFIC LIGHT
	TREE
	TREELINE
	UNIDENTIFIED OBJECT
	UTILITY POLE
	VALVE
	WATER LINE
	EXISTING CONTOUR
	EXISTING GRADEBREAK
	PROPERTY LINE
	ELECTRICAL UTILITIES TO BE REMOVED
	ABOVE-GROUND ELECTRICAL UTILITIES
	UNDERGROUND ELECTRICAL UTILITIES
	PROPOSED ABOVE-GROUND ELECTRICAL UTILITIES
200	CONTROL MONUMENT (SEE TABLE BELOW)
2 / 33	DETAIL REFERENCE NUMBER / DRAWING REFERENCE NUMBER
E 13500 N 7000	COORDINATE GRID (SEE NOTE 3)

NOTES:

1. REFER TO DRAWING NO. 2 FOR ADDITIONAL BASEMAP INFORMATION.
2. ELECTRICAL UTILITIES SHOWN ARE APPROXIMATE AND ARE BASED ON SITE OBSERVATIONS MADE IN 2003 BY BLASLAND, BOUCK & LEE, INC. (NOW KNOWN AS ARCADIS) AND INPUT FROM CWM. POINT OF CONNECTION BETWEEN EXISTING AND PROPOSED UTILITIES ARE APPROXIMATE.
3. REFER TO DRAWINGS IN ATTACHMENT D-1 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.
4. REFER TO DRAWINGS IN ATTACHMENT J FOR FURTHER DETAIL.

200' 0 200' 400'
1"=200'

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Professional Engineer's No: 072644
State: NY | Date Signed: 11/5/13 | Project Mgr: TJF
Designed by: BMS/NWF | Drawn by: SJK | Checked by: BMS

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SITE ELECTRICAL FEED RELOCATION PLAN

GENERAL

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CITY: SYRACUSE, NY DIV/GROUP: ENVCAD DB: K. DAVIS LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* G:\ENVCAD\SYRACUSE\ACT\B0023725\2013\00003\DWG\CONTRACT\FAC5POND\23725G09.dwg LAYOUT: 9 SAVED: 10/30/2013 5:26 PM ACADVER: 18.1S (LMS TECH) PAGESETUP: — PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 10/31/2013 2:14 PM BY: DAVIS, KATHI
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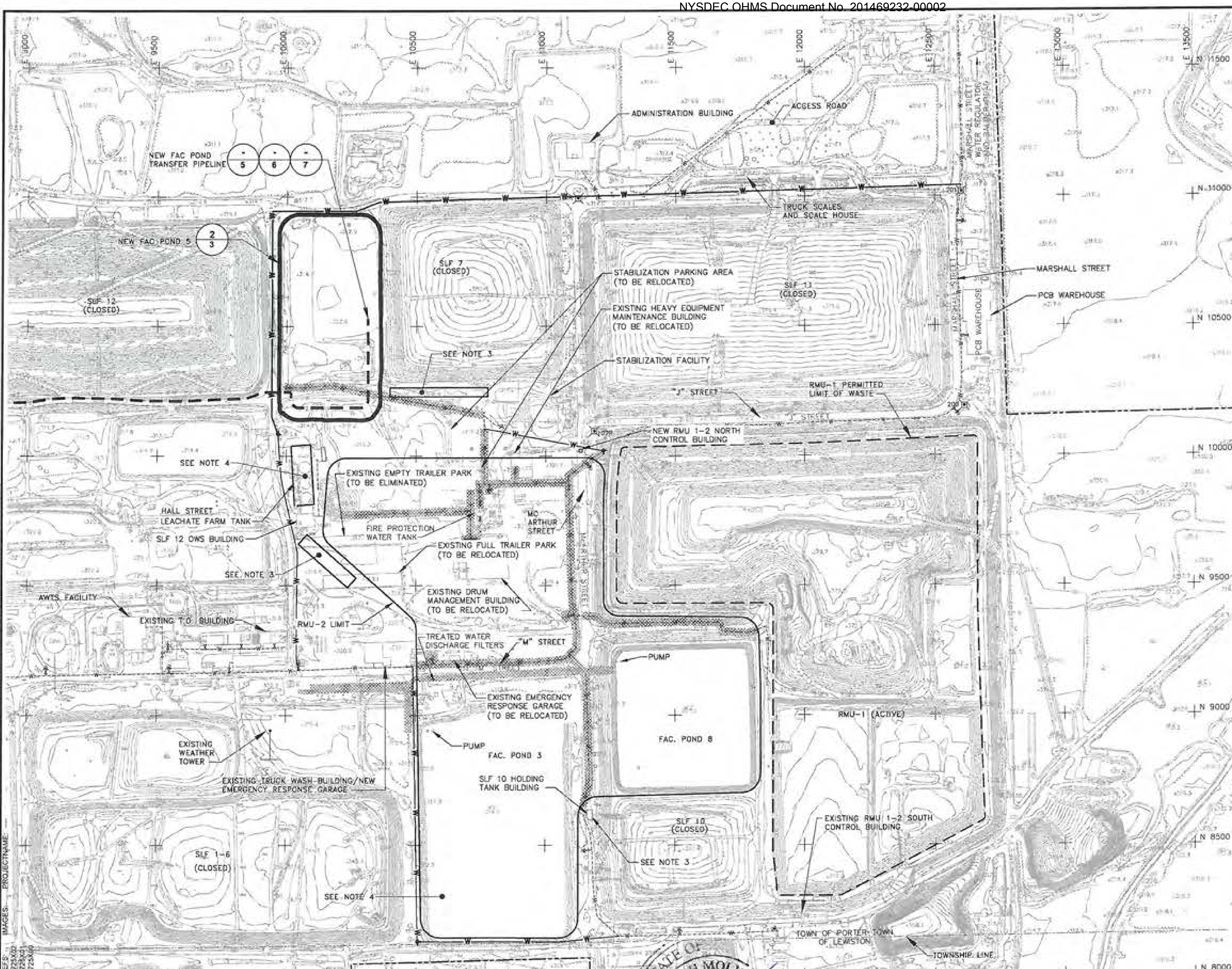

LEGEND:

- BRUSHLINE
- CABLE MARKER
- CATCH BASIN
- DROP INLET
- FENCE
- FIRE HYDRANT
- GUARD RAIL
- LIGHT POLE
- MISCELLANEOUS
- POLE
- MONUMENT POST
- RAILROAD TRACKS
- SIGN
- SWAMP
- TRAFFIC LIGHT
- TREE
- TREELINE
- UNIDENTIFIED OBJECT
- UTILITY POLE
- VALVE
- W POTABLE WATER
- W REROUTE OF WATER SUPPLY
- W NEW WATERLINE
- EXISTING CONTOUR
- EXISTING GRADEBREAK
- PROPERTY LINE
- ACTIVE WATER SUPPLY LINES TO BE DISCONNECTED AND ABANDONED IN PLACE AND/OR REMOVED
- 200 CONTROL MONUMENT
- 2 / 33 DETAIL REFERENCE NUMBER / DRAWING REFERENCE NUMBER
- E 13500 N 7000 COORDINATE GRID

NOTES:

1. REFER TO DRAWING NO. 2 FOR ADDITIONAL BASEMAP INFORMATION.
2. WATER SUPPLY LINES SHOWN ARE APPROXIMATE AND ARE BASED ON SITE OBSERVATIONS MADE IN 2003 BY BLASLAND, BOUCK & LEE, INC. (NOW KNOWN AS ARCADIS) AND INPUT FROM CWM. POINT OF CONNECTION BETWEEN EXISTING AND PROPOSED WATER SUPPLY LINES ARE APPROXIMATE.
3. REFER TO DRAWINGS IN ATTACHMENT D-1 OF THE OVERALL SITE/RMU-1 PERMIT FOR FURTHER DETAIL.
4. REFER TO DRAWINGS IN ATTACHMENT J FOR FURTHER DETAIL.

CITY: SYRACUSE, NY DIV/GROUP: ENVCAD DB: K. DAVIS LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* PLOTSTYLETABLE: PLTCONT.CTB PLOTTED: 10/31/2013 2:15 PM BY: DAVIS, KATHI

XREFS: IMAGES: PROJECTNAME:

200' 0 200' 400'

1"=200'

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No.	Date	Revisions	By	Ckd

Professional Engineer's Name		
JOSEPH MOLINA		
Professional Engineer's No. 072644		
State: NY	Date Signed: 11/5/13	Project Mgr.: TJF
Designed by: BMS/NWF	Drawn by: LAF	Checked by: BMS

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FAC POND 5 PERMIT DRAWINGS

SITE WATER SUPPLY RELOCATION PLAN

GENERAL

ARCADIS Project No. B0023725.2013.00003

Date FEBRUARY 2013

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Syracuse, New York
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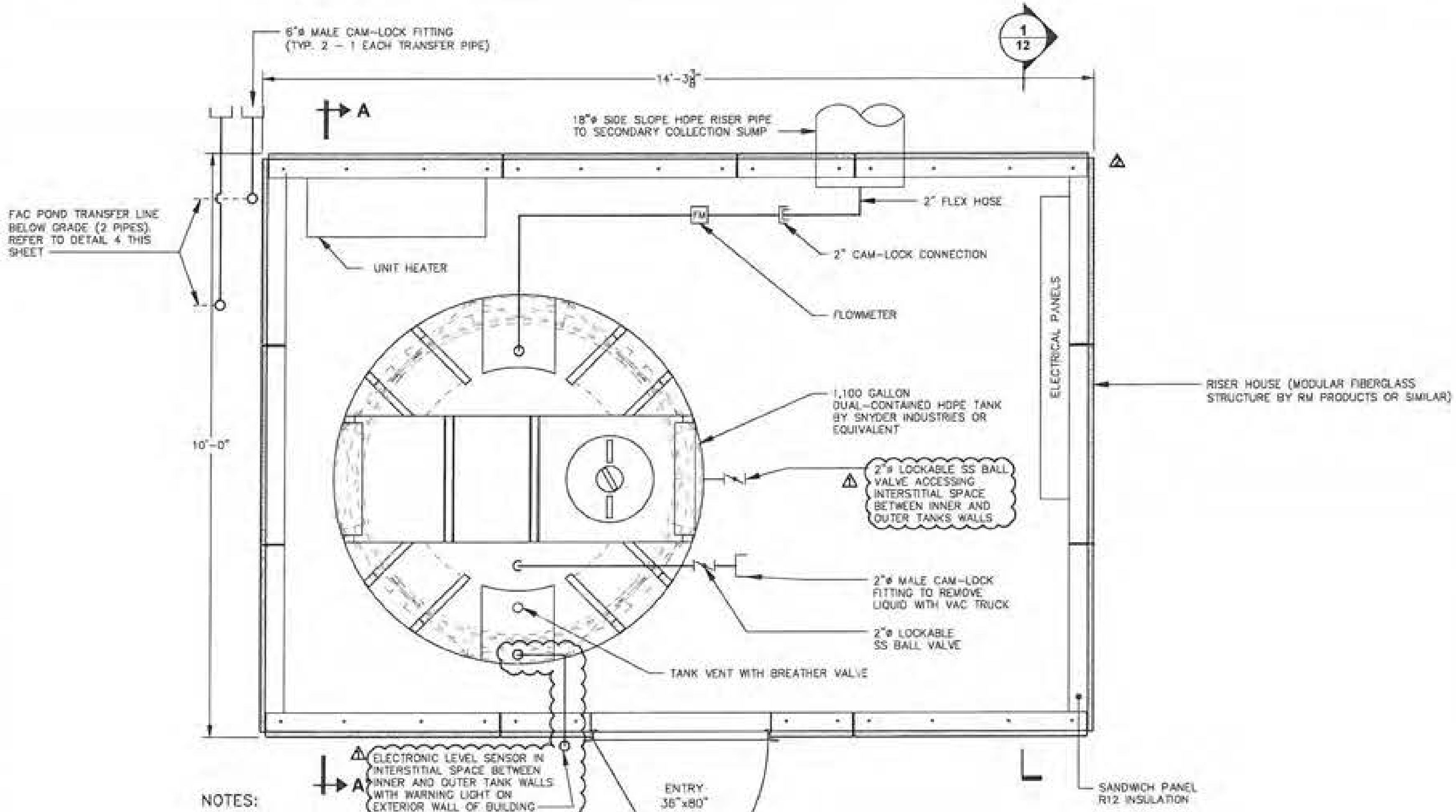
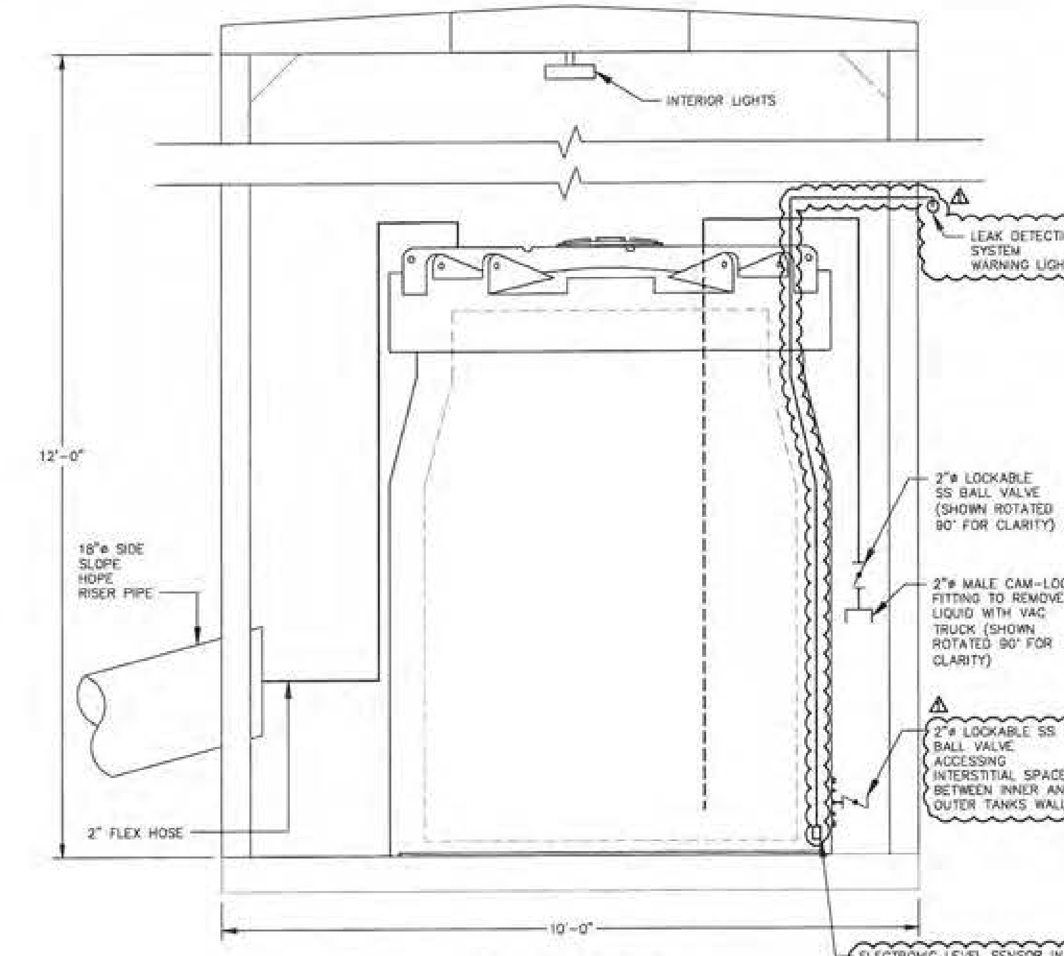


NOTES:

1. ALL PIPE PENETRATIONS OF EXTERIOR WALL SHALL BE SEALED.
2. SEE DRAWING 12 FOR ELECTRICAL AND INSTRUMENTATION DETAILS.
3. SEE DETAIL 3 ON THIS SHEET FOR FOUNDATION AND ANCHORAGE DETAILS.
4. END OF SIDESLOPE RISER TO REMAIN OPEN.

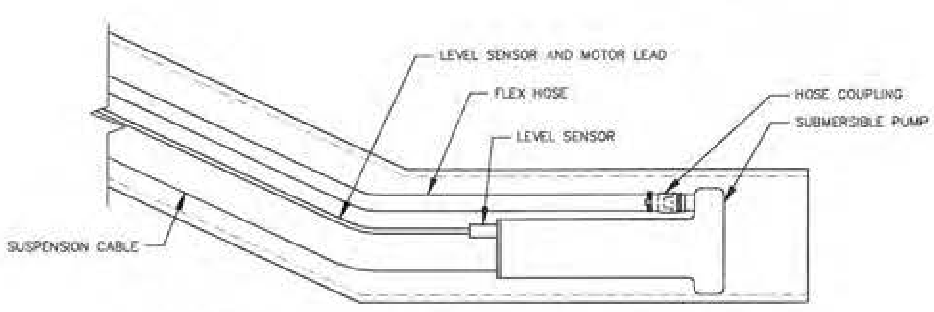
PLAN (1)

SCALE: 3/4"=1'-0"



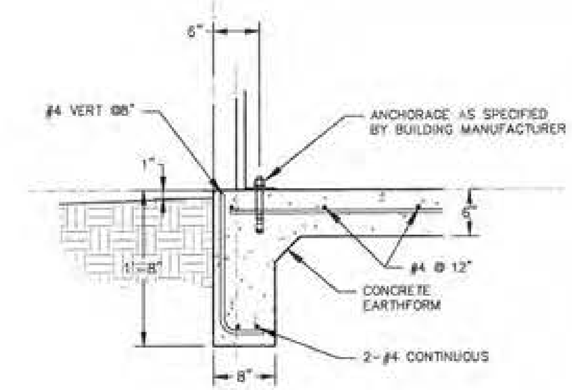
SECTION A-A'

SCALE: 3/4"=1'-0"



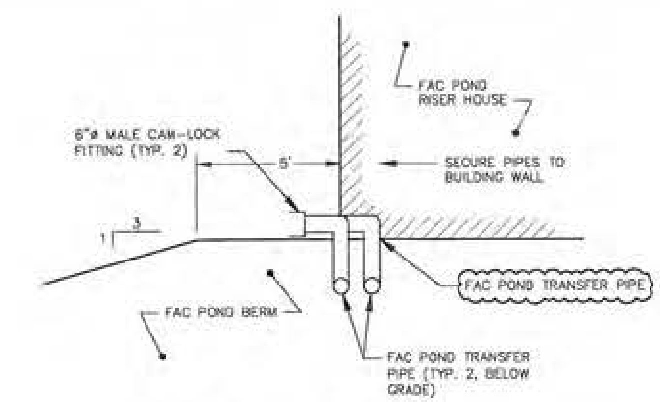
SECONDARY COLLECTION SUMP PUMP INSTALLATION DETAIL (2)

NOT TO SCALE



PROPOSED RISER HOUSE FOUNDATION (3)

SCALE: 1"=1'-0"



FAC POND TRANSFER PIPELINE TERMINATION (4)

NOT TO SCALE

CITY: SYRACUSE DIV/GROUP: ENV/141 DB: K.SARTORI L.FORAKER K.DAVIS LD: PIC: W. FOPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* PAGESETUP: ---- PLOTSTYLETABLE: PLTFCONT1.CTB PLOTTED: 11/4/2013 8:58 AM BY: DAVIS, KATHI
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XREFS: 23725X00 IMAGES: PROJECTNAME: ----

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No.	Date	Revisions	By	Ckd
2	11/2013	REMOVED FAC POND 1/2 RECONSTRUCTION	GNG	BMS
1	10/2013	ADDED ELECTRONIC LEAK DETECTION AND WARNING LIGHT	PTO	BMS

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Professional Engineer's No.: 072644
State: NY | Date Signed: 11/5/13 | Project Mgr.: TJF
Designed by: CDL | Drawn by: SJK | Checked by: BMS

STATE OF NEW YORK — JOSEPH MOLINA — 072644 — PROFESSIONAL ENGINEER

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FAC POND RISER HOUSE MECHANICAL INSTALLATION DETAILS

GENERAL

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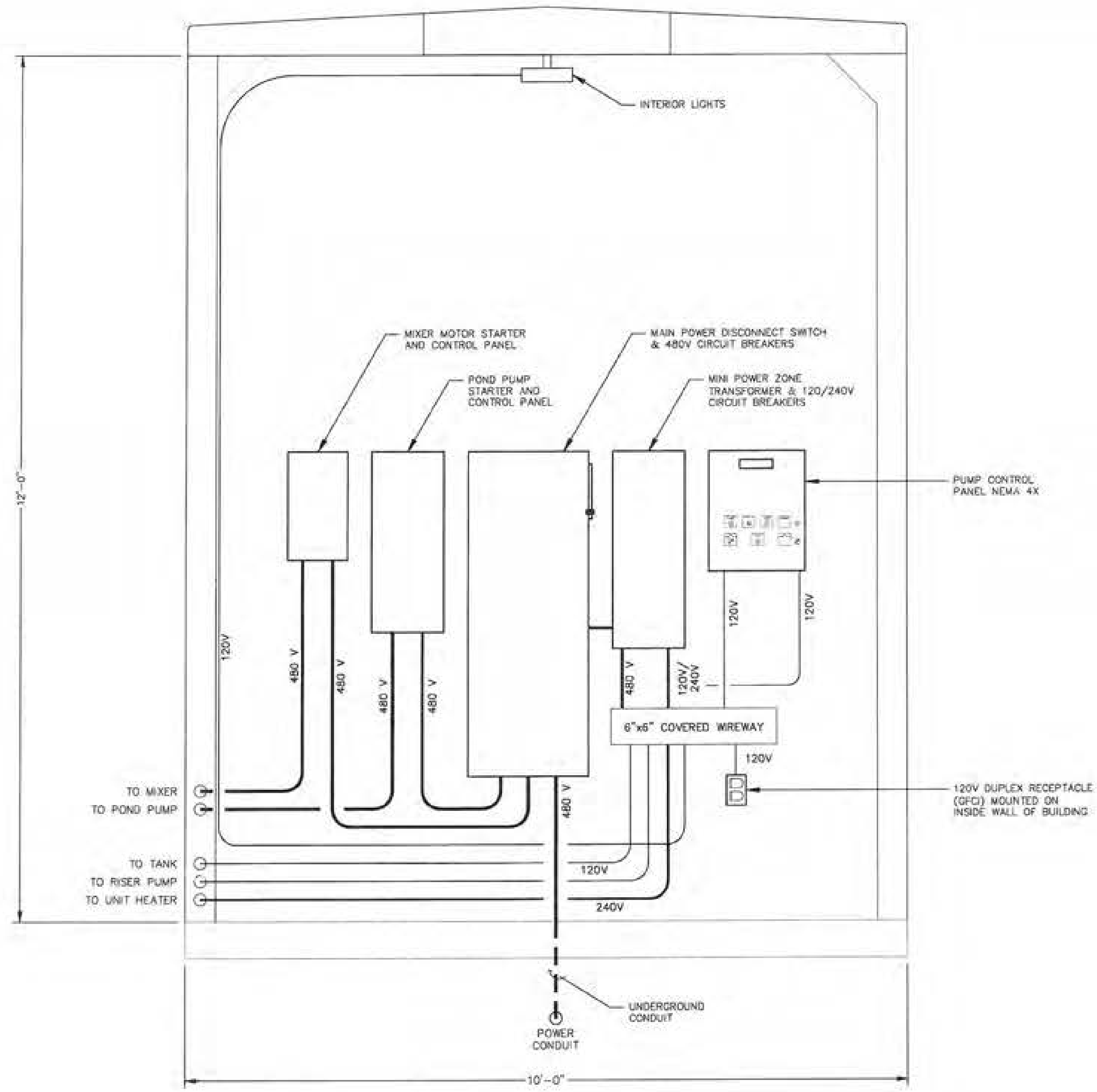

ELECTRICAL SECTION 1

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Professional Engineer's No.: 072644
State: NY
Date Signed: 11/5/13
Project Mgr.: TJF
Designed by: CDL
Drawn by: SJK
Checked by: BMS

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FAC POND RISER HOUSE ELECTRICAL INSTALLATION DETAILS

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12

CITY: SYRACUSE, NY DIV/GROUP: ENVCAD DB: K.DAVIS LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* G:\ENVCAD\SYRACUSE\ACT\B0023725\2013\00003\DWG\CONTRACT\FAC5POND\23725G12.dwg LAYOUT: 12 SAVED: 10/30/2013 10:19 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: PLTCONT1.CTB PLOTTED: 10/31/2013 2:25 PM BY: DAVIS, KATHI
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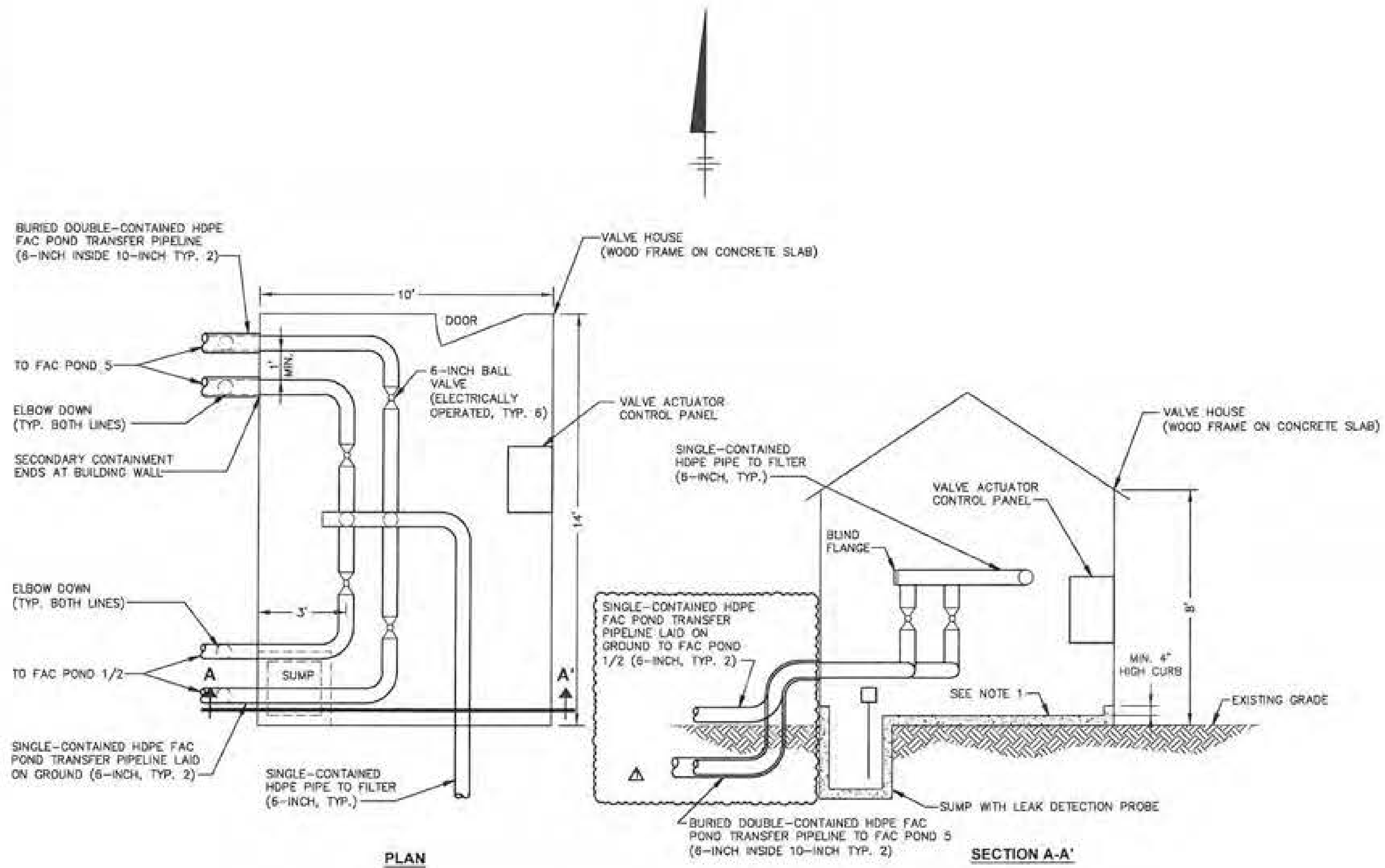
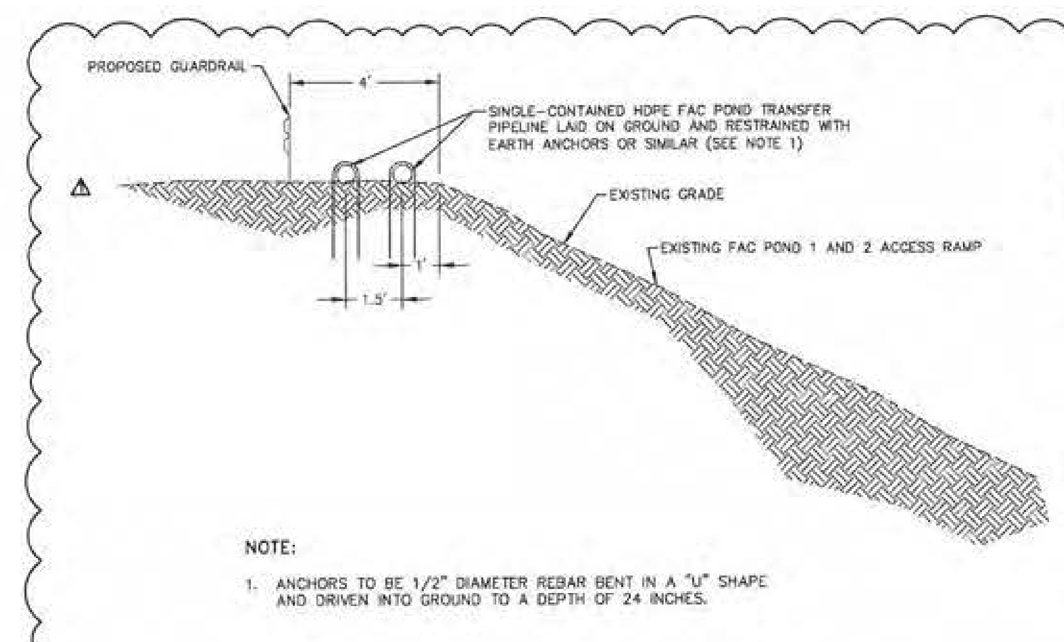


NOTE:

1. CONCRETE FLOOR, SUMP, AND CURB TO BE A MONOLITHIC POUR TO ELIMINATE JOINTS.

VALVE HOUSE AND PIPING LAYOUT (1)

0 2' 5'
SCALE: 3/8"=1'-0"



NOTE:

1. ANCHORS TO BE 1/2" DIAMETER REBAR BENT IN A "U" SHAPE AND DRIVEN INTO GROUND TO A DEPTH OF 24 INCHES.

ABOVE GROUND PIPING DETAIL (2)

NOT TO SCALE

CITY: SYRACUSE, NY DIV/GROUP: ENVCAD DB: K. DAVIS LD: PIC: W. POPHAM PM: W. RANKIN TM: B. STONE LYR: ON=*;OFF=*REF* PLOTTED: 11/4/2013 1:53 PM BY: DAVIS, KATHI
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Professional Engineer's No.: 072644
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Date Signed: 11/5/13
Project Mgr.: TJF
Designed by:
Drawn by: SJK
Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA III · 072644 · LICENSED PROFESSIONAL ENGINEER

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VALVE HOUSE DETAILS

GENERAL

ARCADIS Project No. B0023725.2013.00003
Date: FEBRUARY 2013

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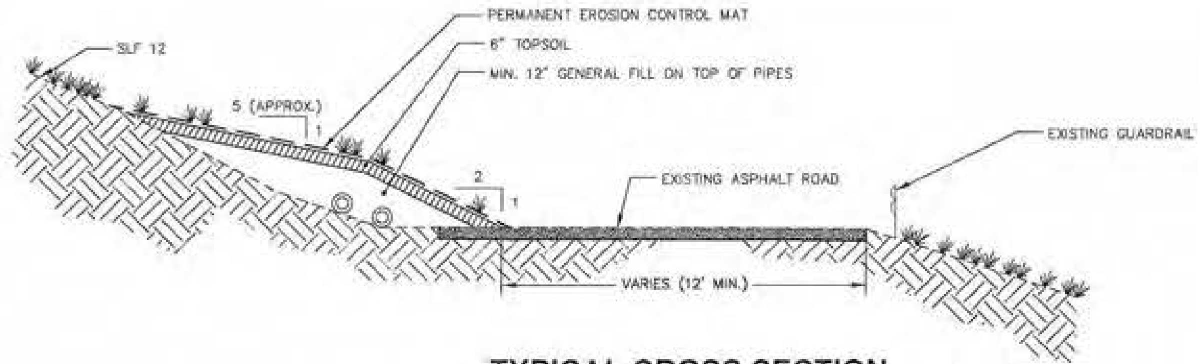
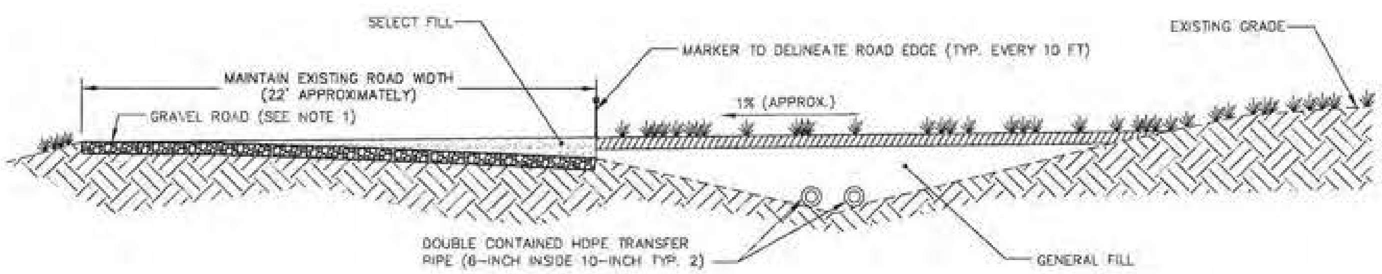


TYPICAL CROSS SECTION ALONG ROAD SOUTH OF SLF 12 (1)

NOT TO SCALE

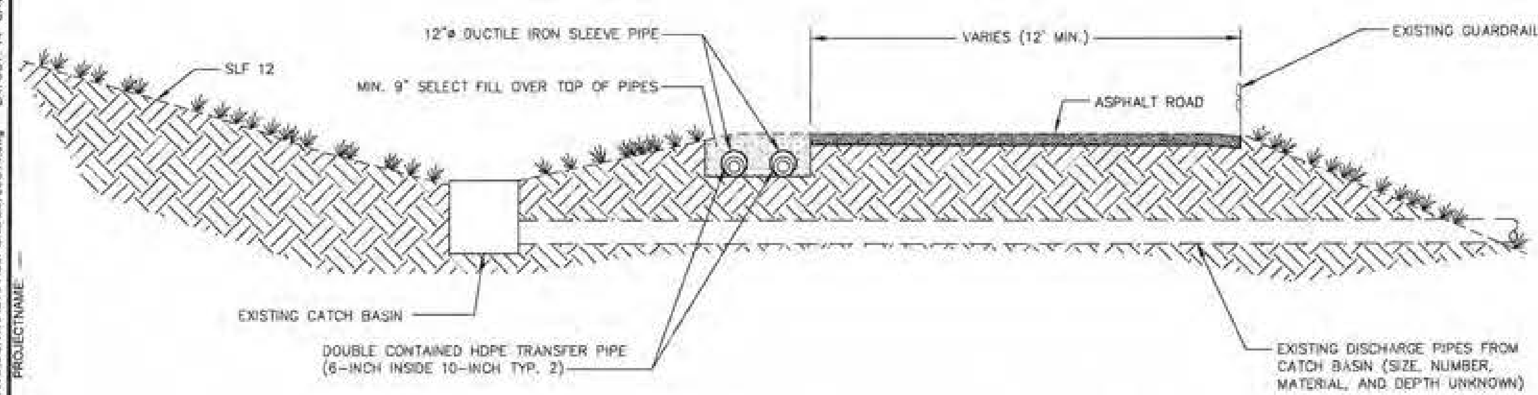


NOTE:

1. EXISTING ROAD SURFACE TO BE REGRADED AS NEEDED TO DRAIN TOWARDS THE WEST.

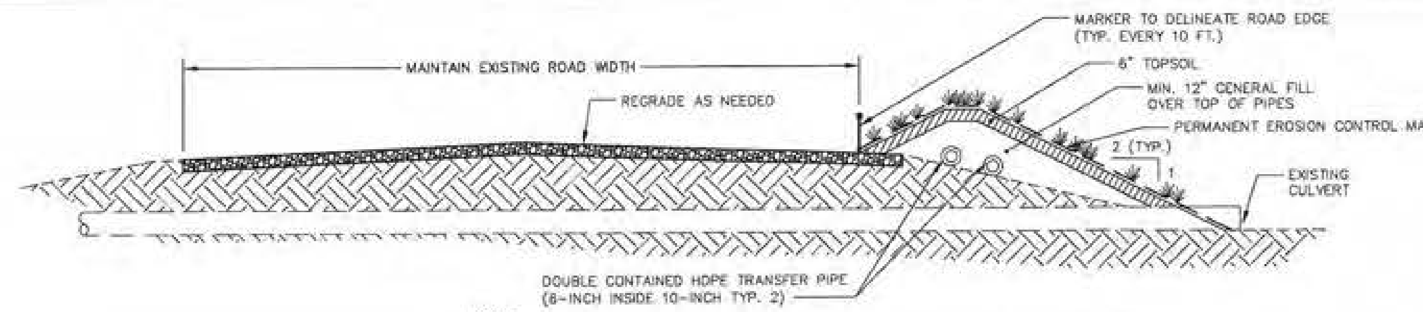
TYPICAL CROSS SECTION ALONG NORTH-SOUTH ROAD (2)

NOT TO SCALE



CROSS SECTION AT SLF 12 DOWNCHUTE CATCH BASIN (3)

NOT TO SCALE

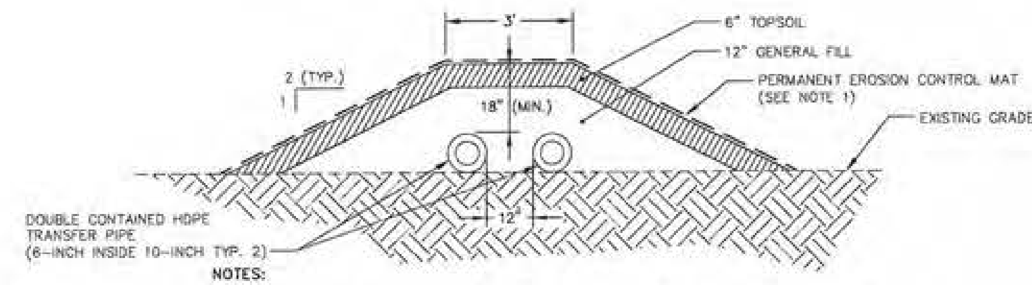


NOTE:

1. EXISTING ROAD SURFACE TO BE REGRADED AS NEEDED TO DRAIN TOWARDS THE WEST.

CROSS SECTION AT NORTH-SOUTH ROAD CULVERT CROSSING (4)

NOT TO SCALE

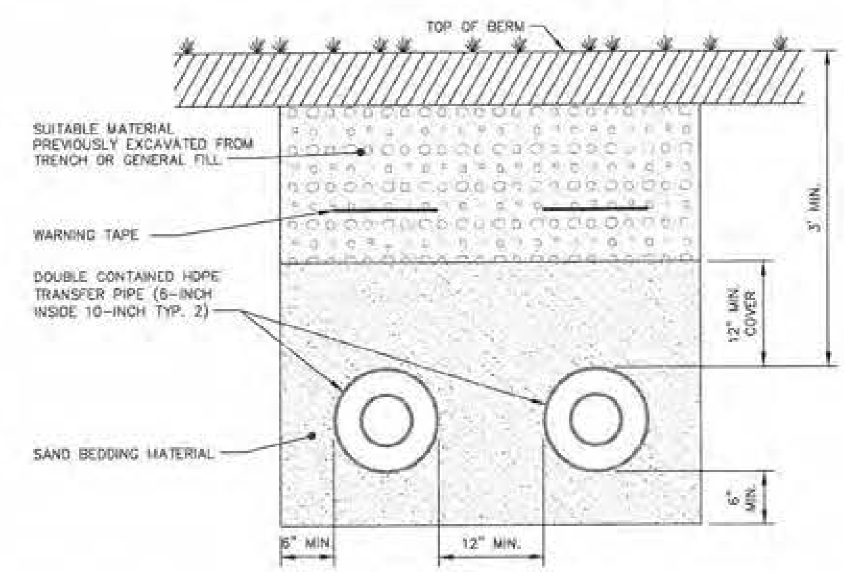


NOTES:

1. PERMANENT EROSION CONTROL MAT SHALL BE INSTALLED IN LOCATIONS WHERE PROPOSED BERM IS SUBJECT TO RUNOFF FROM UPGRADIENT AREAS (SUCH AS SLF 12) OR IS ADJACENT TO CONCENTRATED FLOWS (SUCH AS CULVERTS, CATCH BASINS, OR DITCHES). PERMANENT EROSION CONTROL MAT SHALL NOT BE REQUIRED IN OTHER BERM LOCATIONS.
2. DETAIL SHOWN IS FOR PIPES LAID ON GRADE. OVERALL BERM HEIGHT AND WIDTH MAY DEVIATE IN LOCATIONS WHERE PIPELINE IS PARTIALLY ENTRENCHED OR WHERE FILLING IS NEEDED. MINIMUM COVER AND MAXIMUM SIDESLOPE GRADIENT SHALL BE ADHERED TO IN ALL CONDITIONS.

TYPICAL BERM DETAIL FOR HDPE PIPE (5)

NOT TO SCALE



TYPICAL TRENCH DETAIL FOR HDPE PIPE ALONG FAC POND 5 BERM (6)

NOT TO SCALE

GENERAL NOTE:

1. ALL HDPE PIPING SHALL BE DR-11.

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Professional Engineer's No.: 072644		
State: NY	Date Signed: 11/5/13	Project Mgr.: TJF
Designed by	Drawn by: SJK	Checked by: BMS

STATE OF NEW YORK · JOSEPH MOLINA · LICENSED PROFESSIONAL ENGINEER · 072644

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FAC POND 5 PERMIT DRAWINGS

FAC POND TRANSFER PIPELINE DETAILS

GENERAL

ARCADIS Project No. B0023725.2013.00003

Date FEBRUARY 2013

ARCADIS of New York, Inc
6723 Towpath Road
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TEL. 315.446.9120

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FACULTATIVE PONDS 1 / 2 AND 5 RESPONSE ACTION PLAN

RESPONSE ACTION PLAN

Facultative Pond 5

Model City Treatment, Storage, and Disposal Facility

Model City, Niagara County, New York

Submitted To: CWM Chemical Services, LLC
Model City Facility
1550 Balmer Road
Model City, Niagara County, New York

Submitted By: Golder Associates Inc.
10 Canal Street, Suite 217
Bristol, PA 19007 USA

STATE OF NEW YORK
PAUL A. WHITTY
083843
LICENSED PROFESSIONAL ENGINEER

Paul A. Whitty, P.E.
NY PE 083843

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Revised November 2013

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1.0 INTRODUCTION

1.1 General

CWM Chemical Services, LLC (CWM) owns and operates the Model City Treatment Storage, and Disposal (TSD) Facility (Model City Facility or "Site"), in Niagara County, New York. The Model City Facility is regulated at the federal level under the Resource Conservation and Recovery Act (RCRA) and the Toxic Substances Control Act. Since the United States Environmental Protection Agency (USEPA) has delegated the implementation of the RCRA regulations in New York to the New York State Department of Environmental Conservation (NYSDEC), the Model City Facility operates under an NYSDEC-issued Permit pursuant to Title 6 of the New York Codes, Rules, and Regulations (6 NYCRR) Part 373. The general site layout, shown on Permit Drawing No. 2 of the permit drawing set, comprises waste receiving areas, storage and mixing tanks, chemical treatment facilities, biological treatment impoundments, and secure landfills. Current operations include treatment, recovery, stabilization, disposal, and transfer of hazardous and industrial non-hazardous waste.

As part of the revised permit application for Residuals Management Unit 2 (RMU-2) Facultative (Fac) Pond 5 will be added. New Fac Pond 5 will be a double-composite-lined surface impoundment for the storage of treated wastewater from CWM's Aqueous Wastewater Treatment System (AWTS).

As required by 6 NYCRR Part 373-2.11(k), a Response Action Plan (RAP) must be approved for surface impoundments prior to receipt of any treated wastewater and this requirement applies to Fac Pond 5. The RAP is a site-specific plan that the owner develops to address leakage through the primary liner and into the leak detection system (LDS) to minimize the potential migration of treated wastewater out of the Fac ponds. This RAP, which is part of CWM's overall leachate management program, describes the criteria used to establish key inflow rates to the LDS that require the implementation of certain response actions as described herein. Fac Pond 5 consists of an open-air facultative pond with primary and secondary liner systems. The layout of Fac Pond 5 is shown on Fac Pond Permit Drawing No. 3.

This RAP addresses the potential sources of inflows to the LDS in Fac Pond 5 and discusses the development of site-specific performance characteristics for the pond. It should be noted that liquids encountered in the LDS of the facultative ponds are not necessarily derived from the treated wastewater. Depending on the rate, responses to inflows of liquids into the LDS of the Fac ponds include no action, modifying operating procedures, and, where appropriate, notifying the USEPA and the NYSDEC. The various response actions are described in Section 4.

1.2 Action Leakage Rate and Response Rate

In accordance with 6 NYCRR Parts 373-2.11(j) and (k), this RAP presents the Action Leakage Rate (ALR), which is the primary trigger to implement a response action, for the Fac ponds. The ALR is based on the maximum flow rate that the LDS can remove without the fluid head on the secondary liner exceeding 1 foot. Consistent with the Residuals Management Unit 1 (RMU-1) RAP, and the RMU-2 RAP, this RAP also presents a secondary trigger level known as the Response Rate (RR). The RR is based on the anticipated maximum inflow to the LDS that could be expected under normal operating conditions. The RR could be used in identifying potential problems with the primary liner by alerting CWM personnel to unanticipated inflows to the LDS. The trigger levels are presented both as "unit-specific" and "pond-specific." The term "unit-specific" relates to a unit area (e.g., 1 acre), whereas "pond-specific" is a function of each Fac pond area. Unit-specific rates are presented in terms of gallons per acre per day [gpad]; pond-specific rates are presented in terms of gallons per day (gpd). The development of the ALR and RR values is discussed in greater detail in Sections 2 and 3, respectively.

1.3 RMU-2 Overview

The Site has been a hazardous waste TSD facility since 1972. RMU-2 encompasses approximately 43.5 acres (as measured to the outside toe of the perimeter mechanically stabilized earth wall). Fac Pond 5 are constructed above the existing ground surface and are surrounded by containment berms. Fac Pond 5 is approximately 4.7 acres, as measured planimetrically along the centerline of the top of slope for the side slope liner system.

1.3.1 Facultative Pond Liner System Description

The Fac Pond 5, which ispart of RMU-2 development, has been designed to meet or exceed the requirements for hazardous waste landfills as specified in 6 NYCRR Part 373-2.11. As shown on Fac Pond Permit Drawing No. 4, the facultative pond liner system consists of the following components (in descending order):

- Primary Liner System
  - 1 foot of ballast layer stone on the pond floors;
  - A layer of nonwoven geotextile on the pond floors;
  - A 30-mil ethylene interpolymer alloy (EIA) geomembrane on the pond floors and side slopes; and,
  - A layer of geosynthetic clay liner (GCL) on the pond floors and side slopes.
- Leak Detection System (LDS)
  - A layer of geocomposite on the pond floors and side slopes;
  - A layer of non-woven cushion geotextile heat bonded to the geocomposite on either side of the sump and riser trench; and,
  - A select fill sump with an 18-inch diameter perforated collection pipe and an 18-inch diameter solid riser pipe.
- Secondary Liner System
  - A 30-mil EIA geomembrane on the pond floor and side slopes; and
  - 3 feet of compacted glacial till or other suitable clay soil having a maximum hydraulic conductivity of 1×10^{-7} cm/s on the pond floor and side slopes.

On the perimeter side slopes, the 1 foot of ballast stone has been omitted and replaced with weight tubes to provide ballast against uplift forces on the geomembranes. In addition, vent pockets will be installed in the primary and secondary liners at the edge of the anchor trench. These vent pockets will allow any gas below the liners to escape without allowing liquid within the LDS to pass through the liner system.

1.3.2 Liquid Collection and Removal from the Leak Detection System

The LDS is designed and managed to control and remove liquids in a manner consistent with the requirements of 6 NYCRR Part 373-2.11(b)(3)(ii) and (iii). A sumps located at the low point of the Fac pond collect liquids that enter the LDS. Liquids that collect in the LDS are removed by pumping through the 18-inch diameter high density polyethylene (HDPE) side slope riser pipes. Liquids are removed from the LDS at regular intervals with dedicated automatic pumps to provide effective leachate management and to minimize the hydrostatic head on the secondary liner. The performance of the LDS of the Fac pond will be monitored based on regular documentation of the liquid volume encountered in and removed from the LDS.

1.3.3 Geologic and Hydrogeologic Setting

Numerous past investigations have been conducted throughout the Model City Facility. Geologic and hydrogeologic investigations for the entire Model City Facility have been performed and were submitted to the NYSDEC and the USEPA in March 1985 (*Hydrogeologic Characterization*, Golder Associates, Inc. [Golder], March 1985). Two updates to the 1985 hydrogeologic report were prepared and submitted in 1988 (*Hydrogeologic Characterization Update*, Golder, February 1988) and in 1993 (*Hydrogeologic Characterization Update*, Golder, June 1993). These studies detail the physiography, drainage, regional geology, site stratigraphy, hydrogeology and site hydrologic parameters. In terms of hydrogeology, these studies focused on defining the uppermost aquifer underlying the Model City Facility, groundwater flow direction and rates. A supplemental geologic investigation within the footprint of RMU-2 was also performed and presented in a letter report entitled *Geotechnical Investigation for Proposed Residuals Management Unit Number 2 Western Expansion Area* (Golder, December 2002). In general, the 2002 geotechnical investigation confirmed the geologic findings presented in the 1985, 1988 and 1993 site-wide investigations. Additional hydrogeologic investigations were performed by Golder in 2004 and again in 2009 to obtain geological and subsurface site stratigraphy data specific to the proposed RMU-2 location. The 2009 investigation was summarized in a report entitled *Landfill Footprint Analytical Data Study and Western Boundary Relocation Investigation, Residuals Management Unit Number 2* (Golder, August 2009). Additionally, groundwater elevation measurements were performed in 2008 in the area of the proposed RMU-2. Copies of the 2002 and 2009 Golder reports are presented in Appendices A-2 and A-4, respectively, of the *RMU-2 Engineering Report* (ARCADIS, April 2003, revised August 2009 and February 2013).

The Site is situated on the Ontario Plain that is an area of low topographic relief between the Niagara Escarpment and Lake Ontario. The upper portion of the stratigraphy at the Model City Facility generally includes low-permeability silt and clay tills over Glaciolacustrine Clay, underlain by a Glaciolacustrine Silt/Sand unit. Beneath these units is a lodgment of till (Basal Red Till) above shale bedrock. Over the northwestern portion of the Model City Facility, the Glaciolacustrine Clay is separated into an upper and lower member by a silt till (Middle Silt Till). Because of variations in topography, the thickness of the prevailing materials and the subbase depth of the cells, RMU-2 penetrates either one or both of the Upper Tills and the Glaciolacustrine Clay units.

In general, a varying thickness of in-situ glacial till will be left in place above the in-situ Glaciolacustrine Clay formation to withstand hydrostatic pressures and provide a suitable surface for construction equipment. The thickness of glacial till varies because of the irregularity of the surface of the Glaciolacustrine Clay. However, in particular areas, the entire in-situ glacial till may be removed in order to accommodate excavation grades in certain sump elevations. Natural surface elevations in the vicinity of RMU-2 are approximately 320 feet above mean sea level.

The typical hydraulic conductivity values of the geologic formations indicate that the Glaciolacustrine Silt/Sand stratum is the most permeable geologic unit and forms the uppermost aquifer underlying the Model City Facility. The Silt Till, Clay Till and Glaciolacustrine Clay above this aquifer are very low-permeability materials and restrict aquifer recharge from infiltration. The Basal Red Till and bedrock beneath the aquifer are also low-permeability units, although the shallow, weathered bedrock is more permeable than the deeper bedrock.

Water-level data collected on May 15, 2001 and in October 2004 from wells screened in the Glaciolacustrine Silt/Sand unit appear to represent the period of greatest piezometric heads for the confined aquifer since regular recording of Site-wide groundwater elevation data began in the early 1980s. Of these two monitoring events, the May 2001 levels were found to be more critical (i.e., higher) and, thus, governed the establishment of design elevations for the RMU-2 cells. Additional groundwater elevation data from “Figure 4 – Upper Tills Unit Potentiometric Surface Contours October 2011” prepared by Golder was also used to estimate the inflow rate of groundwater through the Fac pond secondary liner (see Section 3).

2.0 ACTION LEAKAGE RATE

2.1 General

The purpose of this section is to quantify the ALR for the Fac pond. The NYSDEC defines the ALR as the maximum design flow rate that the LDS can remove without the fluid head on the bottom liner exceeding 1 foot. As such, the ALR is dependent on the hydraulic capacities of the various components of the LDS. The ALR for the Fac ponds is established by evaluating each component of the LDS to determine the limiting component (i.e., the component having the least hydraulic capacity that would cause the fluid head on the bottom liner to exceed 1 foot). A factor of safety is typically applied to the hydraulic capacity of the limiting component to arrive at the actual ALR. The individual flow rate components that are used to determine the ALR are discussed in the following section. The ALR calculation is presented in Appendix A and summarized in Section 2.3.

2.2 ALR Flow Rate Components

The following hydraulic capacities for the various LDS components are calculated to determine the ALR for each pond:

- Flow rate through the geocomposite that drains directly to the LDS sump;
- Flow rate through the drainage stone surrounding the perforated section of the 18-inch diameter side slope riser pipe within the LDS sump; and,
- Flow rate through the perforations in the horizontal portion of the 18-inch diameter side slope riser pipe.

The analysis of each of these components is discussed in greater detail below.

2.2.1 Flow Rate through the Geocomposite Draining Directly into the LDS Sump

The LDS of each Fac pond includes a geocomposite that covers the side slopes and floor and discharges into the sump. The capacity of the geocomposite is designed to exceed the contributing maximum flow rate into the geocomposite, with a minimum transmissivity of 3×10^{-4} meters squared per second (m^2/s). The maximum flow rate conveyed into the sump via this mechanism is estimated by multiplying the flow per unit width through the geocomposite by the perimeter of the LDS sump.

2.2.2 Flow Rate through the Drainage Stone Surrounding the Perforated Section of the Side Slope Riser Pipe within the LDS Sump

Liquids that drain into the LDS sump from the surrounding geocomposite must permeate through the stone surrounding the perforated section of the side slope riser pipe and pass through the perforations. The maximum flow rate through the drainage stone is computed using Darcy's law and a flow net for the drainage stone surrounding the perforated portion of the side slope riser pipe.

2.2.3 Flow Rate through the Perforations in the Horizontal Portion of the Side Slope Riser Pipe

Liquids that flow through the drainage stone surrounding the perforated portion of the side slope riser pipe must ultimately pass through the perforations themselves. The flow rate through the perforations is determined from calculations presented in Appendix A, which are based on the orifice equation and the effective head on each perforation in the side slope riser pipe.

2.3 ALR Values

For the Fac pond, the limiting flow rate is determined to be the flow rate through the geocomposite that drains directly into the sump (discussed in Section 2.2.1). Because this flow rate is dependent on the slope of the pond floor, the ALRs are pond-specific (i.e., the ALR per unit area differs from one pond to the next). The calculation for the Fac Pond 5 ALR is summarized in Table 1. As discussed above, the ALR is calculated by multiplying the limiting flow rate by a factor of safety. To maintain consistency with the RMU-1 and RMU-2 RAPs and USEPA recommendations, a factor of safety of two is applied to the calculated ALR.

Table 1: Calculated ALR Values

Fac Pond	Pond-Specific ALR [gpd]	Pond Area[1] [acres]	Unit-Specific ALR [gpad]
5	7,982	4.7	1,698

Notes:
1. Pond area is the planimetric area as measured along the centerline of the top of slope for the side slope liner system.

The unit-specific ALR of 1,698 gpad is used to calculate the Pond-Specific ALR for Fac Pond 5. This unit-specific ALR value is multiplied by the pond area to calculate a pond-specific ALR, as summarized in the following table.

Table 2: Final ALR Values

Fac Pond	Unit-Specific ALR[1] [gpad]	Pond Area[2] [acres]	Pond-Specific ALR [gpd]
5	1,698	4.7	7,982

Notes:
1. Unit-specific ALR is based on the minimum calculated value from Table 1.
2. Pond area is the planimetric area as measured along the centerline of the top of slope for the side slope liner system.

3.0 RESPONSE RATE

3.1 General

The purpose of this section is to quantify the RR Fac Pond 5. As described earlier in this RAP, the RR is the anticipated maximum inflow to the LDS that could be expected under normal operating conditions. An RR value is calculated to represent the Fac pond at their maximum design capacity. The Fac pond RR value is discussed below in Section 3.2. The RR calculation is presented in Appendix B and summarized in Section 3.3.

3.2 Facultative Pond RR

The maximum design capacity RR has been established to account for the increased flow rates experienced in the LDS when the liquid level in the Fac ponds is at the maximum design level. The higher flow rates are primarily attributable to increased flows in the LDS due to leakage and permeation through the primary and secondary liner systems into the LDS.

In order to calculate the Fac pond RRs, it is necessary to identify potential inflow sources to the LDS and estimate the peak anticipated inflow to the LDS from each source. The following potential inflow sources to the LDS are considered in the estimation of the Fac pond RR:

- Leakage and permeation of liquids through the primary liner system due to hydrostatic head on the primary liner;
- Leakage and permeation of groundwater through the secondary liner system; and
- Leakage and permeation of consolidation water from the compacted clay layer in the secondary liner system.

Construction liquids (i.e., liquids that have entered the pond during the LDS construction period) are not considered in the Fac pond RR because these liquids will have been collected by the LDS during the initial stages of pond operation. Furthermore, because the liner system of the RMU-2 Fac ponds utilizes a GCL in the composite primary liner system, the Fac pond RR calculation does not consider the generation of liquids from the consolidation of a primary clay layer. The potential inflow sources to the LDS are discussed in greater detail below and in Appendix B.

3.2.1 Inflow through the Primary Liner System

Leakage and permeation through the primary liner system is considered one of the three main long-term sources for liquids entering the LDS. Higher heads on the primary liner will cause a corresponding increase in flow to the LDS due to leakage and permeation through the primary geomembrane and GCL. The computation of leakage and permeation rates through the primary liner system is discussed separately in the following sections.

3.2.1.1 Leakage through the Primary Liner System

Good construction practices and thorough construction quality control/quality assurance procedures can be employed in the installation of pond liners to minimize or eliminate defects in the geomembrane that typically occur during the course of installation. Defects in the form of pinholes are also known to occur during the manufacturing process. The frequency and size of these installation and manufacturing defects are estimated from the *Hydrologic Evaluation of Landfill Performance (HELP) Model User's Guide for Version 3* (USEPA, September 1994).

Leakage through defects in the primary liner geomembrane will occur whenever a hydrostatic head exists on the primary liner geomembrane and is a function of the frequency of defects, their size, head on the geomembrane and the hydraulic conductivity of the material beneath the geomembrane (i.e., the GCL). For the purposes of determining the RR, the leakage rate is estimated assuming the maximum operational level on the primary liner geomembrane. Using equations from the *HELP Model Engineering Documentation for Version 3* (USEPA, September 1994), leakage rate through the assumed geomembrane defects isestimated to be approximately 712.4 gpd for Fac Pond 5. The calculations for the leakage rate through the primary liner system is presented in Appendix B and summarized in Table 1 of Appendix B.

3.2.1.2 Permeation of Liquids through the Primary Liner System

Permeation of liquids through the primary liner system will occur whenever a hydrostatic head exists on the primary geomembrane. The permeation rate estimate assumes the pond is filled to its maximum operational level of 26 feet. In order for liquids to permeate completely through the primary liner and into the LDS, they must pass through a geomembrane layer and a GCL. The presence of both these low-permeability layers is accounted for in the permeation rate estimate by combining their individual thicknesses and using an effective hydraulic conductivity, as recommended in the *HELP Model Engineering Documentation for Version 3* (USEPA, September 1994). The resulting permeation rate through the primary liner system is estimated to be approximately 879.3 gpd for Fac Pond 5. The calculations for the permeation rates through the primary liner system are presented in Appendix B and summarized in Table 2 of Appendix B.

3.2.2 Groundwater Inflow through Secondary Liner System

In general, the elevations of the components in the secondary liner system (geomembrane and compacted clay layer) on the pond floors are below the historical high piezometric head in the confined aquifer (i.e., those recorded in October 2011). The historical high groundwater elevation beneath Fac Pond 5 is 308 feet. Using the Fac Pond elevations provided on Permit Drawing No. 3 and the liner system details on Permit Drawing No. 4, the low point of the compacted clay layer of the secondary liner system is at elevation 301 feet for Fac Pond 5. The resulting hydrostatic head exerted on the compacted clay layer and geomembrane in the secondary liner system of 7 ft. will cause groundwater to enter the LDS by permeation and leakage through the geomembrane, similar to the mechanisms discussed in Section 3.2.1. Although the rate of groundwater inflow to the LDS is expected to fluctuate due to seasonal variations in groundwater elevations, the presence of this external hydrostatic head is expected continuously throughout the life of the Fac pond. The computation of leakage and permeation rate of groundwater through the secondary liner is discussed separately in the following sections.

3.2.2.1 Leakage of Groundwater through the Secondary Liner System

Leakage of groundwater into the LDS through assumed defects in the secondary liner geomembrane will occur whenever the confined aquifer piezometric head beneath a given pond exceeds the lowest LDS elevation. For the purposes of determining the RR, the leakage rate of groundwater through the secondary liner is estimated using the bottom of the liner system design grade (i.e., subgrade) depicted on Fac Pond Permit Drawings 3 and 4 prepared by Arcadis of New York, Inc. as well as the groundwater elevation contours on Figure 4 – Upper Tills Unit Potentiometric Surface Contours October 2011 prepared by Golder Associates Inc. Using equations from the *HELP Model Engineering Documentation for Version 3* (USEPA, September 1994), leakage of groundwater though the assumed defects in the secondary liner geomembrane is estimated at 22.7 gpd for Fac Pond 5. The calculations for the leakage of groundwater through the secondary liner system are presented in Appendix B and summarized in Table 3 of Appendix B.

3.2.2.2 Permeation of Groundwater through the Secondary Liner System

Permeation of groundwater into the LDS through the secondary liner will occur whenever the confined aquifer piezometric head beneath a given pond exceeds the lowest LDS elevation. As with the leakage rate calculation in the preceding section, the permeation rate estimate is based on the design grades for the bottom of the compacted clay layer in the secondary liner and the average piezometric heads from the

October 2011 monitoring event. In order for groundwater to permeate completely through the secondary liner and into the LDS, it must pass through the compacted clay layer and the geomembrane. As for the composite primary liner system discussed in Section 3.2.1.1, the presence of both of these low-permeability layers in the secondary liner system is accounted for in the permeation rate estimate by combining their individual thicknesses and using an average effective hydraulic conductivity. The flow rate of groundwater into the LDS through the secondary liner system due to permeation is estimated at 195.9 gpd for Fac Pond 5. The calculations for the permeation of groundwater through the secondary liner system are presented in Appendix B and summarized in Table 3 of Appendix 2.

3.2.3 Consolidation Water Inflow from the Secondary Liner Compacted Clay Layer

Construction of the pond system and subsequent filling activities result in applied stresses to the compacted clay layer in the secondary liner system. The applied stress will vary as the liquid level in the pond varies under operational conditions.

The resulting consolidation of the compacted clay layer produces excess pore pressures within the clay, which drive water from the clay layer. The resulting flow rate depends on, and is expected to temporarily lag slightly behind, the filling rate. The inflow of consolidation water to the LDS is expected to continue for some period after the pond is initially filled and gradually diminish over time. As with the other potential inflow sources discussed thus far, this consolidation water will enter the LDS via leakage and permeation through the secondary liner system. The computation of leakage and permeation rates of consolidation water through the secondary liner system is discussed separately in the following sections.

3.2.3.1 Leakage of Consolidation Water through the Secondary Liner Geomembrane

The leakage rate of consolidation water through assumed defects in the secondary liner geomembrane is calculated using equations from the *HELP Model Engineering Documentation for Version 3* (USEPA, September 1994), as discussed in previous sections. The hydrostatic head used to calculate leakage is equal to the excess pore pressure produced within the compacted clay layer during consolidation divided by the unit weight of water. The resulting leakage rate through geomembrane defects is estimated at 54.1 gpd for Fac Pond 5. The calculations for the leakage of consolidation water through the secondary liner system are presented in Appendix B and summarized in Table 3 of Appendix B.

3.2.3.2 Permeation of Consolidation Water through the Secondary Liner System

The permeation rate of consolidation water through the secondary liner geomembrane is estimated using Darcy’s law. The flow rate of consolidation water through the pond floors is estimated at 727.4 gpd for Fac Pond 5. The calculations for the permeation of consolidation water through the secondary liner system are presented in Appendix B and summarized in Table 2 of Appendix B.

3.3 RR Values

Unit-specific RR values were calculated based on the conditions in the Fac pond. For the Fac pond RR, the individual flow rates into the LDS from the sources described in Section 3.2 are combined to generate a single unit-specific RR for the pond. The following table summarizes the estimated flow rates into the LDS from each potential inflow source for the pond.

Table 3: Calculated Fac Pond Unit-Specific RR Inflow Components (From Appendix B)

Fac Pond	Leachate Inflow through Primary Liner System		Groundwater Inflow through Secondary Liner System		Consolidation Water Inflow through Secondary Liner System		Combined [gpad]
	Leakage Rate [gpad]	Permeation Rate [gpad]	Leakage Rate [gpad]	Permeation Rate [gpad]	Leakage Rate [gpad]	Permeation Rate [gpad]	
5	151.6	187.1	4.8	41.7	11.5	154.8	551.5

Pond-specific RR values have been calculated using the unit-specific RR values summarized in Table 3. The unit-specific RR value was multiplied by the pond area to calculate the Fac pond RR that is pond-specific, and is summarized in Table 4.

Table 4: Final Fac Pond RR Values

Fac Pond	Unit-Specific RR[1] [gpad]	Pond Area[2] [acres]	Pond-Specific RR [gpd]
5	552	4.7	2,595

Notes:
1. Unit-specific RR values have been rounded up for conservatism.
2. Pond area is the planimetric area as measured along the centerline of the top of slope for the side slope liner system.

4.0 RESPONSE ACTIONS

4.1 General

The purpose of this section is to outline the required response actions corresponding to various flow rates in the LDS sumps of the Fac pond, including the ALR and RR calculated in Sections 2 and 3, respectively. For all flow rates, the following procedure is required for monitoring of the LDS:

- The LDS sump will be monitored at least once every seven (7) days for the presence of liquids. Pumpable amounts of liquids contained in the sump will be removed automatically or manually, and the liquid quantity will be measured and recorded. The inflow value will be determined by taking the liquid volumes removed each week divided by seven (7) days to establish an average daily inflow for the week.

4.2 Flow Rate at or Below the RR

Routine monitoring should continue. No action is required.

4.3 Flow Rate Between the RR and the ALR

1. If the average daily flow rate is between the RR and ALR, verbally notify the NYSDEC within three (3) working days of an apparent exceedance of the RR. Complete one or more of the following activities to determine whether the apparent exceedance is actually due to an electronic or mechanical equipment malfunction:

    a. Evaluate the LDS volume data transferred from Fac pond sump to the storage tank by checking recent level trends and alarm summary logs.

    b. Verify proper operation of the LDS pump via computer control and by manually switching it on and off.

    c. Inspect the LDS flow meter and verify its proper operation using timed pumping and comparing the estimated volume with the meter flow readings.

    d. Remove the LDS pump and level probe and inspect for any obvious defects. Verify proper operation of level probe by either electrical simulation or by manually placing the probe in water.

2. If the average daily flow to the LDS sump for a week exceeds the RR and is not conclusively determined within two (2) weeks of an apparent RR exceedance to be clearly attributable to an operational failure (e.g., equipment or power failures based on the investigation specified in Item 1 above), the following will be performed:

    a. Conduct a review of the most recent LDS analytical data available from the sampling programs required by the site permit.

    b. Immediately perform the following tests and observations on samples of the LDS liquids:

        1) color;

        2) turbidity;

        3) specific-conductance; and

        4) pH.

    c. Make a preliminary comparison of these values with the previous results and record the information.

d. Perform, within one (1) week after verifying that the RR exceedance is not attributed to operational failure, the sampling and analysis of the LDS liquid that would normally occur on a yearly basis (chloride and sulfate). Test results are to be available within 45 days of the exceedance. Results will be reviewed with the NYSDEC to determine what, if any, additional response actions are necessary based on the results. This sampling will satisfy the next yearly sampling requirements for that sump and pond.

e. Increase monitoring and calculation of the flow rate from the LDS sump of the pond involved, if pumpable quantities are present, to every day until flow decreases below the RR. Also, verify that the automatic removal of liquid from the LDS sumps is occurring as designed. If the automatic pumping of the LDS is unable to maintain a level of 12 inches or less in the LDS, evaluate whether it is necessary to increase the pumping rate.

f. Review all analytical data and if liquid characteristics do not match the pond contents investigate alternative sources of liquid.

3. If the flow is between the RR and the ALR for seven (7) consecutive additional days, provide written notification to the NYSDEC within 14 days from the date of determination and implement the following steps:

   a. Determine the need to temporarily stop placing treated wastewater into the affected pond during the pond's normal operation.

   b. Assess the potential cause or causes of the RR exceedance. In the affected pond, examine any exposed portions of the pond liner.

   c. Repair any observed damage.

   d. If no obvious defects are detected, propose mitigative actions to return the leakage rate to below the RR. Upon approval, sequentially inspect side slope liner and likely locations of base liner, if necessary, removing water and ballast stone as needed. Repair any observed damage.

   e. Document location, type and extent of liner damage, if any.

4. If the liquid in the LDS appears to be stormwater, investigate possible pathways and repair, as necessary. After all necessary mitigative measures have been taken, the pond may be returned to service upon authorization by the NYSDEC.

5. Return to routine monitoring as indicated in Section 4.1

4.4 Flow Rates Greater than the ALR

1. Notify, in writing, the USEPA and NYSDEC within seven (7) working days from the date of determination if the average daily flow from the LDS sump exceeds the ALR, if this is not clearly attributable to an operational disturbance. Determine the need to temporarily stop placing treated wastewater into the affected pond during the pond's normal operation. Prepare a written preliminary assessment report describing the amount of liquids; likely source of liquids; possible location, size and cause of any leaks and short-term actions taken and planned. Submit this report to the USEPA and NYSDEC within 14 days from the date of determination of exceedance. Use of the pond may not resume until written notification is given by the NYSDEC.

2. Increase monitoring and calculation of the flow rate from the LDS sump of the pond involved, if pumpable quantities are present, to every day until flow decreases below the ALR. Also, verify that the automatic removal of liquid from the LDS sumps is occurring as designed.

3. Immediately perform the following tests and observations on samples of the LDS liquids:

   1) color;

2) turbidity;
3) specific-conductance; and
4) pH.

Make a preliminary comparison of these values with the previous results and record the information.

4. Determine, to the extent practicable, the location, size and cause of any leak.
5. Determine other short-term and longer-term actions necessary to mitigate or stop any leaks.
6. Within 30 days after the notification that the ALR has been exceeded, submit to the USEPA and the NYSDEC the results of the analyses from Responses 1 through 5 above, as well as the results of actions taken and actions planned.
7. If the average daily flow exceeds the ALR for two weeks, implement the following steps:
   a. Test a sample of the liquid obtained from the LDS for chloride and sulfate and compare to pond contents;
   b. If the liquid characteristics match the pond contents, stop placing treated wastewater into the affected pond during the pond's normal operation;
   c. Assess the seriousness of the leak and the potential for release to the environment;
   d. Examine any exposed portion of the pond liner;
   e. Determine if material should be removed from the pond for repair or control; and
   f. Repair any observed damage. If damage cannot be repaired, determine whether the pond should be closed.
8. If the liquid in the LDS appears to be stormwater or groundwater, investigate possible pathways and repair as necessary. Provide third-party inspection by a registered professional engineer who will investigate alternative sources of liquid, review available analytical and pumping event data for the pond to identify any trends and prepare a written report to the USEPA and the NYSDEC on the findings and recommended actions to protect human health and the environment.
9. As long as the flow rate in the LDS exceeds the ALR, submit monthly reports to the USEPA and the NYSDEC summarizing actions taken and planned.
10. If the ALR value continues to be exceeded after taking all reasonable corrective measures, implement the following steps:
    a. Remove all standing water inside the Fac pond;
    b. Sequentially inspect side slope liner and likely locations of base liner, if necessary, removing ballast stone as needed;
    c. Repair any observed damage;
11. Prepare third-party certification that observed damage has been repaired and return the pond to service upon NYSDEC approval; and
12. Return to routine monitoring as indicated in Section 4.1.

APPENDIX A

Action Leakage Rate (ALR) Calculation

Golder Associates

CALCULATIONS

Date:	April 16, 2013 Revised November 4, 2013	Made by: Checked by:	JPG BJG
Project No.:	123-89494	Revised by: Checked by:	MTW ~~JB~~
Subject:	Action Leakage Rate Calculation	Reviewed by:	PAM 11/4/13
Project Short Title:	FACULTATIVE POND RESPONSE ACTION PLAN FOR RMU-2 EXPANSION		

In accordance with 6 NYCRR Part 373.2-11 regulations, the action leakage rate (ALR) must be calculated for Facultative (Fac) Pond 5 as part of the RMU-2 expansion. *This revision of the ALR calculation includes only Fac Pond 5.*

1.0 OBJECTIVE

Determine the ALR for the Facultative Pond 5 leak detection system (LDS). The ALR is defined as the maximum design flow rate that the LDS can remove without the fluid head on the bottom liner exceeding one (1) foot.

2.0 METHOD

The ALR is the maximum design flow rate that the LDS can remove without the fluid head on the bottom liner exceeding 1 foot. In order for liquid to flow through the LDS, it must be collected and conveyed to the sump and then flow into the perforated section of the side slope riser pipe and be pumped out. This calculation will determine the limiting flow rate, ie. the ALR.

3.0 REFERENCES

1. "Response Action Plan Residuals Management Unit 1 Model City TSDR Facility" prepared by Rust Environment and Infrastructure, February 1993.
2. "Response Action Plan Residuals Management Unit 2" prepared by Arcadis, April 2003. Revised August 2013.
3. RMU-2 Technical Specifications, Section 02210, Earthworks, Article 2.09.
4. Fac Pond Permit Drawing No. 3 "Fac Pond Grading Plans" prepared by Arcadis of New York, Inc., August 2009. Revised November 2013.
5. Fac Pond Permit Drawing No. 4 "Fac Pond Sections and Details" prepared by Arcadis of New York, Inc., August 2009. Revised November 2013.
6. 6 NYCRR Subpart 373.2-11 Surface Impoundments, effective September 6, 2006.

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4.0 ASSUMPTIONS

1. The liner system has been designed to meet the minimum requirements outlined in Reference 5.
2. The LDS has been designed to meet the minimum requirements outlined in Reference 5 for permeability/transmissivity, bottom slope, clogging, and sump size.
3. Liquids collected in the LDS sump will be pumped to minimize head on the bottom liner.

5.0 CALCULATION

Three potentially limiting flow rates will be evaluated to determine the ALR. These flow rates are:

- Flow rate from the geocomposite that drains directly into the sump.
- Flow rate through the stone in the vicinity of the perforated section of the side slope riser pipe.
- Flow rate through the perforations in the horizontal portion of the side slope riser.

5.1 Flow Rate Through Geocomposite

The daily flow rate from the geocomposite draining directly into the sump can be calculated as:

$$Q_{GEO} = L\Phi i$$

Where,

Φ	=	Geocomposite transmissivity (per Reference 5) Minimum design value = 3.0×10^{-4} m^2/sec = 0.003 ft^2/sec
L	=	Length of geocomposite draining directly into the sump
i	=	Hydraulic gradient perpendicular to the rim of the sump From Figure 34 (Reference 3), both Fac ponds have floor slopes of 1.4% and side slopes of 33%.

Sumps are square in plan view with a trapezoidal cross-section. The bottom dimensions are 10 feet by 10 feet, the side slopes are 3H:1V, and the sump is two (2) feet deep. The rim dimensions at the top of the sump are each 22 feet in length.

Sides parallel to the centerline of the pond are assumed to have hydraulic gradient of 0.014. Sides perpendicular to the center line of the pond have hydraulic gradients as follows:

i = 0.33 (pond side slope) and i = 0.016 (along pond centerline)

$$Q_{GEO} = L\Phi i$$

$$Q_{GEO} = 22\ (0.003)\ (0.33) + 22(0.003)(0.014) + 22(0.003)(0.014) + 22(0.003)(0.016)$$

$$Q_{GEO} = 0.0218\ cfs + 0.000924\ cfs + 0.000924\ cfs + 0.00106\ cfs$$

$$Q_{GEO} = 0.0247\ cfs = 15{,}964\ gpd$$

5.2 Flow Rate Through Sump Drainage Stone

Since sump design is the same for both basins, this calculation is applicable to both basins.

Using the flownet created for the sump, the flow through the stone is calculated:

$$Q_{FLOWNET} = k\ H\ \frac{N_f}{N_D} L$$

Where,

k	=	Hydraulic conductivity of drainage stone; 0.4 cm/s = 1,134 ft/day (Reference 3).
H	=	Head difference between free surface at top of drainage stone (equal to 1 foot above the top of the secondary liner at the sump fringe) and average centroid of perforations (ie. center of pipe).
	=	2.25 ft.
N_f	=	Number of flow paths from flow net = 8
N_d	=	Number of equipotential drops from flow net = 3
L	=	Length of perforated pipe = 10 ft.

$$Q_{FLOWNET} = (1{,}134\ ft/day)\ (2.25\ ft)\ \frac{8}{3}(10\ ft)$$

$$Q_{FLOWNET} = 68{,}040\frac{ft^3}{day} = 508{,}939\ gpd$$

5.3 Flow Rate Through Perforation in Side Slope Pipe

For an 18-inch diameter perforated pipe in the sump, using an orifice equation, the flow through the perforations calculated:

$$Q_{ORIFICE} = CA\sqrt{2gh}$$

Where,

C	=	Orifice coefficient (assume 0.61 for sharp edged orifice).
A	=	Area of orifice (ft^2)
g	=	Acceleration due to gravity (32.2 ft/sec^2)
h	=	Head above side slope riser pipe (ft) (assume middle of pipe)

From Advanced Drainage Systems, Inc. manufacturer data for perforated high density polyethylene pipe (HDPE), standard AASHTO class II perforated 18-inch dia. pipe has minimum water inlet area of 1.42 in^2/ft = 0.00986 ft^2/ft.

$$Q_{ORIFICE} = 0.61(0.00986)\sqrt{2 * 32.2 * 2.25}$$

$$Q_{ORIFICE} = 0.072\frac{cfs}{linear\ foot}$$

$$Q_{PERF} = (Length\ of\ perforated\ pipe)(Q_{ORIFICE})$$

$$Q_{PERF} = 10ft\ \times 0.072\frac{cfs}{linear\ foot}$$

$$Q_{PERF} = 0.72\ cfs = 465{,}348\ gpd$$

6.0 CONCLUSIONS

The daily flow rate from the drainage geocomposite at the edge of the sump is the limiting factor.

A factor of safety of 2.0 is applied to the limit flow rate for the pond to determine the pond-specific ALRs.

Fac Pond 5
ALR = 0.5 x 15,964 gpd
ALR = 7,982 gpd

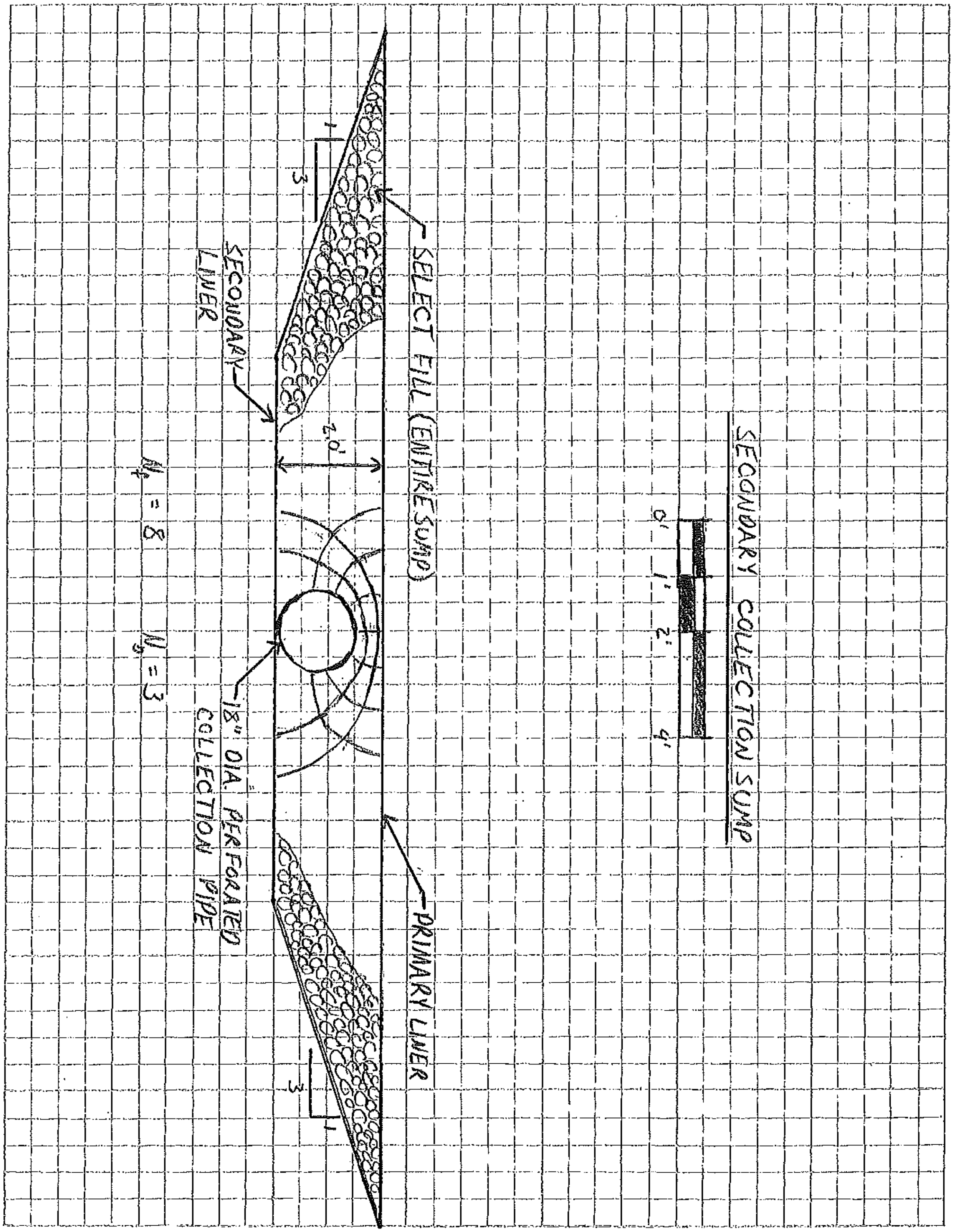
Table 1: Calculated ALR Values

Fac Pond	Pond-Specific ALR [gpd]	Pond Area[1] [acres]	Unit-Specific ALR [gpad]
5	7,982	4.7	1,698

Notes:
1. Pond area is the planimetric area as measured along the centerline of the top of slope for the side slope liner system.

Golder Associates

SUBJECT Model City Fac Ponds ALR		
Job No. 123-89494	Made by JPG	Date 2/13/13
Ref.	Checked	Sheet 5 of 5
	Reviewed	



APPENDIX B

Response Rate (RR) Calculation

Golder Associates

CALCULATIONS

Date:	April 16, 2013 Revised November 4, 2013	**Made by:**	BJG
		Checked by:	JPG
Project No.:	123-89494	**Revised by:**	MTW
		Checked by:	~~JB~~ PAW 11/4/13
Subject:	Response Rate Calculation	**Reviewed by:**	
Project Short Title:	**FACULTATIVE POND RESPONSE ACTION PLAN FOR RMU-2 EXPANSION**		

In accordance with 6 NYCRR Part 373.2-11 regulations, the computed action leakage rate (ALR) must include a Response Rate (RR) calculation. The RR calculation includes the likelihood and amounts of other sources of liquids in the leak detection system (LDS) calculated for Facultative (FAC) Pond 5 as part of the RMU-2 expansion. *This revision of the calculation includes only Fac Pond 5.*

1.0 OBJECTIVE

Quantify the leakage Response Rate in FAC Pond 5 at the Model City Landfill.

2.0 METHOD

The Response Rate is equal to the maximum anticipated inflow to the LDS from all likely sources. Permeation through the primary and secondary geomembrane layers and leakage through the secondary geomembrane will be combined to calculate the maximum anticipated inflow.

3.0 REFERENCES

1. "Soil Mechanics and Foundations," 2nd Edition, Budhu, 2007.
2. "Response Action Plan Residuals Management Unit 2," prepared by Arcadis, April 2003. Revised August 2013.
3. "Response Action Plan Residuals Management Unit 1 Model City TSDR Facility," prepared by RUST Environment and Infrastructure, February 1993.
4. "Hydrologic Evaluation of Landfill Performance (HELP) Model Engineering Documentation: Version 3," U.S. Environmental Protection Agency, August 1994.
5. "Hydrologic Evaluation of Landfill Performance (HELP) Model User's Guide: Version 3," U.S. Environmental Protection Agency, September 1994.
6. Fac Pond Permit Drawing No. 3 "Fac Pond Grading Plans" prepared by Arcadis of New York, Inc., August 2009. Revised November 2013.
7. Fac Pond Permit Drawing No. 4 "Fac Pond Sections and Details" prepared by Arcadis of New York, Inc., August 2009. Revised November 2013.
8. 6 NYCRR Subpart 373.2-11 Surface Impoundments, effective September 6, 2006.
9. "Upper Tills Unit Potentiometric Surface Contours October 2011" drawing prepared by Golder Associates Inc. dated January 2012.

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4.0 ASSUMPTIONS

1) Manufacturing defects in the primary geomembrane occur at a rate of 1 per acre and are approximately 1 mm in diameter (Reference 4).

2) Installation defects in the primary geomembrane occur at a rate of 5 per acre and are assumed to be 1 cm^2 in area (Reference 4).

3) Manufacturing defects in the secondary geomembrane occur at a rate of 1 per acre and are approximately 1 mm in diameter (Reference 4).

4) Installation defects in the secondary geomembrane occur at a rate of 5 per acre and are assumed to be 1 cm^2 in area (Reference 4).

5) The liner system cross section is composed (working from top to bottom) of a primary 30-mil Ethylene Interpolymer Alloy (EIA) geomembrane, a 200-mil Geosynthetic Clay Liner (GCL), a geocomposite drainage layer, a secondary 30-mil EIA geomembrane, and a 3-foot thick layer of compacted clay. The hydraulic conductivity of the EIA liner is assumed to be 2×10^{-11} cm/s, which is one of the highest hydraulic conductivities for geomembrane materials listed in the HELP Engineering Document (Reference 4). The hydraulic conductivity of the GCL is assumed to be 5×10^{-9} cm/s (Reference 2), and the hydraulic conductivity of the compacted clay is assumed to be 1×10^{-7} cm/s (Reference 2).

6) The combined effective hydraulic conductivity through two or more layers is calculated using the procedure described in Reference 5.

5.0 CALCULATION

5.1 Leakage Through the Primary Liner System

The leakage of liquid stored in the pond through the primary liner system is influenced by the number and size of small defects in the geomembrane and the transmissivity of the GCL layer directly below. Assumptions 1 and 2 outline the estimated defects due to manufacturing and installation per the EPA's HELP Model Engineering Documents (Reference 4). Leakage through these geomembrane defects is estimated using equation 149 from Reference 4 outlined below:

$$q_h = k_s i_{ave} n \pi R^2 (0.87719)$$

Where,

q_h	=	flow per unit area of geomembrane (m/s)
k_s	=	hydraulic conductivity of controlling soil layer = 1×10^{-9} m/s
i_{ave}	=	average hydraulic gradient from HELP equ. 150
n	=	number of defects per unit area (#/m^2)
R	=	radius of wetted area around flaw from HELP equ. 162 (m)

The average hydraulic gradient is calculated using equation 150 from Reference 4 outlined below:

$$i_{ave} = 1 + [h_g \div (2T_s * \ln(R \div r_o))]$$

Where,

h_g	=	hydraulic head on secondary layer (m)
T_s	=	thickness of controlling soil layer (m)
r_o	=	radius of defect (m)

The radius of wetted area around each defect is calculated using equation 162 from Reference 4 outlined below:

$$R = 0.26a_o^{0.05}h_g^{0.45}k_s^{-0.13}$$

Where,

a_o	=	area of defect (m^2)

<u>Leakage Through Manufacturing Defects in Primary Geomembrane for FAC Pond 5</u>

$$R = 0.26a_o^{0.05}h_g^{0.45}k_s^{-0.13}$$

Where,

a_o	=	area of defect (m^2) = $7.85x10^{-7}$ m^2
h_g	=	hydraulic head on secondary layer (m) = 16.2 ft = 4.94 m
k_s	=	hydraulic conductivity of controlling layer = $5x10^{-9}$ m/s

$$R = 0.26(7.85x10^{-7})^{0.05}(4.94)^{0.45}(5.00x10^{-9})^{-0.13}$$

$$\boldsymbol{R = 5.77\ m;}$$

$$i_{ave} = 1 + [h_g \div (2T_s * \ln(R/r_o)]$$

Where,

h_g	=	hydraulic head on secondary layer (m) = 16.2 ft = 4.94 m
T_s	=	thickness of controlling soil layer (m) = .0167 ft = 0.0051 m
r_o	=	radius of defect (m) = $5.0x10^{-4}$ m

$$i_{ave} = 1 + [4.94 \div (2(0.005) * \ln(5.77/5.0x10^{-4})]$$

$$\mathbf{i_{ave} = 52.86;}$$

$$q_h = k_s i_{ave} n\pi R^2(0.87719)$$

$$q_h = (5x10^{-9}cm/s)(52.86)(1flaw \div 4046m^2)\pi(5.77m)^2(0.87719)$$

$$\boldsymbol{q_h = ((5.99 \times 10^{-11}\ m/s)(86,400\ s/day)(1.0\ acres)) \div (9.35 \times 10^{-7}\ gallons/[meter \cdot acres])}$$
$$\boldsymbol{q_h = 5.53\ gallons/acre/day}$$

This calculated flow rate is 5.53 gallons/acre/day of liquid from the pond leaking through manufacturing defects in the primary geomembrane of FAC Pond 5. A summary of leakage through the primary liner for the pond can be found in Table 1.

5.2 Permeation Through the Primary Liner System

Permeation through the primary geomembrane occurs regardless of the presence of material or installation defects. The flow rate through the primary liner is estimated using Darcy's Law (Reference 1):

$$Q = k_e i A$$

Where,

k_e = effective hydraulic conductivity (ft/day)
i = hydraulic gradient across the geomembrane = H/t
H = hydraulic head (ft) = Max. Operating Level of Pond
t = geomembrane thickness (ft)
A = Area of Liner (ft^2)

The effective hydraulic conductivity combines the hydraulic conductivities of the geomembrane and the GCL layer directly below it. The effective hydraulic conductivity is calculated using the following equation (Reference 5):

$$k_e = (t_1+t_2) \div [(t_1 \div k_1)+(t_2 \div k_2)]$$

Where,

k_e = Effective hydraulic conductivity (ft/day)
k_1 = Hydraulic conductivity of layer 1 (ft/day)
t_2 = Thickness of layer 1 (ft)
k_1 = Hydraulic conductivity of layer 2 (ft/day)
t_2 = Thickness of layer 2 (ft)

Permeation Through Primary Geomembrane for FAC Pond 5

$$k_e = (t_1+t_2) \div [(t_1 \div k_1)+(t_2 \div k_2)]$$

Where,

k_e = Effective hydraulic conductivity (ft/day)
k_1 = Hydraulic conductivity of geomembrane (ft/day) = 5.67×10^{-8} ft/day
t_2 = Thickness of layer 1 (ft) = 0.0025 ft
k_1 = Hydraulic conductivity of layer 2 (ft/day) = 1.42×10^{-5} ft/day
t_2 = Thickness of layer 2 (ft) = 0.0167 ft

$$k_e = (.0025+.0167) \div [(.0025 \div 5.67 \times 10^{-8})+(.0167 \div 1.42 \times 10^{-5})]$$

$$\mathbf{k_e = 4.24 \times 10^{-7}\ ft/day;}$$

$$Q = k_e i A$$

Where,

k_e = effective hydraulic conductivity (ft/day)
i = hydraulic gradient across the geomembrane = H/t = 16.2/0.0192 = 843.8
H = hydraulic head (ft) = Max. Operating Level of Pond = 16.2 ft
t = layer thickness (ft) = 0.0025 ft + 0.0167 = 0.0192
A = Area of Liner (ft^2) = 1.0 acres = 43,560 ft^2

$$Q = (4.24x10^{-7}\ ft/day)(843.8)(\ 43{,}560\ ft^2)$$

$$Q = 15.58\,ft^3(7.48\,gal/ft^3) = \mathbf{116.57\ gallons\,/acre/day}$$

The calculations for the permeation rates through the primary liner are presented in Scenario 3 of the attachments to this calculation. The calculated permeation rate through the primary geomembrane for the pond is summarized in Table 2.

5.3 Permeation Through the Secondary Liner System

Permeation through the secondary geomembrane occurs due to pressure exerted by a groundwater table that is higher than the bottom of the secondary liner system and excess pore water pressure in the compacted clay layer below the geomembrane. Permeation of groundwater and clay consolidation water through the secondary geomembrane is calculated using the same method used to find the volumes permeated through the primary geomembrane. For groundwater permeation, the hydraulic head (h) used will be equal to the difference between the elevations of the bottom of the compacted clay layer at the lowest point, 301 feet for Fac Pond 5, compared to the highest piezometric head from the confined aquifer in the Upper Tills Unit below the footprint of 308 feet for Fac Pond 5, and the effective hydraulic conductivity (k) through the secondary geomembrane will be a combination of the 30-mil EIA geomembrane and the 3-foot layer of compacted clay.

Initially, the compacted clay layer below the secondary geomembrane will have excess pore pressure due to the initial loading of the pond. As the layer settles due to the extra loading from the full pond, water will be expelled from the clay. To be conservative, these calculations will be done assuming the clay layer is saturated and the pond is full (at maximum operating level). Under these conditions, the initial pore pressure will equal the initial load applied by the pond being filled to the maximum operating level. Assuming that the water can be forced either up through the geomembrane or down into the native soil, the hydraulic head (h) acting on the geomembrane used will be one-half of the pore pressure. The layer thickness (t) used in this calculation to find the permeability of the compacted clay will also be equal to one-half of the actual layer thickness in order to model the two drainage paths. The consolidation water has been included in this analysis, however it is recognized that over time the liquid contributed by this mechanism will become negligible.

The permeation through the secondary liner system was calculated using the same methodology presented in Section 5.2. The calculations for the permeation rates through the secondary liner in the pond are presented in Scenario 3 of the attachments to this calculation. The permeation rates through the secondary geomembrane for the pond are summarized in Table 2.

5.4 Leakage of Groundwater Through the Secondary Liner System

The leakage of groundwater through the secondary geomembrane is influenced by the number and size of small defects in the geomembrane and the transmissivity of the compacted clay layer directly below. The hydraulic head on secondary layer was determined as described above in Section 5.3. Assumptions 3 and 4 outline the estimated defects due to manufacturing and installation per the EPA's HELP Model Engineering Documents (Reference 4). Leakage through these geomembrane defects is estimated using equation 149 from Reference 4 outlined below:

$$q_h = k_s i_{ave} n\pi R^2 (0.87719)$$

Where,

q_h	=	flow per unit area of geomembrane (m/s)
k_s	=	hydraulic conductivity of controlling soil layer = $1\text{x}10^{-9}$ m/s
i_{ave}	=	average hydraulic gradient from HELP equ. 150
n	=	number of defects per unit area (#/m^2)
R	=	radius of wetted area around flaw from HELP equ. 162 (m)

The average hydraulic gradient is calculated using equation 150 from Reference 4 outlined below:

$$i_{ave} = 1 + [h_g \div (2T_s * \ln(R \div r_o)]$$

Where,

h_g	=	hydraulic head on secondary layer (m)
T_s	=	thickness of controlling soil layer (m)
r_o	=	radius of defect (m)

The radius of wetted area around each defect is calculated using equation 162 from Reference 4 outlined below:

$$R = 0.26 a_o^{0.05} h_g^{0.45} k_s^{-0.13}$$

Where,

a_o	=	area of defect (m^2)

<u>Groundwater Leakage Through Manufacturing Defects in Secondary Geomembrane for FAC Pond 5</u>

$$R = 0.26 a_o^{0.05} h_g^{0.45} k_s^{-0.13}$$

Where,

a_o	=	area of defect (m^2) = $7.85\text{x}10^{-7}$ m^2
h_g	=	hydraulic head on secondary layer (m) = 8.2 ft = 2.5 m
k_s	=	hydraulic conductivity of controlling soil layer = $1\text{x}10^{-9}$ m/s

$$R = 0.26(7.85x10^{-7})^{0.05}(2.5)^{0.45}(1.00x10^{-9})^{-0.13}$$

$$\boldsymbol{R = 2.88\ m;}$$

$$i_{ave} = 1 + [h_g \div (2T_s * \ln(R/r_o)]$$

Where,

h_g = hydraulic head on secondary layer (m) = 8.2 ft = 2.5 m
T_s = thickness of controlling soil layer (m) = 3 ft = 0.9144 m
r_o = radius of defect (m) = $5.0x10^{-4}$ m

$$i_{ave} = 1 + [2.5 \div (2(0.9144) * \ln(2.88/5.0x10^{-4})]$$

$$i_{ave} = 1.16;$$

$$q_h = k_s i_{ave} n \pi R^2 (0.87719)$$

$$q_h = (1x10^{-9})(1.16)(1 + 4046)\pi(2.88)^2(0.87719)$$

$$q_h = ((6.52x10^{-12}\ m/s)(86{,}400\ s/day)(1.0\ acres)) \div (9.35x10^{-7}\ gallons/[meter \cdot acres])$$
$$q_h = 0.60 gallons/acre/day$$

This flow rate equates to 0.60 gallons/acre/day of groundwater leaking through manufacturing defects in the secondary geomembrane of FAC Pond 5. The same methodology presented above for leakage through manufacturing defects was used in determining the leakage rate due to installation defects. Installation defects are assumed to be 1 cm^2 and occur at a frequency of five (5) per acre. The groundwater leakage in the pond due to manufacturing defects and installation damage are presented in Scenarios 4 and 5 of the attachments to this calculation. A summary of calculated groundwater leakage rates through defects for the pond can be found in Table 3.

5.5 Compacted Clay Layer Consolidation Water Leakage Through the Secondary Geomembrane

The leakage volume of clay consolidation water through the secondary geomembrane is calculated using the same method used to find the groundwater leakage volume through the secondary geomembrane. In calculating the leakage of clay consolidation water, it is assumed that the clay layer is doubled drained. Therefore, the clay layer thickness (t) will be cut in half to model the two drainage paths. The head (h) is assumed to be the average depth of liquid in the pond. This value relates to the increase in pore pressure generated from the liquid within the pond. This increased pressure is the driving force of the clay consolidation. The consolidation water has been included in this analysis, however it is recognized that over time the liquid contributed by this mechanism will become negligible.

The calculated leakage rate for the compacted clay consolidation water was determined by the same methodology used for the leakage of groundwater through the secondary liner system and can be found in Scenarios 6 and 7 of the attachments to this calculation. A summary of calculated compacted clay layer consolidation water leakage rate through defects in the secondary geomembrane for the pond can be found in Table 3.

6.0 CONCLUSIONS

Combining all sources of liquids entering the leak detection system will yield the Response Rate for the FAC Pond. Tables 1 to 4 below summarize liquid quantities per day from each source. Table 5 summarizes the Response Rates for the pond.

Table 1: Leakage Through Defects in Primary Geomembrane in FAC Pond 5

	Pond 5
Manufacturing Defects (gallons/acre/day)	13.2
Installation Defects (gallons/acre/day)	138.4
Total (gallons/acre/day)	**151.6**

Table 2: Permeation Through Geomembranes in FAC Pond 5

	Pond 5
Leachate Liquid through Primary Liner System (gallons/acre/day)	187.1
Groundwater through Secondary Liner System (gallons/acre/day)	41.7
Clay Consolidation Water through Secondary Geomembrane (gallons/acre/day)	154.8
Total (gallons/acre/day)	**383.6**

Table 3: Leakage Through Defects in Secondary Geomembrane in FAC Pond 5

		Pond 5
Manufacturing Defects (gallons/acre/day)	Groundwater	0.5
	Clay Consolidation	1.0
Installation Defects (gallons/acre/day)	Groundwater	4.3
	Clay Consolidation	10.5
Total (gallons/acre/day)		**16.3**

Table 4: Response Rates for FAC Pond 5

	Pond 5
Total Permeation (gallons/acre/day)	383.6
Total Leakage (gallons/acre/day)	167.9
Total (gallons/acre/day)	**551.5**

Table 5: Final Response Rate Values

Fac Pond	Unit-Specific RR[2] [gpad]	Pond Area[1] [acres]	Pond-Specific RR [gpd]
5	552	4.7	2,595

Notes:
1. Pond area is the planimetric area as measured along the centerline of the top of slope for the side slope liner system.
2. Unit-specific RR values have been rounded up for conservatism

Scenario 1: Leakage Through Primary Liner Due to Manufacturing Defects

Assumption 1: One (1) defect per acre, with an approximate diameter of 1 mm

Pond 5		SI Units (m, s)
h_g = Hydraulic Head on Liner (ft)	26	7.9248
k_s = Permeability of Controlling Soil Layer (cm/s)	5.00E-09	5.00E-11
T_s = Thickness of Controlling Soil Layer (ft)	1.67E-02	5.09E-03
r_0 = Radius of Flaw (mm)	0.5	5.00E-04
a_0 = Flaw Area (m^2)		7.8540E-07
R = Radius of Wetted Area Around Flaw[1] (m)		7.1352
n = Density of Flaws (number per acre)	1	2.47E-04
Area of Pond (acres)	1	4047

Average Hydraulic Gradient, i_{avg} [2]	82.38
Leakage Rate Through Flaws, q_h (m/s) [3]	1.43E-10
Daily Leakage Volume (gallons/acre/day)	13.19

Notes:

(1) From HELP Model Engineering Documentation Equ. 162

(2) From HELP Model Engineering Documentation Equ. 150

(3) From HELP Model Engineering Documentation Equ. 149

Scenario 2: Leakage Through Primary Liner Due to Installation Defects
Assumption 1: Five (5) defects per acre, with an approximate diameter of 5.65 mm

Pond 5		SI Units (m, s)
h_g = Hydraulic Head on Liner (ft)	26	7.9248
k_s = Permeability of Controlling Soil Layer (cm/s)	5.00E-09	5.00E-11
T_s = Thickness of Controlling Soil Layer (ft)	1.67E-02	5.09E-03
r_0 = Radius of Flaw (mm)	5.65	5.65E-03
a_0 = Flaw Area (m^2)		1.0029E-04
R = Radius of Wetted Area Around Flaw[1] (m)		9.0931
n = Density of Flaws (number per acre)	5	1.24E-03
Area of Pond (acres)	1	4047

Average Hydraulic Gradient, i_{avg} [2]	106.43
Leakage Rate Through Flaws, q_h (m/s) [3]	1.50E-09
Daily Leakage Volume (gallons/acre/day)	138.38

Notes:
(1) From HELP Model Engineering Documentation Equ. 162
(2) From HELP Model Engineering Documentation Equ. 150
(3) From HELP Model Engineering Documentation Equ. 149

Scenario 3: Permeation through the primary and secondary layers
Assumed hydraulic conductivity of 30-mil liner, k= $2x10^{-11}$ cm/s
Q=kiA

Pond 5

For primary layer (permeation from pond through liner)

k = Effective Hydraulic Conductivity	4.24E-07
i = Hydraulic Gradient = H/t	1354.2
H = Hydraulic Head (ft)	26
t = layer thickness (ft)	0.019
A = Area (acres)	1
Daily Leakage Volume (gallons/acre/day)	187.08

For secondary layer (groundwater permeation)

k = Effective Hydraulic Conductivity	5.49E-05
i = Hydraulic Gradient = H/t	2.3314
H = Hydraulic Head (ft)	7
t = layer thickness (ft)	3.0025
A = Area (acres)	1
Daily Leakage Volume (gallons/acre/day)	41.70

For secondary layer (clay consolidation water permeation)

k = Effective Hydraulic Conductivity	5.49E-05
i = Hydraulic Gradient = H/t	8.6522
H = Hydraulic Head (ft)	13
t = layer thickness (ft)	1.5025
A = Area (acres)	1
Daily Leakage Volume (gallons/acre/day)	154.77

Total Permeation (gallons/day):	**383.56**

Scenario 4: Groundwater Leakage Due to Manufacturing Defects
Assumption 1: One (1) defect per acre, with an approximate diameter of 1 mm
Assumption 2: Hydraulic head is acting on the bottom of the clay layer

Pond 5		SI Units (m, s)
h_g = Hydraulic Head on Secondary Layer (ft)	7	2.1336
k_s = Permeability of Controlling Soil Layer (cm/s)	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer (ft)	3	0.9144
r_0 = Radius of Flaw (mm)	0.5	5.00E-04
a_0 = Flaw Area (m^2)		7.8540E-07
R = Radius of Wetted Area Around Flaw(1) (m)		2.6781
n = Density of Flaws (number per acre)	1	2.47E-04
Area of Pond (acres)	1	4047

Average Hydraulic Gradient, i_{avg} (2)	1.14
Leakage Rate Through Flaws, q_h (m/s) (3)	5.55E-12
Daily Leakage Volume (gallons/acre/day)	0.51

Notes:
(1) From HELP Model Engineering Documentation Equ. 162
(2) From HELP Model Engineering Documentation Equ. 150
(3) From HELP Model Engineering Documentation Equ. 149

Scenario 5: Groundwater Leakage Due to Installation Defects

Assumption 1: Five (5) defects per acre, with an approximate diameter of 5.65 mm

Assumption 2: Hydraulic head is acting on the bottom of the clay layer

Pond 5		SI Units (m, s)
h_g = Hydraulic Head on Secondary Layer (ft)	7	2.1336
k_s = Permeability of Controlling Soil Layer (cm/s)	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer (ft)	3	0.9144
r_0 = Radius of Flaw (mm)	5.65	5.65E-03
a_0 = Flaw Area (m^2)		1.0029E-04
R = Radius of Wetted Area Around Flaw[1] (m)		3.4130
n = Density of Flaws (number per acre)	5	1.24E-03
Area of Pond (acres)	1	4047

Average Hydraulic Gradient, i_{avg} [2]	**1.18**
Leakage Rate Through Flaws, q_h (m/s) [3]	4.69E-11
Daily Leakage Volume (gallons/acre/day)	4.33

Notes:

(1) From HELP Model Engineering Documentation Equ. 162

(2) From HELP Model Engineering Documentation Equ. 150

(3) From HELP Model Engineering Documentation Equ. 149

Scenario 6: Secondary Clay Layer Consolidation Water Leakage Due to Manufacturing De
Assumption 1: One (1) defect per acre, with an approximate diameter of 1 mm

Pond 5		SI Units (m, s)
h_g = Hydraulic Head on Liner (ft)	13	3.9624
k_s = Permeability of Controlling Soil Layer (cm/s)	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer (ft)	3	0.9144
r_0 = Radius of Flaw (mm)	0.5	5.00E-04
a_0 = Flaw Area (m^2)		7.8540E-07
R = Radius of Wetted Area Around Flaw(1) (cm^2/s)		3.5384
n = Density of Flaws (number per acre)	1	2.47E-04
Area of Pond (acres)	1	4047

Average Hydraulic Gradient, i_{avg} (2)	**1.24**
Leakage Rate Through Flaws, q_h (m/s) (3)	1.06E-11
Daily Leakage Volume (gallons/acre/day)	0.98

Notes:
(1) From HELP Model Engineering Documentation Equ. 162
(2) From HELP Model Engineering Documentation Equ. 150
(3) From HELP Model Engineering Documentation Equ. 149

Scenario 7: Secondary Clay Layer Consolidation Water Leakage Due to Installation Defect:
Assumption 1: Five (5) defects per acre, with an approximate diameter of 5.65 mm

Pond 5		SI Units (m, s)
h_g = Hydraulic Head on Liner (ft)	13	3.9624
k_s = Permeability of Controlling Soil Layer (cm/s)	1.00E-07	1.00E-09
T_s = Thickness of Controlling Soil Layer (ft)	1.5	0.4572
r_0 = Radius of Flaw (mm)	5.65	5.65E-03
a_0 = Flaw Area (m^2)		1.0029E-04
R = Radius of Wetted Area Around Flaw[1] (cm^2/s)		4.5094
n = Density of Flaws (number per acre)	5	1.24E-03
Area of Pond (acres)	1	4047

Average Hydraulic Gradient, i_{avg} [2]	1.65
Leakage Rate Through Flaws, q_h (m/s) [3]	1.14E-10
Daily Leakage Volume (gallons/acre/day)	10.54

Notes:
(1) From HELP Model Engineering Documentation Equ. 162
(2) From HELP Model Engineering Documentation Equ. 150
(3) From HELP Model Engineering Documentation Equ. 149

Application Appendix D-3 – Tanks

(proposed modified pages are designated with a November 2013 revision date at the top of the respective page)

APPENDIX D-3
TANKS

TABLE OF CONTENTS

TANKS

I. INTRODUCTION

The CWM Model City Facility utilizes tanks for storing, treating and transferring many different materials including leachate, PCB liquids, organic liquids, products, aqueous waste, acids, caustics, sludges, recycle water, ground water, waste solids and lab waste.

All of the permitted tanks at the Model City Facility are listed in this Appendix.

II. TANKS AND THEIR SECONDARY CONTAINMENT SYSTEMS

The Permittee has constructed tankage specified in this Appendix with the required secondary containment and leak detection systems as specified in 6 NYCRR Part 373-2.10, except for Tank T-58 which was granted a variance from secondary containment requirements in CWM's 2005 Part 373 Permit No. 9-2934-00022/00097. Drawings and secondary containment volume calculations for each tank area are provided in the attached System schematics. Process and Instrumentation Drawings (P&IDs) are also provided.

The secondary containment for tanks located inside buildings is provided by the building itself and designed to contain, at a minimum, 100% of the volume of the largest tank. Tanks located outside of buildings are provided with secondary containment designed to contain a minimum of 100% of the largest tank plus a 25 year, 24 hour storm event.

Precipitation that falls into outdoor secondary containment areas is typically collected and removed via pump, vacuum truck or equivalent and treated in the Aqueous Waste Treatment System, or if appropriate, tested and discharged to the surface water drainage system if analysis indicates that it meets surface water standards. Under normal circumstances, the secondary containment will be pumped free of liquid no later than the end of the next business day after the end of a rainfall event or thaw.

All ancillary equipment for the permitted tank systems is provided with secondary containment, except for that ancillary equipment meeting the exemption specified in 6NYCRR 373-2.10(d)(6). All exempted ancillary equipment, e.g., welded piping, which is located outside of secondary containment, is visually inspected on a daily basis (except for groundwater extraction systems during the winter shut down period).

All hazardous waste tank systems have been evaluated to determine if any such systems meet the definition of being interconnected, in accordance with 6NYCRR 370.2(b)(105). Criteria has been used to identify all areas where equipment failure at any point in the tank system or operator error could result in the release from more than one tank for tank systems interconnected in the same, or separate, secondary containments. As specified by 6NYCRR 373-2.10(d)(5)(i)(a), secondary containment systems must be designed or operated to contain 100% of the largest tank or the volume of all interconnected tanks, whichever is greater.

CWM has installed valving and electronic safeguards for all interconnected tanks at the Model City Facility whose combined volume exceeds the volume of secondary containment provided for these tanks to prevent potential secondary containment volume exceedences which could be caused by operator error.

III. GENERAL PROCESS SYSTEMS

A. The Aqueous Waste Treatment Facility

CWM has engineered and constructed an Aqueous Wastewater Treatment System (AWTS) designed to treat on-site waters, landfill leachate and gate receipts from customers. The system occupies an area of approximately two acres, and is located at the western edge of the existing operating facility. The facility features enclosed tanks for receipt of waste materials, reaction vessels, filter presses for the removal of solids, biotowers for the removal of biodegradable organics (alcohols and ketones), carbon adsorbers for the capture of residual organics, cartridge filter units for removal of residual solids, adsorption media for removal of arsenic and storage tanks for the treated waste. The alkalization/precipitation, lime slurry, filter press and gate receipts receiving operations are housed in the 10,000 square foot Aqueous Treatment (A/T) Building along with the control room, laboratory and offices. The 1,500 square foot Water Treatment (W/T) Building houses the filtration, arsenic adsorption and carbon adsorption processes.

The system features a Programmable Logic Controller (PLC) to monitor operations and transfers of materials within the facility. The PLC is also used to insure system safety by interlocking with various control equipment.

The Aqueous Treatment and Water Treatment Buildings were designed to provide an environmentally safe water treatment operation. Environmental control was one of the primary objectives in the design and operation of the facility. The system features concrete containment surrounding all tanks, reaction vessels, and other process equipment. In addition, where needed, process piping is lined with special corrosion resistant plastic (polypropylene) or is constructed of High Density Polyethylene (HDPE) in order to prevent corrosion on the interior surface of the piping and prolong the process life of the piping. Finally, process tanks within the A/T Building are tied into a vent collection system. This system controls acid vapors associated with receipt and treatment of the waste materials. In addition, carbon canisters are installed on the process tanks which contain Subpart CC wastes to control organic emissions.

The system is designed to be flexible in the treatment of waste streams. Flexibility is provided by the capability to by-pass or recirculate the process flow through major components of the treatment system. This allows for enhanced treatment and additional process capacity.

The incoming leachate, which is pretreated by oil/water separation when necessary, is pumped into the reaction/blending tanks where sulfuric acid and ferrous sulfate are added to lower the pH prior to metals precipitation, as needed and directed by the laboratory. Aqueous gate receipts can be mixed in the special treatment tanks and then transferred to the reaction/blending tanks. Each batch of blended waste is carefully prepared and analyzed by facility chemists.

The aqueous wastes then go through an alkalization step and filtration unit to remove metal contaminants. The filter cake from the process is incinerated or transported to the site's secure landfill depending on the F039 analysis and achievement of land ban treatment standards. The treated effluent is then pumped into the biological treatment system (biotowers), where the wastewater undergoes biodegradation to remove organics. Flow is then processed through the cartridge filter and arsenic adsorption units (for aqueous wastes requiring arsenic removal) and carbon adsorption unit and on to the effluent holding tanks for testing prior to discharge to the facultative ponds. The biotowers can also be bypassed if organic constituent concentrations are low and the carbon treatment system can handle the organic load. The final treated effluent undergoes extensive laboratory testing and is discharged to the lower Niagara River under a state SPDES permit.

While some AWTS tanks are used for storage only, various treatment options may be used in other tanks to facilitate the most efficient overall treatment, as listed in the following tank tables. For example, anti-foaming agents, nutrients and inoculum are typically added to lift station tanks T-3011 and T-3012 or tank T-3002 to improve organic reduction efficiency in the biotowers. Various agents may be added to filtrate storage tank T-100 and leachate tank farm tanks T-101, T-102 and T-103 to reduce the concentration of organics. Air sparging may be performed and various agents may be added to final effluent tanks T-58 and T-125 to reduce the concentration of organics. Hexametaphosphate is typically added to carbon adsorber feed tank T-3003 to prevent bridging of the carbon adsorbers. An oxidizer may be added to RMU-1 lift station tank T-160 to control the generation of hydrogen sulfide gas. A wide variety of other chemicals may also be used in any treatment tank depending on the type of treatment needed.

Aqueous Wastewater Treatment Building Tanks.

TANK #	OVERFILL CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-710 SPECIAL TREATMENT TANK	level indicator with high and high/high level alarms (PLC controlled)	FRP	8,000 storage/ treatment	aqueous waste	AWTS Building	above ground	24,440 gallons	10,000 gallons	visual
T-810 SPECIAL TREATMENT TANK	level indicator with high and high/high level alarms (PLC controlled)	FRP	8,000 storage/ treatment	aqueous waste	AWTS Building	above ground	24,440 gallons	10,000 gallons	visual
T-820 SPECIAL TREATMENT TANK	level indicator with high and high/high level alarms (PLC controlled)	FRP	8,000 storage/ treatment	aqueous waste	AWTS Building	above ground	24,440 gallons	10,000 gallons	visual
T-850 SOLIDS DISSOLVING TANK	visual observation with inspection hatch	FRP	846 treatment	aqueous waste	AWTS Building	above ground	24,440 gallons	10,000 gallons	visual
T-1010 METALS PRECIPITATION TANK	level indicator with high and high/high level alarms (PLC controlled)	Carbon steel	10,000 treatment	lime slurry/ aqueous waste	AWTS Building	above ground	24,440 gallons	10,000 gallons	visual
T-1020 METALS PRECIPITATION TANK	level indicator with high and high/high level alarms (PLC controlled)	Carbon steel	8,000 treatment	lime slurry/ aqueous waste	AWTS Building	above ground	24,440 gallons	10,000 gallons	visual
T-1111 FILTRATE TANK	level indicator with high and high/high level alarms (PLC controlled)	Polyethylene	300 storage	aqueous waste	AWTS Building	above ground	24,440 gallons	10,000 gallons	visual
T-1112 FILTRATE TANK	overflow pipe and level indicator with high and high/high level alarms (PLC controlled)	FRP	450 storage	aqueous waste	AWTS Building	above ground	24,440 gallons	10,000 gallons	visual
T-1310 CAUSTIC SCRUBBER	level indicator with high level alarm (PLC controlled)	FRP	580 treatment	caustic solution / aqueous wastewater	AWTS Building	above ground	24,440 gallons	10,000 gallons	visual

Solids Separation Building Tanks.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-3011 LIFT TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	375 storage/ treatment	aqueous waste	Solids Separator Building (South of AWTS Building)	above ground	14,851 gallons	4,291 gallons	visual
T-3012 LIFT TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	375 storage/ treatment	aqueous waste	Solids Separator Building (South of AWTS Building)	above ground	14,851 gallons	4,291 gallons	visual

Tanks North of AWTS Building.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-100 FILTRATE STORAGE	level indicator with high and high/high level alarms (PLC controlled)	carbon steel	160,545 storage/ treatment	aqueous waste	North of AWTS Building	above ground	571,328 gallons	424,410 gallons	visual/leak detection valve
T-125 EFFLUENT STORAGE	overflow pipe and level indicator with high level alarm (PLC controlled)	carbon steel	394,271 storage/ treatment	aqueous waste	North of AWTS Building	above ground	571,328 gallons	424,410 gallons	visual/leak detection valve

Tanks West of AWTS Building.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-58 EFFLUENT STORAGE	level indicator with high level alarm (PLC controlled)	Glass fused carbon steel	488,529 storage/ treatment	aqueous waste	East of AWTS Building	above ground	see note	see note	leak detection pipe and valve

Note: A request for variance from secondary containment for Tank T-58 has been approved by NYSDEC.

Tanks East of AWTS Building.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-210 REACTION BLEND TANK	level indicator with high and high/high level alarms (PLC controlled)	carbon steel	30,000 treatment	aqueous waste	Tank farm east of AWTS Building	above ground	44,350 gallons	36,903 gallons	visual
T-220 REACTION BLEND TANK	level indicator with high and high/high level alarms (PLC controlled)	FRP	30,000 treatment	aqueous waste	Tank farm east of AWTS Building	above ground	44,350gallons	36,903 gallons	visual
T-230 REACTION BLEND TANK	level indicator with high and high/high level alarms (PLC controlled)	carbon steel	30,000 treatment	aqueous waste	Tank farm east of AWTS Building	above ground	44,350gallons	36,903 gallons	visual
T-310 BIOTOWER	automatic shut off and overflow pipe to clarifier tanks, equipped with pressure relief vent	FRP	30,457 treatment	aqueous waste	Tank farm east of AWTS Building	above ground	44,350gallons	36,903 gallons	visual
T-320 BIOTOWER	automatic shut off and overflow pipe to clarifier tanks, equipped with pressure relief vent	FRP	30,457 treatment	aqueous waste	Tank farm east of AWTS Building	above ground	44,350gallons	36,903 gallons	visual

Waste Water Treatment Building Tanks.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-3007 CARBON ADSORBER	flow rate monitored at control panel and automatic feed pump shutoff	carbon steel	7,600 treatment	aqueous waste	WWT Building	above ground	15,317 gallons	15,200 gallons	visual
T-3008 CARBON ADSORBER	flow rate monitored at control panel and automatic feed pump shutoff	carbon steel	7,600 treatment	aqueous waste	WWT Building	above ground	15,317 gallons	15,200 gallons	visual
T-3010A ARSENIC ADSORBER	Flow rate monitored at control panel and automatic feed pump shutoff	carbon steel	470 treatment	aqueous waste	WWT Building	above ground	15,317 gallons	15,200 gallons	visual

T-3010B ARSENIC ADSORBER	Flow rate monitored at control panel and automatic feed pump shutoff	carbon steel	470 treatment	aqueous waste	WWT Building	above ground	15,317 gallons	15,200 gallons	visual
T-3010C ARSENIC ADSORBER	Flow rate monitored at control panel and automatic feed pump shutoff	carbon steel	470 treatment	aqueous waste	WWT Building	above ground	15,317 gallons	15,200 gallons	visual
T-3010D ARSENIC ADSORBER	Flow rate monitored at control panel and automatic feed pump shutoff	carbon steel	470 treatment	aqueous waste	WWT Building	above ground	15,317 gallons	15,200 gallons	visual

Tanks South of Waste Water Treatment Building.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-52 CARBON TRANSFER TANK	overflow pipe to carbon adsorbers, equipped with pressure rupture disk	carbon steel	7,600 storage	aqueous waste	South of WWT Building	above ground	9,546 gallons	8,400 gallons	Visual

Tanks East of Waste Water Treatment Building.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-3001 pH ADJUST TANK	automatic shut off and overflow pipe to T-3002	FRP	1,255 treatment	aqueous waste	Tank farm east of WWT Building	above ground	1,872 gallons	1,549 gallons	Visual
T-3002 BIOTOWER FEED TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	900 treatment	aqueous waste	Tank farm east of WWT Building	above ground	1,872 gallons	1,549 gallons	Visual
T-3003 ADSORBER FEED TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	1,210 storage/ treatment	aqueous waste	Tank farm east of WWT Building	above ground	1,667 gallons	1,491 gallons	Visual
T-3009 BACKWASH TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	carbon steel	6,000 storage	aqueous waste	East of WWT Building	above ground	Double walled tank	N/A	visual/leak detection valve

B. SLF 1-6 Leachate System

Oily leachate from SLF 1-6 can be pumped or transferred from the SLF 1-6 landfill leachate pumps into the SLF 1-6 lift station (T-105). The leachate received by the lift station is transferred by a pump into a surge tank (T-130). Oil and aqueous phases can be decanted and separately removed from T-130. Otherwise, mixed leachate is transferred to the SLF 1-11 Oil/Water Separator (T-158) by vacuum truck.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-105 LIFT STATION	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	carbon steel	3,000 storage	Leachate	SLF 1-6	above ground	4,143 gallons	3,000 gallons	visual
T-130 SURGE TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	stainless steel	5,732 storage	Leachate	SLF 1-6	above ground	8,228 gallons	6,819 gallons	visual

C. SLF 7, 10 and 11 Leachate Systems

Leachate generated by SLF 7, 10 and 11 is pumped from the SLF 7, 10 and 11 landfill leachate pumps into the associated lift station tank (T-107, T-110 and T-111). The leachate received by the lift station is pumped to holding tanks (T-108 and T-109) from which it is removed by vacuum truck and transferred to the T-200 series tanks or the SLF 1-11 Oil/Water Separator (T-158), which may also be used for various offsite commercial and onsite generated aqueous wastes. Oil from T-158 is transferred to vacuum trucks for offsite disposal. The aqueous phase from T-158 is transferred to tank T-159 and pumped to the Leachate Tank Farm. SLF 7 leachate may also be removed from T-107 by vacuum truck and transferred to AWT for treatment and/or transferred to an outbound tanker for treatment or disposal.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-107 SLF 7 WET WELL TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	350 storage	leachate	SLF 7	aboveground	2,765 gallons	350 gallons	visual
T-110 SLF 10 WET WELL TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	350 storage	leachate	SLF 10	aboveground	15,709 gallons	3,000 gallons	visual
T-111 SLF 11 WET WELL TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	350 storage	leachate	SLF 11	aboveground	15,709 gallons	10,000 gallons	visual
T-108 SLF 7/11 HOLD TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	10,000 storage	leachate	SLF 11	aboveground	15,709 gallons	10,000 gallons	visual
T-109 SLF 10 HOLD TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	3,000 storage	leachate	SLF 10	aboveground	15,709 gallons	3,000 gallons	visual

SLF 1-11 Oil/Water Separator Building

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-158 OIL/WATER SEPARATOR TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	steel	17,000 treatment	leachate, offsite and onsite aqueous wastes	East of Leachate Tank Farm	aboveground	24,876 gallons	17,000 gallons	visual
T-159 AQUEOUS TANK	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	FRP	1,000 storage	leachate, aqueous wastes	East of Leachate Tank Farm	aboveground	24,876 gallons	17,000 gallons	visual

D. SLF 12 Leachate System

Leachate generated by SLF 12 is pumped from the SLF 12 landfill leachate pumps into the SLF 12 lift station tank (T-150). Nonhazardous onsite generated aqueous wastes (i.e., site waters) may also be added to tank T-150. The aqueous wastes received by the lift station are transferred by a pump to the Leachate Tank Farm through above ground piping.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-150 LIFT STATION	control level indicator and controller	carbon steel	8,000 storage /treatment	leachate, onsite generated aqueous wastes	SLF 12 Lift Station	above ground	18,388 gallons	8,000 gallons	visual

Tank T-160 and Lift Station for RMU-1 are located within the northern footprint of proposed new landfill Residuals Management Unit No. 2 (RMU-2). Tank T-160 and Lift Station will be closed in accordance with the Sitewide Closure Plan and will be demolished for the construction of the later northern phases of RMU-2. Therefore, new underground piping from RMU-1 will be installed to transfer leachate to tank T-150. Additionally, RMU-2 leachate will be pumped to T-150 through new underground piping. T-150 will be upgraded with new pumps to management the leachate from SLF-12 and RMU-1 and proposed RMU-2. The existing above ground piping used for transferring aqueous wastes from T-150 to the Leachate Tank Farm will be replaced with underground piping.

E. RMU - 1 Leachate System

Leachate generated by RMU-1 is pumped from the RMU-1 landfill leachate pumps and tank T-165 into the RMU-1 lift station tank (T-160). The leachate received by the lift station is transferred by pump through double walled underground piping and aboveground piping, then to the Leachate Tank Farm through aboveground piping.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-160 LIFT STATION	automatic shut off and level indicator with high and high/high level alarms (PLC controlled)	carbon steel	3,000 storage/ treatment	leachate	RMU-1 Landfill	above ground	7,563 gallons	3,000 gallons	visual
T-165	automatic shut off and level indicator with high and high/high level alarms	Glass fused carbon steel	876,769 storage	leachate	RMU-1 Landfill	above ground	913,155 gallons	889,529 gallons	visual

Tank T-160 and Lift Station are located within the footprint of proposed new landfill Residuals Management Unit No. 2 (RMU-2). Tank T-160 and Lift Station will be closed in accordance with the Sitewide Closure Plan and will be demolished for the construction of later phases of RMU-2. Tank T-165 will be retained for future management of leachate from RMU-2.

F. Leachate Storage Tanks T-101, T-102, T-103 and Frac Tank #3

The Leachate Tank Farm contains three (3) leachate storage tanks which are used to collect the aqueous phase leachate from active and closed landfills as well as other site waters. The leachate is held in the tanks and transferred to the AWTS on a demand basis. Also, located within this secondary containment area is Frac Tank # 3 which is used for storage of aqueous waste prior to treatment at the AWTS or SLF 7 leachate prior to offsite shipment for treatment or incineration.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-101 STORAGE (southern)	level indicator and controller and overflow pipe to sump	carbon steel	350,000 storage/ treatment	aqueous waste	East of North Salts	above ground	500,959 gallons	392,765 gallons	visual
T-102 STORAGE (middle)	level indicator and controller and overflow pipe to sump	carbon steel	350,000 storage/ treatment	aqueous waste	East of North Salts	above ground	500,959 gallons	392,765 gallons	visual
T-103 STORAGE (northern)	level indicator and controller and overflow pipe to sump	carbon steel	350,000 storage/ treatment	aqueous waste	East of North Salts	above ground	500,959 gallons	392,765 gallons	visual
FRAC TANK #3	level indicator with high and high/high level alarms (PLC controlled)	carbon steel	21,000 storage	aqueous waste	East of North Salts	above ground	500,959 gallons	392,765 gallons	visual

G. Waste Stabilization Facility

Stabilization is a process that results in the reduction in the mobility (or leachability) of hazardous components within a hazardous waste matrix. This stabilization is accomplished by inducing a chemical reaction between the hazardous components and one or more reagents, such as cement, cement kiln dust, lime, flyash or other pozzolanic materials.

Typical materials to be stabilized are inorganic waste water treatment sludges, media with metals, contaminated soils, sand blast grit, incinerator ash, incinerator slag, emissions control dust and debris. These waste streams are chemically compatible and have no reactive properties, therefore, compatibility concerns are minimal.

Waste Profiles are carefully reviewed for EPA codes, components, types of metals present and stabilization recipe (type and quantity of reagents). Generally, bulk loads are processed as individual batches. Drum or other small quantities of waste and bulk loads that have similar characteristics, non-conflicting EPA waste codes and the same stabilization recipe may be combined to increase the batch size for processing.

Waste water from equipment wash down or compatible hazardous and non-hazardous gate receipts may be used as the water source in the recipe. The EPA codes will be tracked through the process tankage and the impact on the treatment standards will be assessed for each batch prior to processing. Alternatively, city water or non-hazardous site waters may be used to avoid code conflict.

The bulk waste material to be stabilized arrives at the site in dump trailers, rolloff boxes, drums, pneumatic trailers, and other types of containers. The waste can be wet, sticky, cohesive, dusty and contain rock, pipe sections, metal, concrete, rags, wire and other debris.

The majority of the waste that requires stabilization is deposited in a mixing basin. Reagents are metered into the basin in accordance with a predetermined recipe. Water is added to the mixture, and the waste with reagent and water is mixed to a homogeneous mixture. The stabilized waste mixture is then removed from the pit with a backhoe, loaded into a dump truck or container, and transported to the landfill or an off-site disposal facility. Waste in drums can be emptied into the pit using a forklift and drum handler or placed full into the pit and broken apart with the mixing backhoe.

Microencapsulation is a specified technology involving the immobilization of contaminants on debris by stabilization. Stabilization treatment is performed in the mixing basin (pit) system. As it is not possible to develop a waste stream specific recipe, the requirement is to utilize sufficient stabilization media to treat all surfaces. For material or debris that is not easily manageable in the mixing pits, a slurry of stabilization media can be mixed in the pit and transferred into the waste container where the material will be encapsulated.

Debris that may not be physically suitable for the stabilization equipment, or that contains organic contamination (e.g. pump contaminated with leachate) may be managed by macroencapsulation. This type of debris is placed in a non-degradable container such as a poly drum or HDPE box. The void space is then eliminated by the addition of stabilization material that does not need to be held and tested or other non-degradable absorbent/space filler. The container is then permanently sealed and disposed of in the landfill.

Stabilization-Northern Expansion Tanks

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
MIXING PIT 1	visual observation during operation	carbon steel	20,354 treatment	RCRA/TSCA wastes	Stab. Northern Expansion	underground	Double walled underground tank	Double walled underground tank	sensor probe
MIXING PIT 2	visual observation during operation	carbon steel	20,354 treatment	RCRA/TSCA wastes	Stab. Northern Expansion	underground	Double walled underground tank	Double walled underground tank	sensor probe

Stabilization-Southern Expansion Tanks

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
TA-1 PROCESS WATER	high level indicator	rubber lined carbon steel	20,000 storage	aqueous waste, miscellaneous site waters	Stab. Southern Expansion	above ground	28,174 gallons	24,739 gallons	visual
TA-2 PROCESS WATER	high level indicator	rubber lined carbon steel	20,000 storage	aqueous waste, miscellaneous site waters	Stab. Southern Expansion	above ground	28,174 gallons	24,739 gallons	visual

H. Truck Wash Facility

The Truck Wash Facility is comprised of the Truck Wash Building and the Truck Wash Bay. A collection tank (T-120) is contained in the Truck Wash Building for holding wash water accumulated as a result of washings from the Truck Wash Bay. Tank T-120 is permitted for hazardous waste in case collected wash waters are determined to be hazardous.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-120 WASH WATER STORAGE	electronic level control	FRP	1,650 storage	wash water	Truck Wash Building	aboveground	1,659 gallons	1,650 gallons	visual

I. Groundwater Pumping Systems

The groundwater pumping system tanks were constructed as part of the Corrective Measures Program at Model City. Originally installed as Interim Corrective Measures to check the spread of groundwater contamination and, ultimately, to improve groundwater quality in the affected areas, these systems were determined to be capable of achieving the goals of the Corrective Action Program and were made Final Corrective Measures by the NYSDEC on February 13, 2001.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	TANK CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-8001	level indicator with high and high/high level alarms (PLC controlled)	carbon steel	5,000 storage	groundwater	West Drum Area	above ground	6,445 gallons	5,000 gallons	visual
T-8002	level indicator with high and high/high level alarms (PLC controlled)	FRP	550 storage	groundwater	West Drum Area	above ground	6,445 gallons	5,000 gallons	visual
T-8004	level indicator (PLC controlled)	FRP	550 storage	groundwater	South of SLF 3	above ground	892 gallons	550 gallons	visual
T-8005	automatic shut off and high level alarm	carbon steel	300 storage	groundwater	South of SLF 10	above ground	356 gallons	300 gallons	visual
T-8006	automatic shut off and high level alarm	carbon steel	300 storage	groundwater	East of SLF 12	above ground	356 gallons	300 gallons	visual
T-8007	automatic shut off and high level alarm	FRP	500 storage	groundwater	South of PCB Warehouse	above ground	539 gallons	500 gallons	visual
T-8008	automatic shut off and high level alarm	FRP	500 storage	DNAPL	Tank T-125/T-100 Area	above ground	571,328 gallons	424,410 gallons	visual
T-8009	automatic shut off and high level alarm	HDLPE	525 storage	groundwater	Inside T.O. Building CSA	above ground	853 gallons	525 gallons	visual
T-8010	automatic shut off and high level alarm	HDPE	1,000 storage	groundwater	South of South Trailer Parking CSA	above ground	1,300 gallons	1,000 gallons	visual

J. Process and Secondary Containment Sump Systems

SUMP	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
FILTER PRESS SUMP SYSTEM	daily visual inspection and pumped as needed	concrete with FRP insert	175 storage	aqueous waste/floor washdowns	Filter Press Room AWTS Building	underground	Sump provided with FRP box insert and leak detection.	N/A- double walled sump	leak detection view pipe
AWTS BLDG. UNLOADING PAD SYSTEM	daily visual inspection and pumped as needed	concrete	14,851	aqueous waste/floor washdowns	South side of AWTS Building	underground	N/A - part of containment for unloading pad	N/A - part of containment for unloading pad	not required
AWTS BLDG. FLOOR SUMP SYSTEM	daily visual inspection and pumped as needed	concrete	230	aqueous waste/floor washdowns	Floor in AWTS Building	underground	N/A - part of containment for building	N/A - part of containment for building	not required

K. Fuels Tanks

The fuels tanks in the Process Area were previously used for bulking, storage and transfer of fuel and incinerable wastes such as PCB liquids, sludges and organic wastes. These tanks provided for the separation of solvent, oil and incinerable material, disposal of wastewater and sludge, and the blending and storage of fuels and incinerables for off-site shipment. All fuels tanks have been emptied, cleaned, removed and certified closed. Final closure of the secondary containment and underlying soils for all fuels tank areas is being addressed as part of the facility Corrective Measures.

K. Fac Pond 5 Tank

The facultative pond tank will be located on the berms of the surface impoundment. The tank will store waters pumped from the secondary collection sump of the impoundment. The surface impoundment (facultative pond) are used for storage of treated effluent from the AWTS.

TANK #	OVERFLOW CONTROL	MATERIAL OF CONSTRUCTION	CAPACITY IN GALLONS AND USAGE	CONTENTS	GENERAL LOCATION	VERTICAL LOCATION	SECONDARY CONTAINMENT VOLUME	REQUIRED CONTAINMENT VOLUME	LEAK DETECTION
T-9001	automatic shut off and level indicator with high level alarm	HDPE	1,100 storage	Secondary Leachate/Leak detection waters	East Berm of Fac Pond 5	above ground	Double walled tank	N/A	visual/leak detection valve

IV. PROCEDURES TO PREVENT HAZARDS

A. Inspections

Tanks will be inspected and evaluated according to the procedures and schedules provided in the CWM Inspection Plan.

B. Tank Inspection Criteria

Environmental Compliance Tank Inspection Criteria will generally include inspection items such as:

- above ground tank exterior free of signs of leakage, including discoloration that may be a residue of a prior release.
- above ground tank exterior free of signs of deterioration that could lead to potential leakage, including cracks, corrosion, defects, and obvious deformation.
- above ground tank ancillary equipment free of signs of leakage
- secondary containment shows no visible evidence of spills
- secondary containment intact and free of cracks which exhibit separation and coating is free of chips which expose the underlying concrete
- secondary containment not holding liquids for more than is allowable under the Inspection Plan
- overfill controls (where present) do not indicate overflow condition; overfill controls (where present) are operable
- liquids (not including condensate) not present in leak detection systems (visual or electronic indication); electronic leak detection systems (where present) are operable

C. Tank Assessments

All permitted hazardous waste tank systems must undergo a periodic assessment performed by an independent professional engineer who must certify that the tank is fit for continued use. Generally, all above ground tanks with secondary containment and leak detection are assessed once every five years. For certain tanks, an internal inspection is also required. The double walled, underground stabilization mixing pits and the AWTS floor sump are subjected to an annual, internal assessment. The assessment frequency and whether the tank will be internally inspected are specified in the attached Tank Assessment Schedule. In addition, all secondary containments and sumps associated with permitted tank systems are inspected by a qualified inspector every year. Tank assessment and secondary containment inspection reports are submitted to the NYSDEC each year.

Tanks T-3010A, T-3010B, T-3010C, and T-3010D are part of the arsenic treatment system and will be periodically changed out as part of normal operations. During regular tank change out installations, CWM personnel will inspect the system components prior to start up to insure they are installed properly. In addition, the tanks, along with the associated flexible hoses and their connections, involved in the change out will be re-tested for tightness in accordance with the procedure specified in Section 3.2 of the "Tank System Design and Assessment Report for AWTS Arsenic Removal Tanks T-3010A/B/C/D". Also, prior to start up, CWM will comply with the requirements in Condition C.1.i.ii."b" of Exhibit D in Schedule 1 of Module I of the Permit. During start up after tank change out, CWM will visually inspect the system components to insure they are free of leaks and that any deficiencies are addressed immediately. Documentation of each tank change out, and associated tightness testing and installation inspections will be maintained on-site for Department review.

D. Overflow Protection

Generally, most tanks within the AWT system are connected to a programmable logic controller (PLC). This unit is programmed to continuously monitor tank level, pump status and valve positions for the process vessels. The logic in the PLC is arranged so that pumps are shut down should levels become too low or reach a pre-determined high or high-high level.

Tanks that are not equipped with mechanical or electronic overflow protection generally contain an overflow pipe which is directed into the tank's secondary containment. As part of normal operations, the process operators and department supervisors make visual checks of the status of the operation. Overflow conditions would be identified at that time. In addition, the Site Inspector inspects each permitted tank on a daily basis.

E. Repairs

When a system deficiency is identified by any of the above inspection programs, it will generally be repaired immediately, if possible. Otherwise, action will be initiated with an environmental or maintenance work order by the end of the next business day. The time period to complete a repair varies depending on the type and extent of the deficit. Some repairs, such as outdoor concrete work or coating applications cannot be efficiently completed during winter conditions. Major defects affecting human health or the environment such as a tank leak, require immediate action by taking the unit out of service. After repairs have been completed, the area will be re-inspected and the repairs will be documented on the work order or by a subsequent tank assessment or secondary containment inspection report.

V. REQUIREMENTS FOR IGNITABLE, REACTIVE AND INCOMPATIBLE WASTE STREAMS

The facility Waste Analysis Plan addresses the special hazards and compatibility concerns for tank storage. Ignitable or reactive wastes will only be placed in tanks which are designed for storage of ignitable or reactive wastes unless the tank is used for an emergency. The aqueous waste treatment system is equipped with treatment tanks designed to react and mix wastewaters requiring special treatment or handling techniques. These tanks are closed top tanks meeting the buffer zone requirements of NFPA Combustible Liquids Code (1984). All tanks must be at least 50 feet internal to property lines or public roadways. NFPA 30 sets minimum buffer distances required for Class I, II and IIIB materials at 5 feet from a building. The distance increases depending on capacity.

Process wastewater, other site water or city water may be added prior to the addition of concentrated incoming wastewaters to control the generation of significant heat during mixing. All reaction vessels and tanks which could be subject to significant chemical reactions are equipped with the appropriate level, pH and/or temperature monitoring devices.

Mixing of incompatible wastes, which could produce an uncontrolled reaction is avoided by adhering to a prescribed process for purging and flushing of all process lines and tanks following transfer operations.

Incompatible wastes which could produce an uncontrolled reaction will not be mixed in storage tanks. Control of waste mixtures in storage tanks will be accomplished by actual laboratory bench tests if the material to be stored in a tank is different than the existing stored material.

Procedures to prevent incompatible mixtures in tanks are detailed in the Waste Analysis Plan. Materials that indicate signs of reaction which may exceed the design specifications of the vessel will not be stored in the same tank. Hazardous wastes will not be placed into an unwashed tank which previously held an incompatible waste or material.

VI. AIR EMISSION STANDARDS

Air emission standards for tanks are specified in 6NYCRR 373-2.29 and 40CFR 264/265.1080-1091 (Subpart CC), which became effective on December 6, 1996. RCRA Subpart CC is applicable to owners and operators of a TSDF which treats, stores or disposes of hazardous waste containing greater than 500 ppmw volatile organics in tanks, surface impoundments and containers. If Subpart CC wastes are managed in tanks, either Level 1 or Level 2 controls must be implemented.

Level 1 controls are based on the size of the tank, vapor pressure of the waste contained in the tank and the use of the tank. As long as the tank and its contents meet the specifications below, Level 1 controls consisting of a fixed roof with no cracks, gaps or leaks (conservation vents and relief devices are allowed) are sufficient. All closure devices must be maintained in the closed position except when necessary to access the waste or equipment under the cover.

Tank size (gallons)	Maximum vapor pressure
≥ 40,000	< 5.2 kPa (< 0.75 psi)
≥ 20,000 but < 40,000	< 27.6 kPa (< 4.5 psi)
< 20,000	< 76.6 kPa (< 11.1 psi)

Level 2 controls are required for tanks that do not meet the Level 1 criteria and for tanks in which stabilization of wastes with greater than 500 ppmw volatile organics is performed. Level 2 tanks must be vented to a control device. Stabilization (any physical or chemical process used to reduce the mobility of hazardous constituents or eliminate free liquids, except for the addition of absorbent to the surface of a waste without mixing) must be performed in an enclosure vented to a control device.

Based on volatile organic content of the leachate from SLF 1-6, SLF 7, SLF 10 and SLF 11, the lift stations and collection tanks associated with these landfills, as well as the SLF 1-11 oil/water separator system and the leachate storage tanks in the Leachate Tank Farm, are subject to Subpart CC requirements. Based on vapor pressure, Level 1 controls are sufficient for these tanks. Tanks associated with SLF 12 and RMU-1 contain leachate with less than 500 ppmw volatile organics at the point of origin and are exempt from Subpart CC requirements.

AWTS tanks associated with the treatment of leachate from SLF 1-6, SLF 7, SLF 10 and SLF 11 are also subject to Subject CC requirements. These tanks must also meet Level 1 controls based on the vapor pressure of the waste. All AWTS tanks downstream of the carbon adsorbers contain treated wastewater meeting the exit concentration and are exempt from Subpart CC requirements. Other AWTS tanks, e.g., the special treatment tanks, may be used for wastes containing greater than 500 ppmw volatile organics and would then be subject to Subpart CC requirements.

CWM limits the types of waste processed through the stabilization facility to those containing less than 500 ppmw volatile organics. Therefore, the stabilization mixing pits are exempt from Subpart CC requirements. Liquids contained in tanks TA-1 and TA-2 contain less than 500 ppmw volatile organics and are exempt from Subpart CC requirements.

Tanks associated with the groundwater pumping systems are part of the facility corrective measures and are exempt from Subpart CC requirements.

APPENDIX D-3, SECTION VII

TANK ANCILLARY EQUIPMENT TIGHTNESS TESTING PROCEDURES FOR UNDERGROUND HAZARDOUS WASTE TRANSFER LINES

VII. Procedures for Pressure Testing of Underground Hazardous Waste Transfer Lines

The procedures in this section are not required for leachate piping under waste within the boundaries of a landfill liner and piping associated with the river discharge of treated wastewater.

1. **Procedures for Hydrostatic Testing the Inner Carrier Pipe of Double-Walled Underground Transfer Lines:**

The Permittee shall perform either of the two (2) hydrostatic test procedures specified below, as derived from the "Plastic Pipe Institute=s (PPI=s) Technical Report 31 (TR-31)". The Permittee, at its discretion, may use a "tracer" (e.g., dye, etc.) in the water used in these tests to differentiate it from other liquids that may be present. The pressure measurement device used in either of these procedures must be incremented at, and sensitive to pressure fluctuations of 1 psi or less. Also, regardless of which test is used, the Permittee shall, throughout the test=s duration, periodically inspect the down-gradient end of the outer containment pipe associated with the section of inner carrier pipe being tested, for signs of liquid discharge. If liquid discharge is observed, or if a tracer is used and it is detected in the liquid, it shall be assumed to be leakage.

a. Pressure Drop Procedure -

1. Pipe to be tested shall be filled with fresh water or Department approved alternate, and have all air bled off from its highest point.
2. Pipe shall be pressurized to not less than 1.5 times the system operating pressure with a minimum of 11 psi.
3. Maintain this test pressure for four (4) hours by adding sufficient liquid at hourly intervals as necessary, to each time re-establish the test pressure.
4. Drop the pressure by 10 psi, and measure and record the pressure one (1) hour thereafter. If the final pressure is within 5% of this reduced pressure, the pipe has passed the test.

If any pipe fails to pas the above test, prior to initiating any leak location and repair activities, the Permittee, at its discretion, may perform the Volume Loss Procedure specified in Sub-section Ab@ below to verify that the pressure loss is not due to pipe expansion.

b. Volume Loss Procedure -

1. Pipe to be tested shall be filled with fresh water or Department approved alternate, and have all air bled off from its highest point.

2. Pipe shall be pressurized to not less than 1.5 times the system operating pressure with a minimum of 11 psi.
3. Maintain this test pressure to compensate for pipe expansion for four (4) hours by adding sufficient liquid at hourly intervals as necessary, to each time re-establish the test pressure.
4. After the four (4) hour expansion period, the test period shall begin lasting a maximum of three (3) hours. At hourly intervals, liquid shall be added as necessary, to each time re-establish the test pressure. The amount of liquid which is added, if any, shall be measured and recorded each hour.
5. The amount of liquid added after the first hour of the test period and, if necessary, the cumulative amounts added after hours two (2) and three (3), shall be compared to the Expansion Allowance Criteria presented in Table VIII-1 at the end of this Section.
6. If the cumulative quantity of liquid added each hour is equal to, or less than the applicable quantity presented in Table VIII-1, the pipe has passed the test.

2. **Procedure for Testing the Outer Containment Pipe of Double-Walled Underground Transfer Lines:**

The test procedure which follows must be performed prior to burying or otherwise obscuring from view, the installed, or repaired/altered section of the outer containment pipe.

a. Air Pressure Procedure -

1. Pipe to be tested shall be pressurized with air at ambient temperature to not less than 1.5 times the system operating pressure with a minimum of 10 psi.
2. After a minimum of one (1) hour of stabilization, the pipe shall be re-pressurized, if necessary, to re-establish the test pressure.
3. At one-quarter (1/4) hour intervals (i.e., every 15 minutes) after the end of the stabilization period, the pressure will be measured using a pressure measure device which is incremented at, and sensitive to pressure fluctuations of 1 psi or less. These pressure measurements shall be recorded. Also, each time a pressure measurement is taken, at a minimum, the entire length of the newly installed pipe, or the length of the repaired/altered section, shall be inspected for any visible or audible signs of escaping air.

4. The test period shall be a minimum of one (1) hour and shall terminate with a final check of the pressure and inspection of the pipe. The test shall be considered passed if there are no visible or audible signs of escaping air along the pipe and there is no detectable pressure drop.

Table VII 1
Allowances for Plastic Pipe Expansion Under Test Pressure
(Gallons per 100 feet of pipe)

Nominal Pipe Size (inches)	**1-Hour Test Duration (gals. / 1 hr.)**	**2-Hour Test Duration (gals. / 2 hrs.)**	**3-Hour Test Duration (gals. / 3 hrs.)**
3	0.10	0.15	0.25
4	0.13	0.25	0.40
6	0.30	0.60	0.90
8	0.50	1.0	1.5
10	0.75	1.3	2.1
11	1.0	2.0	3.0
12	1.1	2.3	3.4

APPENDIX D-3, SECTION VIII

TANK SYSTEM ASSESSMENT TABLE

Tank ID	Most Recent Assessment prior to January 2004 (year)	Internal Tank Inspection Required (yes/no)	Tank ID	Most Recent Assessment Prior to January 2004 (year)	Internal Tank Inspection Required (yes/no)
T-710	2002	no	T-810	2002	no
T-820	2002	no	T-850	1997	yes
T-1010	1999	yes	T-1020	1999	yes
T-1111	2003	no	T-1112	1999	no
T-1310	2003	no	T-3011	2003	no
T-3012	2002	no	T-100	1999	yes
T-125	1999	no	T-8008	2002	no
T-58	2003	yes	T-210	2001	yes
T-220	2010[3]	no	T-230	2003	yes
T-310	2001	no	T-320	2001	no
T-3010A	2013[5]	no	T-3010B	2013[5]	no
T-3010C	2013[5]	no	T-3010D	2013[5]	no
T-3007	1999	yes	T-3008	1999	yes
T-52	2003	no	T-3001	1999	no
T-3002	1999	no	T-3003	1999	no
T-3009	2000	yes	T-105	2003	yes
T-130	1999	yes	T-107	2001	no
T-108	2001	no	T-109	2001	no
T-110	2001	no	T-111	2001	no
T-158	2001	no	T-159	2001	no
T-150	2003	yes	T-160	2002	no
T-165	2010[3]	yes	T-101	1999	yes
T-102	1999	yes	T-103	1999	yes
Frac Tank 3	1999	no	Mix Pit Tank 1	2003[1]	yes
Mix Pit Tank 2	2003[1]	yes	TA-1	2003	no

Tank ID	Most Recent Assessment prior to January 2004 (year)	Internal Tank Inspection Required (yes/no)	Tank ID	Most Recent Assessment Prior to January 2004 (year)	Internal Tank Inspection Required (yes/no)
TA-2	2003	no	T-120	1999	no
T-8001	1999	no	T-8002	1999	no
T-8004	1999	no	T-8005	1999	no
T-8006	1999	no	T-8007	2001	no
T-8009	2012[4]	no	T-8010	2012[4]	no
Filter Press Sump Tank	2003[2]	yes	T-9001	2014[5]	no

FOOTNOTES:

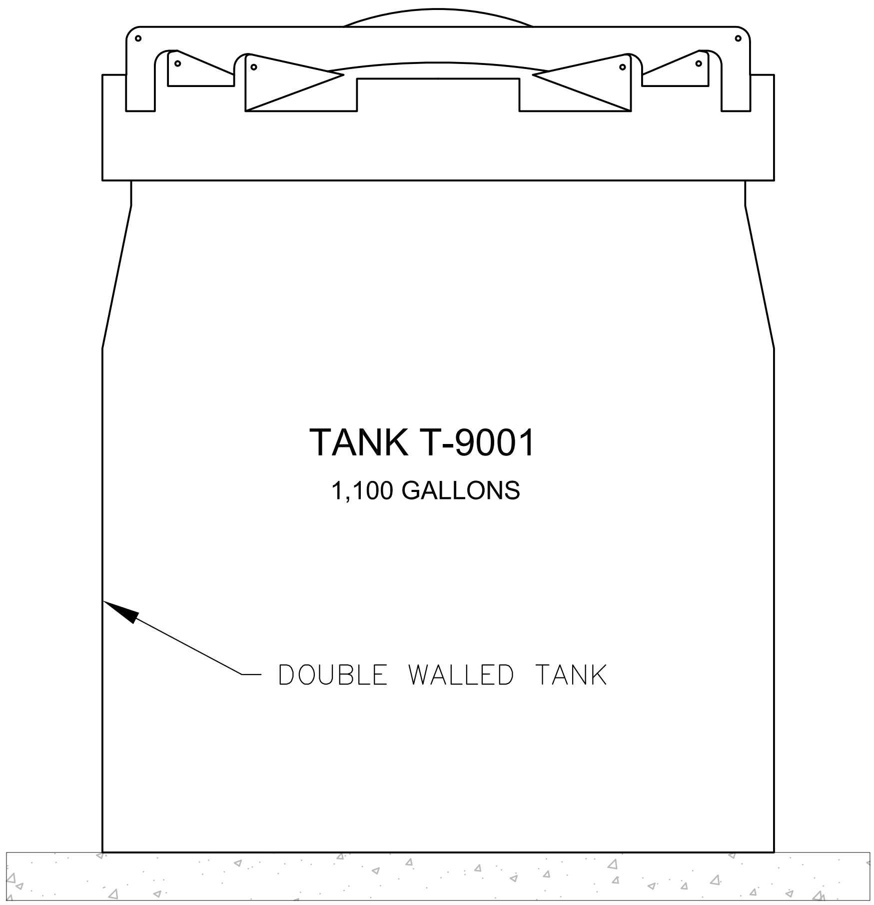
1. Mix Pit Tanks 1 & 2 shall be assessed annually instead of every five years in accordance with Condition B.1.c.i in Exhibit D of Schedule 1 of Module I of the Permit.
2. The Filter Press Tank Sump shall be assessed annually instead of every five years since it is part of the AWT secondary containment system, in accordance with Condition B.1.c.i in Exhibit D of Schedule 1 of Module I of the Permit.
3. Year of Tank T-165 & T-220 installation assessment.
4. Year of Tank T-8009 & T-8010 installation assessment.
5. Year of Tank T-3010A, T-3010B, T-3010C & T-3010D initial assessment. These tanks shall be re-assessed upon each operational change out in accordance with Condition C.1.i.ii."b" of Exhibit D in Schedule 1 of Module I of the Permit.
6. Year of Tank T-9001 installation assessment.

Application Appendix D-3, Figures & Capacity Calculations

for Tank Systems' Secondary Containment

FIGURE D-36

TANK T-9001



PROFILE

SCALE: 1' 0' 1' 2'

FAC POND 5 TANK T-9001

6NYCRR PART 373 PERMIT

CWM CHEMICAL SERVICES LLC

TOWN OF PORTER, STATE OF NEW YORK

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Environmental Solutions
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FAX (716) 285-3928

FIGURE D-36

10/28/13 | PN: 13-7028

X:\AAAp\CWM\13-7028 Sitewide Permit Sec Cont Calcs Updates (Task 9) \Fac Ponds 1-2 & 5 (Figs D-36 & D-37) \ACAD\13-7028-D-36-37 - FAC POND 1-2 & 5 TANKS.dwg, 10/29/2013 8:38:31 AM, awellington

DOUBLE WALLED ABOVEGROUND STORAGE TANK