



Civil & Environmental Consultants, Inc.

*Celebrating 25 Years*

April 8, 2014

Mr. Blake Arthur  
Ohio Department of Natural Resources  
Division of Oil and Gas Resources Management  
2045 Morse Road  
Columbus, OH 43229

Dear Mr. Arthur:

Subject: Application to Operate a Facility  
Weavertown Transport Leasing, Inc.  
50810 State Route 7  
New Matamoras, OH 45767  
CEC Project 112-048

On behalf of Weavertown Transport Leasing, Inc. (WTL), Civil & Environmental Consultants, Inc. (CEC) is pleased to submit this Application to Operate a Facility (Application) to the Ohio Department of Natural Resources (ODNR). The subject facility is located at 50810 State Route 7, New Matamoras, Ohio 45767 and will be referenced as the WTL Processing Facility herein. Drilling mud/cuttings solidification, brine treatment for re-use and TENORM down-blending processes are included in this Application.

This Application includes the following items for ODNR authorization:


- ODNR Form DNR 1509.22 (12/2013);
- WTL Processing Facility Application to Operate a Facility (supporting narrative and referenced documents); and,
- Drawings.

Please contact me at the 614-545-1260 if you have any questions or require additional information regarding this submittal.

Sincerely,

**CIVIL & ENVIRONMENTAL CONSULTANTS, INC.**

  
Roy A. Stanley, CPG  
Project Manager

  
Duane Lanoue, P.E.  
Principal

cc: Mr. Daryl Heiser, WTL  
Mr. Eric Meduho, WTL

Enclosures

**APPLICATION TO OPERATE A FACILITY**  
OHIO DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL AND GAS RESOURCES MANAGEMENT  
2045 MORSE ROAD, BUILDING F-2  
COLUMBUS, OHIO 43229-6693  
(614) 265-6922

<b>1.</b>	Name of Applicant: <u>Weavertown Transport Leasing, Inc.</u>	Phone #: <u>(800) 746-4850</u>
	Address: <u>2 Dorrington Road, Carnegie, PA 15106</u>	
	Date: <u>April 7, 2014</u> eMail Address: <u>dheiser@weavertown.com</u>	
	For an Order or a Permit to Operate: <input type="checkbox"/> Existing Facility <input checked="" type="checkbox"/> New Facility	
<b>2.</b>	<b>PURPOSE OF FACILITY:</b> <input checked="" type="checkbox"/> Storage <input checked="" type="checkbox"/> Recycling <input checked="" type="checkbox"/> Treatment (Check all that Apply) <input checked="" type="checkbox"/> Processing <input type="checkbox"/> Disposal	
<b>3.</b>	<b>TYPE OF MATERIAL:</b> <input checked="" type="checkbox"/> Brine <input checked="" type="checkbox"/> Drill Cuttings <input checked="" type="checkbox"/> Drilling Mud <input checked="" type="checkbox"/> Other Waste Substance (explain) <u>Tank Heel, TENORM down-blending</u>	
<b>4.</b>	<b>If a Business Entity, list the statutory agent and include a certified copy of their appointment:</b> Name: <u>Daryl Heiser, Vice President</u> Address: <u>2 Dorrington Road, Carnegie, PA 15106</u>	
<b>5.</b>	<b>Engineer of Record:</b> Name: <u>Duane Lanoue</u> Address: <u>3333 Baldwin Road, Pittsburgh, PA 15205</u> Ohio Professional Engineering License Number: <u>E-61772</u>	
<b>6.</b>	<b>Address of Facility:</b> Address: <u>50810 State Route 7, New Matamoras, OH 45767</u> County: <u>Washington</u> Township: <u>Grandview</u> Municipal Corporation: <u>New Matamoras, Ohio</u> Latitude: <u>39.511089</u> Longitude: <u>-81.077043</u>	
<b>7.</b>	<b>Write a brief description of the facility and operations:</b> <u>Drilling mud/cuttings and cement water solidification, brine liquids storage and treatment for re-use. Also TENORM down-blending. Additional information attached.</u>	
<b>8.</b>	<b>Include all information as set forth in the "Guidelines for Application for Chief's Order". Attach Additional Documents</b>	

I, the undersigned, being first duly sworn, depose and state under penalties of law, that I am authorized to make this application, that this application was prepared by me or under my supervision and direction, and that the facts stated herein are true, correct, and complete, to the best of my knowledge.

I certify that the facility will comply with or is currently in compliance with all provisions of Chapter 1509 ORC, Chapter 1501 OAC, and all terms and conditions of orders and permits issued by the Chief, Division of Oil and Gas Resources Management.

Signature of Authorized Agent Daryl Heiser

Name (Type or Print) DARYL HEISER Title CORPORATE VICE PRESIDENT

Sworn to and subscribed before me this the 8 day of APRIL, 2014.

COMMONWEALTH OF PENNSYLVANIA  
Notarial Seal  
Rosemary A. Vulcano, Notary Public  
Peters Twp., Washington County  
My Commission Expires June 30, 2017  
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

Rosemary A. Vulcano  
(Notary Public)

June 30, 2017  
(Date Commission Expires)



RELEASE FORM

To all Courts, Probation Departments, Selective Service Boards, Credit Bureaus, Employers, Educational Institutions, Banks, Financial and Other Such Institutions, and all Governmental Agencies (federal, state and local, without exception, both foreign and domestic):

I, Daryl Heiser, as an owner, officer, director, partner, stockholder or key employee of an Applicant Business Concern or Non-Applicant Business Concern or holder of an Ohio Environmental Protection Agency solid, infectious, or hazardous waste license, or permit, have authorized the Attorney General of Ohio to conduct an investigation into my background for the purpose of determining the suitability of the company with which I am affiliated to hold a solid, infectious, or hazardous waste license or permit, as provided under Sections 3734.41-.47 of the Ohio Revised Code.

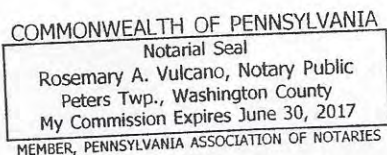
Therefore, you are hereby authorized to release any and all information pertaining to me, documentary or otherwise, as requested by an appropriate employee, agent or representative of the Attorney General.

This authorization shall supersede and countermand any prior request or authorization to the contrary. A copy of this authorization will be considered as effective as the original.

Daryl Heiser  
(Signature)

4-8-2014  
(Date)

Sworn to and subscribed before me this 8 day of APRIL, 2014.



Rosemary A. Vulcano  
Notary Public

My Commission Expires June 30, 2017

*Under Ohio Revised Code 2921.11 and 2929.11, perjury is a felony of the third degree; punishable by imprisonment for one to ten years and a fine up to \$5,000. Under Ohio Revised Code 2921.13 and 2929.21, falsification is a misdemeanor of the first degree; punishable by imprisonment for six months and a fine up to \$1,000.*

**APPLICATION TO OPERATE A FACILITY**  
**WTL PROCESSING FACILITY**  
**GRANDVIEW TOWNSHIP, WASHINGTON COUNTY, OHIO**

*Prepared for:*

**WEAVERTOWN TRANSPORT LEASING, INC.**  
**CARNEGIE, PENNSYLVANIA**

*Prepared by:*

**CIVIL & ENVIRONMENTAL CONSULTANTS, INC.**  
**COLUMBUS, OHIO**

**CEC Project 112-048**

**April 2014**



Civil & Environmental Consultants, Inc.



## Table of Contents

<b>1.0</b>	<b>INTRODUCTION.....</b>	<b>1</b>
1.1	PTI APPLICATION ORGANIZATION.....	1
<b>2.0</b>	<b>FACILITY DESCRIPTION .....</b>	<b>3</b>
2.1	FACILITY LOCATION .....	4
2.2	SITE DESCRIPTION.....	4
2.3	ADJACENT PROPERTY USES.....	5
2.4	FACILITY LAYOUT.....	5
<b>3.0</b>	<b>DESIGN CONSIDERATIONS.....</b>	<b>6</b>
<b>4.0</b>	<b>FACILITY DESIGN.....</b>	<b>9</b>
4.1	FACILITY ACCESS, ROADS AND STAGING AREAS .....	9
4.2	PROCESSING FACILITY BUILDING.....	10
4.2.1	SOLIDIFICATION BASIN.....	11
4.2.2	TRUCK UNLOAD FLOOR.....	11
4.2.3	TRANSFER RAMP.....	11
4.2.4	UNLOAD DOCK .....	11
4.2.5	DRUM STORAGE AREA .....	12
4.2.6	BRINE PROCESSING AREA .....	12
4.2.7	LABORATORY AND OFFICE AREA.....	12
4.3	BULK LIQUID STORAGE TANKS .....	13
4.4	LEACHATE MANAGEMENT SYSTEM .....	13
4.5	EROSION CONTROL SYSTEM .....	16
4.6	TENORM DOWN-BLENDING PROCESS.....	17
<b>5.0</b>	<b>FACILITY OPERATION.....</b>	<b>18</b>
5.1	FACILITY CONSTRUCTION .....	18
5.2	FACILITY ACCESS .....	19
5.3	ACCEPTABLE WASTE MATERIALS.....	19
5.4	WASTE ACCEPTANCE PROCEDURE.....	19
5.4.1	Waste Profiles .....	19
5.4.2	Hauler Registration and Required Documents .....	20
5.4.2.1	Waste Quantity Determination .....	20
5.4.3	Incoming Waste Segregation and Tracking.....	21
5.4.3.1	Classification Specific Log Sheets.....	21
5.5	WASTE BULKING, SOLIDIFICATION AND OUT-BOUND TRANSFER OPERATIONS .....	22
5.5.1	Shipment Verification and Compatibility Evaluation Process .....	22
5.5.2	Description of In-House Testing.....	24
5.5.3	Outbound Transfer Waste Profiles.....	28
5.6	BRINE PROCESSING.....	29
5.7	TENORM RADIATION PROTECTION PROGRAM .....	32
5.8	LEACHATE MANAGEMENT SYSTEM MAINTENANCE.....	32
5.9	EROSION CONTROL SYSTEM MAINTENANCE.....	33
5.10	CONTINGENCY PLANS.....	33
5.10.1	Discovery of Unauthorized Wastes .....	33
5.10.2	Fire, Explosion, and Spills .....	34

## Table of Contents (Continued)

	5.10.3 Equipment Failure.....	34
	5.10.4 Flooding .....	34
<b>5.11</b>	<b>RECORD KEEPING.....</b>	<b>35</b>
	5.11.1 Daily Logs.....	35
	5.11.2 Annual Operational Report.....	36
<b>6.0</b>	<b>FACILITY CLOSURE.....</b>	<b>37</b>
<b>6.1</b>	<b>CLOSURE NOTIFICATIONS.....</b>	<b>37</b>
	6.1.1 Final Closure Contact .....	37
<b>6.2</b>	<b>CLOSURE ACTIVITIES.....</b>	<b>38</b>
<b>6.3</b>	<b>RIGHT OF ENTRY.....</b>	<b>39</b>
<b>6.4</b>	<b>FINANCIAL ASSURANCE .....</b>	<b>39</b>

## DRAWINGS (24" X 36")

Sheet 1	DWG NO.	1A	Title Sheet
Sheet 2	DWG NO.	2A	Site Environs
Sheet 3	DWG NO.	3A	Site Layout
Sheet 4	DWG NO.	3B	Processing Facility Building Plan
Sheet 5	DWG NO.	3C	Processing Facility Building Section Views
Sheet 6	DWG NO.	3D	Waste Handling Areas Plan and Details
Sheet 7	DWG NO.	3E	Solidification Basin Details
Sheet 8	DWG NO.	3F	Erosion Control Plan
Sheet 9	DWG NO.	3G	Storm Profiles
Sheet 10	DWG NO.	3H	Erosion Control Notes and Details
Sheet 11	DWG NO.	3I	Erosion Control Details
Sheet 12	DWG NO.	3J	Process Flow Diagram

## APPENDICES

Appendix A	Property Ownership
Appendix B	Letter of Map Amendment (LOMA) Approval
Appendix C	Ohio River Offset Correspondence
Appendix D	Storm Water Modeling Calculations
Appendix E	Waste Profile Form
Appendix F	Brine Treatment Equipment Specifications
Appendix G	Radiation Protection Plan
Appendix H	Financial Assurance Instrument

## **1.0 INTRODUCTION**

Weavertown Transport Leasing, Inc. (WTL) proposes to re-develop their property located in Grandview Township, Washington County, Ohio for use as an oil and gas exploration and production (E&P) waste material processing facility. The proposed WTL Processing Facility that will provide solidification of non-hazardous E&P wastes (primarily drilling muds, cement water and drill cuttings), temporary brine storage for transfer to a Class II disposal well as well as brine treatment for re-use, and down-blending of refined oil-based (ROB) muds and other E&P wastes that are considered non-exempt technically enhanced naturally occurring radioactive material (TENORM) as defined in the Ohio Administrative Code (OAC) 3701:1-43-01(H). The facility will operate in compliance with the Ohio Revised Code (ORC) 1509.22. The E&P waste streams will be primarily generated located in eastern Ohio, western West Virginia and western Pennsylvania. .

WTL owns and operates a similar solidification and processing facility located in Cecil, Pennsylvania which operates under a Residual Waste Permit issued by the Pennsylvania Department of Environmental Protection (PADEP). The WTL Cecil facility received approximately 40,000 tons of residual material at the Cecil facility in 2011. WTL has never received a violation notice from PADEP associated with the operation of the Cecil Pennsylvania facility.

This Application presents information and data pertaining to the siting, design, construction and operation of the proposed processing facility. WTL is the permit applicant and will be the operator of the proposed WTL Processing Facility. This Application presents a concise, yet comprehensive discussion of the proposed WTL Processing Facility.

### **1.1 PTI APPLICATION ORGANIZATION**

The organization of the Application is intended to provide a description of the WTL Processing Facility including the proposed design and operation of the facility. This Application includes the following sections and drawings:.

#### **Section 1.0 – Introduction**

Presented as Section 1.0, the Introduction provides the organization of the Application.



## Section 2.0 - Facility Description

The Facility Description is provided in Section 2.0 of the Application. This section provides a description of the current site conditions, the proposed facility including physical layout and operations; ownership and surrounding land use information; and an overview of the waste management practices that will be employed at the facility.

## Section 3.0 – Siting Criteria

The Siting Criteria, presented as Section 3.0, provides discussions related to how the proposed facility complies with the ODNR proposed requirements and restrictions for permitting, constructing, and operating a E&P waste material processing facility.

## Section 4.0 – Facility Design

The Facility Design aspects will be presented in Section 4.0 to provide descriptions related to, but not limited to, the facility layout, facility access, storm water management and control, and leachate management.

## Section 5.0 - Facility Operation

Section 5.0 Facility Operation discusses details describing acceptance and processing procedures that will be followed at the facility.

## Section 6.0 – Closure Plan

Methods incorporated to close the WTL Processing Facility, including a discussion of the financial assurance for the final closure and proposed notifications, scheduling, and monitoring are presented in Section 6.0.

## **2.0 FACILITY DESCRIPTION**

The WTL Processing Facility will process/solidify and transfer non-hazardous liquid and solid waste streams. The WTL Processing Facility will be owned and operated by:

Weavertown Transport Leasing, Inc.  
2 Dorrington Road  
Carnegie, Pennsylvania 15106

The WTL Processing Facility is located on property owned by WTL since the mid-1980's and includes two parcels located in Grandview Township, Washington County, Ohio. An ALTA/ACSM survey drawing and property deeds are provided in Appendix A – Property Ownership. Section 2.2 below provides additional information regarding the WTL property.

The facility has been designed to include the following waste processing services:

- Solidification of E&P wastes consisting of liquids (non-brines), sludges and solids prior to transport to licensed municipal solid waste landfill;
- Brine storage and processing for re-use; and
- Down-blending E&P Technically Enhanced Naturally Occurring (TENORM) material.

Liquid and semi-solid materials which do not pass the paint filter test will be off-loaded into a solidification basin for solidification (drying and bulking), then transported to a licensed municipal solid waste landfill. Drying, bulking and solidification agents will include commercially available products, including, but not limited to, lime and kiln dust.

Brine storage and processing will be determined by the final disposition of the water. Brine scheduled to be transported directly to an injection well will not be treated, but may be temporarily stored. Brine selected for re-use will be pumped to the Brine Processing Area and will be treated using physical and chemical processes described in Section 5.6. Treated effluent will be pumped into processed brine bulk storage tanks and re-used for E&P needs.

Incoming solids and sludges that have been classified as non-exempt TENORM will be down-blended at the WTL Processing Facility prior to shipment to licensed landfill. All solids and sludge shipments entering the WTL Processing Facility will be accompanied by a generator

waste profile and screened for radioactivity at the scale. If the material is known to be or appears to be non-exempt TENORM, it will be scheduled for down-blending following laboratory radiation testing. This Application includes detailed procedures describing the TENORM down-blending process and safety procedures in Section 4.6.

## **2.1 FACILITY LOCATION**

The WTL Processing Facility will be located in Grandview Township, Washington County, Ohio, approximately 1 mile south of the Village of New Matamoras, Ohio (please refer to Drawing 1A – Title Sheet). The facility property address is 50810 State Route (S.R.) 7, New Matamoras, Ohio 45767. The facility property is bound by SR 7 to the northwest, 1<sup>st</sup> Avenue to the northeast, the Ohio River to the southeast, and an American Electric Power (AEP) substation and additional property owned by WTL to the southwest. Access to the site will be from three existing driveways off S.R. 7.

## **2.2 SITE DESCRIPTION**

Site features including the topography of the property are presented on Drawing No. 2A - Site Environs. The facility property is elevated approximately 25 feet above the Ohio River and is otherwise relatively flat lying. The WTL property is approximately 10.47 acres and was formerly used as a Shell Oil Tank Farm and a portion of the property is currently leased by Green-Hunter for temporary storage of E&P brine. Green-Hunter's lease includes an approximate 5,600 square foot brick commercial building and an existing tank farm containing three above ground storage tanks that are approximately 1.2 to 1.7 million gallons each in volume. The lease includes appurtenances associated with the tank farm including a pump island for tanker truck loading and a barge unloading station consisting of piping and a catwalk that is approximately 170 feet long.

The proposed WTL Processing Facility building and staging areas are also shown on Drawing No. 2A – Site Environs. All waste handling areas will be enclosed and under roof. The Processing Facility building is approximately 11,825 square feet and includes a 30-foot wide by 58-foot long by 8-foot deep solidification basin with concrete secondary containment, 840 square foot drum storage area, a 2,400 square foot brine processing area and a 320 square foot on-site laboratory and office area. Above ground storage tanks will be used for temporary storage and/or processing of brine.



## **2.3 ADJACENT PROPERTY USES**

The land adjacent to the property along S.R. 7 is used mainly for residential and retail business purposes. 1<sup>st</sup> Avenue to the northeast is residential. As stated previously, AEP operates a substation which is contiguous to the WTL property at the southwest boundary. The Ohio River to the southeast is a major shipping waterway for commercial and industrial material transportation.

## **2.4 FACILITY LAYOUT**

The WTL Processing Facility can be segregated into waste handling areas, truck scale, office and laboratory, staging areas and the bulk liquid tank farm. Drawing 3A – Site Layout shows the facility boundary and site access from S.R. 7, the Processing Facility building, tank farm, truck scale and roll-off container staging areas and TENORM staging area. TENORM materials awaiting laboratory testing results and down-blending will be temporarily stored along the southeastern boundary in a concrete contained staging area.

Waste handling areas are under roof with the Processing Facility building include the following:

- Solidification Basin;
- Truck Unload Floor;
- Transfer Ramp;
- Unload Dock;
- Drum Storage Area; and,
- Brine Processing Area.

Drawing 3B – Processing Facility Plan presents the locations of each of these waste handling areas at the proposed facility. Details of the WTL Processing Facility design are presented on Drawing 3C – Processing Facility Building Section Views and in Section 4.0 – Facility Design. Facility operation is discussed in Section 5.0.

### 3.0 DESIGN CONSIDERATIONS

The proposed WTL Processing Facility building is located with the following design considerations in mind.

**The Processing Facility building is not located in a regulatory floodplain.** The Federal Emergency Management Agency (FEMA) Firmette Map, Panel 164 of 479 indicated that the WTL property was within the regulatory floodplain. However, inspection of the WTL property elevations compared to the floodplain elevation in the site vicinity indicated that much of the property was mistakenly included in the floodplain by FEMA. Thus, WTL and CEC submitted a request for a Letter of Map Amendment (LOMA) from FEMA, which was approved in a letter dated March 15, 2012. The Processing Facility building is no longer in the regulatory floodplain. The FEMA approval letter is included in Appendix B – LOMA Approval.

**The Processing Facility building is not located within two hundred feet of any surface waters of the state, as defined in rule 3745-1-02 of the Administrative Code.** WTL has attained agreement from the Ohio EPA Southeast District Office (SEDO) that the Ordinary High Water Mark (OHWM), that is defined by the U.S. Corp of Engineers, represents the 200 foot offset position from the Ohio River. Appendix C – Ohio River Offset Correspondence provides correspondence between CEC and Ohio EPA SEDO regarding use of the OHWM for the surface water offset criteria. Please refer to Drawing No. 2A – Site Environs to observe the 200 foot surface water offset. The Processing Facility waste handling areas are not located within 200 feet of any surface waters of the state.

**The Processing Facility building is not located in any of the following areas, in existence on the date of the Application:**

- (1) **National park or recreation area.** The Processing Facility is not located within a national park or recreation area.
- (2) **Candidate area for potential inclusion in the national park system.** The Processing Facility is not located within a candidate area for potential inclusion in the national park system.
- (3) **State park or established state park purchase area.** The Processing Facility is not located within a state park or established state park purchase area.

- (4) **Any property that lies within the boundaries of a national park or recreation area but that has not been acquired or is not administered by the secretary of the United States Department of the Interior.** The Processing Facility is not located within the boundaries of a national park or recreation area.

**The Processing Facility building is not located within five hundred feet of the following, which are in existence on the date of the Application:**

- (1) **Areas designated by the Ohio Department of Natural Resources as either a state nature preserve, a state wildlife area, or a state scenic river.** The Processing Facility building is not located within 500 feet of a state nature preserve, a state wildlife area, or a state scenic river.
- (2) **Areas designated, owned, and managed by the Ohio Historical Society as a nature preserve.** The Processing Facility is not located within 500 feet of an area designated, owned, and managed by the Ohio Historical Society as a nature preserve.
- (3) **Areas designated by the United States Department of the Interior as either a national wildlife refuge or a national scenic river.** The Processing Facility building is not located within 500 feet of either a national wildlife refuge or a national scenic river.
- (4) **Areas designated by the United States Forest Service as either a special interest area or a research natural area in the Wayne National Forest.** The Processing Facility building is not located within 500 feet of a special interest area or a research natural area in the Wayne National Forest.
- (5) **Surface waters of the state designated by the Ohio EPA as either a state resource water, a coldwater habitat, or an exceptional warm water habitat, as classified in accordance with Chapter 3745-1 of the Administrative Code.** The Processing Facility building is not located within 500 feet of surface waters of the State of Ohio designated as a state resource water, a coldwater habitat, or an exceptional warm water habitat.



**The Processing Facility building is not within two hundred fifty feet of a domicile in existence on the date of the Application.** The Processing Facility building is not located within 250 feet of a domicile. Please refer to Drawing No. 2A – Site Environs for the 250 foot offset position from the closest domiciles.

## **4.0 FACILITY DESIGN**

This section of the Application provides discussions and information pertaining to the following facility design features:

- Facility Access, Roads, and Staging Areas;
- Processing Facility Building including:
  - Solidification Basin;
  - Truck Unload Floor;
  - Transfer Ramp;
  - Unload Dock;
  - Drum Storage Area;
  - Brine Processing Area; and,
  - Laboratory and Office Area.
- Bulk Liquid Storage Tanks;
- Leachate Management System;
- Erosion Control System; and,
- TENORM Down-Blending Process.

Drawing 3A – Site Layout identifies the plan location of each of the features of the Processing Facility. Details of the WTL Processing Facility design are presented on Drawings 3B - Processing Facility Building Plan and 3C – Processing Facility Building Section Views. A narrative description of each area is provided in the following sections. Please note that WTL will work with the contracted architect to attempt to direct lighting at the facility away from nearby residences.

### **4.1 FACILITY ACCESS, ROADS AND STAGING AREAS**

There are three (3) existing entrances to the WTL facility. The primary entrance to the Processing Facility will be from the northern-most existing entrance. If needed, improvements will be made to widen the approach apron at each of these entrances prior to operation of the facility. The existing middle entrance will be used for employees and visitors to the existing office building.

The main access road, bulk storage staging areas and the surface surrounding the Processing Facility building will be covered with asphalt. Reinforced concrete pavement will be used for

approach aprons at the Processing Facility building and the TENORM staging area. Surface water runoff and control will be provided as necessary through the proper grading and catch basins as described in Section 4.5 - Erosion Control System. Drawing No. 3A – Site Layout, identifies these road and staging area surfaces.

Each site entrance will have appropriate sized gates which will remain locked when the facility is not in operation. A sign will be posted at the gate which will provide the following information:

- Facility name;
- Facility address;
- Operator name and address;
- Facility contact name and telephone number;
- Facility license number;
- Hours of operation;
- Directions of how and where to proceed through the facility; and,
- Grandview Township Volunteer Fire Department telephone number.

A sign will also be posted at the Processing Facility scale which provides the same information as previously listed.

## **4.2 PROCESSING FACILITY BUILDING**

The Processing Facility building will be a four-sided, steel frame structure with metal siding built on reinforced concrete foundation/footers and floor slabs. The structure is approximately 11,825 square feet and includes a Solidification Basin that consists of several water-tight, welded steel boxes that are contained within a reinforced concrete secondary containment basin. The Truck Unload Floor, Transfer Ramp, Unload Dock, Drum Storage Area and Brine Processing Area will be reinforced concrete which will provide adequate capability to withstand the forces and weights of the equipment and containers during normal facility operations. The building layout is presented as Drawing No. 3B - Processing Facility Building Plan.

Ramps and aprons surrounding the structure will be constructed of reinforced concrete. Asphalt surfaces will be used for the remainder of the approaches to the building and concrete ramps/aprons.

Details of the waste handling areas and the laboratory/office are provided below.



#### **4.2.1 SOLIDIFICATION BASIN**

The Solidification Basin is an approximate 30 feet by 58 feet by 8 feet deep concrete structure where several water-tight, steel boxes will be contained which will be used for solidification of incoming shipments. The reinforced concrete secondary containment will be 12 inches thick on all sides and will be sloped to a low point where water used to clean spillage will be drained to the leachate collection sump. The drain will consist of a dual contained pipe and valve system that will extend from the low area in the secondary concrete containment, through the wall of the concrete containment and into the leachate collection sump. Drawing 3B – Processing Facility Building Plan provides the plan view of these features and Drawing 3D – Waste Handling Area Plan and Profiles provides details of each of these features.

#### **4.2.2 TRUCK UNLOAD FLOOR**

The Truck Unload Floor will have approximate dimensions of 58 feet by 50 feet and will be constructed of reinforced concrete. The truck unload area floor will be sloped to force spills during truck unloading or from wet cleanup to drain into the Solidification Basin. Overhead doors will allow the Truck Unload Floor to be secured and will minimize noise. A 6 inch diameter steel wheel stop will be positioned approximately 18 inches above the concrete floor and adjacent to the Solidification Basin to prevent trucks from backing into the basin.

#### **4.2.3 TRANSFER RAMP**

The Transfer Ramp will be a reinforced concrete structure that will slope downward 6 feet below the Truck Unload Floor. This will allow a hydraulic excavator to easily load the transfer trailers with solidified material from the Solidification Basin. Empty transfer trailers will be backed into the sloped ramp and pulled forward after loading. This ramp will also be used to unload and load brine trucks.

#### **4.2.4 UNLOAD DOCK**

The Unload Dock will be used primarily for delivery of drummed, non-hazardous waste materials and other miscellaneous supply deliveries. The Unload Dock will be constructed of reinforced concrete that will slope downward to 4 feet below the Truck Unload Floor. The dock will be 12 feet wide to allow for truck access and roll-off containers that will be used for off-site transport of compatible solids, crushed drums and other drummed waste. This dock ramp will also be used to unload and load brine trucks.

#### **4.2.5 DRUM STORAGE AREA**

The Drum Storage Area is an approximate 30 foot by 28 foot area constructed with a reinforced concrete floor that is adjacent to the Unload Dock and the Solidification Basin. Waste delivered to the facility in drums will be documented and evaluated (including appropriate laboratory testing) and either temporarily stored or combined with other compatible drummed material for off-site shipping following receipt of laboratory testing and compatibility evaluation. Emptied drums will be cleaned for re-use or crushed prior to off-site disposal.

#### **4.2.6 BRINE PROCESSING AREA**

The Brine Processing Area is an approximate 58 foot by 42 foot area and will house equipment used to process brine for re-use. The brine processing system is designed for a maximum capacity of 100 gallons per minute (gpm). A description of the system may be found in Section 5.6. Most of the large tanks associated with this system will be contained in an outside tank farm with containment. The Brine Processing Area will be within the Processing Facility building and will contain most of the treatment system. The processing equipment layout is shown on Drawing 3B – Processing Facility Building Plan. Drawing 3J – Process Flow Diagram presents the brine treatment system. The pumps and chemical feed systems will be aligned on either wall. The filter skid will be located in the rear of the room. An electrical room, next to the laboratory/office, will contain electrical gear associated with the treatment system. A man-door and 16 foot overhead door will provide access to the area.

#### **4.2.7 LABORATORY AND OFFICE AREA**

The Laboratory and Office Area is approximately 28 feet by 11 feet and is constructed with a reinforced concrete floor that is adjacent to the Drum Storage Area. The laboratory will be equipped with a hood area, appropriate analytical devices, including a hand held radiation detector, and a refrigerator for temporary sample storage. Routine waste screening analyses will be performed in the on-site laboratory; however, more detailed waste characterization testing will be routinely shipped to an accredited off-site laboratory. All documents associated with waste testing and operation of the transfer station facility will be filed in the Laboratory and Office Area.

### **4.3 BULK LIQUID STORAGE TANKS**

The WTL Processing Facility will include storage of brine and treated effluent from the brine processing area in the Bulk Liquid Storage Tanks. The above ground tank farm will consist of one (1) 500 barrel frac tank (“Rock Box”) used to removed coarse debris and sediments from the incoming loads, one (1) 400 barrel skim oil tank, one (1) 400 barrel thickener tank, one (1) 1,000 barrel equalization/raw brine tank and three (3) 1,000 barrel processed brine tanks. The combined raw and processed brine storage capacity is 168,000 gallons. The tanks will meet American Petroleum Institute (API) specification 12F (API 12F). A water-tight, concrete secondary containment structure will surround the tanks and is sized to retain the volume of one 1,000 barrel tank plus a 6-inch rainfall event. The base of the concrete containment structure will slope to a sump which will be used to pump out precipitation that falls into the structure. Access to the tanks will consist of a steel stair and catwalk platform. Brine stored in the tank farm will be processed in the Brine Processing Area.

### **4.4 LEACHATE MANAGEMENT SYSTEM**

There will be six (6) areas within the Processing Facility Building (enclosed structure) where management of liquids and solids (i.e. waste handling areas) will occur, including the:

- 1) Solidification Basin;
- 2) Truck Unload Floor;
- 3) Transfer Ramp;
- 4) Unload Dock;
- 5) Drum Storage Area; and,
- 6) Brine Processing Area.

The Leachate Management System will not discharge treated or untreated water to local sewers or surface waters. The Leachate Management System is designed to collect any spillage or leaks from the steel mixing boxes and potential leaks and spillage in each of the other waste handling areas listed above. The concrete floors are designed to slope toward catch basins located in each of the waste handling areas listed above. There is expected to be spillage as the solidified material is transported from the Solidification Basin to the transfer trailers. Otherwise, there is potential for minor spillage of liquids and solids from incoming trucks and tankers, perhaps from minor drips during unloading of trucks, splashing of liquids in the Solidification Basin,

unloading drummed solids or from unloading of brine. The Leachate Management System described below was designed with these considerations in mind.

Drawing 3D – Waste Handling Areas Plan and Details, provides the locations of these catch basins. Spills of stabilized material during loading in the Transfer Ramp area are collected in an enclosed/isolated catch basin and will be removed using a vacuum truck or other vacuum device. Spills on the Truck Unload Floor will be sprayed or swept into the Solidification Basin. Spillage in the Brine Processing Area will be removed using a vacuum truck or other vacuum device and transported back to one of the Bulk Liquid Tanks. Spills and liquids collected in the Unload Dock and Drum Storage Area will drain to the enclosed/isolated catch basins in each of these areas and will be removed using a vacuum truck or other vacuum device. If the materials removed from these isolated catch basins are non-hazardous, they can be deposited into the Solidification Basin for stabilization. Hazardous materials from these catch basins will be placed in appropriate containers, labeled and transported off-site to a licensed hazardous waste processor or disposal facility.

Drawing 3D – Waste Handling Areas Plan and Details and Drawing 3E – Solidification Basin Details present plan view and section details of the Leachate Management System. The reinforced concrete floor and Solidification Basin will prevent leachate infiltration and allow for either dry or wet cleanup of these areas. The concrete floors and ramps will be regularly inspected for cracks or other degradation and repaired, if required. Catch basins will be dual-contained including PolyDrain channels that will be set in reinforced concrete structures with a waterproof coating. Double-walled HDPE piping will be used to transfer liquids and sludges from the Solidification Basin to the central manhole sump and ultimately back to the steel solidification boxes in the Solidification Basin. Descriptions of each of the waste handling areas included in the Leachate Management System area provided below:

**Solidification Basin:** As stated above, the Solidification Basin is designed to contain several water-tight steel solidification boxes set within a concrete secondary containment. Splashing from the steel boxes and spillage of materials during loading of the transfer trailers will collect in the concrete containment structure which will be cleaned regularly using wet-dry cleaning methods. Liquids and sludges generated during cleaning will be piped to the central manhole sump and pumped back to the steel solidification boxes contained in the concrete Solidification Basin. A vacuum truck or other vacuum device will also be used to remove spilled solids and sludges from the concrete Solidification Basin. The central manhole sump will have a grinder pump that is capable of pumping liquids and solids back to the steel solidification boxes.

**Truck Unload Floor:** The Truck Unload Floor will be graded from the overhead door entrances toward the Solidification Basin, which will promote drainage or clean-up of spilled liquids or solids. Wet/dry clean-up of spilled liquids and solids will consist of spraying and/or sweeping the spilled materials directly into the Solidification Basin.

**Transfer Ramp:** The Transfer Ramp is designed to slope to an enclosed/isolated catch basin that will be cleaned out using a vacuum truck or other vacuum device. Spillage that occurs during transfer trailer loading will undergo dry or wet clean-up by pushing or washing the material into the trench-style catch basin positioned at the lowest area of the ramp. A vacuum truck or other vacuum device will be used to remove liquids and sludges from the isolated catch basin. Material from this catch basin will be transported to the Solidification Basin for stabilization. If a brine spill occurs in the Transfer Ramp, a vacuum truck will be used to remove the material from the catch basin and transfer the liquid to the Bulk Liquid Tanks.

**Unload Dock:** The Unload Dock is also designed to slope to an enclosed/isolated catch basin that will be cleaned out using a vacuum truck or other vacuum device. Spillage that occurs at the Unload Dock will undergo dry or wet clean-up by pushing or washing the material into the trench-style catch basin positioned at the lowest area of the dock. A vacuum truck or other vacuum device will be used to remove liquids and sludges from the isolated catch basin. Material from this catch basin will be transported to the Solidification Basin for stabilization. If a brine spill occurs in the Unload Dock, a vacuum truck will be used to remove the material from the catch basin and transfer the liquid to the Bulk Liquid Tanks.

**Drum Storage Area:** The Drum Storage Area floor will slope to an enclosed/isolated catch basin that will be cleaned out using a vacuum truck or other vacuum device. Spillage that occurs at the Drum Storage Area will undergo dry or wet clean-up by pushing or washing the material into the trench-style catch basin positioned at the lowest area of the floor in this area. A vacuum truck or other vacuum device will be used to remove liquids and sludges from the isolated catch basin. Material from this catch basin will be transported to the Solidification Basin for stabilization.

**Brine Processing Area:** The Brine Processing Area floor will slope to an enclosed/isolated catch basin and will be cleaned out using a vacuum truck or other vacuum device. Spillage that occurs at the Brine Processing Area will undergo dry or wet clean-up by pushing or washing the material into the isolated catch basin. Spillage collected in the isolated catch basin will be



removed using a vacuum truck or other vacuum device and transported back to one of the Bulk Liquid Tanks.

#### **4.5 EROSION CONTROL SYSTEM**

The existing stormwater conveyance system at the WTL Processing Facility is currently located in the southern portion of the processing facility, in the vicinity of the existing office building and pump island. This system currently discharges to the Ohio River. The existing surface conditions are asphalt paving at the three (3) existing entrances to the facility, around the existing office building and also around the existing pump island. Remaining areas of the site are currently grass covered.

The proposed stormwater conveyance system will direct runoff from the Processing Facility building area, staging areas, access areas and roads to the detention basin located in the northeastern site area. All roads, staging areas and aprons will be constructed of either asphalt or concrete. Runoff will be routed into the stormwater catch basins and then piped through the conveyance system into the detention basin. The detention basin will detain the 100 year, 24 hour storm event and will slowly release stormwater using the primary outlet structure and will also include a forebay and micropool. The detention basin will also include an emergency spillway for larger storm events. The location of the existing and proposed stormwater conveyance systems are presented on Drawing No. 3F – Erosion Control Plan. Stormwater modeling calculations are included in Appendix D.

Proposed catch basins in the vicinity of the Processing Facility staging and access areas will be constructed with FloGard® (or approved equivalent) filtration devices, which consist of a multi-model, flexible-body, catch basin insert designed to collect silt, debris and petroleum hydrocarbons from stormwater runoff.

A combination of silt fence, erosion control blankets and dandy bags will be incorporated to aid in managing and controlling sediment during the construction of the facility. Silt fence will be placed at the perimeter of the proposed grading areas. Erosion control blankets will be placed where the grading is greater than 3:1 (detention basin area) and dandy bags will be placed as inlet control protection at any existing or proposed stormwater catch basins. Details and notes describing the construction erosion controls are provided on Drawing 3F – Erosion Control Plan, Drawing 3G – Storm Profiles and Drawings 3H and 3I – Erosion Control Notes and Details.

#### **4.6 TENORM DOWN-BLENDING PROCESS**

Down-blending of non-exempt E&P TENORM materials will consist of mixing with exempt TENORM materials, earthen materials or commercially available products, such as lime and kiln dust, in order to reduce radiation to exempt concentrations of Radium 226 and 228. Down-blending will occur in the Solidification Basin inside the Processing Facility building. Temporary storage of non-exempt TENORM material (as determined by the generator, laboratory analysis or radiation monitoring equipment) will occur at the reinforced concrete TENORM staging area located east of the Processing Facility building as shown on Drawing 3A – Site Layout. Operational details and safety protocol describing the non-exempt TENORM down-blending process are provided in Section 5.7.

## **5.0 FACILITY OPERATION**

The WTL Processing Facility will be operated following standard WTL operating procedures. Operations will be in compliance with the approved plans and specifications developed for the facility and the terms and conditions of the approved Application. The day-to-day operations and maintenance will be under the responsible charge of a certified operator who has completed the operator training as required by rules adopted pursuant to Chapter 3734 of the ORC. The certified operator will be on site throughout the normal operating hours for the facility and will be thoroughly knowledgeable of the operations and the facility Contingency Plans (refer to Section 5.10 – Contingency Plans). WTL will operate the proposed facility 24 hours per day, seven days per week.

WTL does not anticipate that odors will be a problem or a nuisance at the facility based on their existing operation located in Cecil, Pennsylvania. However, in order to distance neighbors from any potential waste material odors, WTL will attempt to stage full or partially full roll-off containers as far as possible from the nearest domiciles located along 1<sup>st</sup> Avenue which borders the northern boundary of the facility. WTL will stage full and partially-full roll-off containers primarily in Roll-Off Container Area 3 and Area 4 shown on Drawing 3A – Site Layout. TENORM material awaiting laboratory testing results will be stored in the TENORM staging area shown on Drawing 3A. Roll-Off Container Staging Area 1 and Area 2 will be used primarily to store empty roll-off containers. In addition, WTL will construct a privacy fence along S.R. 7 and 1<sup>st</sup> Avenue adjacent to the Roll-Off Container Areas, as shown on Drawing 3A, which will effectively reduce noise and will be more aesthetically pleasing to the surrounding neighbors.

### **5.1 FACILITY CONSTRUCTION**

Construction of the facility will be in accordance with the plans and specifications approved as part of the Application. Alterations or modifications to the approved facility design and construction will not be incorporated without first obtaining the approval of the ODNR. For any substantial expansion or relocation of the Processing Facility building from the approved design, WTL understands that approval of a new ODNR permit may be required.

Upon completion of the facility construction, WTL will submit a certification report to ODNR indicating that the Processing Facility was constructed in accordance with all terms and conditions of the approved Application which includes the approved design plans and

specifications. The certification will include a discussion and project record drawings of any and all alteration(s) and modification(s) made during the construction activities. Operations at the WTL Processing Facility will not begin until the ODNR has performed an inspection of the facility to ensure that the facility was constructed in accordance with the approved Application, all necessary equipment to operate the facility is present, the financial assurance instrument has been completed and funded, and the construction certification report has been submitted.

## **5.2 FACILITY ACCESS**

Access to the facility will be from Ohio State Route (S.R.) 7. Only commercial hauling companies will be allowed access to the WTL Processing Facility. WTL personnel will be directed to report unauthorized visitors to the facility manager. All solid and semi-solid loads will be required to pass over the scales prior to proceeding to a staging or unload area. All other visitors to the site will proceed to the parking area outside of the existing WTL office building where they must sign in and out. Commercial traffic will enter and exit the facility from the northern-most existing driveway. Existing facility driveways are shown on Drawing No. 3A – Site Layout.

## **5.3 ACCEPTABLE WASTE MATERIALS**

WTL will accept only E&P wastes (liquids, semi-solids and solids) for solidification and for transfer to a licensed municipal solid waste (MSW) landfill, Class II brine injection well or for brine treatment and re-use. Non-exempt E&P TENORM materials will also be accepted for down-blending prior to disposal at a licensed MSW landfill.

WTL will post signs at the scale entrance which will indicate that only E&P wastes will be accepted for processing and transfer. Transporters of the unacceptable materials will be turned away and directed to the nearest facility that is licensed to accept these materials.

## **5.4 WASTE ACCEPTANCE PROCEDURE**

### **5.4.1 Waste Profiles**

WTL will require that E&P waste generators prepare waste profiles for all incoming waste streams. The waste profile sheet will provide generator certification that the waste material is not a hazardous waste as defined in OAC 3745-51-03 or other non-E&P waste and will include waste generator identification and location, waste generation description and available laboratory

analyses. A blank waste profile form is included in Appendix E – Waste Profile Form of this Application. WTL will evaluate each waste profile submittal to determine if the waste material can be accepted at the WTL Processing Facility.

#### 5.4.2 Hauler Registration and Required Documents

Upon arrival at the site, WTL will initially verify that waste hauling vehicles are licensed for waste hauling. All shipments accepted at the WTL Processing Facility will have complete shipping documents, and a waste profile sheet with accompanying analytical results. Each waste profile will be assigned a unique tracking number that will correlate with the facility's tracking system discussed in Section 5.4.3 below.

WTL will conduct additional evaluation of incoming waste shipments as needed to supplement and/or confirm the waste profile information. Additional evaluation may include radiation screening, bench scale testing (describe below) and/or off-site laboratory testing. Results of any additional waste evaluation will be included with the waste profile information and stored in the WTL record files.

Transporters that arrive at the WTL Processing Facility without the proper paperwork will be held in a designated parking area. The transporter and/or generator will be notified of any paperwork or permit discrepancies. If the discrepancy can be resolved by phone, email or fax, then the load will then be directed to the designated unloading or staging area. If the discrepancy cannot be resolved, the load will be rejected and, if needed, directed back to the waste generator. WTL will direct a rejected load back to the generator immediately.

##### 5.4.2.1 Waste Quantity Determination

Trucks, with the exception of brine loads, will be routed to the on-site scale for gross weight measurement. For incoming loads that will undergo facility processing, the net weight of the shipment will be determined following unloading of the material, then by returning the truck to the scale for the net weight calculation. In-transit loads will be weighed to provide a gross weight record; however, the net weight of the material will be determined following transport to the final destination (i.e. solid waste landfill, injection well facility or recycling facility) and recorded in the facility's master log sheet.



### 5.4.3 Incoming Waste Segregation and Tracking

Each load that arrives at the WTL Processing Facility will initially be evaluated to determine its handling classification. Each load will be given a unique tracking number that will identify the load as it goes through the facility. Incoming shipments will be classified as either 1) in-transit storage, 2) waste processing (solidification or dry bulking) or 3) brine processing. A trained WTL technician will determine which classification is appropriate for the incoming shipment based on comparison of the visually observed physical properties of the shipment to the waste profile information. Definitions of the waste handling classifications are provided below:

**In-Transit Storage:** Shipments that are only being temporarily stored at the facility prior to final routing to a licensed landfill or injection well facility will be identified as in-transit storage. Bulking will not take place with this material. It will be shipped out in the same waste container that it was received in (i.e. roll-off container, drums, vacuum truck, tank trailer, etc.). Shipments of this type will be logged in on the facility's in-transit storage log sheet for record keeping purposes only.

**Waste Processing:** These shipments are being accepted at the facility for bulking into larger containers or for solidification prior to bulking into larger containers. Some shipments will be sorted by type or by generator prior to bulking into larger containers. Down-blending of non-exempt TENORM materials is included in this process.

**Brine Processing:** Brine being accepted for processing at the facility will be bulked into the tanks located in the Bulk Liquid Storage Area. Incoming shipments will be unloaded to the bulk tanks at the Transfer Ramp and Unload Dock.

#### 5.4.3.1 Classification Specific Log Sheets

Each incoming shipment will be logged in on a separate, classification-specific log sheet which is specific to one of the three handling classifications described above, including the in-transit processing, transfer processing, or brine processing classifications. Each shipment will be assigned a unique manifest number on the classification specific log sheet which will include waste classification and processing identification numbers.

After a shipment is logged in on the classification-specific log sheet, it will be routed to a staging area until shipment verification and compatibility evaluation is completed.

## **5.5 WASTE BULKING, SOLIDIFICATION AND OUT-BOUND TRANSFER OPERATIONS**

### **5.5.1 Shipment Verification and Compatibility Evaluation Process**

Each waste shipment that is received at the Processing Facility for waste processing will go through the following screening process: 1) review the waste profile information for completeness and accurate facts; 2) review of the generators analysis and/or MSDS sheets; 3) observe physical properties of the waste shipment and compare against the waste profile sheet; and 4) sample the waste shipment as per approved methodology for bench scale or off-site laboratory analysis (if needed). Sampling of waste shipments arriving at the WTL Processing Facility will follow EPA SW-846 methods and/or the following American Society for Testing and Materials (ASTM) standards:

- ASTM D 4687-95 - Standard Guide for General Planning of Waste Sampling;
- ASTM D 5679-95a - Standard Practice for Sampling Consolidated Solids in Drums or Similar Containers;
- ASTM D 5680-95a - Standard Practice for Sampling Unconsolidated Solids in Drums or Similar Containers;
- ASTM D 6699-01 - Standard Practice for Sampling Liquids Using Bailers;
- ASTM D 5743-97 - Standard Practice for Sampling Single or Multilayered Liquids, With or Without Solids, in Drums or Similar Containers;
- ASTM D 6063-96 - Standard Guide for Sampling of Drums and Similar Containers by Field Personnel;
- ASTM D 4547-03 - Standard Guide for Sampling Waste and Soils for Volatile Organic Compounds;
- ASTM D 4057-95 - Standard Practice for Manual Sampling of Petroleum and Petroleum Products; and,
- ASTM D 5854-96 - Standard Practice for Mixing and Handling of Liquid Samples of Petroleum and Petroleum Products.

WTL has developed a bench scale evaluation check sheet that will be used to determine if a material is acceptable for bulking and/or solidification. A representative grab sample will be retrieved from each bulk load. Drum and other loose container shipments will be sampled at a rate of 10 percent total piece count from each waste stream accepted. In-house bench scale

testing will include: flash point, pH, paint filter, total organic halogens, radioactivity, bottom sediment and water (BS and W) and compatibility testing.

Trained WTL personnel under the direct supervision of a degreed environmental scientist and/or chemist will perform all of the above field testing. Sampling bulk containers and drums will generally follow the procedures described below:

- **Tank Trailer/Vacuum Truck Sampling:** A full strata grab sample will be retrieved from the trailer and/or tank truck utilizing a bailer or collawsa sampler. The sample will be retrieved from the center manway or clean-out cap. The sample will be placed into a 250 ml glass jar with a Teflon lid and taken directly to the WTL in-house laboratory. Floating debris and other observations will be noted on the evaluation sheet. If the sampling device is re-used, it will be rinsed with a mild detergent (Alconox) and distilled water. The sample will be labeled with the unique receiving ID number and will be saved until the material has been properly disposed and/or recycled.
- **Roll-Off Container/Dump Trailer Sampling:** A metal auger will be used to retrieve a grab sample from the bulk solid load. The auger will be spun into the load to a depth of about one foot. The grab sample will be placed into a 250 ml glass jar with a Teflon lid and taken directly to the WTL in-house laboratory. Debris and other observations will be noted on the evaluation sheet. The sampling auger will be rinsed with a mild detergent (Alconox), rinsed with distilled water, and wiped clean between uses. The sample will be labeled with the unique receiving ID number and will be saved until the material has been properly disposed and/or recycled.
- **Drum, Pail, Super Sack, and Cubic Yard Container Sampling:** Drums of liquid and/or sludge will be sampled with a simple drum thief. The sample will be placed into a 250 ml glass jar with a Teflon lid. A minimum of 10 percent of the drums will be sampled for each individual waste stream received. Each drum that is sampled will be marked on the top of the container. Other general observations will be noted and recorded on the sampling log sheet. Drums, super sacks and cubic yard containers of solid material will be sampled utilizing a screw auger or a push auger. The sampling device will be pushed approximately two feet into the container to retrieve a representative grab sample from each container. The sample will be placed into a 250 ml glass jar with a Teflon lid. All samples will be labeled with the unique

receiving number, screened in the in-house laboratory, and saved until the material has been properly disposed and/or recycled. The sampling device will be rinsed with a mild detergent (Alconox), rinsed with distilled water, and wiped clean between uses.

### **5.5.2 Description of In-House Testing**

The WTL technician will deliver the waste sample from each load directly to the in-house testing laboratory. A sample of each load will be evaluated against the waste profile that was provided by the generator. Each in-house test that is performed will be recorded on the laboratory log sheet. After the sample has been tested, evaluated, and accepted, the load will be routed to the appropriate unloading or staging area. Listed below are the in-house testing capabilities that will be utilized at the WTL Processing Facility.

- Flash Point Test: an ASTM approved closed cup flash point tester will be used to confirm the actual temperature that the vapor of a liquid material will "flash". Materials that exhibit the definition of a flammable liquid as per 40 CFR Part 261 will be rejected and returned to the generator.
- pH Test: an EPA approved electronic meter will be utilized to determine the pH of a liquid material. Materials that exhibit the definition of a corrosive liquid as per 40 CFR Part 261 will not be accepted at the WTL Processing Facility.
- Paint Filter Test: as per standard SW-846 methodology, solids will be tested to determine if they contain "free liquids". Loads containing free liquids will require solidification prior to off-site shipment.
- Total Organic Halogen Testing: a colormetric field test approved by the EPA will be utilized to determine if a liquid has chlorides over 1,000 ppm. If over 1,000 ppm, an EPA approved Total Organic Halogen test will have to be performed by a state certified laboratory to determine the actual level.
- Radiation Screening: Radiation screening of any E&P generated waste potentially containing TENORM will be tested for radium-226 and radium-228. Waste material containing concentrations of these constituents greater than or equal to 7 picocuries per gram, which includes 2 picocuries per gram for the natural background radiation level,

will be temporarily stored in the TENORM staging area while awaiting down-blending.. In addition, a handheld Geiger Counter will be used to screen all loads that are received at the WTL facility as part of the facility's Radiation Protection Plan discussed in Section 5.7.

- **BS and W Testing:** Bottom sediment and water testing is performed by taking a representative sample of a liquid waste stream and putting it into a graduated test tube or similar glassware. The sample is spun in a laboratory grade centrifuge so that material separates into its different phases. The sample can now be described in its percent petroleum, water and solid layers. BS and W testing is used to compare to the waste profile. If discrepancies are noted, the generator will be contacted to discuss and resolve the irregularity of the shipment. This may involve a letter to discuss any changes, profile amendments and/or a new waste profile sheet. If differences between these tests and the waste profile cannot be resolved within a several hour period, the incoming load will be rejected and directed back to the generator immediately.
- **General Physical Properties:** The WTL sample technician will observe general physical properties of each load and compare those findings against the submitted waste profile sheet. Physical properties will include: color, phases, state of material, debris content, and odor. If discrepancies are noted, the generator will be contacted to discuss and resolve the irregularity of the shipment. This may involve a letter to discuss any changes, profile amendments and/or a new waste profile sheet. If differences between these observed physical properties and the waste profile cannot be resolved within a several hour period, the incoming load will be rejected and directed back to the generator immediately.
- **Compatibility Testing:** This will be performed prior to bulking of solid shipments or solidification of sludge materials with kiln dust, cement dust and/or other solidification agents. A representative solid or sludge sample will be mixed with an equal part of the other bulking solid or solidification agent to determine if there is an observable reaction. A temperature reading will be taken before, during, and after the bench study has been completed. A stabilized temperature increase above 140 degrees F will constitute a failed compatibility test. A stabilized temperature reading will be defined as less than a 10 percent fluctuation in the temperature reading over three successive measurements spaced at 10 minute intervals. A Sample Evaluation Form will be completed for each bulk solid or sludge load that is going to be combined or solidified at the facility. Only those materials that pass the compatibility testing will be bulked and/or solidified. If a



material appears to be highly reactive during compatibility testing, WTL will either segregate that load for in-transit storage or the load may be rejected and directed back to the generator immediately.

Following testing to determine waste shipment acceptance and compatibility for bulking or solidification, accepted loads will be directed to one of the following areas for unloading:

- Unload Dock/Drum Storage Area;
- Solidification Basin;
- Transfer Ramp;
- TENORM Staging Area; and,
- Roll-Off Container Staging Areas.

The designated unloading areas will be properly labeled with weather resistant signs.

A WTL technician will accompany the operator to the appropriate unloading area. The material will be off-loaded and the vehicle will be sent back to the scale for lightweight determination. The difference between the gross and lightweight is the net weight of the material accepted. Brine load volumes will be determined using flow meters installed at the Transfer Ramp and the Unload Dock.

**Unload Dock/Drum Storage Area:** Drums, overpacks, pails, totes, one yard boxes and other small containers that are accepted at the facility will be directed to the Unload Dock, where they will be unloaded and moved to the Drum Storage Area, logged in using a unique lot number for tracking purposes and quantities recorded. Containers will be stored with isle space between drums, which will not be stacked more than two drums high prior to bulking, solidification or off-site shipping (in-transit processing).

Compatible materials will be emptied into a lined, roll off box at the Unload Dock. A small percentage of materials processed at the Drum Storage Area will be directed to the Solidification Basin if there is a significant amount of liquids or sludges in the incoming container.

Brine loads can also be off-loaded at the Unload Dock using a piping system that will pump the brine to the Bulk Liquids Storage Tanks. The logbook will be updated to show the movement and quantity of liquids transferred to the Bulk Liquid Storage Tanks.

**Solidification Basin:** Incoming sludges, drilling muds, etc. will be processed by mixing with drying and bulking agents in the Solidification Basin. Shipments of accepted loads of sludges will be off-loaded into the Solidification Basin along with appropriate proportions of drying and bulking agents. Mixing will be accomplished using a long-reach hydraulic excavator with a smooth-edged bucket that will minimize wear to the steel mixing boxes within the Solidification Basin structure. Solidified material that can pass the paint filter test, will be loaded into the transfer trailers using the same excavator used to mix the sludge and drying agent materials. TENORM down-blending will take place in a separate steel mixing box within the Solidification Basin. Once the material is determined to meet exempt TENORM concentrations, the material will be mixed with other solidified materials for transport.

**Transfer Ramp:** Brine loads can be off-loaded at the Transfer Ramp using a piping system that will pump the brine to the Bulk Liquids Storage Tanks. The logbook will be updated to show the movement and quantity of liquids transferred to the Bulk Liquid Storage Tanks.

**TENORM Staging Area:** The WTL Processing Facility will have a reinforced concrete pad and containment in the northeastern area of the site for temporary staging of sealed roll-off boxes containing non-exempt TENORM material. This concrete staging area will be curbed and graded toward a catch basin in order to contain potential spillage from these vehicles/boxes. A detail of the containment structure is shown on Drawing 3I. The catch basin will be constructed with a valve that will be closed to contain any leakage or spillage in this area. The valve will be opened when needed to allow precipitation to drain from this area. The catch basin will also include a sediment and oil absorbent filter (FloGard® or approved equivalent) that will attenuate any oils that could potentially leak from transport vehicles. A detail of the FloGard filter is provided on Drawing 3I. Procedures discussed in Section 5.7 will be followed for activities at the TENORM staging area. Any spills or leaks observed at this staging area will be recorded on the facility daily log and included in the annual operation report.

**Roll-Off Container Staging Areas:** The Processing Facility will include four (4) designated roll-off container staging areas that are shown on Drawing 3A – Site Layout. Bulk solids transported to the facility may require temporary staging in these areas while waiting for laboratory results for waste characterization verification. Empty roll off containers may also be temporarily staged in these areas. These staging areas will be constructed with a concrete curb and an aggregate base that will be graded toward a catch basin that will include a sediment and oil absorbent filter (FloGard® or approved equivalent) that will attenuate any leaks from the containers staged in this area.

### 5.5.3 Outbound Transfer Waste Profiles

Outbound waste materials will be characterized to document that the material is non-hazardous and to satisfy the requirements of the receiving disposal facility. WTL will be listed as the generator on out-bound waste profiles and shipping documents. Waste characterization may include the following: waste profile completion, appropriate MSDS sheets, and/or characterization analysis at an accredited laboratory. If laboratory testing is required, a WTL sample technician will retrieve a representative grab sample of the appropriate waste material or waste stream. WTL will have the ability to isolate and store outbound waste shipments until approved for off-site shipment.

WTL will develop multiple, generic, waste profiles for the shipment of out-bound materials from routine generation sources that are regularly shipped to dedicated disposal facilities. For example, when WTL generates a bulk shipment prepared from a generation source that routinely is handled at the WTL facility, a profile of this material will be prepared for the out-bound disposal facility based upon the contents that were bulked together. As generic waste profiles are being established, it will be necessary to perform initial waste composite sampling and characterization analysis as per the most current edition of the EPA SW-846 methodology. Sampling of the bulk materials will be performed as per ASTM methodology. The sample analysis will be predicated on the components that make up the waste stream and specific landfill requirements. These results will be included in the generic waste profile. The following characterization analysis will be performed as required at an accredited laboratory:

- Ignitability / SW846-1010
- Reactivity Cyanide / SW846-9010
- Reactivity Sulfide / SW846-9030
- PH Corrosivity / SW846-9040
- TCLP Metals (8 RCRA) / SW846-600B (TCLP Mercury / SW846-7470A)
- TCLP Extraction / SW846-1311
- TCLP BNA / SW846-8270C
- TCLP VOA / SW846-8260B
- TCLP Pesticides / SW846-8081A
- TCLP Herbicides / SW846-8151A
- ZHE Extraction / SW846-1311
- PCB / SW846-8082
- Ra-226/Ra-228 / USEPA Method 901.1M

After the out-bound waste profile has been established for the receiving waste disposal facility, WTL will have the ability to utilize that profile for multiple yearly shipments. Annual re-certification of waste profiles will be completed if required by per state, federal and/or landfill operator.

## **5.6 BRINE PROCESSING**

Each incoming brine load will be off-loaded at the Transfer Ramp or Unload Dock and will be pumped directly to the Bulk Liquid Storage Tanks. The required brine treatment is determined by the final disposition of the water. Brine scheduled to be transported directly to an injection well will not be treated. Brine selected for re-use will be pumped to the Brine Processing Area, and processed by filtration, flocculation and chemical treatment to reduce suspended solids and remove metals and adjust pH. Treated effluent will be pumped into processed brine bulk storage tanks and re-used for E&P needs. Additional details describing the brine treatment system are provided below.

The brine wastewater processing system will treat flowback and produced water from hydrofracturing operations. Flowback wastewater is produced once hydrofracturing is complete followed by the well seals being drilled out. Flowback water is followed by produced water which begins once a large quantity of gas comes from the well with the water. Flowback and produced water are collectively defined as brine for this Application.

The water quality and quantity of flowback and produced water varies across formations and across different drill sites. It's reported that as little as 30% of the water used in hydrofracturing is returned to the surface. Total dissolved solids (TDS) of flowback water generally increases significantly overtime. Flowback water quality parameters of concern include:

1. Salt
2. Scalants
3. Suspended Solids
4. Organics

Sodium chloride and potassium chloride are frequently found in flowback water and contribute significantly to the TDS levels. Flowback water can have TDS levels up to 200,000 mg/L with produced water seeing ranges in excess of 250,000 mg/L. The most common scalants are calcium, magnesium, barium, and strontium. The scalant levels vary considerably. Suspended

solids can range from very low levels up to 1,000 mg/L. The average suspended solid values are expected to be around 400 mg/L. Organics outside of gas within the formations are not common. Oil and Grease measurements tend to be low. Other organics observed in flowback water usually stem from drilling additives including friction reducer additives, dispersants, surfactants, and scale inhibitors. The table below provides published water quality information although this is only a range of what to expect.

<b>Parameter</b>	<b>Davis Well, Marshall Co WV, Day 5 Flowback, May 2009</b>	<b>Southwest PA, February 2009, Day 3+ Flowback</b>	<b>Williamsport, PA, Composite Sample</b>	<b>Susquehanna Co, Composite</b>
TDS, mg/L	100,000	105,000	110,000	40,000
Ca, mg/L	7,630	7,500	6,896	736
Mg, mg/L	829	640	725	127
Sr, mg/L	Not available	1,700	Not available	228
Ba, mg/L	136	170	5,145	596
Fe, mg/L	38	24	39	8

Source: "Shale Gas Water Management, Activated Sludge Technologies for Treating Industrial Wastewaters. Joseph Cleary.

The WTL treatment system will be designed to remove suspended solids, iron, barium, and strontium. The process flow diagram is presented in Drawing No. 3J – Process Flow Diagram and preliminary equipment cut sheets are provided in Appendix F. The process will start with bulk unloading of trucking into a rock box. The rock box will consist of screens and baffles for heavy solids removal. Free oil will also be removed in this tank and directed to the skim oil tank using diaphragm pumps.

The raw brine pumps will direct forward flow to an equalization/raw brine tank with a volume of 1,000 bbl. The tank will help equalize the flow and water quality for consistent feed to the treatment system. The process feed pumps will deliver flow to the reaction tanks and clarifier at a maximum rate of 100 gpm. The reaction tanks are designed for a number of precipitation processes. The pH will be adjusted using sodium hydroxide which will also serve to precipitate iron as a hydroxide. Sulfate will also be added to form insoluble barium sulfate and strontium sulfate. Sulfate may be added in the form of sulfuric acid or sodium sulfate among others.

Chemical costs and equipment will be evaluated for both to select the most economical alternative. A coagulant followed by a polymer will also be added to ensure formation of large particles for settling in the subsequent clarifier. A coagulant may not be necessary given the large amounts of readily settleable barium and strontium sulfates. However, it's availability for

use will provide system flexibility. The coagulant and polymer used will be based on a combination of chemical costs with the use of jar testing. Solids will be settled in a plate clarifier designed at an overflow rate of 0.2 gpm/ft<sup>2</sup>. Traditional clarifiers or reaction thickeners might be able to handle the solids better but an inclined plate clarifier will be used due to space constraints. Particular attention should be given to the operation and maintenance to ensure optimum performance.

Gravity flow from the clarifier will be directed to a pH adjustment tank. Hydrochloric acid will be fed into this tank only as needed if the acceptable pH range is exceeded during the precipitation steps. Filter feed pumps will then direct flow to multi-media filters in order to remove most of the remaining solids carried over from the clarifier. There will be three filters to allow one filter to be out of service for backwashing using filtered water from the other two. Flow from the filters will be directed to three 1,000 bbl clean water tanks. Trucks will be able to connect to quick connect stations to load the treated water. Underflow from the clarifier will be sent to a thickener tank using air diaphragm pumps. The tank will thicken the sludge prior to pumping to the solidification process. Overflow water will gravity flow into a recycle tank in order to recycle the water back to the equalization tank.

Consideration will be given to adding an oxidizer such as chlorine dioxide in order to:

1. Break oil/grease emulsions;
2. Convert ferrous (2+) iron into the ferric (3+) state;
3. Destroy friction reducer and other chemical additives;
4. Inactivate microorganisms; and,
5. Oxidize other compounds.

The number of trucks the facility can process per day will vary based on the hours of operation. It is assumed trucks will be received for 12 hours per day and each truck will hold a maximum volume of 120 bbl. The 1,000 bbl equalization/raw brine tank will be able to hold 8 trucks per day. The treatment system will be able to treat approximately 1,700 bbl which would allow an additional 14 trucks for a total of 22 trucks per day. The treated water tanks will have a combined storage volume of 3,000 bbl (126,000 gallons) which constitutes about 25 truckloads. Demand of treated water must take into consideration available storage to ensure availability of storage during periods of low demand.



It is important to note that treatability testing will be necessary in order to properly adjust the design of this system. This will include obtaining representative samples of anticipated wastewater and conducting bench scale testing.

## **5.7 TENORM RADIATION PROTECTION PROGRAM**

A Radiation Protection Program (RPP), provided in Appendix G, will be followed at the Processing Facility building and the TENORM staging area where handling or staging of non-exempt E&P TENORM material will occur, respectively. The RPP describes the major radiation protection elements to be implemented during operation of the WTL Processing Facility. The primary objectives of the RPP are to:

- Ensure that radiation exposure to workers in the presence of radiation fields and/or radioactive materials are consistent with the As-Low-As-Reasonably-Achievable (ALARM) thresholds.
- Ensure that radiation exposures received by members of the general public and the environment are negligible.
- Maintain control of radioactive materials and sources through documentation of their handling and disposition.

In addition, WTL Processing Facility employees will receive regular radiation protection training including staff responsibilities, program objectives, fundamentals of radiation safety, characteristics of radiation, use of radiation detection equipment, emergency procedures and on the job (practical) training.

## **5.8 LEACHATE MANAGEMENT SYSTEM MAINTENANCE**

The leachate management system is designed to operate with a minimal amount of equipment. This will minimize the potential system failures and required maintenance of mechanical equipment. With the exception of the Solidification Basin, catch basins in other waste handling areas are enclosed/isolated. Any potential spillage in these areas will drain to, and will be contained in, the isolated catch basins shown on Drawing 3D – Waste Handling Areas Plans and Details. The catch basin at the Solidification Basin drains under gravity to the central manhole sump, which includes an electric grinder pump. The system design is described fully in Section 4.4 Leachate Management System.

The leachate management system, including both the waste handling areas and Solidification Basin, will be inspected on a routine basis for evidence of leaks and/or spills, clogs, blockages, equipment malfunctions, etc. Maintenance of the system and cleanup of spills and/or leaks will be performed immediately upon discovery. The facility is designed so that spilled liquids or solids can undergo wet/dry clean up using catch basins within the Processing Facility building. Solids which collect in the catch basins or central manhole sump will be removed using a vacuum truck or other vacuum system and disposed in the Solidification Basin.

## **5.9 EROSION CONTROL SYSTEM MAINTENANCE**

Catch basins in the staging and access areas will each include a FloGard® filter system (or approved equivalent) which will minimize the potential for oil and grease to reach the detention basin. Catch basins will be inspected regularly and whenever a spill occurs at the site. Filtration materials will be replaced as needed upon inspection.

## **5.10 CONTINGENCY PLANS**

This section discusses procedures WTL will implement to address the following emergencies:

- Discovery of unauthorized wastes;
- Fire, explosion, and spills;
- Equipment failure;
- Flooding; and,
- Unavailability of the Processing Facility.

### **5.10.1 Discovery of Unauthorized Wastes**

WTL technicians and equipment operators will be trained regarding wastes and materials that will not be accepted for processing and transfer at the facility. Upon discovery of any unauthorized waste material(s), the technician(s) and/or equipment operator(s) will immediately notify the shift supervisor. The unauthorized material(s) will be segregated and temporarily placed in an isolated area of the facility in either the Drum Storage Area or the Truck Unload Floor. Once the unauthorized material(s) is identified, the operators, at the direction of the shift supervisor, will place the material(s) in containers that are designated for the storage and removal of such items.

WTL will attempt to determine where the unauthorized material(s) were from and who was responsible for their delivery to the facility. Arrangements will be made with the identified party to return to the site to remove the unauthorized material(s) and to inform the party that the material(s) are not an acceptable waste material. If the originating party of the unauthorized material(s) cannot be identified, WTL will make arrangements to have the unauthorized material(s) transported off-site for disposal in an appropriate licensed facility(ies).

#### 5.10.2 Fire, Explosion, and Spills

The WTL Processing Facility will have an Emergency Response Plan (ERP) which will direct the facility personnel to take appropriate actions in accordance with the level of needs. The ERP will include the emergency response telephone numbers for all key WTL contacts, along with the local fire and emergency medical response teams. In addition, fire extinguishers will be located throughout the facility for use in controlling minor fires.

Minor spills of known material(s) (e.g., oils, gasoline, liquids, etc.) will be contained by facility personnel using spill kits located throughout the facility. In the instance of a spill of an unknown substance, facility personnel will notify the local fire department that will deal with the spill and/or notify hazardous materials responders as needed. The appropriate government agencies will be contacted by the WTL Safety Director to assure compliance of all notification and cleanup issues.

#### 5.10.3 Equipment Failure

Trained and experienced maintenance employees will be onsite who can repair, replace, and correct minor mechanical and/or electrical malfunctions that might occur to stationary equipment (e.g., scales, sump pump, piping, etc.). Repairs to mobile equipment (hydraulic excavators, trucks, etc.) will be made at off-site repair facilities.

#### 5.10.4 Flooding

WTL will utilize the National Oceanic and Atmospheric Administration (NOAA) gauging station at the Hannibal Lock & Dam (up river of the site) and at the Willow Island Lock & Dam (down river of the site) to evaluate flood conditions. The real time data from these gauging stations are available at the National Weather Service web sites at:

<http://water.weather.gov/ahps2/hydrograph.php?wfo=rlx&gage=rnoo1> Willow Island

<http://water.weather.gov/ahps2/hydrograph.php?wfo=pbz&gage=hano1> Hannibal

In the event that flooding of any portion of the WTL facility is anticipated based on the lowest WTL property elevation of 630.3 feet above mean sea level, WTL will implement removal of any full or partially full containers, transfer trailers or tankers from the transfer station facility. WTL will request approval to temporarily store these containers at the Wetzel County Landfill located in New Martinsville, West Virginia. Upon recedece of flood waters below elevation 630.3 feet amsl, WTL will return the roll-off containers, transfer trailers and tankers back to the WTL Processing Facility.

## **5.11 RECORD KEEPING**

Proper record keeping is essential for efficient operation, to confirm facility compliance with applicable regulations, and providing the ability to track the type and volume of waste materials processed at the facility. The following types of records will be kept on file for review throughout the life of the facility:

- Copy of the approved ODNR Application including the detailed plans and specifications and any revisions and modifications to the original submittal;
- Copies of permits required in addition to the (e.g., NDPES, etc.);
- Facility's Contingency Plans;
- Master Log;
- Daily logs; and,
- Copies of the Annual Operational Reports.

### **5.11.1 Daily Logs**

Daily Logs will be completed each day to provide a record of the day-to-day operations at the facility. The Daily Logs will be filed onsite for inspection upon request and the Daily Logs can be copied for submittal, if requested.

Any non-acceptable materials received and segregated for transportation and off-site disposal will be documented in the Daily Log and the facility's master log sheet. The type, volume, and final destination of the non-acceptable materials will be recorded.

### 5.11.2 Annual Operational Report

WTL will prepare an Annual Operational Report for each year of operation by April 1 of each year providing operational information for the preceding year. At a minimum, the Annual Operational Report will provide the following information:

- Calendar year which the report represents;
- Wastes received in tons or cubic yards or barrels (brine);
- Quantities and location of solid wastes transferred;
- Summary of unauthorized wastes discovered, if applicable;
- Annual adjustment of the final closure cost estimate;
- Revisions to the facility's final closure contract, if applicable;
- Summary of maintenance activities performed on the Solidification Basin, Leachate Management System, or stationary equipment, if applicable;
- Summary of maintenance activities performed on other monitoring and/or control system(s) at the facility, if applicable;
- A statement of the compliance of the waste handling areas with applicable regulations and discussion of any repairs made, if applicable; and,
- A notarized statement attesting to the truthfulness and accuracy of the annual report.

## **6.0 FACILITY CLOSURE**

WTL will initiate closure activities under one or more of the following scenarios:

- The WTL Processing Facility will cease accepting waste;
- If the WTL Processing Facility license expires and a new license will not be applied for;
- If the WTL Processing Facility license expires and a new license application has been denied and all remedies for the denial have either been exhausted, or waived by failure to pursue remedies in a timely manner;
- If the WTL Processing Facility license has been suspended or revoked, and all remedies for the revocation or suspension have either been exhausted, or waived by failure to pursue remedies in a timely manner; and/or
- If updated design plans, specifications, and information submitted by order of the Chief are disapproved and all remedies for the disapproval have either been exhausted, or waived by failure to pursue remedies in a timely manner.

### **6.1 CLOSURE NOTIFICATIONS**

A notice stating the anticipated date on which the Processing Facility will cease to accept waste will be provided by certified mail to the Chief of ODNR at least ninety (90) days prior to facility closure. A notice will also be posted in prominent location(s) throughout the facility which states the date when the WTL Processing Facility will cease to accept solid waste.

#### **6.1.1 Final Closure Contact**

The final closure contact for the facility is:

Daryl Heiser, Vice President.  
Weavertown Transport Leasing, Inc.  
2 Dorrington Road  
Carnegie, Pennsylvania 15106  
Telephone: 724-746-4850  
Mobile: 412-779-4097  
E-Mail: dheiser@weavertown.com

## 6.2 CLOSURE ACTIVITIES

No later than 30 days after the facility has ceased to accept waste, WTL will initiate closure activities to include the thorough cleaning of all areas where waste materials were handled and/or stored and the equipment used in the waste handling operations. At a minimum the cleaning will include, but not be limited to, the following:

- All solid and liquid wastes will be removed from the site and disposed off-site at appropriate licensed disposal facilities.
- All areas of the facility and appurtenances (i.e., the Solidification Basin, Truck Unload Floor, Transfer Ramp, Unload Dock, Drum Storage Area, etc.) that were in contact with waste materials and will not be removed from the site as part of the facility closure will be washed down in such a manner as to substantially reduce or eliminate any remaining wastes, constituents, or sources of contaminants.
- The wash down activities will be conducted to allow the fluids generated during the cleaning to be directed to and be contained in the Solidification Basin, then pumped out for off-site disposal.
- Following required cleaning activities, WTL will remove off the site all containers, roll off boxes, and transfer trailers associated with the Processing Facility.

WTL will keep the site access gate(s) locked and will post signs easily visible at all access gate(s) leading into the facility for at least six months after closure, stating that the facility is closed for all waste processing activities. During this period the condition of the sign(s) will be monitored to ensure the sign(s) are legible and have not been removed.

No later than 60 days after the facility has ceased to accept waste materials for transfer, WTL will complete the following activities:

- The leachate management system will be modified by sealing the collection system piping and surface access grates; and,
- If deemed necessary, the facility shall be baited for rodents and treated for other vectors.



Within 30 days of completing the requirements of this closure plan, WTL will certify to the Chief of ODNR that the facility has been thoroughly cleaned and closed.

### **6.3 RIGHT OF ENTRY**

WTL recognizes and accepts the Chief's and authorized representatives' right to enter the WTL Processing Facility to inspect and monitor the site to determine compliance of the closure activities. Entry to the site will be granted at any reasonable time upon presentation of proper identification.

### **6.4 FINANCIAL ASSURANCE**

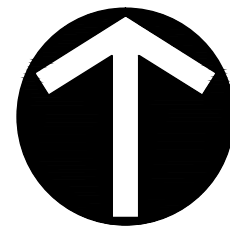
This Application includes an estimated cost for final closure of the WTL Processing Facility. The financial assurance instrument is based on the final closure activities presented in Section 6.2 – Closure Activities and estimated costs provided in Table H-1 – Final Closure Cost Estimate which is provided in Appendix H – Financial Assurance Instrument. The executed final closure financial assurance instrument will be provided following ODNR approval of the closure cost estimate.

---

**SEE ATTACHED DRAWINGS**

---





NORTH

# APPLICATION TO OPERATE A FACILITY WEAVERTOWN TRANSPORT LEASING, INC. WTL PROCESSING FACILITY GRANDVIEW TOWNSHIP, WASHINGTON COUNTY, OHIO

SUBMITTAL RECORD		
NO	DATE	DESCRIPTION
1		
2		
3		
REVISION RECORD		
NO	DATE	DESCRIPTION
△		
△		
△		

**ENGINEER/SURVEY**  
CIVIL & ENVIRONMENTAL CONSULTANTS, INC.  
8740 ORION PLACE, SUITE 100  
COLUMBUS, OHIO 43240  
REPAIRER: ROY A. STANLEY, PROJECT MANAGER  
PHONE: 614-540-6633

**DEVELOPER**  
WEAVERTOWN TRANSPORT LEASING, INC.  
2 DORRINGTON ROAD  
CARNEGIE, PENNSYLVANIA 15106  
REPRESENTATIVE: DARYL HEISER, VICE PRESIDENT  
PHONE: 724-746-4850  
OWNER'S REPRESENTATIVE: ERIC MEDUHO, OPERATIONS MANAGER  
PHONE: 724-746-4850 EXT. 1523



PREPARED FOR:



APPLICANT/OWNER/OPERATOR  
WEAVERTOWN TRANSPORT LEASING, INC.  
2 DORRINGTON ROAD  
CARNEGIE, PENNSYLVANIA 15106

PREPARED BY:

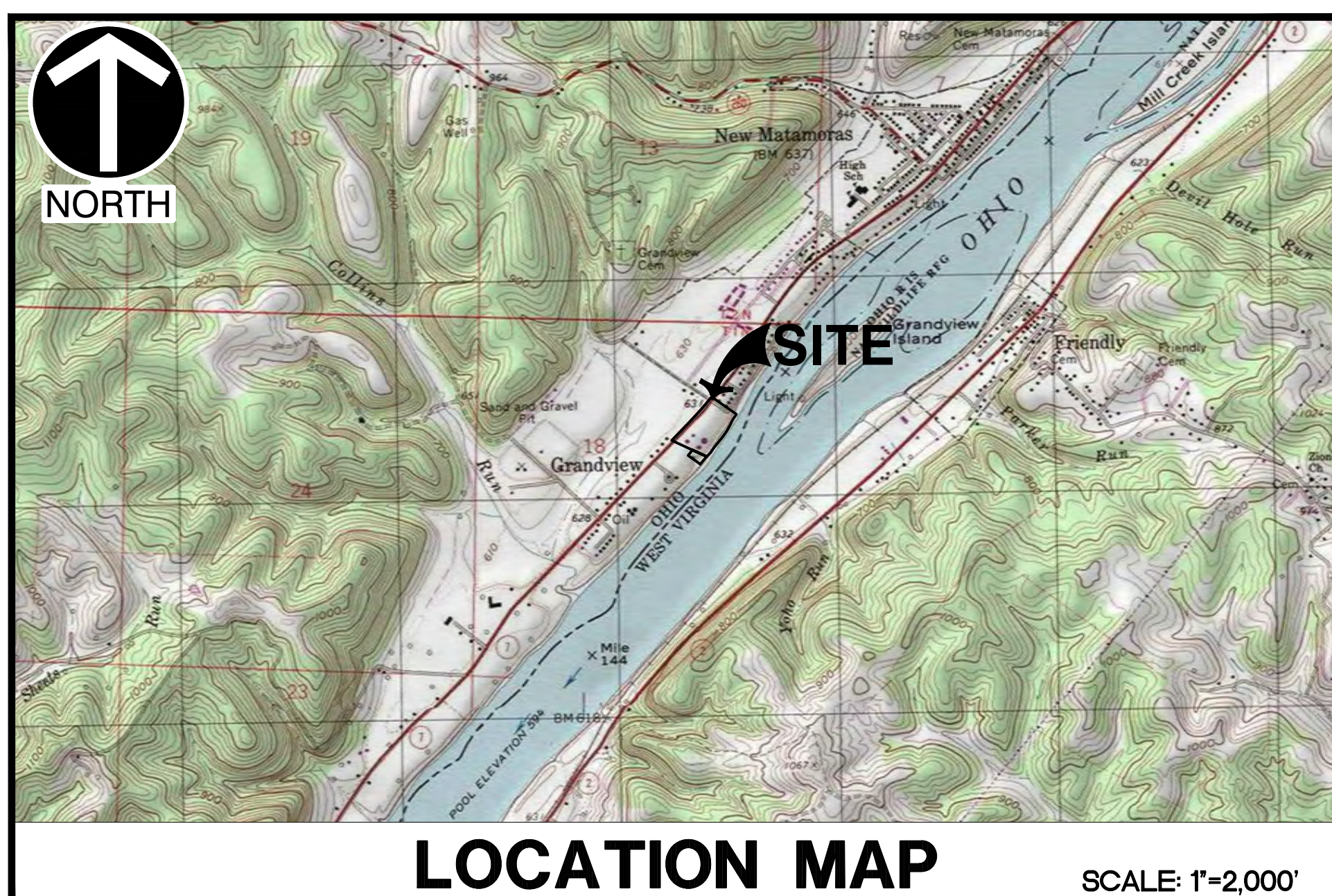


Civil & Environmental  
Consultants, Inc.  
8740 ORION PLACE, SUITE 100  
COLUMBUS, OHIO 43240

APRIL 2014  
CEC PROJECT NO. 112-048

DRAWING INDEX		
SHEET NO.	DWG. DESC.	SHEET TITLE
1	1	TITLE SHEET
2	2A	SITE ENVIRONS
3	3A	SITE LAYOUT
4	3B	PROCESSING FACILITY BUILDING PLAN
5	3C	PROCESSING FACILITY BUILDING SECTION VIEWS
6	3D	WASTE HANDLING AREAS PLAN AND DETAILS
7	3E	SOLIDIFICATION BASIN DETAILS
8	3F	EROSION CONTROL PLAN
9	3G	STORM PROFILES
10	3H	EROSION CONTROL NOTES AND DETAILS
11	3I	EROSION CONTROL DETAILS
12	3J	PROCESS FLOW DIAGRAM

STANDARD DRAWINGS
ODOT
ODOT TYPE CATCH BASIN 2-2A
ODOT TYPE CATCH BASIN 2-3
ODOT TYPE HALF-HEIGHT HEADWALL 2-1
THE STANDARD CONSTRUCTION DRAWINGS LISTED ON THESE PLANS SHALL BE CONSIDERED A PART THEREOF.



REFERENCE  
1. U.S.G.S TOPOGRAPHIC MAP, NEW MATAMORAS QUADRANGLE, OHIO & WEST VIRGINIA DATED: 1979.



**Civil & Environmental Consultants, Inc.**  
8740 Orion Place, Suite 100 - Columbus, OH 43240  
Ph: 614.540.6633 • 888.598.6808 • Fax: 614.540.6638  
www.ccecinc.com

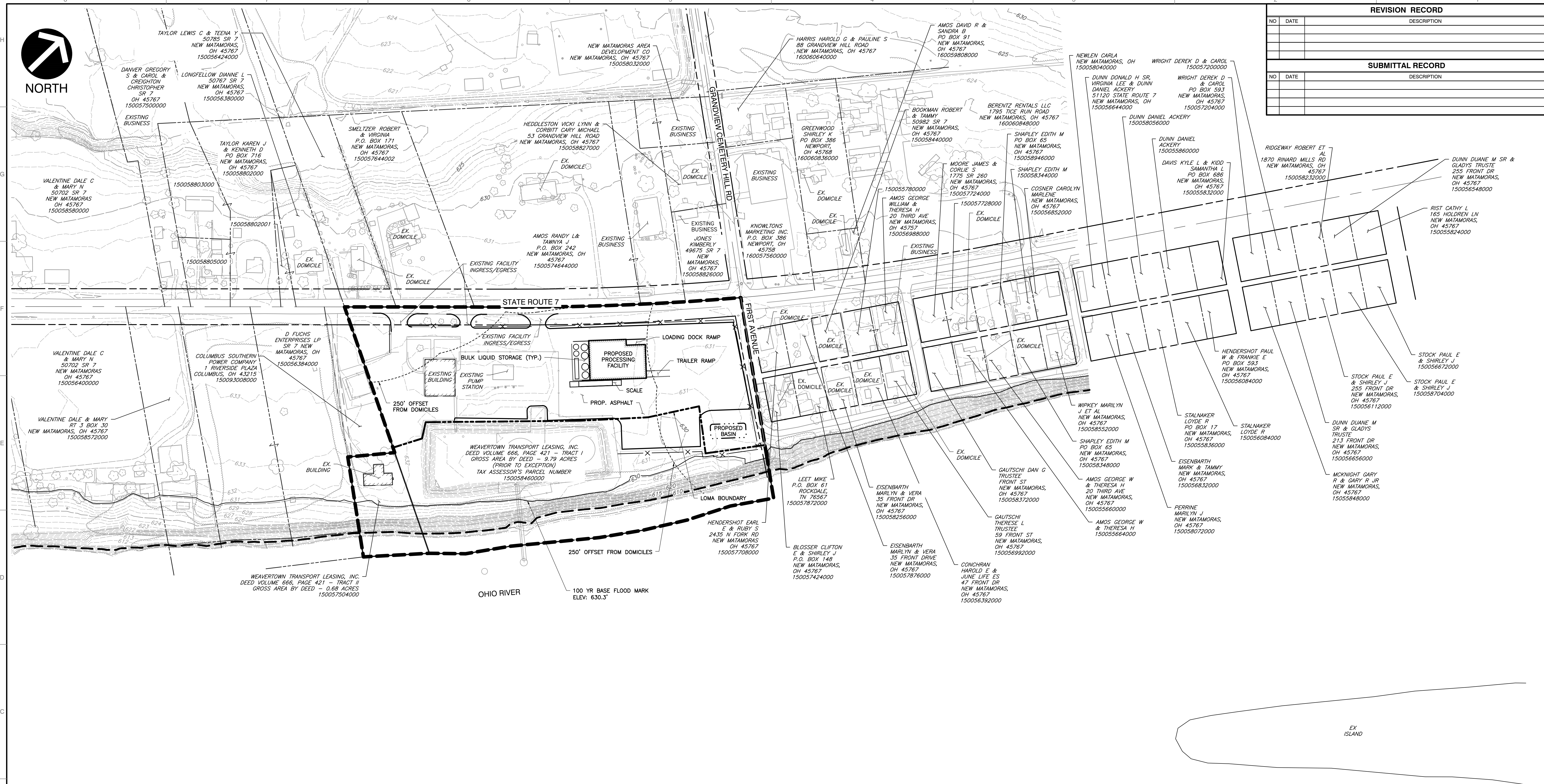
**WEAVERTOWN TRANSPORT LEASING, INC.**  
**APPLICATION TO OPERATE**  
**WTL PROCESSING FACILITY**  
**WASHINGTON COUNTY, OHIO**

DRAWN BY: DFB CHECKED BY: RAS APPROVED BY: NTS  
DATE: APRIL 2014 DWG SCALE: NTS PROJECT NO: 112-048

TITLE SHEET

DRAWING NO.:  
**1**  
SHEET 1 OF 12










[illegible]

**NOTES:**

3. THIS DRAWING MEETS THE REQUIREMENTS OF 3745-27-21 (B)(2)(v) AND (B)(2)(c) THROUGH (g).
2. IN ACCORDANCE WITH 3745-27-21 (B)(2)(b), A SUMMARY OF THE SITE ENVIRONS AND EXPLANATION OF HOW THE SOLID WASTE TRANSFER FACILITY WILL MEET THE CRITERIA FOR THE PERMIT APPROVAL BY THE DIRECTOR SPECIFIED IN RULES 3745-27-02 AND 3745-31-05 OF THE ADMINISTRATIVE CODE IS INCLUDED IN THE PERMIT TO INSTALL NARRATIVE.
3. IN ACCORDANCE WITH 3745-27-21 (B)(2)(a), THERE ARE NO NATIONAL PARKS OR RECREATIONAL AREAS, CANDIDATE AREAS FOR POTENTIAL INCLUSION INTO THE NATIONAL PARKS SYSTEM, AND ANY STATE PARK OR ESTABLISHED STATE PARK PURCHASE AREA.
4. IN ACCORDANCE WITH 3745-27-21 (B)(2)(f), THERE ARE NO STATE NATURAL PRESERVES, STATE WILDLIFE AREAS, NATIONAL AND STATE SCENIC RIVERS, ANY NATIONAL WILDLIFE REFUGE, SPECIAL INTEREST AREAS, RESEARCH NATIONAL AREAS IN WAYNE NATIONAL FOREST, AND STATE RESOURCE WATERS, COLDWATER HABITATS, AND EXCEPTIONAL WARMWATER HABITATS AS CLASSIFIED IN ACCORDANCE WITH CHAPTER 3745-1 OF THE ADMINISTRATIVE CODE.
5. IN ACCORDANCE WITH 3745-27-22 (c), THE WASTE HANDLING AREAS OF THE SOLID WASTE TRANSFER FACILITY ARE NOT LOCATED WITHIN TWO HUNDRED FEET OF ANY SURFACE WATERS OF THE STATE, AS DEFINED IN RULE 3745-1-02 OF THE ADMINISTRATIVE CODE.
6. IN ACCORDANCE WITH 3745-27-22 (d), THE WASTE HANDLING AREAS OF THE SOLID WASTE TRANSFER FACILITY ARE NOT LOCATED WITHIN TWO HUNDRED FEET OF ANY SURFACE WATERS OF THE STATE, AS DEFINED IN RULE 3745-1-02 OF THE ADMINISTRATIVE CODE.
7. IN ACCORDANCE WITH 3745-27-22 (i), THE SOLID WASTE TRANSFER FACILITY IS NOT LOCATED IN EITHER A NATIONAL PARK OR RECREATION AREA, A CANDIDATE AREA FOR POTENTIAL INCLUSION IN THE NATIONAL PARKS SYSTEM, A STATE PARK OR ESTABLISHED STATE PARK PURCHASE AREA, OR ANY PROPERTY THAT LIES WITHIN THE BOUNDARIES OF A NATIONAL PARK OR RECREATION AREA BUT THAT HAS NOT BEEN ACQUIRED OR IS NOT ADMINISTERED BY THE SECRETARY OF THE UNITED STATES DEPARTMENT OF THE INTERIOR.
8. IN ACCORDANCE WITH 3745-27-22 (j), THE WASTE HANDLING AREAS OF THE SOLID WASTE TRANSFER FACILITY ARE NOT LOCATED WITHIN FIVE HUNDRED FEET OF AREAS DESIGNATED BY THE OHIO DEPARTMENT OF NATURE RESOURCES AS EITHER A STATE NATURAL PRESERVE, A STATE WILDLIFE AREA, OR A STATE SCENIC RIVER, ARE DESIGNATED, OWNED, AND MANAGED BY THE OHIO HISTORICAL SOCIETY AS A NATURAL PRESERVE, AREAS DESIGNATED BY THE UNITED STATES FOREST SERVICE AS EITHER A SPECIAL INTEREST AREA OR A RESEARCHED NATURAL AREA IN THE WAYNE NATIONAL FOREST, SURFACE WATERS OF THE STATE DESIGNATED BY EXCEPTIONAL WARMWATER HABITAT, AS CLASSIFIED IN ACCORDANCE WITH CHAPTER 3745-1 OF THE ADMINISTRATIVE CODE.
9. IN ACCORDANCE WITH 3745-27-22 (k), THE WASTE HANDLING AREAS OF THE SOLID WASTE TRANSFER FACILITY ARE NOT LOCATED WITHIN TWO HUNDRED FIFTY FEET OF A DOMICILE.

**LEGEND:**


- |   |   |
|---|---|
|  | EX. INDEX CONTOUR                       |
|  | EX. INTERMEDIATE CONTOUR                |
|  | EX. SITE PROPERTY BOUNDARY              |
|  | ORDINARY HIGH WATER MARK (ELEV. 607.9') |
|  | LETTER OF MAP AMENDMENT (LOMA) BOUNDARY |
|  | 100 YR BASE FLOOD MARK (ELEV. 630.3')   |
|  | PROP. FACILITY BOUNDARY                 |

**REFERENCES:**

1. BASE MAP DEVELOPED FROM TOPOGRAPHIC MAPPING BY HENDERSON AERIAL SERVICES, INC. FROM PHOTOGRAPHY DATED 12/08/2011 AND ADDITIONAL TOPOGRAPHY SURVEY BY CIVIL & ENVIRONMENTAL CONSULTANTS, INC. COMPLETED ON 12/21/2011.



SCALE IN FEET



100 200



**Civil & Environmental Consultants, Inc.**  
8740 Orion Place, Suite 100 - Columbus, OH 43240  
Ph: 614.540.6633 • 888.598.6808 • Fax: 614.540.6638  
[www.cecinc.com](http://www.cecinc.com)

**WEAVERTOWN TRANSPORT LEASING, INC.  
APPLICATION TO OPERATE  
WTL PROCESSING FACILITY  
WASHINGTON COUNTY, OHIO**

DRAWN BY:	DFB	CHECKED BY:	RAS	APPROVED BY:	----
DATE:	APRIL 2014	DWG SCALE:	NTS	PROJECT NO:	112-048

## SITE ENVIRONS

**2A**

SHEET 2 OF 12





NORTH

REVISION RECORD

NO	DATE	DESCRIPTION

SUBMITTAL RECORD

NO	DATE	DESCRIPTION

LEGEND:

630	PROP. INDEX CONTOUR
631	PROP. INTERMEDIATE CONTOUR
630	EX. INDEX CONTOUR
631	EX. INTERMEDIATE CONTOUR
ST	EX. SITE PROPERTY BOUNDARY
ST	PROP. STORM LINE
■	PROP. ODOT CATCH BASIN
SAN	EX. SANITARY SERVICE
W	EX. WATERLINE SERVICE
SAN	PROP. SANITARY SERVICE
W	PROP. WATERLINE SERVICE
R/W	EX. RIGHT-OF-WAY
OH-W	EX. OVERHEAD WIRE
○	EX. UTILITY POLE
○	EX. LIGHT
○	EX. STORM SEWER
○	EX. STORM SEWER CATCH BASIN
○	EX. TREE
---	PROP. FACILITY BOUNDARY
X	PROP. FENCE
X	EX. FENCE
X	PROP. TOP OF CASTING
X	PROP. HIGH POINT
■	PROP. ASPHALT
■	PROP. CONCRETE
■	EX. ASPHALT

NOTES:

1. BASE MAP DEVELOPED FROM TOPOGRAPHIC MAPPING BY HENDERSON AERIAL SERVICES, INC. FROM PHOTOGRAPHY DATED 12/08/2011 AND ADDITIONAL TOPOGRAPHY SURVEY BY CIVIL & ENVIRONMENTAL CONSULTANTS, INC. COMPLETED ON 12/21/2011.
2. EXISTING WATERLINE SERVICE AND SANITARY SERVICE ARE APPROXIMATE BASED ON FIGURE FROM THE VILLAGE OF NEW MATAMORAS DEPARTMENT OF WATER AND WASTEWATER RECEIVED ON 4/11/12, NOT FIELD VERIFIED.
3. PROPOSED FENCE SHALL HAVE A HEIGHT OF 8' AND BE 75% OPAQUE.



**Civil & Environmental Consultants, Inc.**  
8740 Orion Place, Suite 100 - Columbus, OH 43240  
Ph: 614.540.6633 - 888.598.8808 - Fax: 614.540.6638  
www.ccecinc.com

**WEAVERTOWN TRANSPORT LEASING, INC.**  
**APPLICATION TO OPERATE**  
**WTL PROCESSING FACILITY**  
**WASHINGTON COUNTY, OHIO**

DRAWN BY: DFB CHECKED BY: RAS APPROVED BY: ---  
DATE: APRIL 2014 DWG SCALE: NTS PROJECT NO: 112-048

SITE LAYOUT

DRAWING NO.:  
**3A**  
SHEET 3 OF 12



P:\2011\112-048\112-048.dwg (03/11/2014) - LP: 4/8/2014 1:17 PM

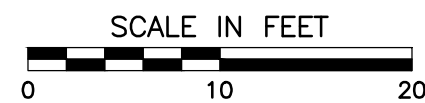


P:\2011\112-048\000\DWG\001\112-048 - REC2 - Arch Elev.dwg/TRANSFER STATION BUILDING PLAN (5/4/8/2014 - Asanuma) - LP: 4/8/2014 1:17 PM

- 1 - RAW BRINE FEED PUMPS
- 2 - PROCESS FEED PUMPS
- 3 - FILTER FEED PUMPS
- 4 - RECYCLE PUMPS
- 5 - CLARIFIER SLUDGE PUMPS
- 6 - THICKENER SLUDGE PUMPS
- 7 - SULFATE FEED SYSTEM
- 8 - CAUSTIC FEED SYSTEM
- 9 - COAGULANT FEED SYSTEM
- 10 - POLYMER FEED SYSTEM
- 11 - SULFATE REACTION TANK
- 12 - RAPID MIX TANK
- 13 - FLOC TANK
- 14 - PLATE CLARIFIER
- 15 - pH ADJUSTMENT TANK
- 16 - FILTERS
- 17 - RECYCLE TANK
- 18 - PLANT AIR

REVISION RECORD		
NO	DATE	DESCRIPTION
SUBMITTAL RECORD		
NO	DATE	DESCRIPTION

REFERENCES:  
1. INTERIOR BUILDING LAYOUT WAS PROVIDED TO CIVIL & ENVIRONMENTAL CONSULTANTS, INC. BY HERSCHMAN ARCHITECTS, DATED: 6/15/12.



**Civil & Environmental Consultants, Inc.**  
8740 Orion Place, Suite 100 - Columbus, OH 43240  
Ph: 614.540.6633 - 888.598.8808 - Fax: 614.540.6638  
www.ccecinc.com

**WEAVERTOWN TRANSPORT LEASING, INC.**  
**APPLICATION TO OPERATE**  
**WTL PROCESSING FACILITY**  
**WASHINGTON COUNTY, OHIO**

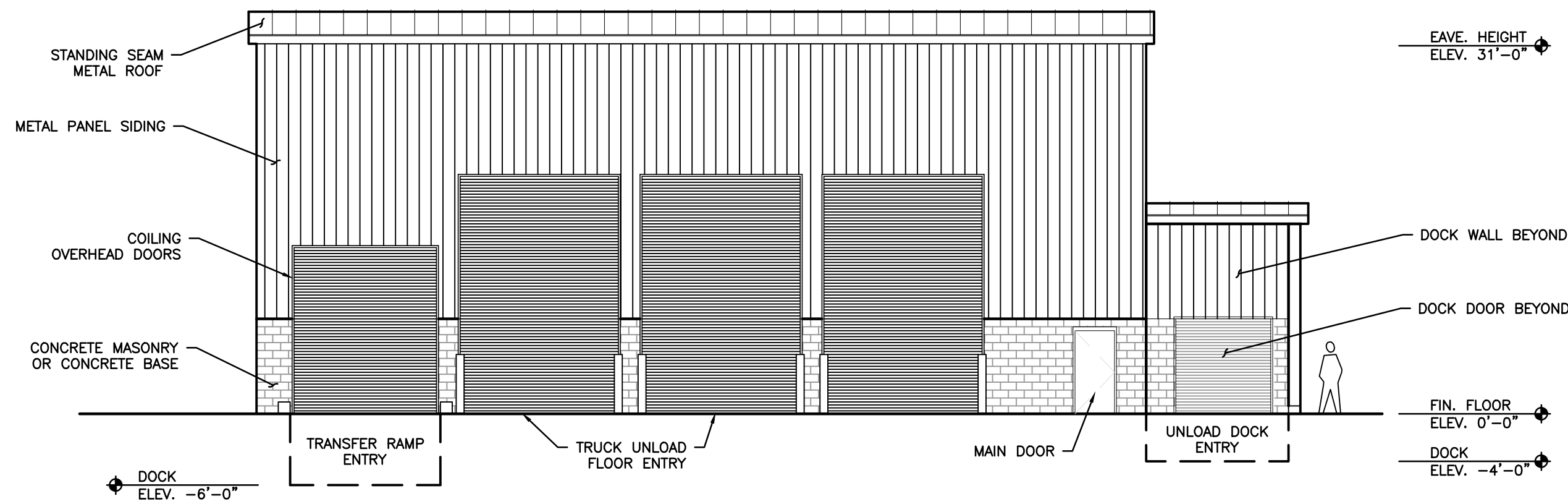
DRAWN BY: DFB | CHECKED BY: RAS | APPROVED BY: ---  
DATE: APRIL 2014 | DWG SCALE: NTS | PROJECT NO: 112-048

PROCESSING FACILITY BUILDING PLAN

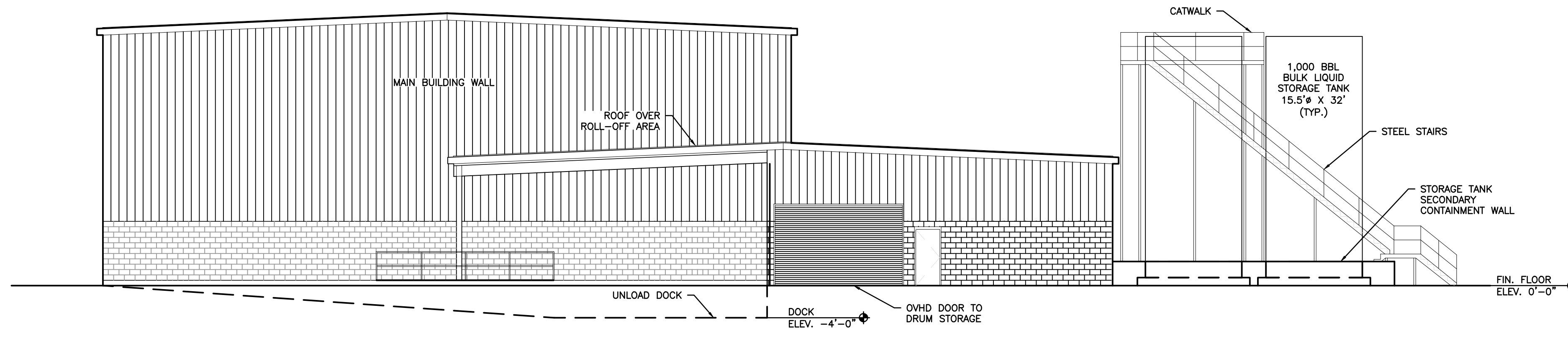
DRAWING NO.: **3B**  
SHEET 4 OF 12



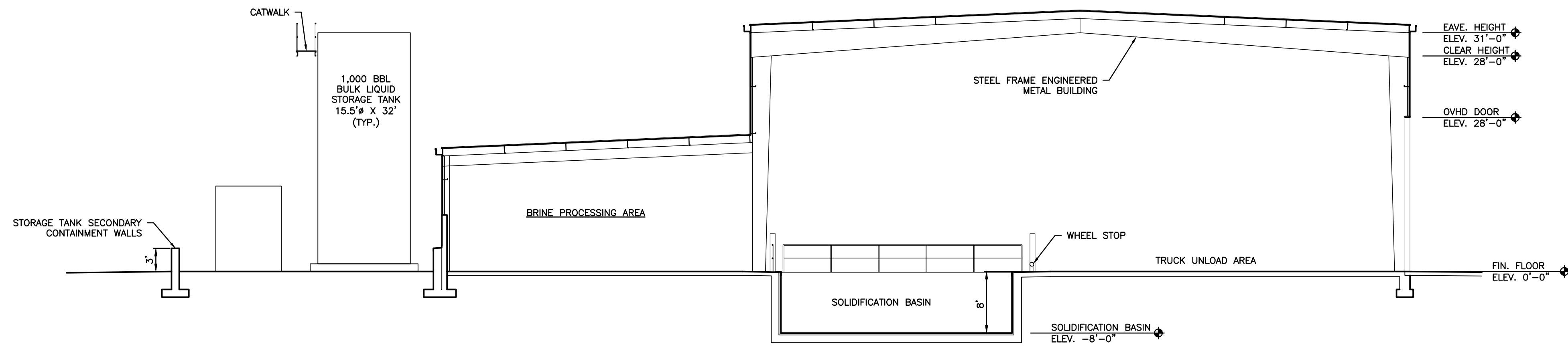
P:\2011\112-048\000\DWG\112-048 - WEAVERTOWN TRANSPORT LEASING, INC. - 112-048.dwg (11/12/2014 1:17 PM) - L.P. 4/8/2014 1:17 PM



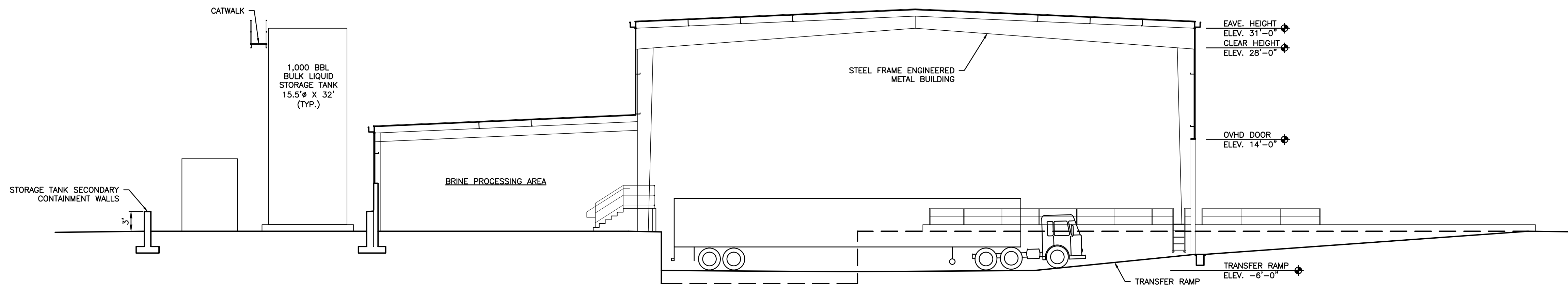
**BUILDING ELEVATION A-A'**  
SCALE: 1" = 10'



**BUILDING ELEVATION B-B'**  
SCALE: 1" = 10'



**SOLIDIFICATION MIXING BASIN SECTION C-C'**  
SCALE: 1" = 10'



**TRANSFER TRAILER LOADING RAMP SECTION D-D'**  
SCALE: 1" = 10'

REVISION RECORD		
NO	DATE	DESCRIPTION
SUBMITTAL RECORD		
NO	DATE	DESCRIPTION

**REFERENCES:**  
1. INTERIOR BUILDING LAYOUT WAS PROVIDED TO CIVIL & ENVIRONMENTAL CONSULTANTS BY HERSCHMAN ARCHITECTS, DATED: 6/15/12.

SCALE IN FEET  
0 10 20

**C&E**  
**Civil & Environmental Consultants, Inc.**  
8740 Orion Place, Suite 100 - Columbus, OH 43240  
Ph: 614.540.6633 888.598.8808 Fax: 614.540.6638  
www.ccecinc.com

**WEAVERTOWN TRANSPORT LEASING, INC.**  
**APPLICATION TO OPERATE**  
**WTL PROCESSING FACILITY**  
**WASHINGTON COUNTY, OHIO**

DRAWN BY: DFB CHECKED BY: RAS APPROVED BY: ---  
DATE: APRIL 2014 DWG SCALE: NTS PROJECT NO: 112-048

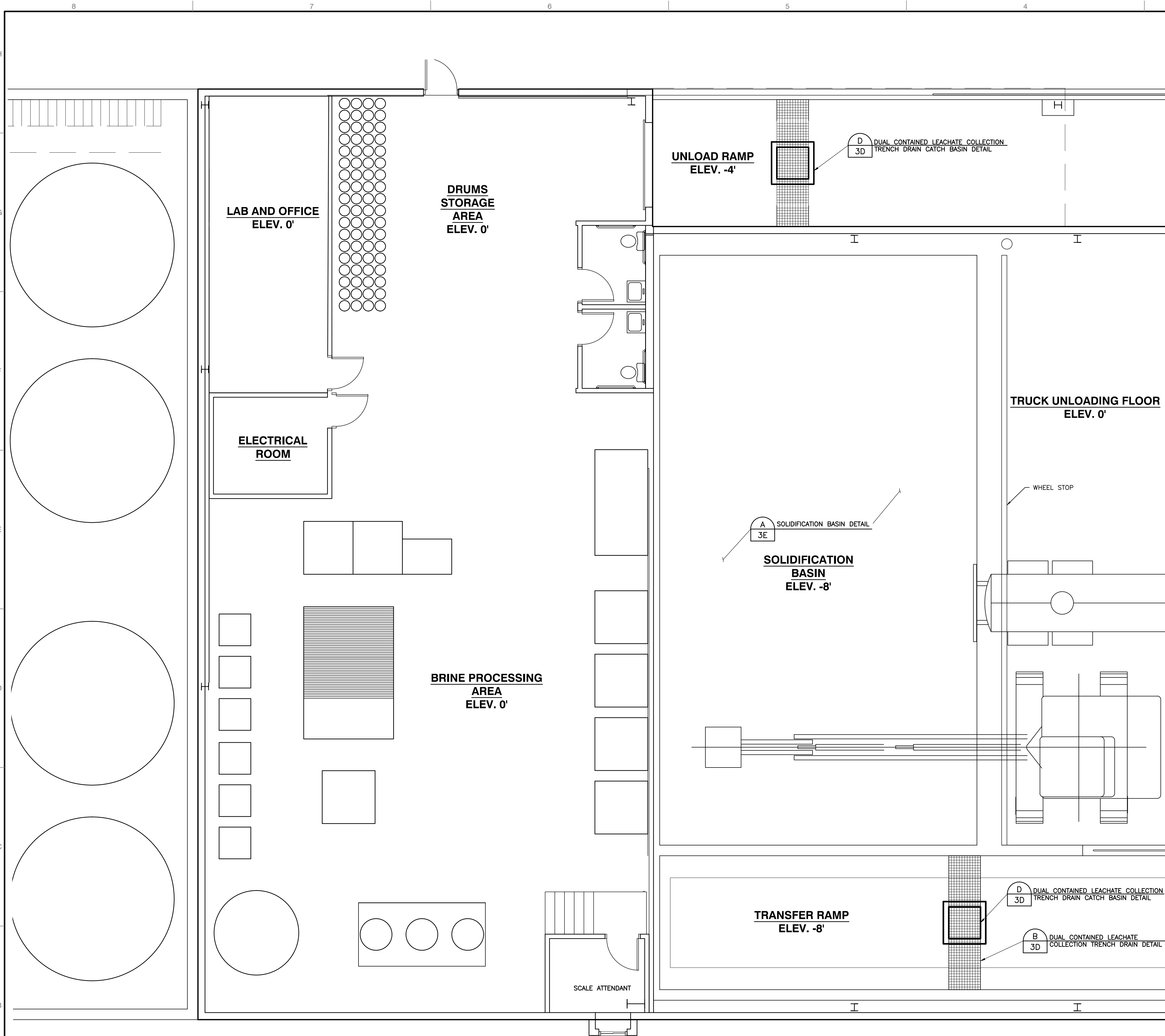
PROCESSING FACILITY BUILDING SECTION VIEWS

DRAWING NO.:  
**3C**  
SHEET 5 OF 12



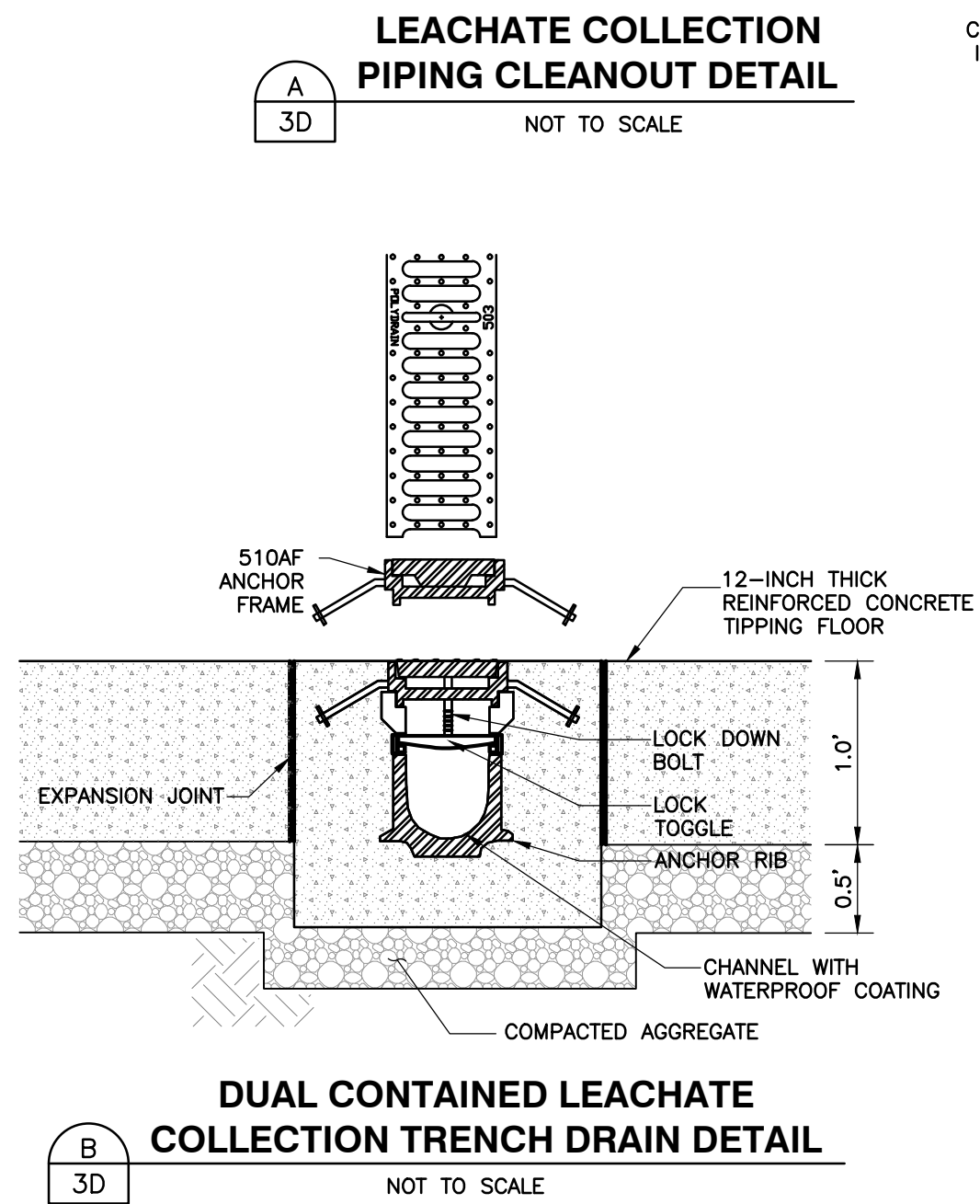


P:\2011\112-048\000\DWG\0001\112-048 - C002 - Waste Handling Areas\WASTE HANDLING AREAS PLAN AND DETAILS\LS(4/8/2014 - AutoCAD) - LP, 4/8/2014 1:17 PM

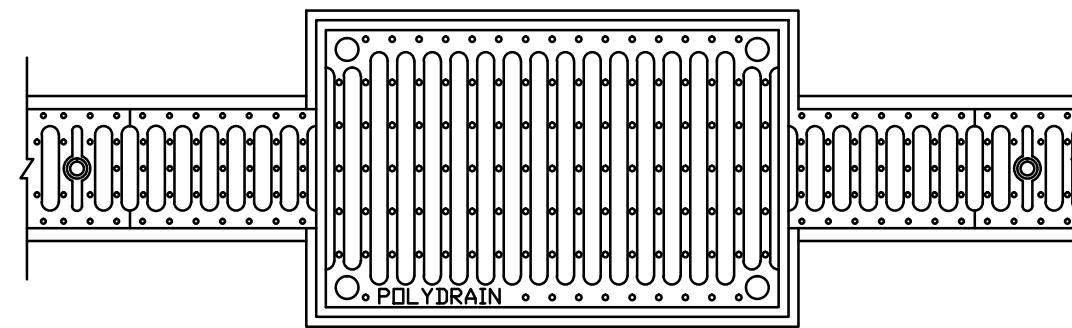


WASTE HANDLING AREAS PLAN VIEW

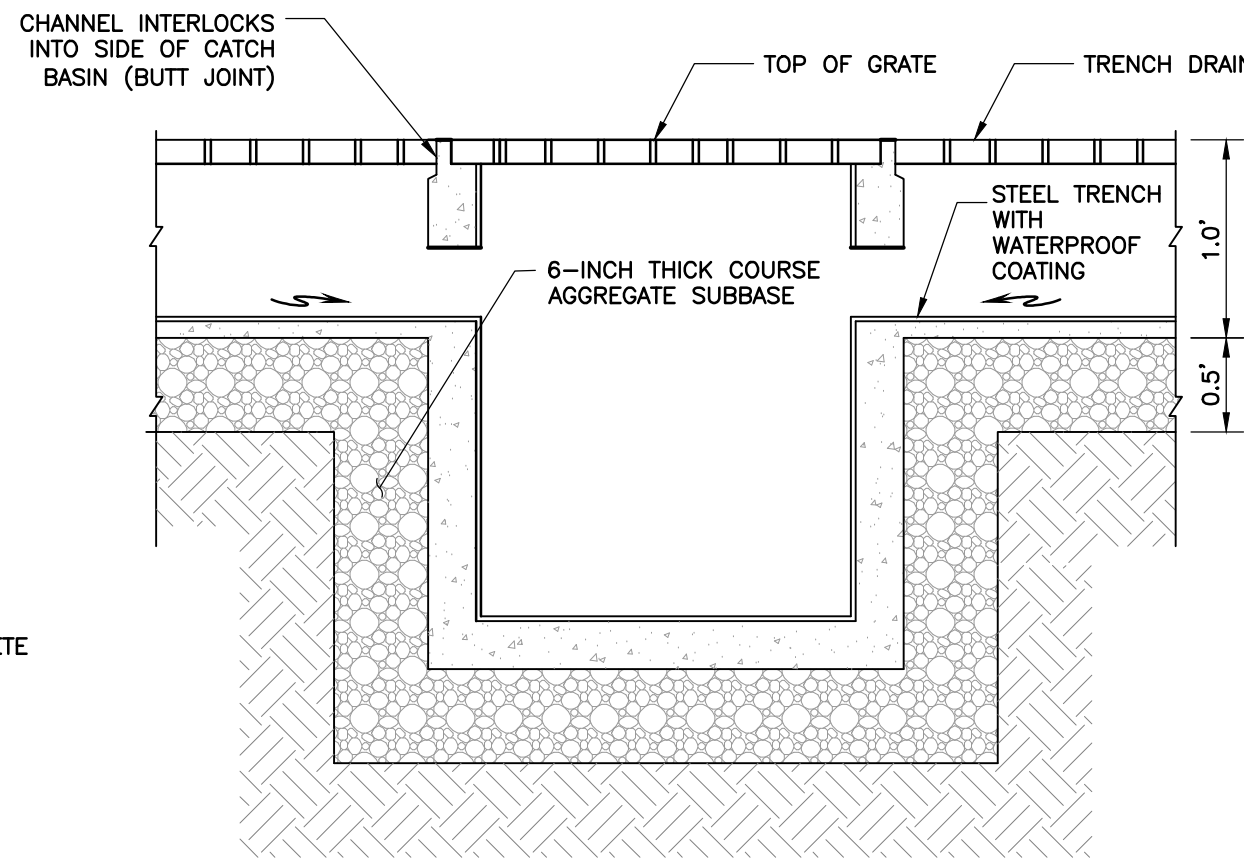
SCALE: 1" = 5'



REVISION RECORD		
NO	DATE	DESCRIPTION
SUBMITTAL RECORD		
NO	DATE	DESCRIPTION



PLAN VIEW



ELEVATION VIEW

DUAL CONTAINED LEACHATE COLLECTION TRENCH DRAIN CATCH BASIN DETAIL

NOT TO SCALE

D 3D





**Civil & Environmental Consultants, Inc.**  
8740 Orion Place, Suite 100 - Columbus, OH 43240  
Ph: 614.540.6633 - 888.598.6808 - Fax: 614.540.6638  
www.ccecinc.com

**WEAVERTOWN TRANSPORT LEASING, INC.**  
**APPLICATION TO OPERATE**  
**WTL PROCESSING FACILITY**  
**WASHINGTON COUNTY, OHIO**

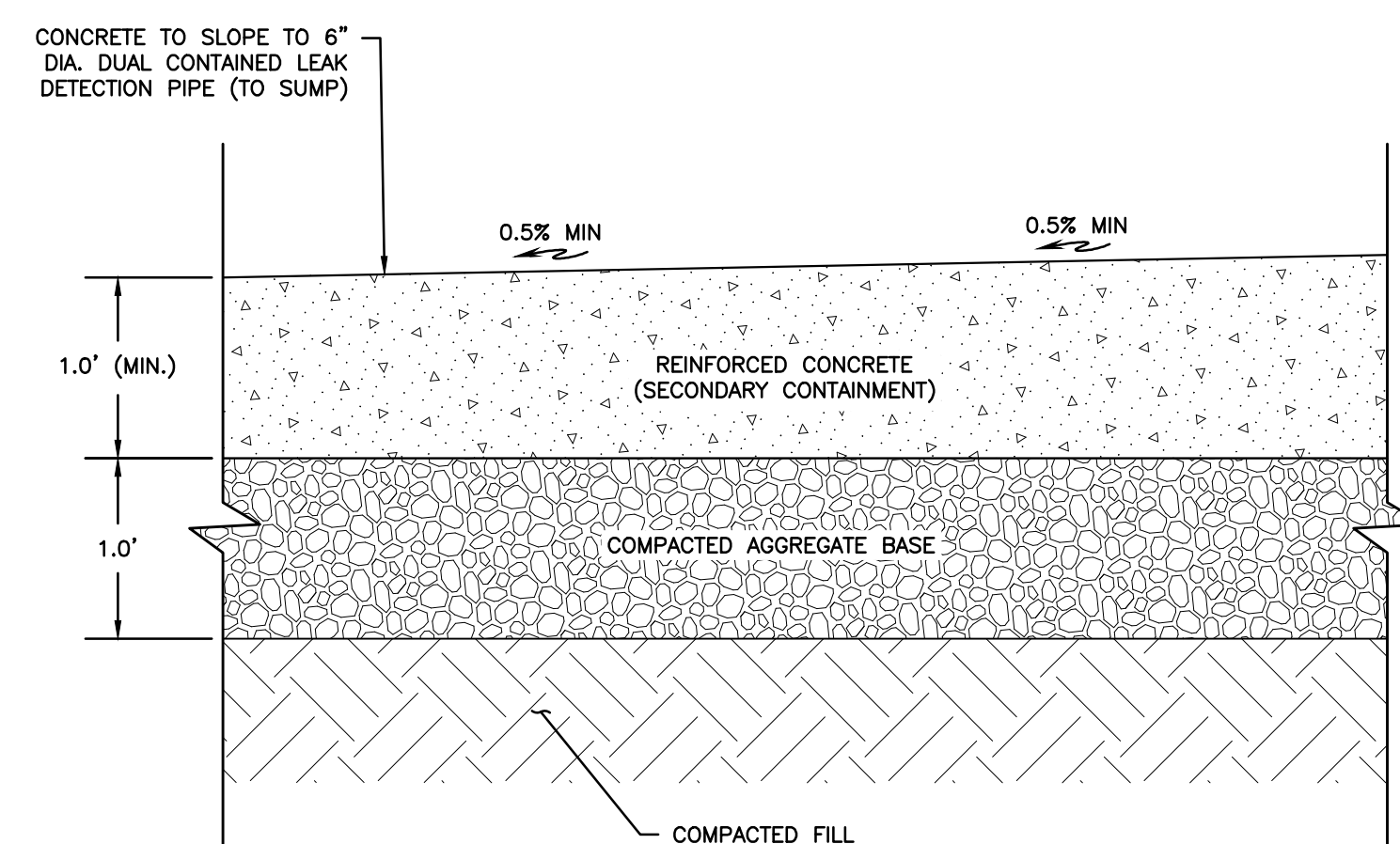
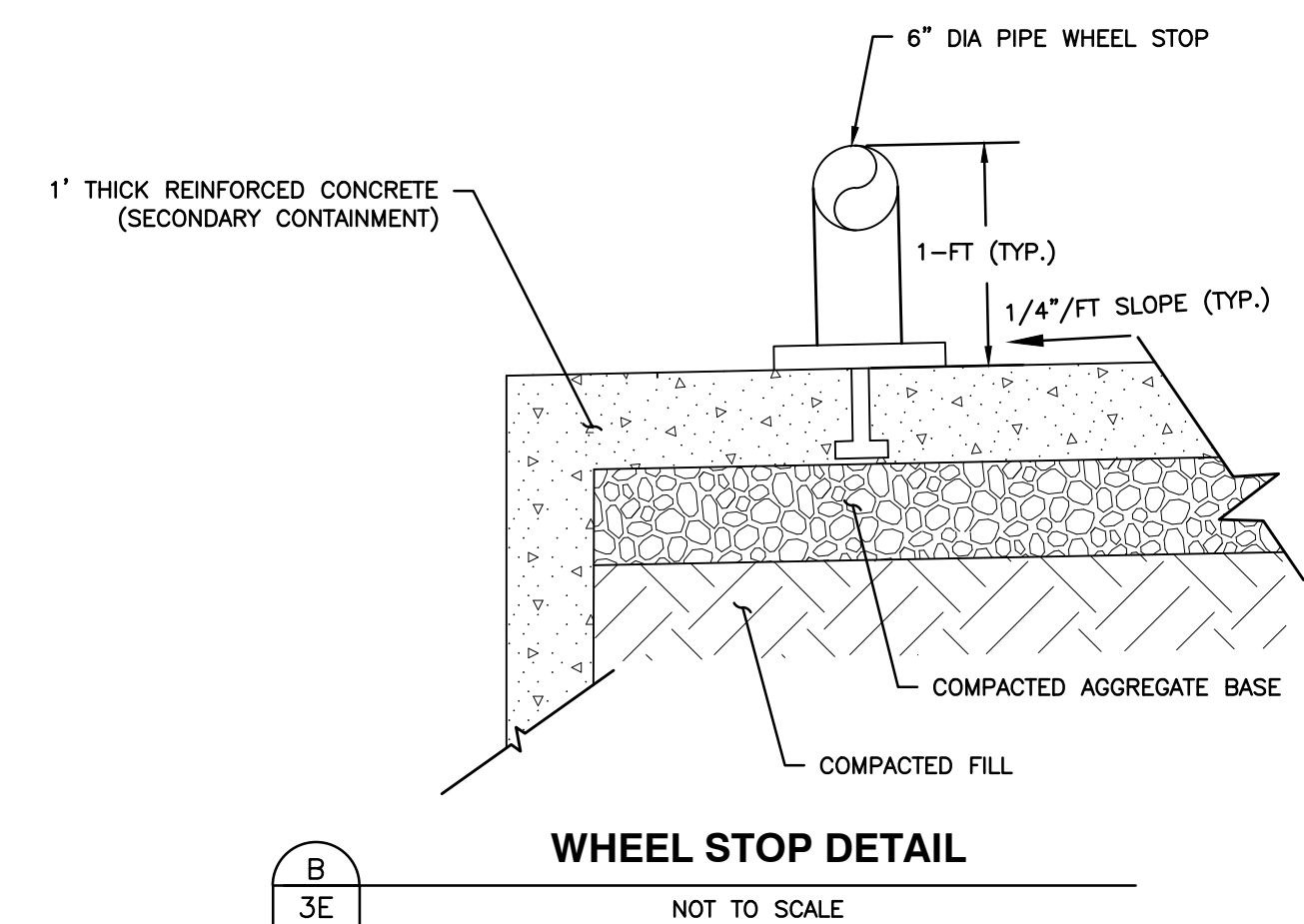
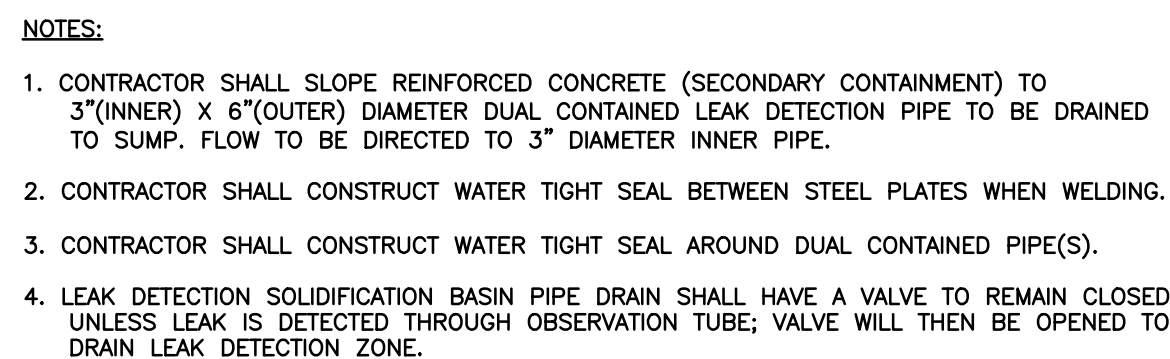
DRAWN BY: DFB	CHECKED BY: RAS	APPROVED BY: _____
DATE: APRIL 2014	DWG SCALE: NTS	PROJECT NO: 112-048

WASTE HANDLING AREAS PLAN AND DETAILS


DRAWING NO: **3D**

SHEET 6 OF 12



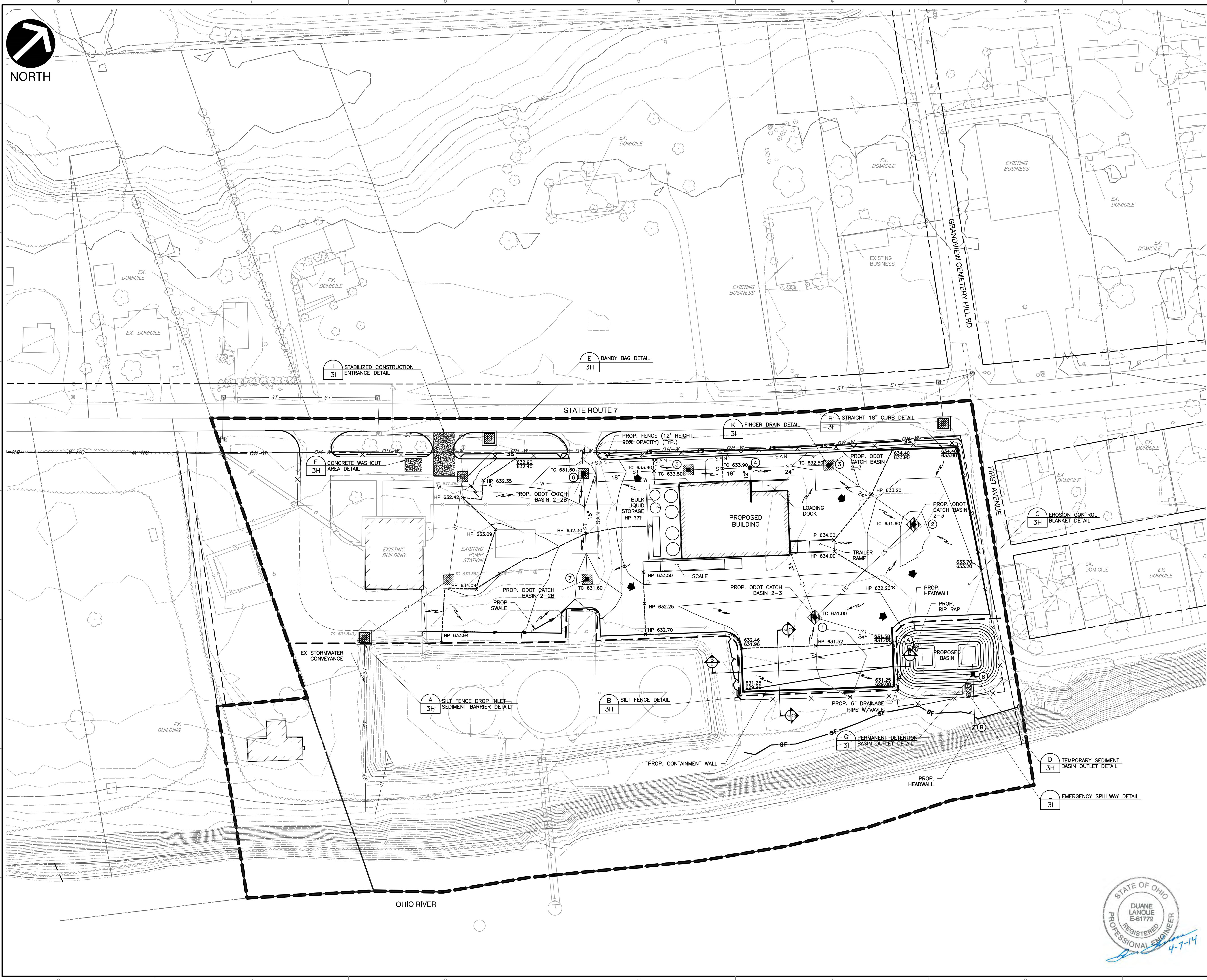


- DUAL CONTAINED LEACHATE MANHOLE SUMP DETAIL**

			
<b>Civil &amp; Environmental Consultants, Inc.</b>			
8740 Orion Place, Suite 100 - Columbus, OH 43240 Ph: 614.540.6633 • 888.598.6808 • Fax: 614.540.6638 www.cecinc.com			
<b>WEAVERTOWN TREATMENT LEASING, INC.</b> <b>APPLICATION TO OPERATE</b> <b>WTL PROCESSING FACILITY</b> <b>WASHINGTON COUNTY, OHIO</b>			
DRAWN BY:	DFB	CHECKED BY:	RAS
DATE:	APRIL 2014	DWG SCALE:	NTS
		APPROVED BY:	---
		PROJECT NO.:	112-048

P:\2011\112-048\CADD\DWG\CVD3\112-048 - CVD3 - LMon System Plan and Details.dwg(SOLIDIFICATION BASIN DETAILS) LS(4/8/2014 - koshanski) - LP: 4/8/2014 1:17 PM





REVISION RECORD		
NO	DATE	DESCRIPTION
SUBMITTAL RECORD		
NO	DATE	DESCRIPTION

- LEGEND:**
- 630 PROP. INDEX CONTOUR
  - 631 PROP. INTERMEDIATE CONTOUR
  - 630 EX. INDEX CONTOUR
  - 631 EX. INTERMEDIATE CONTOUR
  - EX. SITE PROPERTY BOUNDARY
  - PROP. FACILITY BOUNDARY
  - ST PROP. STORM LINE
  - SF PROP. ODOT CATCH BASIN 2-3
  - SF SILT FENCE
  - INLET CONTROL PROTECTION DANDY BAG
  - INLET CONTROL PROTECTION SILT FENCE DROP INLET SEDIMENT BARRIER
  - PROP. MAJOR FLOOD ROUTE
  - PROP. DRAINAGE
  - EROSION CONTROL BLANKET
  - SAN EX. SANITARY SERVICE
  - W EX. WATERLINE SERVICE
  - SAN PROP. SANITARY SERVICE
  - W PROP. WATERLINE SERVICE
  - X TC=631.00 PROP. TOP OF CASTING
  - X HP=631.00 PROP. HIGH POINT
  - X 634.40 633.90 PROP. TOP OF CURB/WALL PROP. PAVEMENT ELEVATION
  - PROP. SWALE
  - PROP. BREAKLINE
  - PROP. FENCE
  - EX. FENCE

SCALE IN FEET

0 50 100

**C&E**

**Civil & Environmental Consultants, Inc.**

8740 Orion Place, Suite 100 - Columbus, OH 43240

Ph: 614.540.6633 - 888.598.6808 - Fax: 614.540.6638

www.ccecinc.com

**WEAVERTOWN TRANSPORT LEASING, INC.**

**APPLICATION TO OPERATE**

**WTL PROCESSING FACILITY**

**WASHINGTON COUNTY, OHIO**

DRAWN BY: DFB CHECKED BY: RAS APPROVED BY: \_\_\_\_\_

DATE: APRIL 2014 DWG SCALE: NTS PROJECT NO: 112-048

EROSION CONTROL PLAN

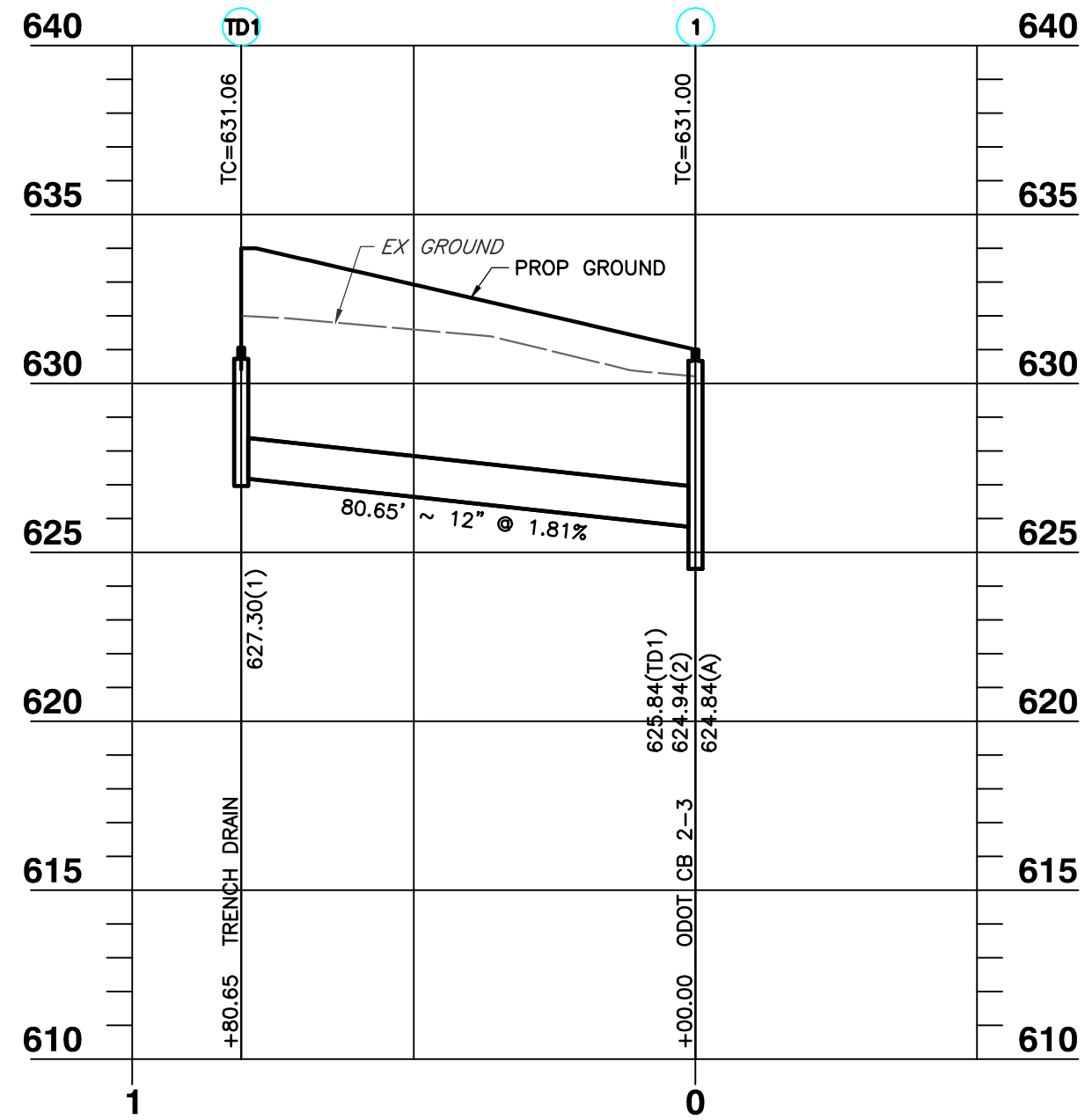
DRAWING NO: **3F**

SHEET 8 OF 12

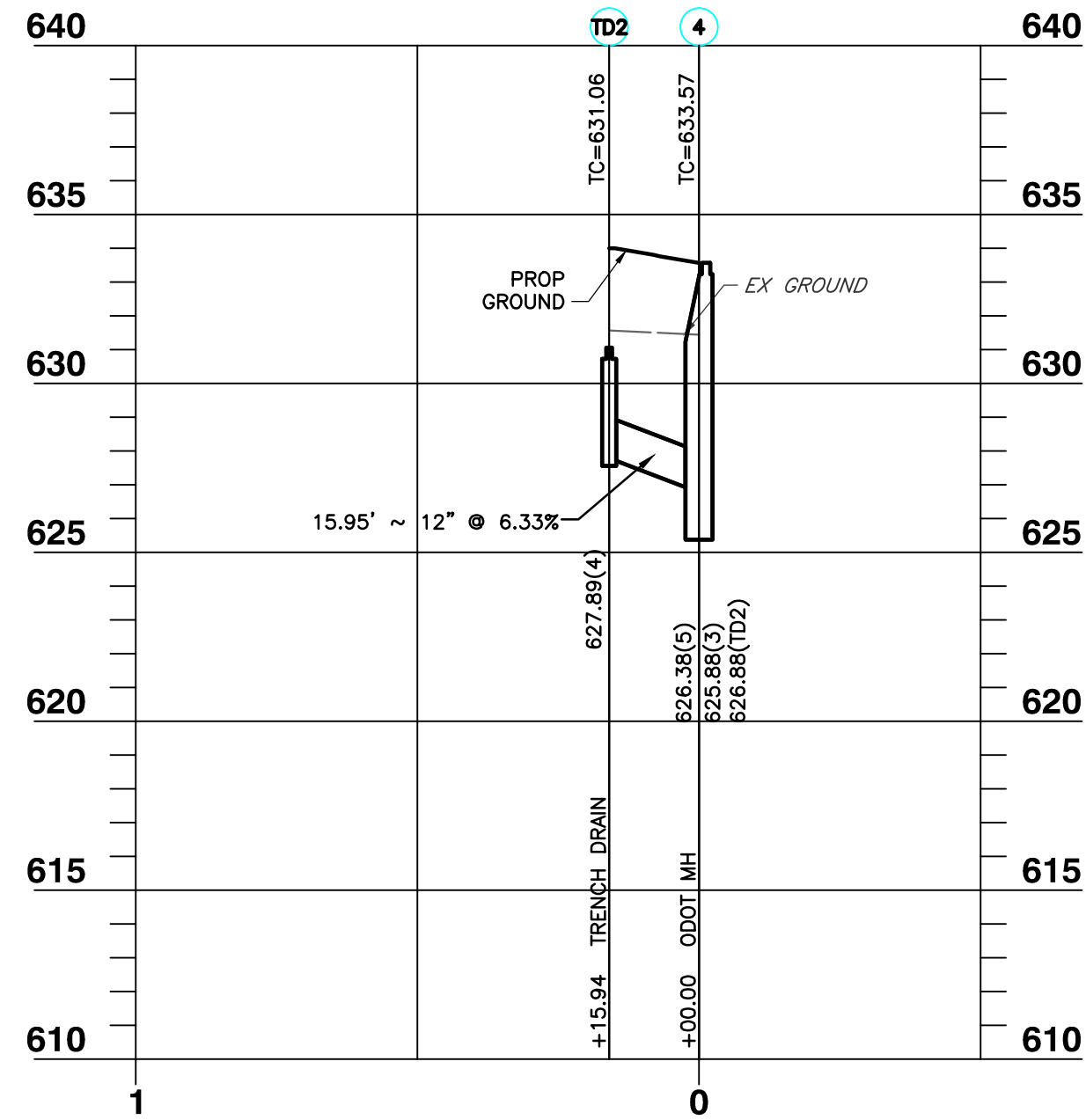
P:\2011\112-048\DWG\1023112-048 - 002 - E308 - Erosion Control Plan and Details.dwg\EROSION CONTROL PLAN 12-048 - 002 - E308 - Erosion Control Plan and Details.dwg (12-048 - 002 - E308 - Erosion Control Plan and Details.dwg) - LP: 4/8/2014 1:17 PM



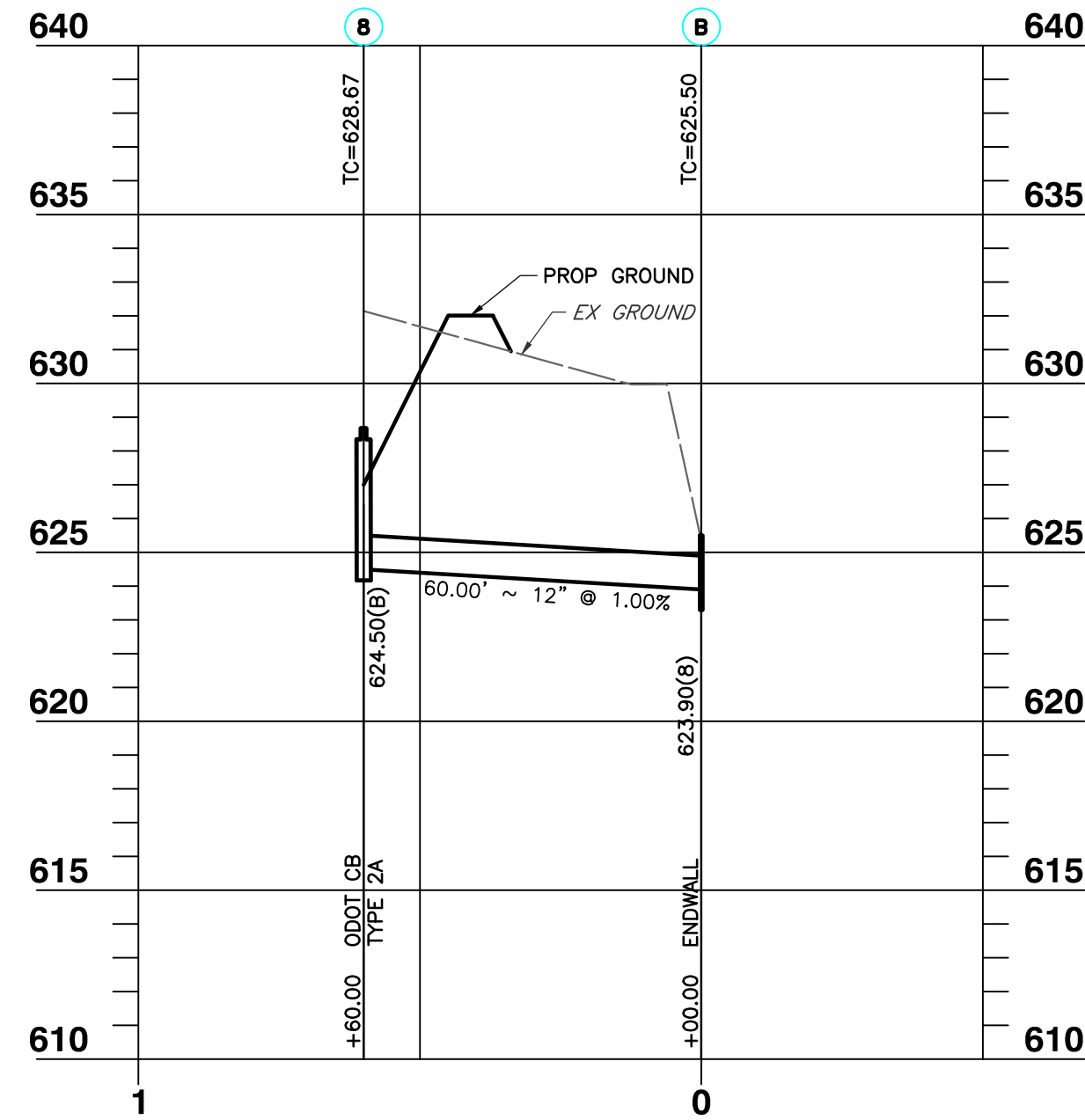
P:\2011\112-048\000\DWG\000112-048 - 002 - 3F - Storm Profiles.dwg(Storm Profiles) LS(4/8/2014 - kashwan) - LP 4/8/2014 1:17 PM



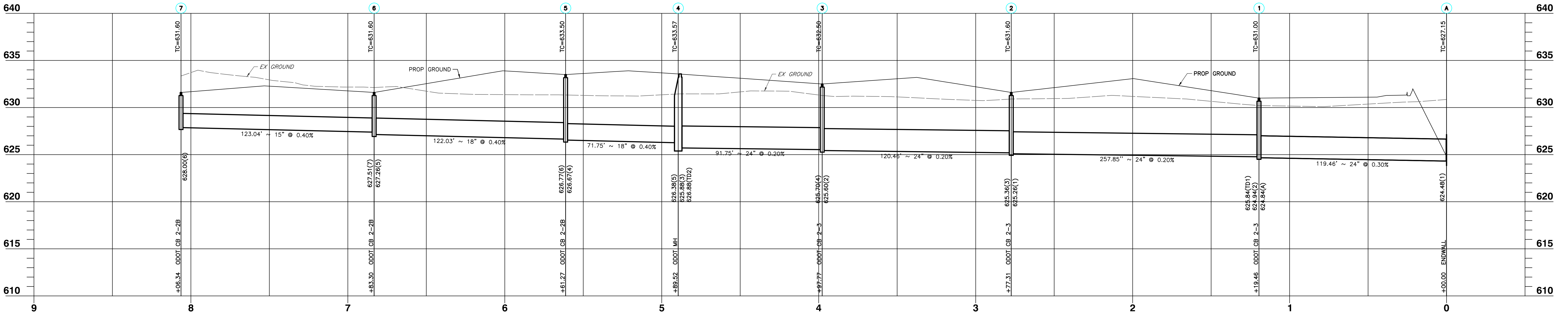
TD1-1 PROFILE  
SCALE: 1" = 30' HORIZ



TD2-4 PROFILE  
SCALE: 1" = 30' HORIZ



8-B PROFILE  
SCALE: 1" = 30' HORIZ



7-A PROFILE  
SCALE: 1" = 30' HORIZ

REVISION RECORD		
NO	DATE	DESCRIPTION
SUBMITTAL RECORD		
NO	DATE	DESCRIPTION

**NOTES**  
CONTRACTOR SHALL FIELD VERIFY ALL EXISTING ELEVATIONS AND INVERTS PRIOR TO START OF CONSTRUCTION.  
  
18" MINIMUM CLEARANCE SHALL BE MAINTAINED BETWEEN ALL STORM, SANITARY AND WATER LINES.  
  
ALL FITTINGS SHALL BE LEAD FREE.





**Civil & Environmental Consultants, Inc.**  
8740 Orion Place, Suite 100 - Columbus, OH 43240  
Ph: 614.540.6633 - 888.598.6808 - Fax: 614.540.6638  
www.cecinc.com

**WEAVERTOWN TRANSPORT LEASING, INC.**  
**APPLICATION TO OPERATE**  
**WTL PROCESSING FACILITY**  
**WASHINGTON COUNTY, OHIO**

DRAWN BY: DFB	CHECKED BY: RAS	APPROVED BY: _____
DATE: APRIL 2014	DWG SCALE: NTS	PROJECT NO: 112-048

**STORM PROFILES**

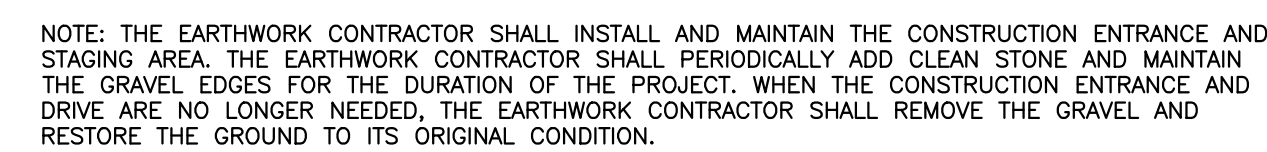
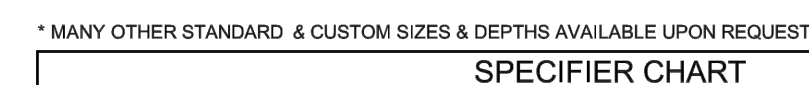
SHEET **9** OF **12**

DRAWING NO.: **3G**

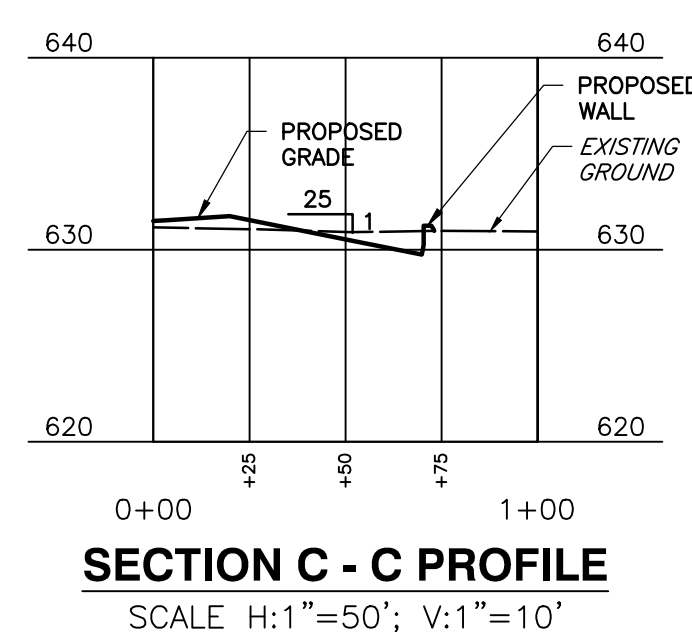
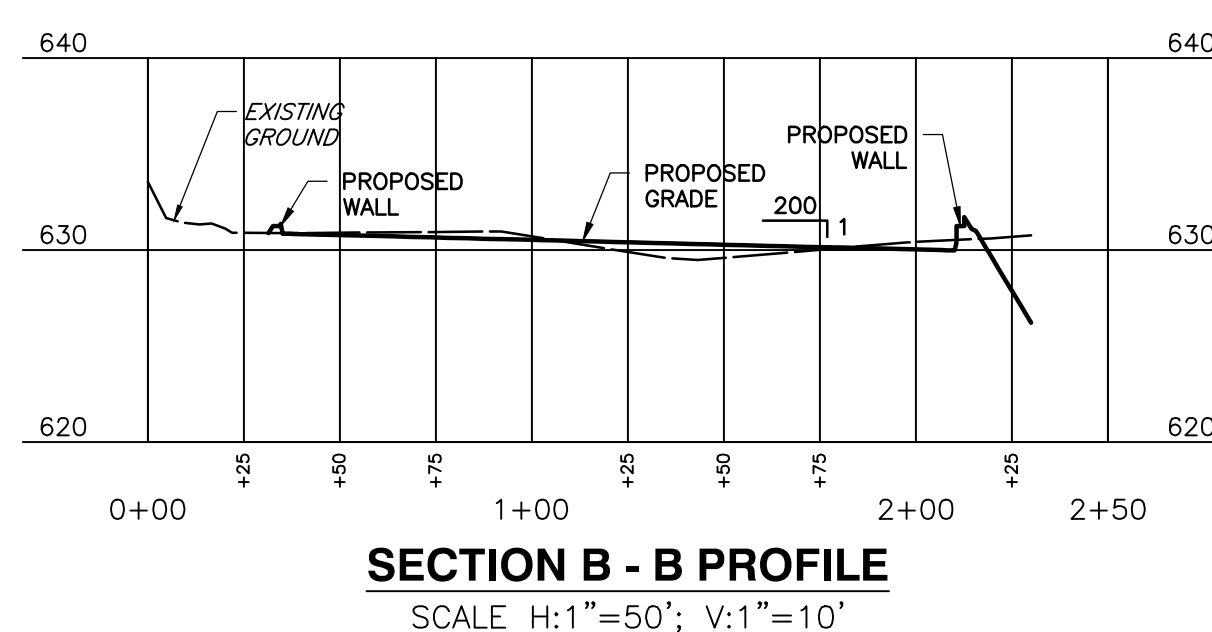






[illegible]

SPECIFIER CHART									
MODEL NO.		STANDARD & SHALLOW DEPTH			STANDARD DEPTH -20 inches-			SHALLOW DEPTH -12 inches-	
		(Data in these columns is the same for both STANDARD & SHALLOW versions)							
STANDARD DEPTH	INLET ID Dimension (inch x inch)	GRATE OD Outside Dimension (inch x inch)	TOTAL BYPASS CAPACITY (cu. ft. / sec.)	SOLIDS STORAGE CAPACITY (cu. ft.)	FILTERED FLOW (cu. ft. / sec.)	SHALLOW DEPTH	SOLIDS STORAGE CAPACITY (cu. ft.)	FILTERED FLOW (cu. ft. / sec.)	
FGP-12F	12 X 12	12 X 14	2.8	0.3	0.4	FGP-12F8	.15	.25	
FGP-1350F	15 X 30	15 X 35	6.9	2.3	1.6	FGP-1530F8	1.3	9	
FGP-16F	16 X 16	16 X 19	4.7	0.8	0.7	FGP-16F8	.45	4	
FGP-1624F	16 X 24	16 X 26	5.0	1.5	1.2	FGP-1624F8	.85	7	
FGP-18F	18 X 18	18 X 20	4.9	0.9	0.7	FGP-18F8	.45	4	
FGP-1824F	18 X 19	18 X 21	5.9	2.1	1.4	FGP-1824F8	1.2	8	
FGP-1824F	16 X 22	16 X 24	5.0	1.5	1.2	FGP-1824F8	.85	7	
FGP-1936F	19 X 36	18 X 40	6.9	2.3	1.6	FGP-1936F8	1.3	9	
FGP-2024F	18 X 22	20 X 24	5.9	1.2	1.0	FGP-2024F8	7	55	
FGP-21F	22 X 22	22 X 24	6.1	2.2	1.5	FGP-21F8	1.25	.85	
FGP-2142F	21 X 40	24 X 41	9.1	4.3	2.4	FGP-2142F8	2.45	1.35	
FGP-2148F	19 X 46	22 X 48	9.8	4.7	2.6	FGP-2148F8	2.7	1.5	
FGP-24F	24 X 24	24 X 27	6.1	2.2	1.5	FGP-24F8	1.25	.85	
FGP-2430F	24 X 30	26 X 30	7.0	2.8	1.8	FGP-2430F8	1.6	1.05	
FGP-2436F	24 X 36	26 X 40	8.0	3.4	2.0	FGP-2436F8	1.95	1.15	
FGP-2448F	24 X 48	26 X 48	9.3	4.4	2.4	FGP-2448F8	2.5	1.35	
FGP-28F	28 X 28	32 X 32	6.3	2.2	1.5	FGP-28F8	1.25	.85	
FGP-2840F	24 X 36	28 X 40	8.3	4.2	2.3	FGP-2840F8	2.4	1.3	
FGP-30F	30 X 30	30 X 34	6.1	3.8	2.0	FGP-30F8	2.5	1.15	
FGP-36F	36 X 36	36 X 40	6.1	4.6	2.4	FGP-36F8	2.65	1.35	
FGP-3648F	36 X 48	40 X 48	11.5	6.8	3.2	FGP-3648F8	3.9	1.85	
FGP-48F	48 X 48	48 X 54	13.2	9.5	3.9	FGP-48F8	5.45	2.25	
FGP-SD24F	24 X 24	26 X 28	6.1	2.2	1.5	FGP-SD24F8	1.25	.85	



**CEC**  
**Civil & Environmental Consultants, Inc.**  
8740 Orion Place, Suite 100 - Columbus, OH 43240  
Ph: 614.540.6633 · 888.598.6808 · Fax: 614.540.6638  
[www.cecinc.com](http://www.cecinc.com)

**WEAVERTOWN TRANSPORT LEASING, INC.  
APPLICATION TO OPERATE  
WTL PROCESSING FACILITY  
WASHINGTON COUNTY, OHIO**

DRAWN BY:	<b>DFB</b>	CHECKED BY:	<b>RAS</b>	APPROVED BY:	---
DATE:	<b>APRIL 2014</b>	DWG SCALE:	<b>NTS</b>	PROJECT NO:	<b>112-048</b>

### EROSION CONTROL DETAILS

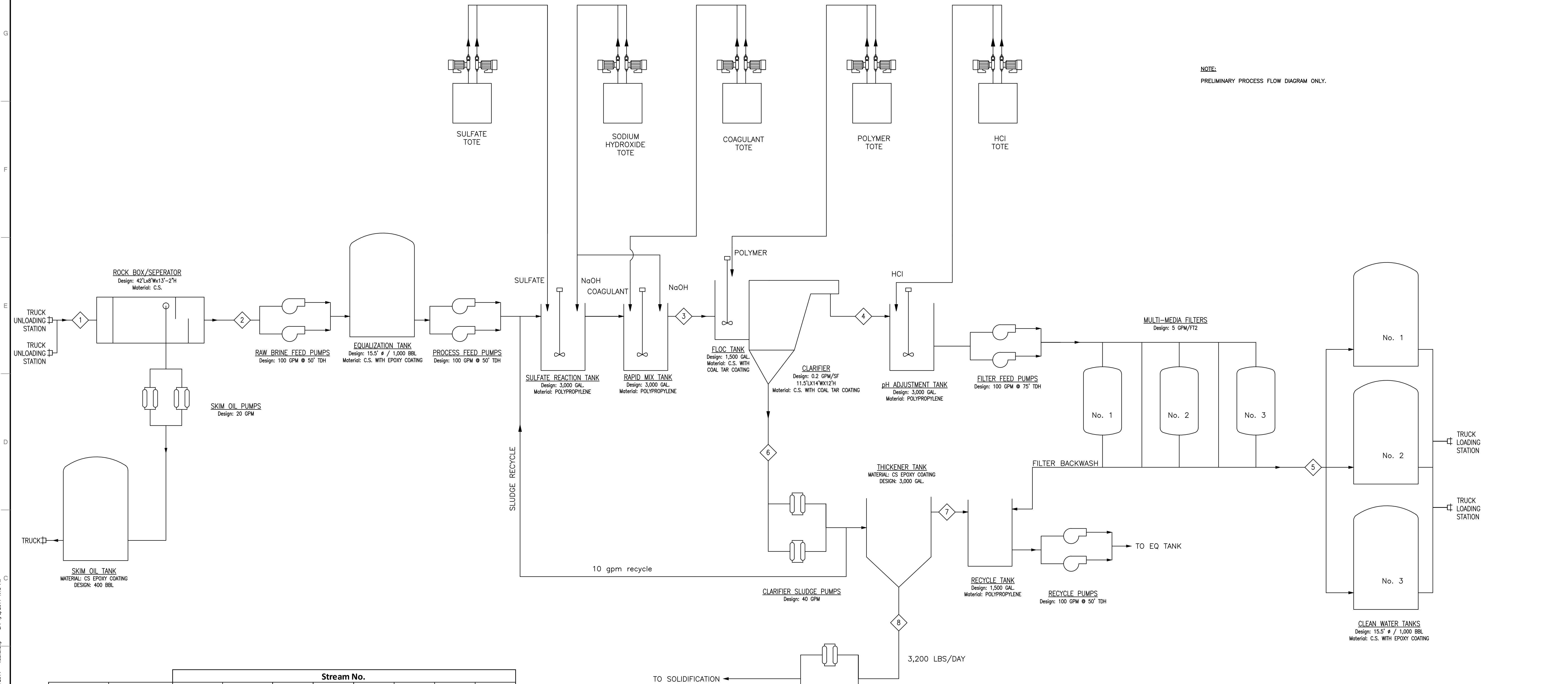
**31**

SHEET 11 OF 12



A: 2011/12-048 - C000 [DWG] 10/21/12-048 - C002 - Birm PFD.dwg (R2) 15/4/2014 - 4/8/2014 11:18 PM  
B: 2011/12-048 - C000 [DWG] 10/21/12-048 - C002 - Birm PFD.dwg (R2) 15/4/2014 - 4/8/2014 11:18 PM  
C: 2011/12-048 - C000 [DWG] 10/21/12-048 - C002 - Birm PFD.dwg (R2) 15/4/2014 - 4/8/2014 11:18 PM  
D: 2011/12-048 - C000 [DWG] 10/21/12-048 - C002 - Birm PFD.dwg (R2) 15/4/2014 - 4/8/2014 11:18 PM  
E: 2011/12-048 - C000 [DWG] 10/21/12-048 - C002 - Birm PFD.dwg (R2) 15/4/2014 - 4/8/2014 11:18 PM  
F: 2011/12-048 - C000 [DWG] 10/21/12-048 - C002 - Birm PFD.dwg (R2) 15/4/2014 - 4/8/2014 11:18 PM  
G: 2011/12-048 - C000 [DWG] 10/21/12-048 - C002 - Birm PFD.dwg (R2) 15/4/2014 - 4/8/2014 11:18 PM  
H: 2011/12-048 - C000 [DWG] 10/21/12-048 - C002 - Birm PFD.dwg (R2) 15/4/2014 - 4/8/2014 11:18 PM

REVISION RECORD		
NO	DATE	DESCRIPTION
SUBMITTAL RECORD		
NO	DATE	DESCRIPTION



Parameter	units	Stream No.							
		1	2	3	4	5	6	7	8
Flow	gpm	100	100	110	70	70	40	10	20
TDS	mg/L	100,000			Negligible change				
TSS	mg/L	400	300	2,743	75	1	6,669	100	13,288
Barium	mg/L	1,000	1,000	1,000	30	10	2,425	30	4,835
Strontium	mg/L	1,000	1,000	1,000	30	10	2,425	30	4,835
Iron	mg/L	50	50	50	5	1	113	5	223
Calcium	mg/L	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000
Magnesium	mg/L	800	800	800	800	800	800	800	800
Total Hardness	mg/L <sup>1</sup>	22,670	22,670	22,670	20,843	20,800	25,346	20,843	29,881
Oil & Grease	mg/L	20	5	5	5	5	5	5	5
pH	s.u.	5.5	5.5	7	7	7	7	7	7

<sup>1</sup>as CaCO<sub>3</sub>



**Civil & Environmental Consultants, Inc.**  
8740 Orion Place, Suite 100 - Columbus, OH 43240  
Ph: 614.540.6633 • 888.598.6808 • Fax: 614.540.6638  
www.ccecinc.com

**WEAVERTOWN TRANSPORT LEASING, INC.**  
**APPLICATION TO OPERATE**  
**WTL PROCESSING FACILITY**  
**WASHINGTON COUNTY, OHIO**

DRAWN BY: **DFB** | CHECKED BY: **RAS** | APPROVED BY: **---**  
DATE: **APRIL 2014** | DWG SCALE: **NTS** | PROJECT NO: **112-048**

**PROCESS FLOW DIAGRAM**  
SHEET **12** OF **12**

DRAWING NO.: **3J**



---

**APPENDIX A**

**PROPERTY OWNERSHIP**

---

07241

LIMITED WARRANTY DEED

THIS IS A DEED dated August 3, 1992 by R&F COAL COMPANY, a Delaware corporation with principal offices in Cadiz, Ohio (herein called "Grantor") to WEAVERTOWN TRANSPORT LEASING INC., a Pennsylvania corporation in Canonsburg, Pennsylvania (herein called "Grantee"):

GRANTOR, for good and valuable consideration received, hereby grants and conveys to Grantee the following described Premises situated on Route 7 at Mile Post 143 on the Ohio River in the Township of Grandview, County of Washington, State of Ohio:

TRACT I (EXHIBIT "A"): Situated in the Township of Grandview, County of Washington and State of Ohio:

Being part of Fractional Section Eighteen (18), Town One (1), Range Five (5) of the "Seven Ranges" in the Ohio River Survey, bounded thus:

Beginning at a railroad spike in Grandview Township Road 430, where the Southwest corner of Grandview (dedicated by Hannibal A. W. Williamson, et al., on June 16, 1848, and presented for recording in Deed Book 38, Page 440 in the office of the Recorder of said County on June 19, 1848), bears North 29 degrees 16' West 33.66 feet distant. Thence South 56 degrees 38' 30" East a distance of 349.22 feet to the Ohio River, where an iron pipe bears North 56 degrees 38' 30" West 34.88 feet distant. Thence down the Ohio River the following Seven (7) courses: South 33 degrees 21' 30" West 100 feet; South 25 degrees 00' West 101.07 feet; South 30 degrees 00' West 100.17 feet; South 33 degrees 21' 30" West 100.00 feet; South 37 degrees 25' West 200.50 feet; South 33 degrees 21' 30" West 100.00 feet; South 43 degrees 40' West 81.00 feet to a point where an iron pipe bears North 66 degrees 00' West 35.50 feet. Thence North 66 degrees 0' West a distance of 581.64 feet to the center of Ohio State Route Seven (7), where an iron pipe bears South 66 degrees 0' East 42.31 feet distant. Thence North 43 degrees 2' East along the center of Ohio State Route Seven (7) a distance of 387.08 feet; thence with a curve to the left, having a radius of 5,729.58 feet, a distance of 497.56 feet, to a point where a railroad spike bears South 56 degrees 18' 20" East 14.17 feet distant, said last course being subtended by a chord that bears North 40 degrees 32' 40" East 497.21 feet. Thence South 56 degrees 18' 30" East a distance of 105.54 feet to the place of beginning. CONTAINING 9.79 acres, of which the right of way of Ohio State Route Seven (7) occupies .81 acre.

EXCEPTING THEREFROM that portion of River Bank Land (Tract No. 2022E) taken by the United States Department of the Army for a flowage easement by Warranty Deed of Easement dated December 1, 1969.

Subject to easements, restrictions and conditions of record, easements or restrictions visible upon the ground and any state of facts which an accurate survey would disclose.

DATE AUG 07 1992

APPROVED

*Paul F. Junk*  
PAUL F. JUNK  
Washington County  
Recorder of Deeds

No. <u>192</u>
TRANSFERRED
TRANS. FEE <u>1.00</u>
AUG - 7 1992
SEC. 318.232 R.C. COMPLIED WITH
322.12
IN AMOUNT <u>600.00</u>
WHITFIELD MERRITT
AUDITOR, WASHINGTON CO. OH
BY <u>SP. Clerk</u>

IAE9221016

**TRACT II (EXHIBIT "B"):** Situated in the Township of Grandview, County of Washington and State of Ohio, and being in Section 18, Town 1, Range 5, bounded and described as follows:

BEGINNING at an iron pin in the Easterly right of way line of SR7 from which an iron pin at the Northeast corner of Arch Cochran 2-acre tract bears N. 63 degrees 48' W. 85.4 feet and being the Northwest corner of Ada Cochran 3-acre tract; thence with right of way line S. 45 degrees 18' W. 53.88 feet to an iron pin; thence S. 53 degrees 43' E. 437.97 feet to an iron pin; thence S. 53 degrees 43' E. 86.42 feet to Ohio River; thence up river N. 40 degrees 28' E. 146.77 feet; thence N. 63 degrees 48' W. 135 feet to a stake; thence N. 63 degrees 48' W. 400 feet to beginning. CONTAINING 1.22 acres.

Survey and description by Gerald W. Sims, Surveyor, Woodsfield, Ohio.

EXCEPTING FROM the above that certain parcel conveyed from John G. Knowlton, et al., to Monongahela Power Co., to-wit:

BEGINNING at an iron pipe in the Southeasterly right of way line of State Route 7 at the Northwestern corner of a 1.22 acre tract of land conveyed by Mary Knowlton to Mary Knowlton and John G. Knowlton by Deed dated July 14, 1973, recorded in Volume 409, Page 308 (Tract 3), of the Deed Records of Washington County, Ohio; thence South 66 degrees 00' East a distance of 301.62 feet to an iron pipe; thence South 37 degrees 37' West a distance of 105.55 feet to an iron pipe; in a southerly line of said 1.22 acre tract; thence North 55 degrees 57' 10" West along the southerly line of said 1.22 acre tract a distance of 298.76 feet to an iron pipe in the southeasterly right of way line of State Route 7; thence North 43 degrees 02' East along the right of way line of State Route 7, a distance of 53.38 feet to the place of beginning. CONTAINING 0.54 acres. Leaving in said parcel 0.68 acres, more or less.

Also conveying to former grantor, a ten (10) foot wide right of way over the above described property from Knowlton to Monongahela Power, as reserved in Deed Vol. 409, Pg. 308.

together with all rights, privileges and appurtenances thereto and all buildings and land improvements thereon; but subject to all easements, rights-of-way, reservations, restrictions and encumbrances of record, to any existing tenancies, to all zoning laws and ordinances, and to any state of facts an accurate survey or inspection of the premises would show;

TO HAVE AND TO HOLD the same unto Grantee and Grantee's successors and assigns forever.

SUBJECT to the foregoing and to the liens of all taxes and assessments for 1992 and subsequent years, Grantor covenants with Grantee that Grantor will warrant and defend the title to the premises against the lawful claims of all persons claiming by, through or under Grantor.

EXECUTED by Grantor as of the date first herein specified.

WITNESS:

R&F COAL COMPANY

Mary Ann F. Roche

By [Signature]

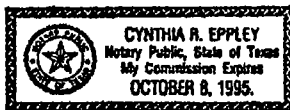
Title: Chief Executive Officer  
& Chairman of the Board

IAE9221016

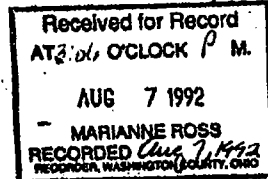
THE STATE OF TEXAS §

COUNTY OF HARRIS §

On this 3rd day of August, 1992, before me appeared N. J. Isto, to me personally known, who being by me duly sworn did say that he is Chairman of the Board of R&F Coal Company, and that the seal affixed to said instrument is the corporate seal of said corporation and said N. J. Isto acknowledged said instrument to be the free act and deed of said corporation.



*Cynthia R. Eppley*  
Notary Public

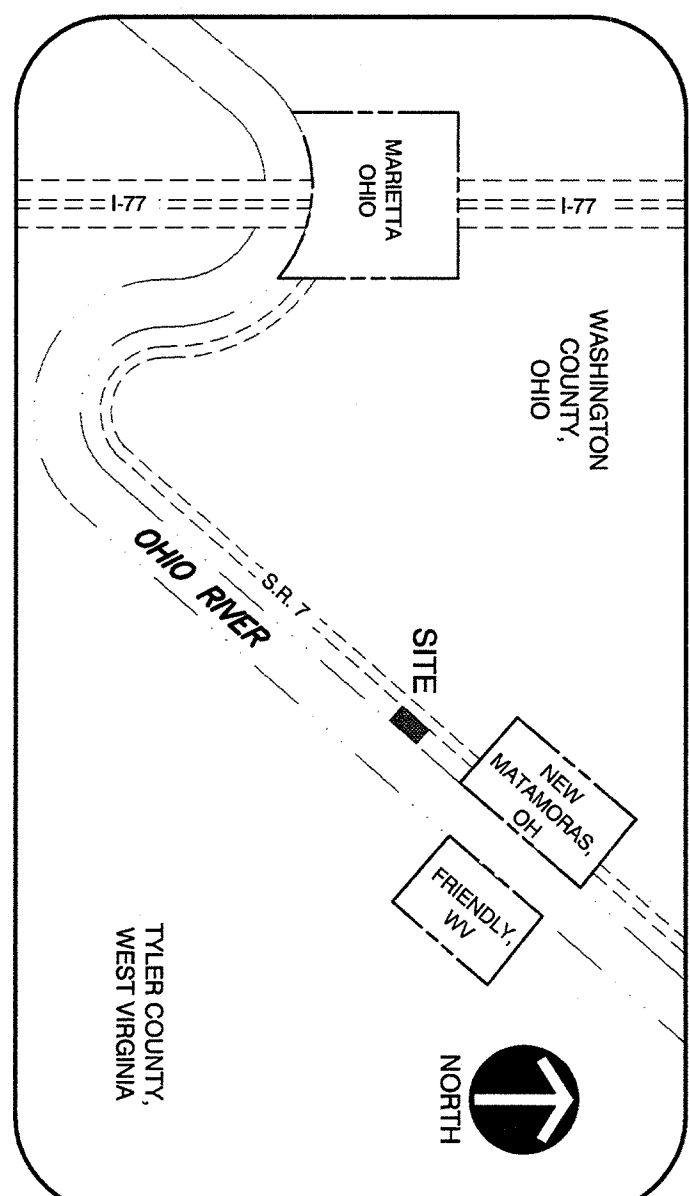
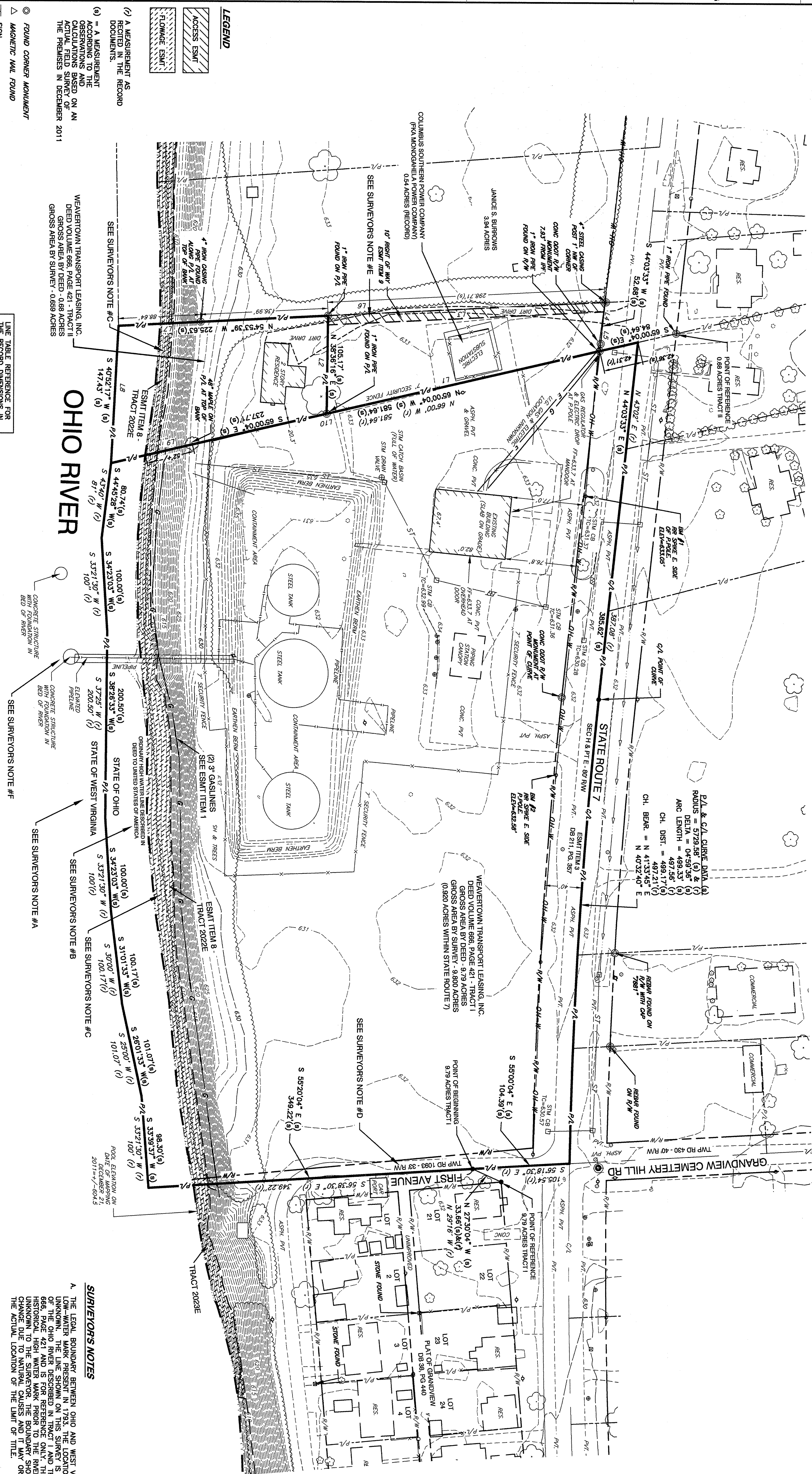




IN OFFICIAL RECORD 666, PAGE 421, RECORDER'S OFFICE, WASHINGTON COUNTY, OHIO

SITUATED IN THE STATE OF OHIO, WASHINGTON COUNT, GRANDVIEW TOWNSHIP, FRACTIONAL SECTION 18, TOWNSHIP 1, RANGE 5, SEVEN RANGES, AND BEING A SURVEY OF TRACT I AND TRACT II CONVEYED TO WEAVERTOWN TRANSPORT LEASING, INC., OF RECORD

IN OFFICIAL RECORD 666, PAGE 421, RECORDER'S OFFICE, WASHINGTON COUNTY, OHIO



**LEGAL DESCRIPTION OF RECORD**

[illegible]

SITUATED IN T. 10 N. W. 1/4, RANGE 5, BOUNDED AND DESCRIBED AS FOLLOWS:

BEING IN SECTION 18, TOWN 1, RANGE 5, BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT AN IRON PIN IN THE EASTERLY CORNER OF WY. LANE S 67° 10' 00" W. 113.4 FEET TO THE NORTHEAST CORNER OF ARCH COOKMAN, 4 ACRES TRACT BEARS N 33° 00' 00" W. 85.4 FEET AND BEING THE NORTHEAST CORNER OF ARCH COOKMAN 3 ACRES TRACT, THENCE WITH RIGHT OF WAY LANE S 45 DEGREES 18' W. 53.88 FEET TO AN IRON PIN, THENCE WITH RIGHT OF WAY LANE S 45 DEGREES 18' W. 53.88 FEET TO AN IRON PIN, THENCE S 53 DEGREES 43' E. 43.97 FEET TO AN IRON PIN, THENCE S 45 DEGREES 28' E. 86.42 FEET TO OHIO RIVER, THENCE UP RIVER N 40 DEGREES 28' E. 146.77 FEET TO AN IRON PIN, THENCE N 63 DEGREES 48' W. 135 FEET TO A STAKE, THENCE N 63 DEGREES 48' W. 135 FEET TO BEGINNING, CONTAINING 1.22 ACRES.

EXCEPTING FROM THE ABOVE CERTAIN PARCELS CONNECTED FROM JOHN G. KNOWLTON, A.L., TO MONONGAHELA POWER CO. TO WIT:

AT THE NORTHEASTLY CORNER OF A 1.122 ACRE TRACT OF LAND CONVEYED BY MARY KNOWLTON TO MARY KNOWLTON AND JOHN G. KNOWLTON BY DEED DATED JULY 14, 1913, IN VOLUME 648, PAGE 308 (TRACT 3), OF THE RECORDED RECORDS OF WASHINGTON COUNTY, MARYLAND, THERE IS A 1.122 ACRE TRACT OF LAND, BEING THE SOUTHERLY HALF OF THE SOUTHERLY LINE OF SAID 1.122 ACRE TRACT, THENCE NORTH 37 DEGREES 27 WEST DISTANCE OF 105.55 FEET TO AN IRON PIPE, IN THE SOUTHERLY LINE OF SAID 1.122 ACRE TRACT, THENCE NORTH 55 DEGREES 57 WEST DISTANCE OF 284.78 FEET TO A CORNER OF SAID TRACT, THENCE SOUTH 52 DEGREES 57 WEST DISTANCE OF 105.55 FEET TO AN IRON PIPE, IN THE SOUTHERLY LINE OF SAID 1.122 ACRE TRACT, THENCE SOUTH 37 DEGREES 27 WEST DISTANCE OF 105.55 FEET TO AN IRON PIPE, IN THE SOUTHERLY LINE OF SAID 1.122 ACRE TRACT, THENCE NORTH 37 DEGREES 27 WEST DISTANCE OF 105.55 FEET TO THE PLACE OF BEGINNING, CONTAINING 0.54 ACRES, LEAVING SAID PARCEL 0.88 ACRES, MORE OR LESS.

**SURVEYOR'S CERTIFICATION**

**TO: WEAVERTOWN ENVIRONMENTAL GROUP**

THIS IS TO CERTIFY THAT THIS MAP OR PLAN AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH THE 2011 "MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/ACSM LAND TITLE SURVEYS," JOINTLY ESTABLISHED AND ADOPTED BY ALTA AND NSPS, AND INCLUDES ITEMS 1, 2, 3, 4, 6, 7A, 8, 11A, 13, 14, 16, AND 18 OF TABLE A THEREOF. THE FIELD WORK WAS COMPLETED ON DECEMBER 30, 2011.

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.  
MARK D. POWER  
REGISTERED LAND SURVEYOR NO.: S-7933

**Civil & Environmental Consultants, Inc.**

ALTA/ACSM LAND TITLE SURVEY  
50810 STATE ROUTE 7  
NEW MATAMORAS, OHIO 45767

**WEAVERTOWN TRANSPORT LEASING INC**

AWN BY:	MP	CHECKED BY:	MP
DATE:	July 14, 2012	DWG SCALE:	AS SHOWN

<b>EB</b>	APPROVED BY:
<b>' = 60</b>	PROJECT NO: <b>112-</b>

SHEET 1 OF 1



---

**APPENDIX B**

**LETTER OF MAP AMMENDMENT**

---



# Federal Emergency Management Agency

Washington, D.C. 20472

**March 15, 2012**

MR. DARYL HEISER

WEAVERTOWN TRANSPORT LEASING, INC.  
2 DORRINGTON ROAD  
CARNEGIE, PA 15106

**CASE NO.: 12-05-2539A**

**COMMUNITY:** VILLAGE OF MATAMORAS,  
WASHINGTON COUNTY, OHIO  
**COMMUNITY NO.:** 390573

DEAR MR. HEISER:

This is in reference to a request that the Federal Emergency Management Agency (FEMA) determine if the property described in the enclosed document is located within an identified Special Flood Hazard Area, the area that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood), on the effective National Flood Insurance Program (NFIP) map. Using the information submitted and the effective NFIP map, our determination is shown on the attached Letter of Map Amendment (LOMA) Determination Document. This determination document provides additional information regarding the effective NFIP map, the legal description of the property and our determination.

Additional documents are enclosed which provide information regarding the subject property and LOMAs. Please see the List of Enclosures below to determine which documents are enclosed. Other attachments specific to this request may be included as referenced in the Determination/Comment document. If you have any questions about this letter or any of the enclosures, please contact the FEMA Map Assistance Center toll free at (877) 336-2627 (877-FEMA MAP) or by letter addressed to the Federal Emergency Management Agency, LOMC Clearinghouse, 7390 Coca Cola Drive, Ste 204, Hanover, MD 21076.

Sincerely,

Luis Rodriguez, P.E., Chief  
Engineering Management Branch  
Federal Insurance and Mitigation Administration

## LIST OF ENCLOSURES:

LOMA DETERMINATION DOCUMENT (REMOVAL)

cc: State/Commonwealth NFIP Coordinator  
Community Map Repository  
Region





# Federal Emergency Management Agency

Washington, D.C. 20472

## LETTER OF MAP AMENDMENT DETERMINATION DOCUMENT (REMOVAL)

COMMUNITY AND MAP PANEL INFORMATION		LEGAL PROPERTY DESCRIPTION
COMMUNITY	VILLAGE OF MATAMORAS, WASHINGTON COUNTY, OHIO	<p>A parcel of land, as described in the Limited Warranty Deed, recorded as Document No. 07241, in Volume 666, Pages 421 through 423, in the Office of the Recorder, Washington County, Ohio</p> <p>The portion of property is more particularly described by the following metes and bounds:</p>
	COMMUNITY NO.: 390573	
AFFECTED MAP PANEL	NUMBER: 39167C0164E	
	DATE: 2/16/2006	
FLOODING SOURCE: OHIO RIVER		<p>APPROXIMATE LATITUDE &amp; LONGITUDE OF PROPERTY: 39.511, -81.076</p> <p>SOURCE OF LAT &amp; LONG: ARCGIS 9.3</p> <p>DATUM: NAD 83</p>

### DETERMINATION

LOT	BLOCK/ SECTION	SUBDIVISION	STREET	OUTCOME WHAT IS REMOVED FROM THE SFHA	FLOOD ZONE	1% ANNUAL CHANCE FLOOD ELEVATION (NAVD 88)	LOWEST ADJACENT GRADE ELEVATION (NAVD 88)	LOWEST LOT ELEVATION (NAVD 88)
--	--	--	50810 State Route 7	Portion of Property	X (shaded)	630.3 feet	--	630.3 feet

**Special Flood Hazard Area (SFHA)** - The SFHA is an area that would be inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood).

**ADDITIONAL CONSIDERATIONS** (Please refer to the appropriate section on Attachment 1 for the additional considerations listed below.)

LEGAL PROPERTY DESCRIPTION  
PORTIONS REMAIN IN THE FLOODWAY

This document provides the Federal Emergency Management Agency's determination regarding a request for a Letter of Map Amendment for the property described above. Using the information submitted and the effective National Flood Insurance Program (NFIP) map, we have determined that the described portion(s) of the property(ies) is/are not located in the SFHA, an area inundated by the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood). This document amends the effective NFIP map to remove the subject property from the SFHA located on the effective NFIP map; therefore, the Federal mandatory flood insurance requirement does not apply. However, the lender has the option to continue the flood insurance requirement to protect its financial risk on the loan. A Preferred Risk Policy (PRP) is available for buildings located outside the SFHA. Information about the PRP and how one can apply is enclosed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at (877) 336-2627 (877-FEMA MAP) or by letter addressed to the Federal Emergency Management Agency, LOMC Clearinghouse, 7390 Coca Cola Drive, Ste 204, Hanover, MD 21076.

Luis Rodriguez, P.E., Chief  
Engineering Management Branch  
Federal Insurance and Mitigation Administration



# Federal Emergency Management Agency

Washington, D.C. 20472

## LETTER OF MAP AMENDMENT DETERMINATION DOCUMENT (REMOVAL)

### ATTACHMENT 1 (ADDITIONAL CONSIDERATIONS)

#### LEGAL PROPERTY DESCRIPTION (CONTINUED)

BEGINNING at the Northwest corner of Tract I; thence S55°00'04"E, a distance of 104.39 feet; thence S55°20'04"E, a distance of 229.16 feet; thence S36°04'18"W, a distance of 133.47 feet; thence N53°55'42"W, a distance of 106.03 feet; thence S31°45'41"W, a distance of 116.23 feet; thence S41°06'27"W, a distance of 152.00 feet; thence S43°27'35"W, a distance of 344.74 feet; thence S33°51'34"E, a distance of 37.27 feet; thence S26°30'50"W, a distance of 68.00 feet; thence N65°00'04"W, a distance of 332.33 feet; thence N44°03'33"E, a distance of 385.62 feet; thence 499.33 feet along a curve to the left, having a radius of 5729.58 feet and a central angle of 04°59'36", a chord bearing of N41°33'45"E, a distance of 499.17 feet to the POINT OF BEGINNING.

#### **PORTIONS OF THE PROPERTY REMAIN IN THE FLOODWAY (This Additional Consideration applies to the preceding 1 Property.)**

A portion of this property is located within the Special Flood Hazard Area and the National Flood Insurance Program (NFIP) regulatory floodway for the flooding source indicated on the Determination/Comment Document while the subject of this determination is not. The NFIP regulatory floodway is the area that must remain unobstructed in order to prevent unacceptable increases in base flood elevations. Therefore, no construction may take place in an NFIP regulatory floodway that may cause an increase in the base flood elevation, and any future construction or substantial improvement on the property remains subject to Federal, State/Commonwealth, and local regulations for floodplain management. The NFIP regulatory floodway is provided to the community as a tool to regulate floodplain development. Modifications to the NFIP regulatory floodway must be accepted by both the Federal Emergency Management Agency (FEMA) and the community involved. Appropriate community actions are defined in Paragraph 60.3(d) of the NFIP regulations. Any proposed revision to the NFIP regulatory floodway must be submitted to FEMA by community officials. The community should contact either the Regional Director (for those communities in Regions I-IV, and VI-X), or the Regional Engineer (for those communities in Region V) for guidance on the data which must be submitted for a revision to the NFIP regulatory floodway. Contact information for each regional office can be obtained by calling the FEMA Map Assistance Center toll free at (877) 336-2627 (877-FEMA MAP) or from our web site at <http://www.fema.gov/about/regoff.htm>.

This attachment provides additional information regarding this request. If you have any questions about this attachment, please contact the FEMA Map Assistance Center toll free at (877) 336-2627 (877-FEMA MAP) or by letter addressed to the Federal Emergency Management Agency, LOMC Clearinghouse, 7390 Coca Cola Drive, Ste 204, Hanover, MD 21076.

Luis Rodriguez, P.E., Chief  
Engineering Management Branch  
Federal Insurance and Mitigation Administration

---

**APPENDIX C**

**OHIO RIVER OFFSET CORRESPONDENCE**

---

## Stanley, Roy

---

**From:** Fox, Rich <Rich.Fox@epa.state.oh.us>  
**Sent:** Tuesday, March 06, 2012 4:23 PM  
**To:** Stanley, Roy  
**Cc:** Mansfield, Mark  
**Subject:** RE: Weavertown Transfer Station Permit Application

Thanks you for your follow up to our phone conversation. In reference to Ohio's siting criteria for solid waste transfer stations, I am in agreement that using the Ordinary High Water Mark is acceptable for the 200 foot setback from the Ohio River at the New Matamoras, Ohio site. It is also my understanding that a request for an exemption to accept liquids at the transfer station should be made as part of the permit to install application. An air pollution control permit may also be needed for roads and parking areas and also for handling of absorbent materials. You should also contact Ohio Division of Natural Resources to determine what requirements they have for the treatment and disposal of wastewater from shale gas drilling.

Please feel free to ask for assistance as this project moves forward.

---

**From:** Stanley, Roy [<mailto:rstanley@cecinc.com>]  
**Sent:** Tuesday, March 06, 2012 3:28 PM  
**To:** Fox, Rich  
**Subject:** Weavertown Transfer Station Permit Application

Rich,  
Thank you for your time yesterday to discuss the offset from the Ohio River using the Ordinary High Water Mark as the offset reference elevation for the project referenced above. You indicated that you would forward to me a letter or email indicating that the Ohio EPA SEDO agrees that the OHWM can be used as the offset elevation. Could you please forward the email or letter of agreement to me as soon as possible?  
Thanks,  
Roy

**Roy A. Stanley** / Project Manager  
Civil & Environmental Consultants, Inc.  
8740 Orion Place, Suite 100 · Columbus, Ohio 43240  
Toll-Free: 888-598-6808 · Direct: (614) 545-1260 · Fax: 614-540-6638  
Mobile: 614-425-6324 · <http://www.cecinc.com>  
Senior Leadership · Integrated Services · Personal Business Relationships

*This electronic communication and any attachments are intended solely for the use of the person or entity to which it is addressed, and may contain information that is confidential, privileged and exempt from disclosure under applicable law, including copyright law. If you are not the intended recipient of this message, you are prohibited from disclosing, reproducing, distributing, disseminating or otherwise using this transmission. Please promptly notify the sender by reply electronic communication and immediately delete this message from your system.*



December 22, 2011

Mr. Joe Holland  
Environmental Specialist II  
Ohio Environmental Protection Agency  
Southeast District Office  
Division of Material & Waste Management  
2195 Front Street  
Logan, OH 43138

Dear Mr. Holland;

Subject: Request for Agreement – Surface Water Setback Requirement  
Solid Waste Transfer Station Permit to Install Application  
Weavertown Environmental Group  
New Matamoras, Ohio  
CEC Project 112-048

On behalf of Weavertown Environmental Group (WEG), Civil & Environmental Consultants, Inc. (CEC) is submitting this request to the Ohio Environmental Protection Agency (Ohio EPA) Southeast District Office (SEDO) for written agreement regarding the surface water setback criteria for a proposed solid waste transfer station permit to install (PTI) application. The proposed transfer station will be located near New Matamoras, Ohio in Grandview Township, Washington County, Ohio (Figure 1 enclosed). Delineation of the surface water setback position critically affects the location and size of the waste handling area design and the viability of this project.

## 1.0 BACKGROUND

WEG contracted CEC to prepare a due diligence evaluation of the potential to re-develop their property located near New Matamoras, Ohio for permitting and construction of a solid waste transfer station that will stabilize drilling mud, drill cuttings, petroleum impacted soils and other non-hazardous industrial sludges prior to transportation to an appropriately permitted solid waste landfill. A site features map is provided in the enclosed Figure 2.

## Civil & Environmental Consultants, Inc.

**Columbus** 8740 Orion Place, Suite 100  
Orion Office Park  
Columbus, Ohio 43240-4063  
Phone 614/540-6633  
Fax 614/540-6638  
Toll Free 888/598-6808  
E-mail [columbus@cecinc.com](mailto:columbus@cecinc.com)

**Pittsburgh** 800/365-2324  
**Austin** 855/365-2324  
**Charlotte** 704/773-6465  
**Chicago** 877/963-6026  
**Cincinnati** 800/759-5614

**Cleveland** 866/507-2324  
**Detroit** 866/380-2324  
**Export** 800/899-3610  
**Indianapolis** 877/746-0749  
**Nashville** 800/763-2326

**North Central PA** 877/389-1852  
**Phoenix** 877/231-2324  
**St. Louis** 866/250-3679

Corporate Web Site <http://www.cecinc.com>



Solid waste transfer station rules in the Ohio Administrative Code (OAC) 3745-27-22 (D) require that the waste handling area cannot be located within 200 feet of any surface waters of the state, as defined in OAC 3745-1-02. OAC 3745-1-02 (S)(31) defines “Surface Water” as “any water on the surface of the earth”, however, this rule does not define the lateral limits of the surface water body. To determine the area of the WEG property where the waste handling area could be located, it is required to determine the 200 foot setback from the Ohio River at the WEG property.

CEC researched additional Ohio laws and rules in an effort to determine the definition of the lateral limits of a surface water body. The Ohio Revised Code definition under Title 61, Chapter 6111.01 (H) states that “Waters of the state means all streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, irrigation systems, drainage systems, and other bodies or accumulations of water, surface and underground, natural or artificial, regardless of the depth of the strata in which underground water is located, that are situated wholly or partly within, or border upon, this state, or are within its jurisdiction, except those private waters that do not combine or effect a junction with natural surface or underground waters.” Again, this definition does not address the lateral limits of surface waters of the state.

Additional Ohio EPA surface water definitions contained in the Ohio Administrative Code were reviewed including;

- Water Quality Standards definitions in OAC 3745-1-02 (77);
- Section 401 Water Quality Certification definitions in OAC 3745-32-01(N);
- Ohio NPDES Individual Permits definitions in OAC 3745-33-01(PP) and (YY);
- Ohio NPDES General Permits definitions in OAC 3745-38-01(T);
- Permits to Install and Plan Approvals for Water Pollution Control definitions in OAC 3745-42-01(GGG) and (OOO); and
- Voluntary Action Program definitions in OAC 3745-300-01.

CEC did not find any definition of the lateral limits of surface waters of the state defined in any of these rules.

The United States Army Corp of Engineers (USACE) and United States Environmental Protection Agency (USEPA) have federal regulatory authority over wetlands and streams. The USACE has authority to permit work and the placement of structures in navigable waters of the United States under Sections 9 and 10 of the Rivers and Harbors Act of 1899, and to permit the discharge of dredged or fill material in waters of the United States under Section 404 of the Clean Water Act (CWA).





Where the USACE has established jurisdiction over a particular water body, the lateral limits of jurisdiction for that water body are determined pursuant to, e.g., Title 33 Code of Federal Regulations (CFR) Sections 328.4, 329.11, 329.12, and 329.13. Among the indicators of the lateral limits of jurisdiction set forth in those regulations are the shoreward limit of adjacent wetlands, or, where there are no adjacent wetlands, the presence of an ordinary high water mark (OHWM) for non-tidal waters and the high tide line or mean high water mark for tidal waters.

Because wetlands have been included in the definition of a surface water body under Ohio rules, CEC reviewed the USACE Wetland Delineation Manual<sup>1</sup> which states in Part IV, Section G that “water in a depression normally must be sufficiently persistent to exhibit an ordinary high-water mark or the presence of wetland characteristics before it can be considered as a water body potentially subject to Clean Water Act jurisdiction.”

The USACE has published a Regulatory Guidance Letter (RGL) No. 05-05 dated December 7, 2005 which includes in Section 2 General Considerations, a discussion of Regulations and Policy. Section 2 of the RGL states that “For purposes of Section 404 of the Clean Water Act, the lateral limits of jurisdiction over non-tidal water bodies extend to the ordinary high water mark (OHWM), in absence of adjacent wetlands.” The RGL also summarizes that for Sections 9 and 10 of the Rivers and Harbor Act of 1899, the lateral extent of Federal jurisdiction, is limited to the traditional navigable waters of the United States, which extends to the OHWM, whether or not adjacent wetlands extend landward of the OHWM.”

CEC reviewed the online National Wetlands Inventory Map published by the U.S. Fish & Wildlife Service which indicates that there are no wetlands on, or adjacent to the Ohio River, at the WEG New Matamoras property.

## **2.0 OHIO EPA AGREEMENT REQUESTED**

As a result of this research described above, which searched for a definition of the lateral limits of a surface water body or waters of the state, CEC telephoned Mr. Rich Fox of Ohio EPA SEDO on October 27, 2011 to propose that the Ohio River OHWM be used as the reference contour for the 200 foot offset from surface water. Mr. Fox acknowledged that using the OHWM is acceptable as the reference elevation for the 200 foot setback from surface water for a transfer station permit application.

The USACE Navigation Chart No. 178 enclosed in Attachment A provides the Ohio River OHWM in the vicinity of the WEG site. The WEG site is at approximate river mile 143.5. The OHWM is equal to 608.9 feet above mean sea (amsl) level at river mile 140 (upstream of the site) and 606.9 feet amsl at river mile 145 (downstream of the site). A reasonable and slightly

---

<sup>1</sup> US Army Corp of Engineers, Waterways Experiment Station, January 1987 – Final Report, Wetlands Research Program Technical Report Y-87-1 (on-line edition).



Mr. Joe Holland  
CEC Project 112-048  
Page 4  
December 22, 2011



conservative value for the OHWM at the WEG site is 607.9 feet above mean sea level. The enclosed Figure 3 shows the setback criteria for a solid waste transfer PTI application, including the 200 foot surface water setback based on the OHWM for the Ohio River.

The surface water offset criteria for a solid waste transfer facility is critical to the development of the WEG site near New Matamoras, Ohio. Thus, CEC and WEG are requesting that Ohio EPA, SEDO provide written agreement that the ordinary high water mark provided on USACE Navigation Chart No. 178, will define the lateral extent of the Ohio River for the purposes of delineating the 200 foot offset from a surface water of the state on the WEG property in accordance with the transfer station siting criteria in OAC 3745-27-22 (D).

### **3.0 CLOSING**

Civil & Environmental Consultants, Inc. and the Weavertown Environmental Group appreciate consideration of this Request for Agreement by the Ohio Environmental Protection Agency, Southeast District Office. This proposed transfer station facility will provide jobs and revenue to the local economy, as well as a needed service for the oil and gas exploration and production industry. Please contact me if you have any questions or if you require additional information regarding this matter.

Very truly yours,

**CIVIL & ENVIRONMENTAL CONSULTANTS, INC.**

A handwritten signature in blue ink, appearing to read 'Roy A. Stanley', is positioned above the name.

Roy A. Stanley, CPG  
Project Manager

A handwritten signature in blue ink, appearing to read 'John DiNunzio', is positioned above the name.

John DiNunzio, CPG  
Vice President

Enclosures

cc: Mr. Daryl Heiser – WEG

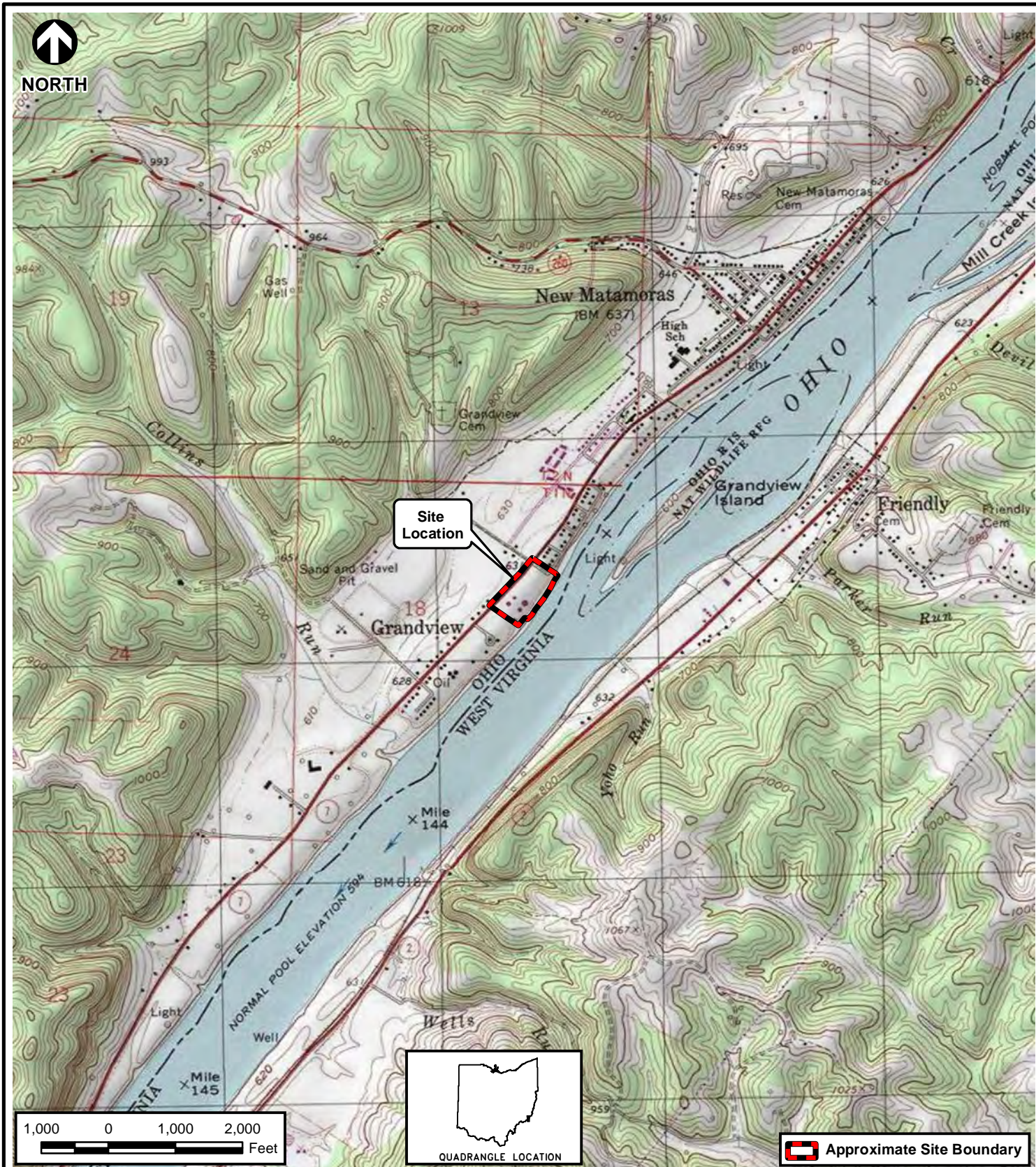


---

## FIGURES

---





## Civil & Environmental Consultants, Inc.

8740 Orion Place, Suite 100 - Columbus, Ohio 43240

614-540-6633 - 888-598-6808

www.cecinc.com

WEAVERTOWN ENVIRONMENTAL GROUP  
PRELIMINARY DUE DILIGENCE SERVICES  
PROPOSED SOLID WASTE TRANSFER STATION  
AND TANK STORAGE FACILITY  
NEW MATAMORAS, OHIO

### SITE LOCATION MAP

DRAWN BY:

MJB

CHECKED BY:

JSC

APPROVED BY:

RAS\*

FIGURE NO:

DATE:

DECEMBER 20, 2011

DWG SCALE:

1" = 2,000'

PROJECT NO:

112-048

**1**

Signature on File \*





NORTH



SOURCE: PORTION OF A NATIONAL AGRICULTURAL IMAGERY PROGRAM (NAIP) COLOR COUNTY AERIAL MOSAIC - WASHINGTON COUNTY, OHIO, 2009.  
EXISTING BASE FILE PROVIDED BY WEAVERTOWN ENVIRONMENTAL GROUP DRAWING NO. 9112D1. A.M.S.L. IS AN ABBREVIATION FOR ABOVE MEAN SEA LEVEL



### Civil & Environmental Consultants, Inc.

8740 Orion Place, Suite 100 - Columbus, Ohio 43240  
614-540-6633 - 888-598-6808  
www.cecinc.com

WEAVERTOWN ENVIRONMENTAL GROUP  
PRELIMINARY DUE DILIGENCE SERVICES  
PROPOSED SOLID WASTE TRANSFER STATION  
AND TANK STORAGE FACILITY  
NEW MATAMORAS, OHIO

### SITE AND VICINITY AERIAL MAP

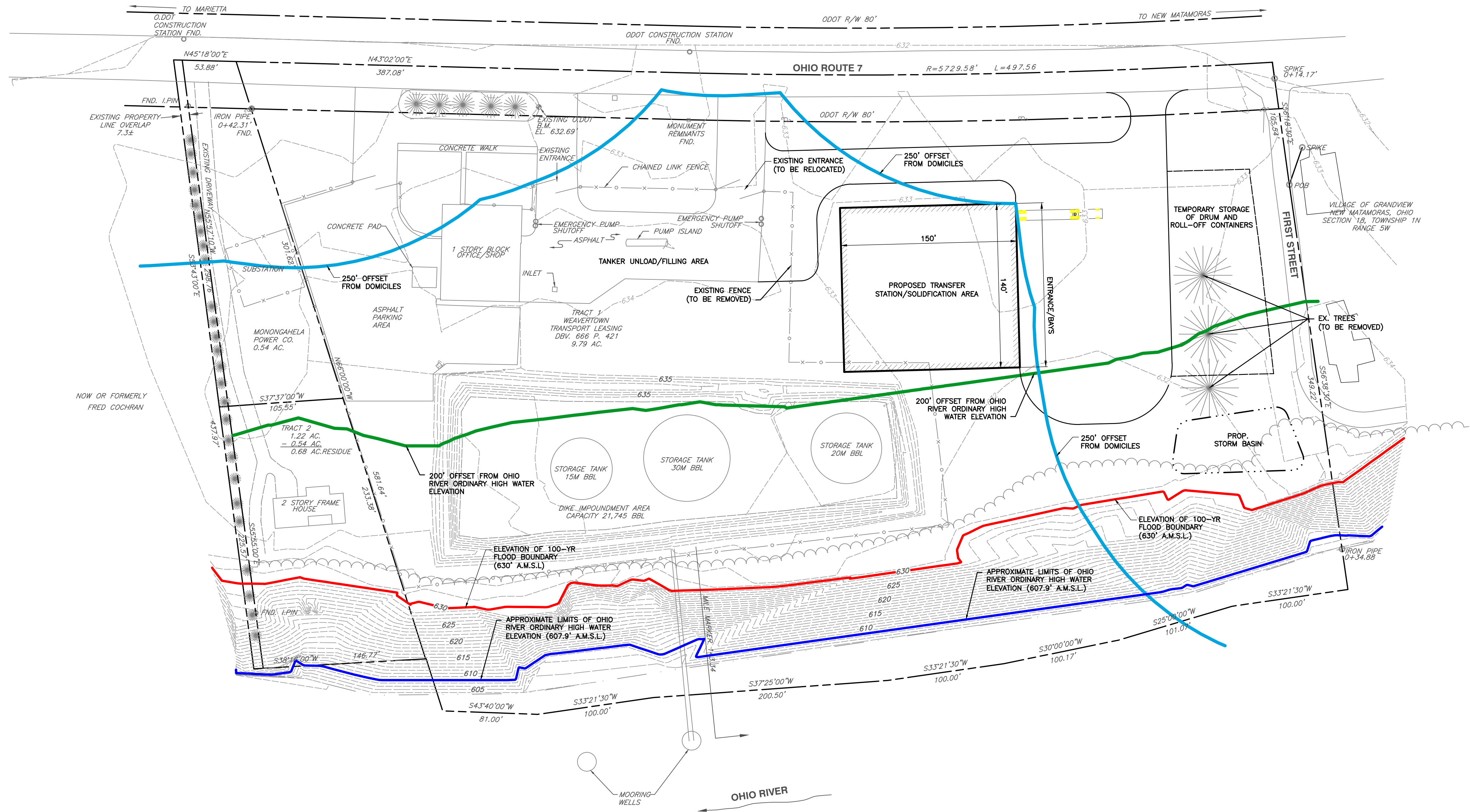
DRAWN BY:	MJB	CHECKED BY:	JSC	APPROVED BY:	RAS*	FIGURE NO:	2
DATE:	DECEMBER 20, 2011	DWG SCALE:	1" = 200'	PROJECT NO:	112-048		

Signature on File \*

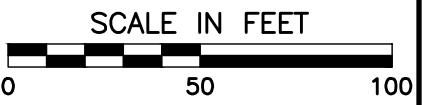





SUBMITTAL RECORD		
NO	DATE	DESCRIPTION
REVISION RECORD		
NO	DATE	DESCRIPTION



- REFERENCES**
- EXISTING BASE FILE PROVIDED BY WEAVERTOWN ENVIRONMENTAL GROUP DRAWING NO. 9112D1.
  - A.M.S.L. IS AN ABBREVIATION FOR ABOVE MEAN SEA LEVEL.





**Civil & Environmental Consultants, Inc.**  
8740 Orion Place, Suite 100 - Columbus, OH 43240  
Ph: 614.540.6633 · 888.598.6808 · Fax: 614.540.6638  
www.cecinc.com

**WEAVERTOWN ENVIRONMENTAL GROUP  
PRELIMINARY DUE DILIGENCE FINDINGS  
PROPOSED SOLID WASTE TRANSFER  
STATION AND TANK STORAGE FACILITY**

DRAWN BY:	BTW	CHECKED BY:	JSC	APPROVED BY:	RAS*
DATE:	DEC 2011	DWG SCALE:	1"=50'	PROJECT NO:	112-048

TRANSFER STATION AND SOLIDIFICATION PROCESS AREA CONCEPT	DRAWING NO: <b>3</b>
---	-------------------------

I:\CUMMINGS\219496\111-399\CD\DWG\PLANS\111399 - FIGURE\DWG\LA001111399.dwg - 12/21/2011 11:18:06 AM - LP: 12/21/2011 11:18:42 AM

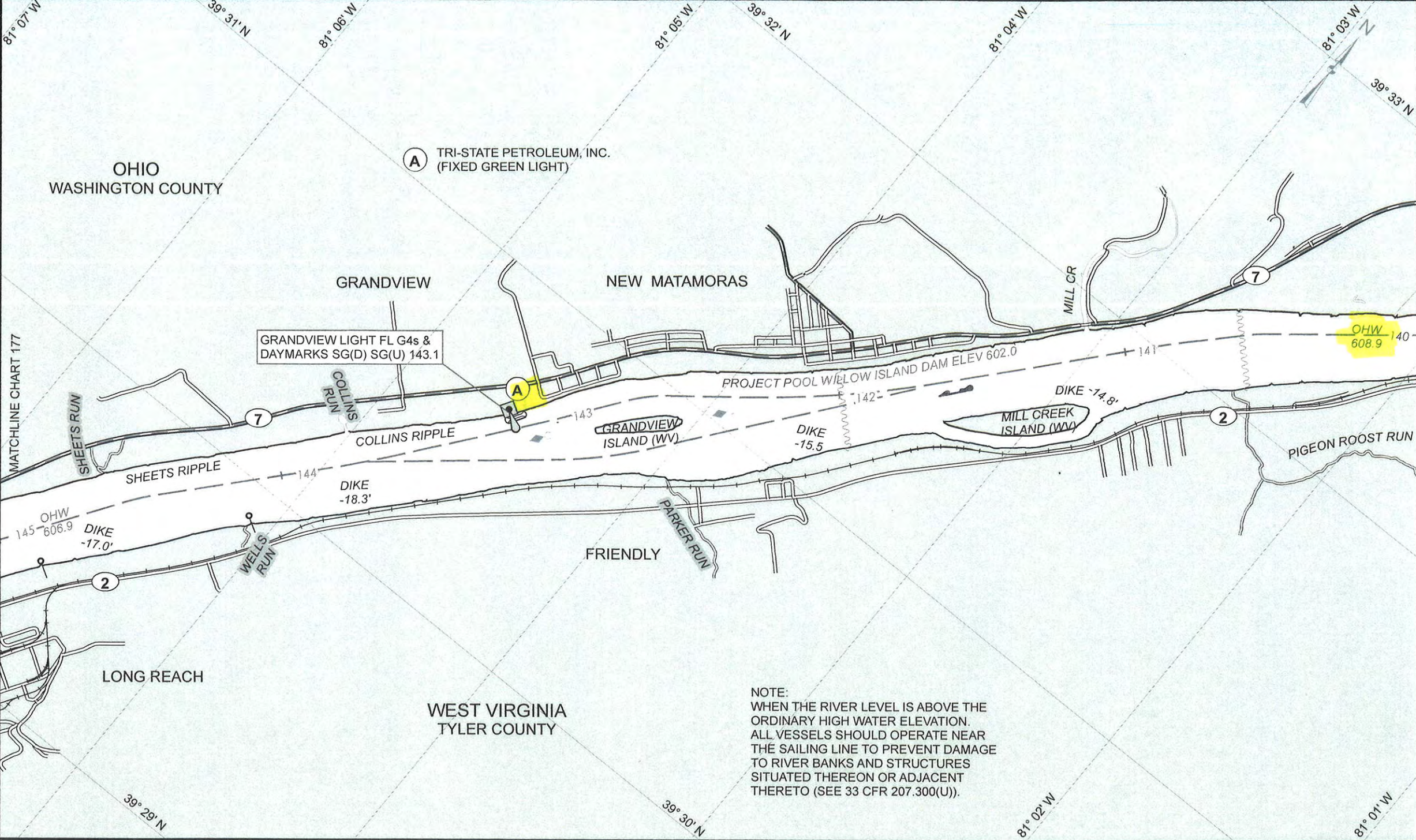


---

## **ATTACHMENT A**

---







---

**APPENDIX D**

**STORM WATER MODELING CALCULATIONS**

---



# Stormwater Management Report Weavertown Transfer Station

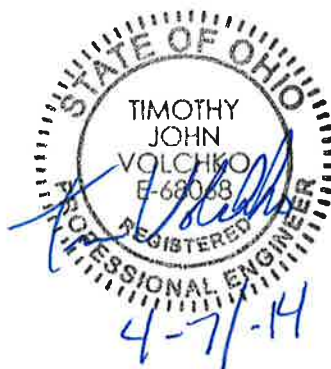
New Matamoras,  
Washington County, Ohio

Prepared For:  
**Weavertown Transport Leasing, Inc.**  
2 Dorrington Road  
Carnegie, PA 15106

Prepared By:  
**Civil & Environmental Consultants, Inc.**  
8740 Orion Place, Suite 100  
Columbus, OH 43240

**CEC Project 112-048**

**April 2014**



## **Table of Contents**

1.0	Background	1
2.0	Pre & Post-Developed Conditions	2
3.0	Allowable Outflow	2
4.0	Detention Basin Details	3
5.0	Water Quality Details	4
6.0	Sediment Basin Details	4
7.0	Storm Sewer Design	4

## **Appendices**

Appendix A:	Drainage Maps
Appendix B:	Pre vs. Post Drainage Calculations
Appendix C:	Detention Basin Calculations
Appendix D:	Water Quality Calculations
Appendix E:	Sediment Basin Calculations
Appendix F:	Storm Sewer Design Calculations

## 1.0 Background

The proposed Weavertown Solid Waste Transfer Facility is located at the southeast corner of the intersection of State Route 7 and First Avenue, New Matamoras, Ohio. The parcel is currently owned by Weavertown Transport Leasing, Inc., and is identified as Washington County parcel #150058460000. The site is bordered on the north by First Avenue, on the southwest by a property owned by the Columbus Southern Power Company, on the southeast by a property owned by Weavertown Transport Leasing, Inc., on the west by State Route 7 and on the east by the Ohio River.

The site currently is composed of one existing building, a pump station, three large tanks and an agricultural field. The existing southern portion of the site has a storm sewer that discharges to the Ohio River without detention facilities. The northern portion of the site drains by sheet flow to the Ohio River.

The project consists of a new 10,000 SF building, related parking lot areas and utilities, and associated storm water detention facilities. There are no existing storm water management practices within the area of the proposed improvements. Refer to **Appendix A** for the pre & post-developed drainage maps.

A detention basin will be constructed on the northeast portion of the site to control the peak rates of discharge after the site is developed. Water Quality volume will be provided within the basin to meet OEPA requirements.

The basin will discharge into the Ohio River which has the following elevations established:

Ohio River Elevation		
O.H.W.M.	607.9	Per Field Survey
100-Yr	630.3	Per FEMA flood map

O.H.W.M. Ordinary High Water Mark

**Note:** It is assumed that the detention basin outlet pipe will be free flowing into the Ohio River for the 1 thru 25 year storm events.

The drainage calculations provided within this report were designed using HydroCAD software & the SCS TR-20 method.

## 2.0 Pre & Post-Developed Conditions

### Hydrological Soil Group

The hydrological soil group for this site is listed as type “B” per the NRCS Web soil survey.

Map Unit Symbol	Map Unit Name	Rating
MeA	Mentor Silt Loam, 0-2% slopes	B

### Pre-Developed Conditions

Area (ac)	CN	Description
1.70	61	Pasture/grassland/range, Good, HSG B
0.10	98	Paved parking, HSG B
1.50	72	Legumes, straight row, Good, HSG B
<b>3.30</b>	<b>67</b>	<b>Tc= 14.3 minutes</b>

### Post-Developed Conditions

Area (ac)	CN	Description
2.95	98	Paved parking, HSG B
0.75	61	>75% Grass cover, Good, HSG B
<b>3.70</b>	<b>91</b>	<b>Tc= 5 minutes</b>

Storm (year)	Pre-Dev Peak Flow (cfs)	Post-Dev Peak Flow (cfs)
<b>1-yr</b>	0.49	8.33
<b>2-yr</b>	1.13	10.57
<b>5-yr</b>	2.28	13.68
<b>10-yr</b>	3.34	16.17
<b>25-yr</b>	5.02	19.66
<b>50-yr</b>	6.53	22.52
<b>100-yr</b>	8.18	25.49

Refer to **Appendix B** for pre & post-developed drainage calculations.

## 3.0 Allowable Outflow

The post-developed allowable outflow from the detention basin was held at or below the pre-developed peak flow rates for the respective 1-yr through 100-yr storm events.

## 4.0 Detention Basin Details

### Detention Basin Volumes

Elevations (ft)	Zone	Volume (cu. ft.)
623.00 to 625.00	Forebay/ Micropool	2,535
625.00 to 627.39	WQ	8,051
627.39 to 631.11	Detention	21,440
631.11 to 632.00	Em. Spillway	7,004

### Detention Basin Outlet Structure

60'-12" Outlet Pipe @ 1.0%	Inv. 624.50
1.25" Orifice	Inv. 625.00 (WQ Outlet Structure)
Catch Basin (ODOT 2-2b)	T/G 627.39 (Detention Outlet Structure)
6' Wide Emergency Spillway	Inv. 630.50

### Detention Basin Peak Outlet

Storm (year)	Allowable Peak Flow (cfs)	Basin Post-Dev Peak Flow (cfs)	Basin Peak Water Elevation (ft)
1-yr	0.49	0.18	628.11
2-yr	1.13	0.23	628.74
5-yr	2.28	0.28	629.58
10-yr	3.34	0.31	630.22
25-yr	5.02	1.03	630.62
50-yr	6.53	3.29	630.84
100-yr	8.18	7.87	631.11

Refer to **Appendix C** for detention basin calculations.



## 5.0 Water Quality Details

The proposed basin will provide the water quality volume (WQv) required for the post-developed tributary area. The WQv is based on a C value of 0.80 for commercial use. The 1.25" orifice outlet structure for the proposed basin will release the WQv over a 48 hour period and will allow no more than 50% of the WQv to be released during the first third of the required drawdown time of 16 hours. Refer to **Appendix D** for water quality calculations.

## 6.0 Sediment Basin Details

During Construction, the basin will be used for erosion & sediment control. A skimmer will be used to dewater the basin over 48 hour time period. Once construction is complete and 70% of the upland drainage area is established, the skimmer will be removed and the final detention basin outlet structure and elevations will be established.

### Sediment Basin Volumes

Elevations (ft)	Zone	Volume (cu. ft.)
623.00 to 625.00	Sediment	3,817
625.00 to 627.39	Dewatering	8,051
627.39 to 630.50	Detention	17,130
630.50 to 632.00	Em. Spillway	11,314

### Sediment Basin Outlet Structure

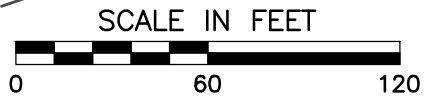
60'-12" Outlet Pipe @ 1.0%	Inv. 624.50
Skimmer w/ 1.25" Orifice	Inv. 625.00
Catch Basin (ODOT 2-2b)	T/G 627.39
6' Wide Emergency Spillway	Inv. 630.50

Refer to **Appendix E** for the sediment basin calculations.









## 7.0 Storm Sewer Design

Washington County does not provide specific requirements regarding the required design year for storm sewer sizing. Therefore, the storm sewer design on this project was based on the 10-year storm event which is consistent with the general approach to stormwater management in this region of Ohio. Refer to **Appendix F** for the storm sewer calculations.

# **Appendix A: Drainage Maps**



## LEGEND

	DRAINAGE AREA
	
	FLOW PATH (TC)
	EX INDEX CONTOUR
	EX INTERMEDIATE CONTOUR
	EX STORM PIPE
	EX STORM CATCH BASIN
	EX CROPS

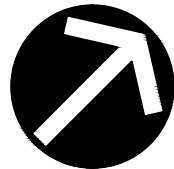


**Civil & Environmental Consultants, Inc.**

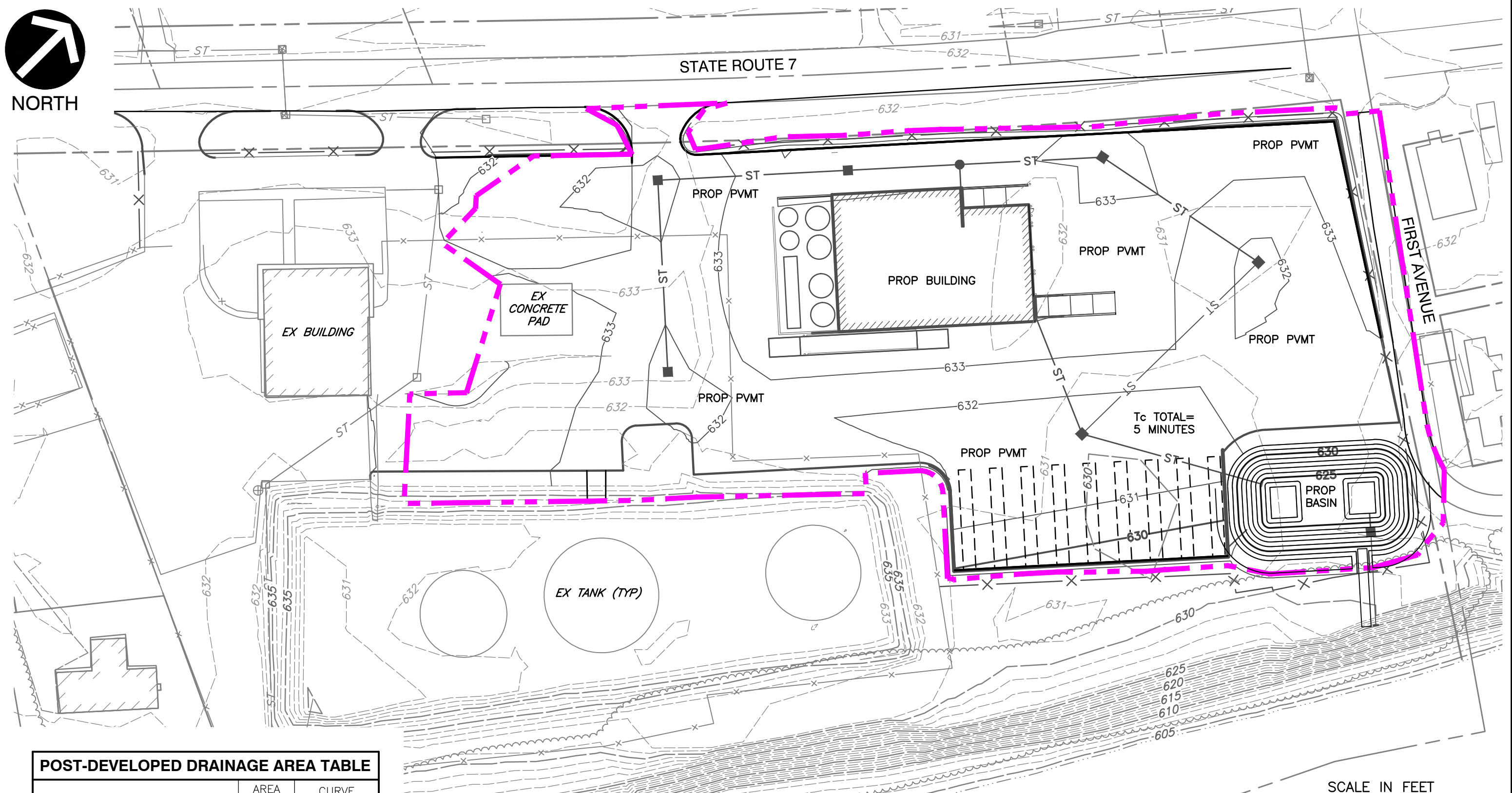
8740 Orion Place, Suite 100 - Columbus, OH 43240  
 614-540-6633 · 888-598-6808  
[www.cecinc.com](http://www.cecinc.com)

DRAWN BY: <b>BAB</b>	CHECKED BY: <b>TJV</b>
DATE: <b>MAR. 2014</b>	DWG SCALE: <b>1" = 60'</b>

WEAVERTOWN TRANSPORT LEASING, INC. TRANSFER STATION PTI APPLICATION WTL TRANSFER STATION WASHINGTON COUNTY, OHIO		
PRE-DEVELOPED TRIBUTARY MAP		
APPROVED BY:	TJV	FIGURE NO.:
PROJECT NO:	112-048	1



NORTH



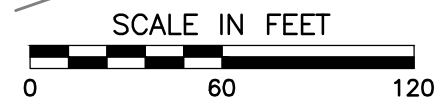
POST-DEVELOPED DRAINAGE AREA TABLE		
AREA DESCRIPTION	AREA (ACRES)	CURVE NUMBER
IMPERVIOUS AREA =	2.95	98
>75% GRASS COVER =	0.75	61
TOTAL AREA OF SITE =	3.70	91 (COMPOSITE)

SITE SOIL DATA

MeA - MENTOR SILT LOAM, 0 TO 2 PERCENT SLOPES

LEGEND

- DRAINAGE AREA FLOW PATH (TC)
- EX INDEX CONTOUR
- EX INTERMEDIATE CONTOUR
- EX STORM PIPE
- EX STORM CATCH BASIN
- PROP STORM PIPE
- PROP STORM CATCH BASIN
- PROP INDEX CONTOUR
- PROP INTERMEDIATE CONTOUR



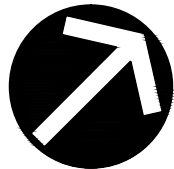
**Civil & Environmental Consultants, Inc.**  
8740 Orion Place, Suite 100 - Columbus, OH 43240  
614-540-6633 · 888-598-6808  
www.cecinc.com

WEAVERTOWN TRANSPORT LEASING, INC.  
TRANSFER STATION PTI APPLICATION  
WTL TRANSFER STATION  
WASHINGTON COUNTY, OHIO

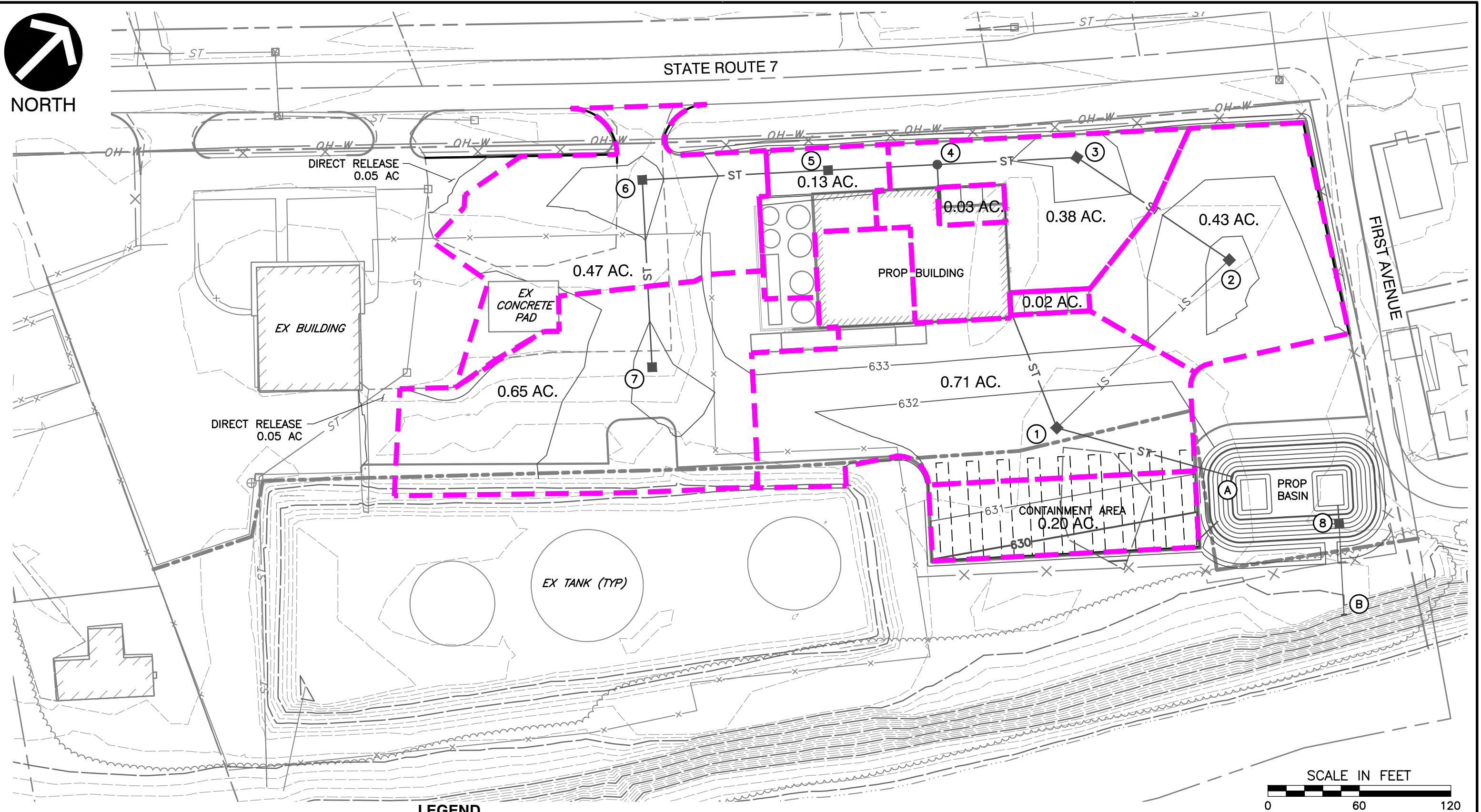
POST-DEVELOPED TRIBUTARY MAP

DRAWN BY: BAB	CHECKED BY: TJV	APPROVED BY: TJV	FIGURE NO.: 2
DATE: MAR. 2014	DWG SCALE: 1" = 60'	PROJECT NO: 112-048	





NORTH



**LEGEND**

- CATCH BASIN DRAINAGE AREA
- FLOW PATH (TC)
- EX INDEX CONTOUR
- EX INTERMEDIATE CONTOUR
- EX STORM PIPE
- EX STORM CATCH BASIN
- PROP INDEX CONTOUR
- PROP INTERMEDIATE CONTOUR



**Civil & Environmental Consultants, Inc.**

8740 Orion Place, Suite 100 - Columbus, OH 43240  
614-540-6633 • 888-598-6808  
www.cecinc.com

WEAVERTOWN TRANSPORT LEASING, INC.  
TRANSFER STATION PTI APPLICATION  
WTL TRANSFER STATION  
WASHINGTON COUNTY, OHIO

POST-DEVELOPED STORM  
SEWER TRIBUTARY MAP

DRAWN BY:	BAB	CHECKED BY:	TJV	APPROVED BY:	TJV	FIGURE NO.:	3
DATE:	MARCH 2014	DWG SCALE:	1" = 60'	PROJECT NO:	112-048		

\\syr-columbus\Projects\2011\112-048\112-048-CADD\Drawings\112-048XR-TRIBUTARY AREA POST CATCH BASIN.dwg[LAYOUT] LS(4/7/2014 8:25 AM) - LP: 4/7/2014 8:25 AM

## **Appendix B: Pre vs. Post Drainage Calculations**

**Summary for Subcatchment PRE: pre-dev**

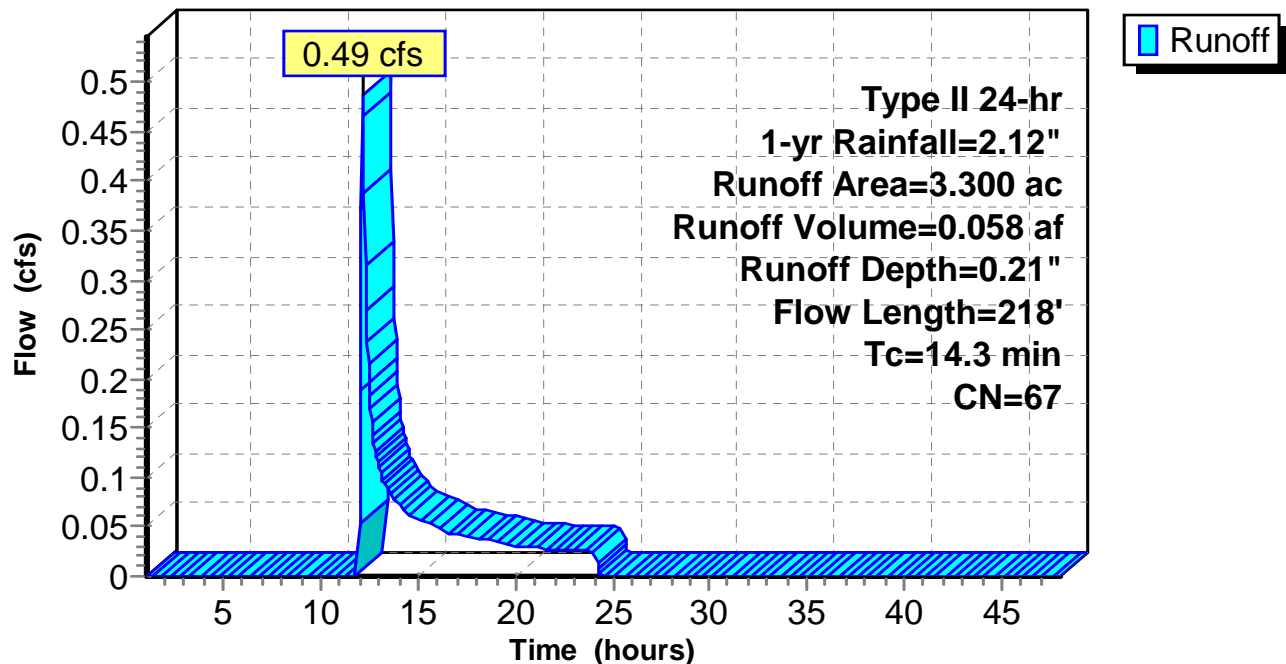
Runoff = 0.49 cfs @ 12.12 hrs, Volume= 0.058 af, Depth= 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs  
Type II 24-hr 1-yr Rainfall=2.12"

Area (ac)	CN	Description
1.700	61	Pasture/grassland/range, Good, HSG B
0.100	98	Paved parking, HSG B
1.500	72	Legumes, straight row, Good, HSG B
3.300	67	Weighted Average
3.200		96.97% Pervious Area
0.100		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0161	0.13		<b>Sheet Flow,</b> Cultivated: Residue>20% n= 0.170 P2= 2.52"
1.0	118	0.0158	2.02		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
14.3	218	Total			

**Subcatchment PRE: pre-dev****Hydrograph**



**Summary for Subcatchment PRE: pre-dev**

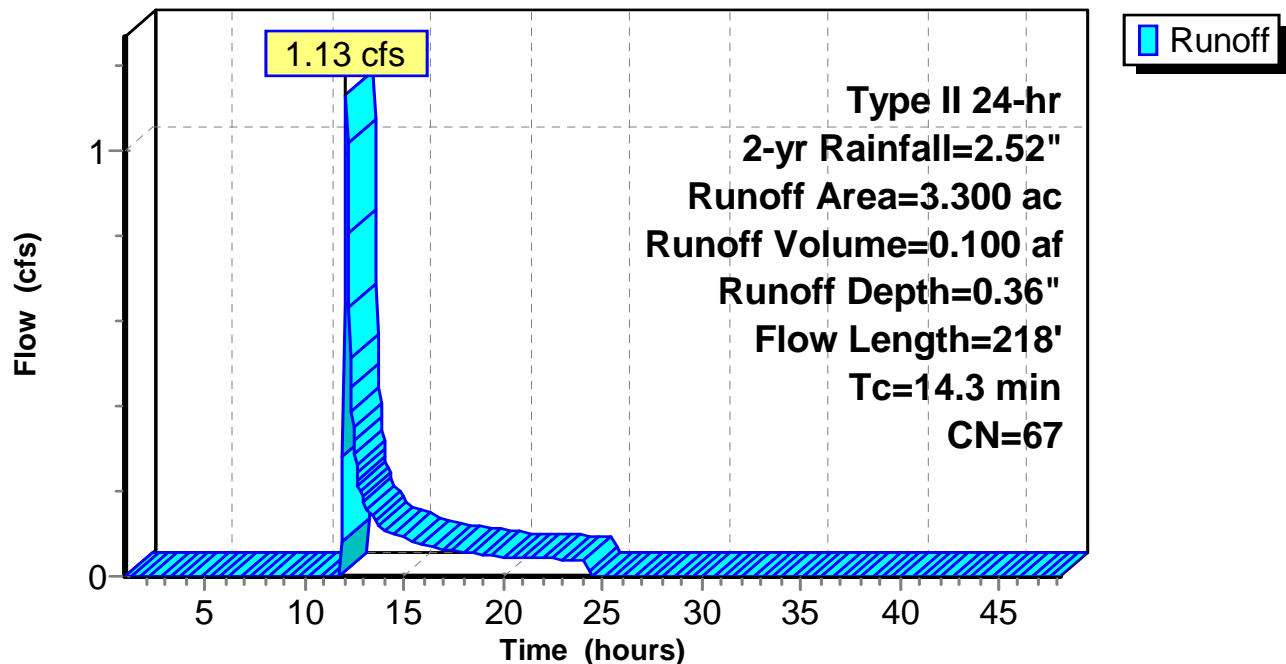
Runoff = 1.13 cfs @ 12.10 hrs, Volume= 0.100 af, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs  
Type II 24-hr 2-yr Rainfall=2.52"

Area (ac)	CN	Description
1.700	61	Pasture/grassland/range, Good, HSG B
0.100	98	Paved parking, HSG B
1.500	72	Legumes, straight row, Good, HSG B
3.300	67	Weighted Average
3.200		96.97% Pervious Area
0.100		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0161	0.13		<b>Sheet Flow,</b> Cultivated: Residue>20% n= 0.170 P2= 2.52"
1.0	118	0.0158	2.02		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
14.3	218	Total			

**Subcatchment PRE: pre-dev****Hydrograph**

**Summary for Subcatchment PRE: pre-dev**

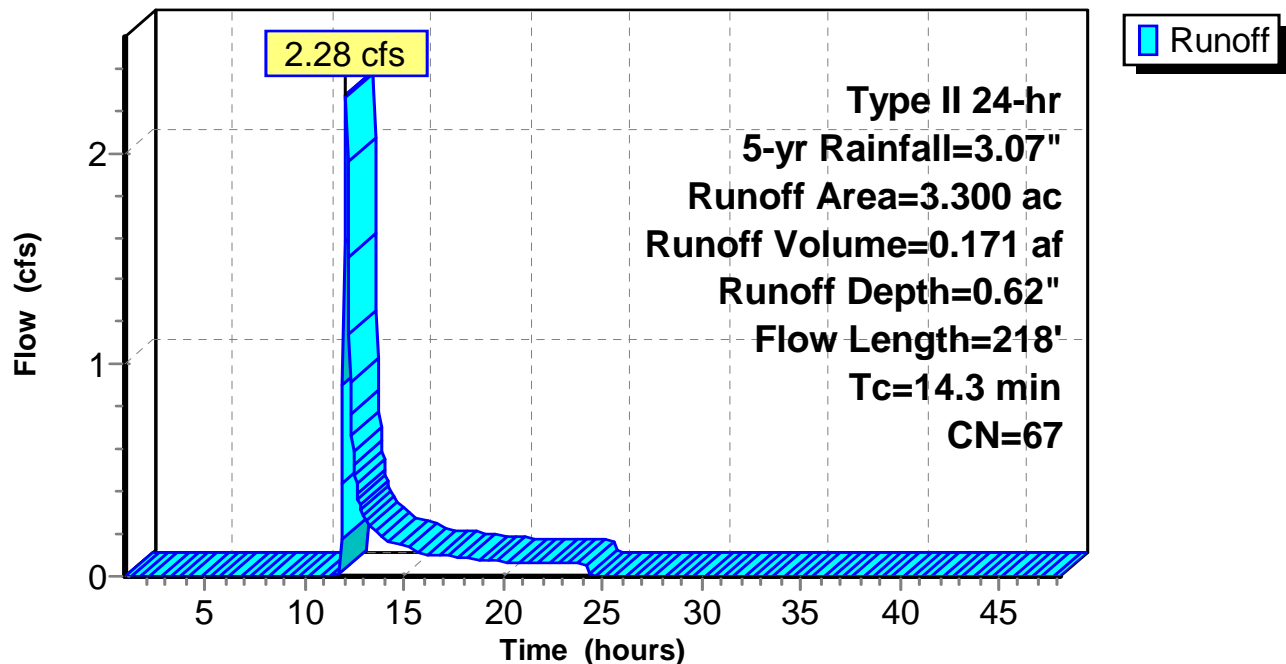
Runoff = 2.28 cfs @ 12.09 hrs, Volume= 0.171 af, Depth= 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs  
Type II 24-hr 5-yr Rainfall=3.07"

Area (ac)	CN	Description
1.700	61	Pasture/grassland/range, Good, HSG B
0.100	98	Paved parking, HSG B
1.500	72	Legumes, straight row, Good, HSG B
3.300	67	Weighted Average
3.200		96.97% Pervious Area
0.100		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0161	0.13		<b>Sheet Flow,</b> Cultivated: Residue>20% n= 0.170 P2= 2.52"
1.0	118	0.0158	2.02		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
14.3	218	Total			

**Subcatchment PRE: pre-dev****Hydrograph**

**Summary for Subcatchment PRE: pre-dev**

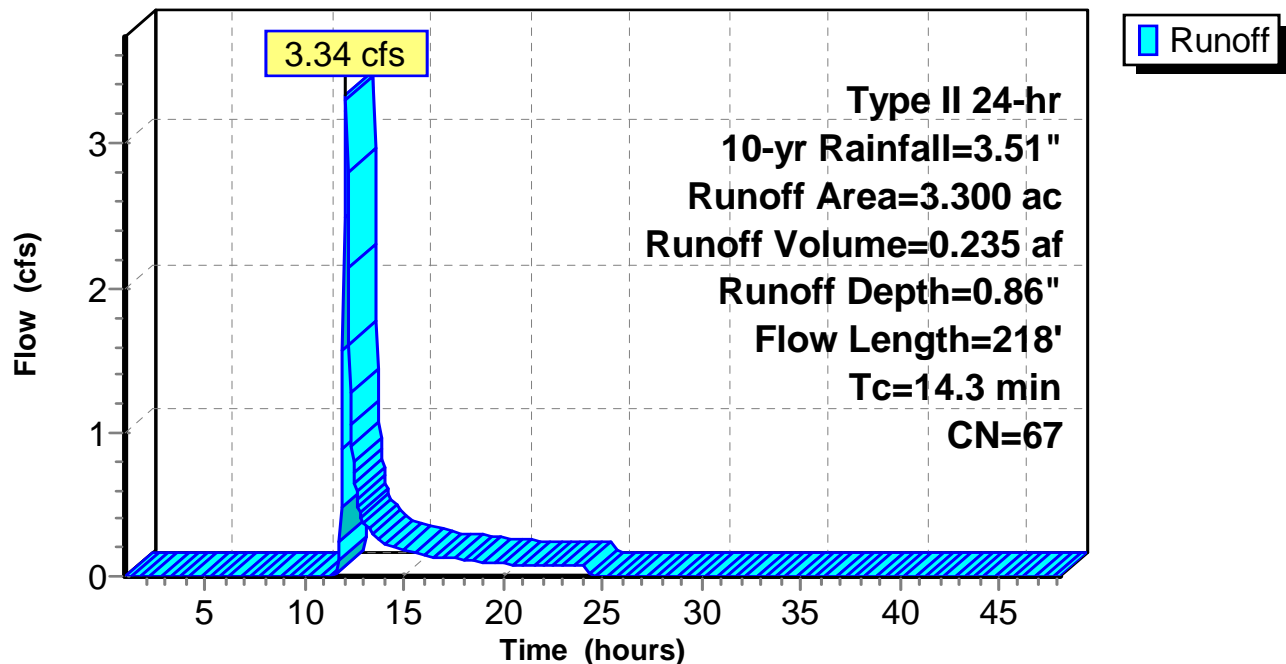
Runoff = 3.34 cfs @ 12.08 hrs, Volume= 0.235 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs  
Type II 24-hr 10-yr Rainfall=3.51"

Area (ac)	CN	Description
1.700	61	Pasture/grassland/range, Good, HSG B
0.100	98	Paved parking, HSG B
1.500	72	Legumes, straight row, Good, HSG B
3.300	67	Weighted Average
3.200		96.97% Pervious Area
0.100		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0161	0.13		<b>Sheet Flow,</b> Cultivated: Residue>20% n= 0.170 P2= 2.52"
1.0	118	0.0158	2.02		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
14.3	218	Total			

**Subcatchment PRE: pre-dev****Hydrograph**

**Summary for Subcatchment PRE: pre-dev**

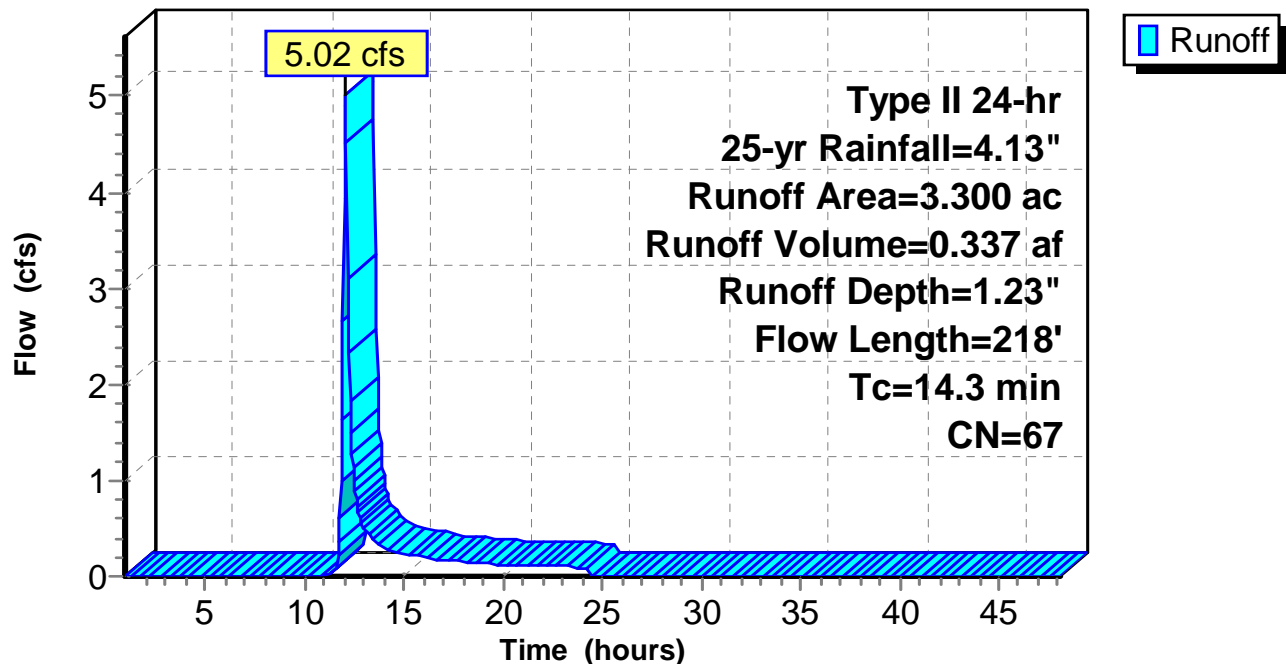
Runoff = 5.02 cfs @ 12.08 hrs, Volume= 0.337 af, Depth= 1.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs  
Type II 24-hr 25-yr Rainfall=4.13"

Area (ac)	CN	Description
1.700	61	Pasture/grassland/range, Good, HSG B
0.100	98	Paved parking, HSG B
1.500	72	Legumes, straight row, Good, HSG B
3.300	67	Weighted Average
3.200		96.97% Pervious Area
0.100		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0161	0.13		Sheet Flow, Cultivated: Residue>20% n= 0.170 P2= 2.52"
1.0	118	0.0158	2.02		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
14.3	218	Total			

**Subcatchment PRE: pre-dev****Hydrograph**

**Summary for Subcatchment PRE: pre-dev**

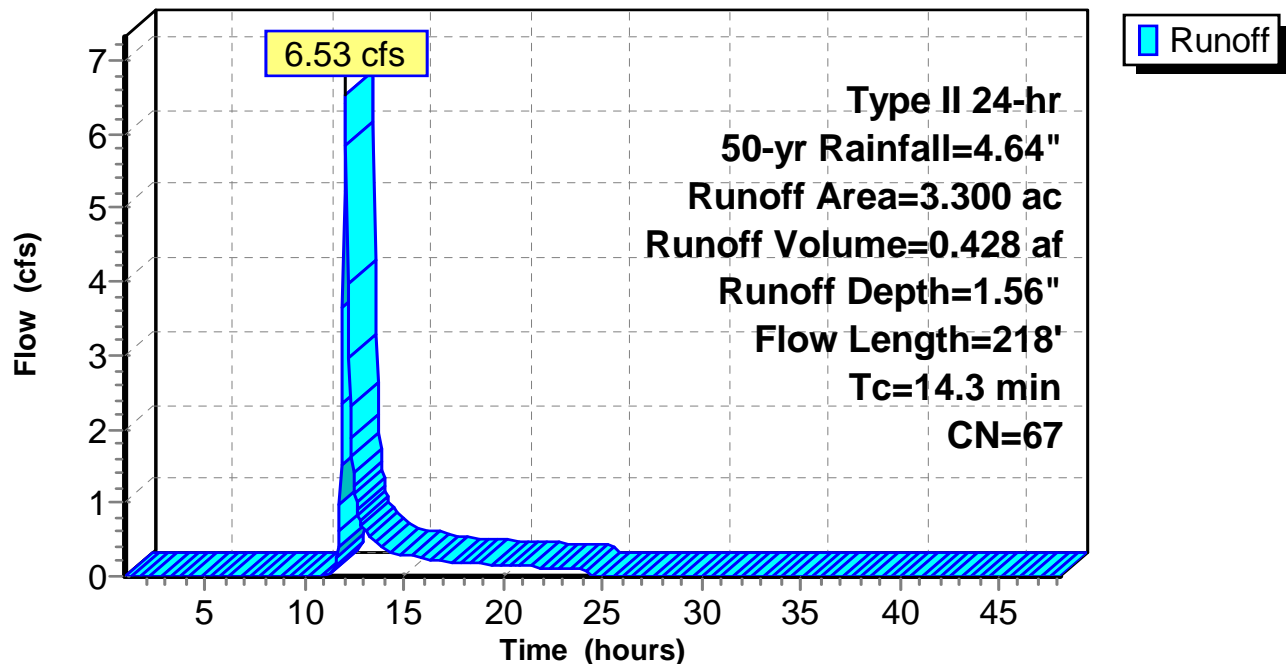
Runoff = 6.53 cfs @ 12.07 hrs, Volume= 0.428 af, Depth= 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs  
Type II 24-hr 50-yr Rainfall=4.64"

Area (ac)	CN	Description
1.700	61	Pasture/grassland/range, Good, HSG B
0.100	98	Paved parking, HSG B
1.500	72	Legumes, straight row, Good, HSG B
3.300	67	Weighted Average
3.200		96.97% Pervious Area
0.100		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0161	0.13		<b>Sheet Flow,</b> Cultivated: Residue>20% n= 0.170 P2= 2.52"
1.0	118	0.0158	2.02		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
14.3	218	Total			

**Subcatchment PRE: pre-dev****Hydrograph**



**Summary for Subcatchment PRE: pre-dev**

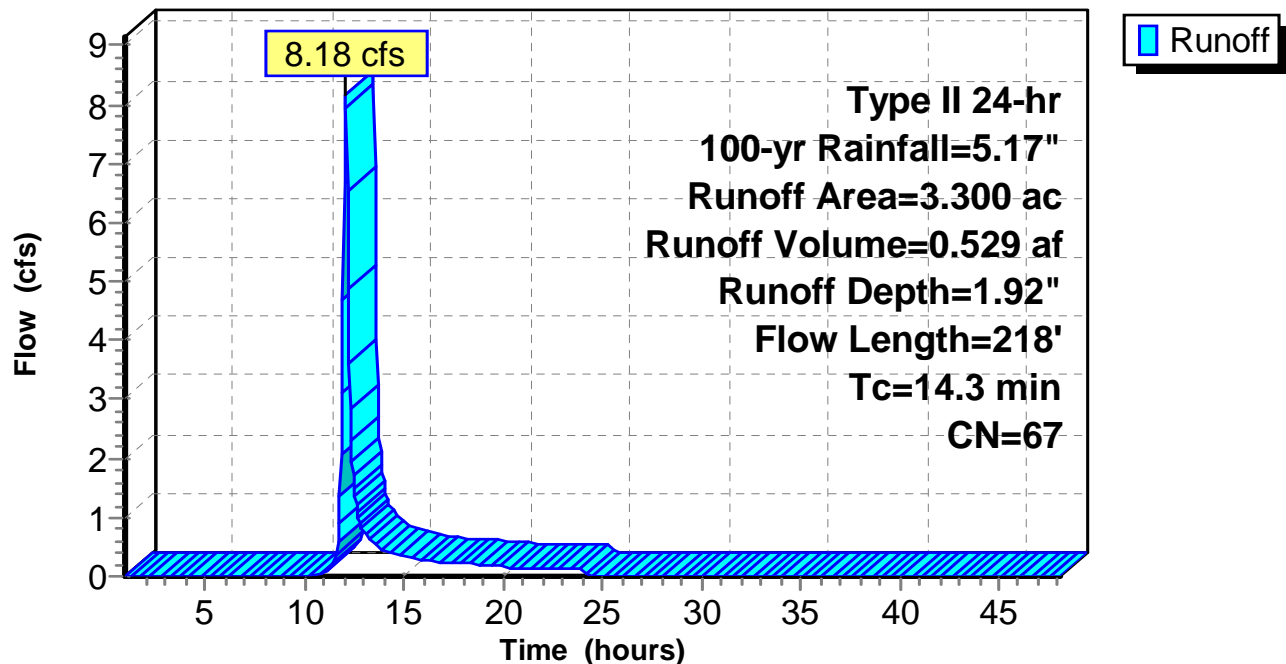
Runoff = 8.18 cfs @ 12.07 hrs, Volume= 0.529 af, Depth= 1.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-yr Rainfall=5.17"

Area (ac)	CN	Description
1.700	61	Pasture/grassland/range, Good, HSG B
0.100	98	Paved parking, HSG B
1.500	72	Legumes, straight row, Good, HSG B
3.300	67	Weighted Average
3.200		96.97% Pervious Area
0.100		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.3	100	0.0161	0.13		<b>Sheet Flow,</b> Cultivated: Residue>20% n= 0.170 P2= 2.52"
1.0	118	0.0158	2.02		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
14.3	218	Total			

**Subcatchment PRE: pre-dev****Hydrograph**

**Summary for Subcatchment POST: post-dev**[49] Hint:  $T_c < 2dt$  may require smaller  $dt$ 

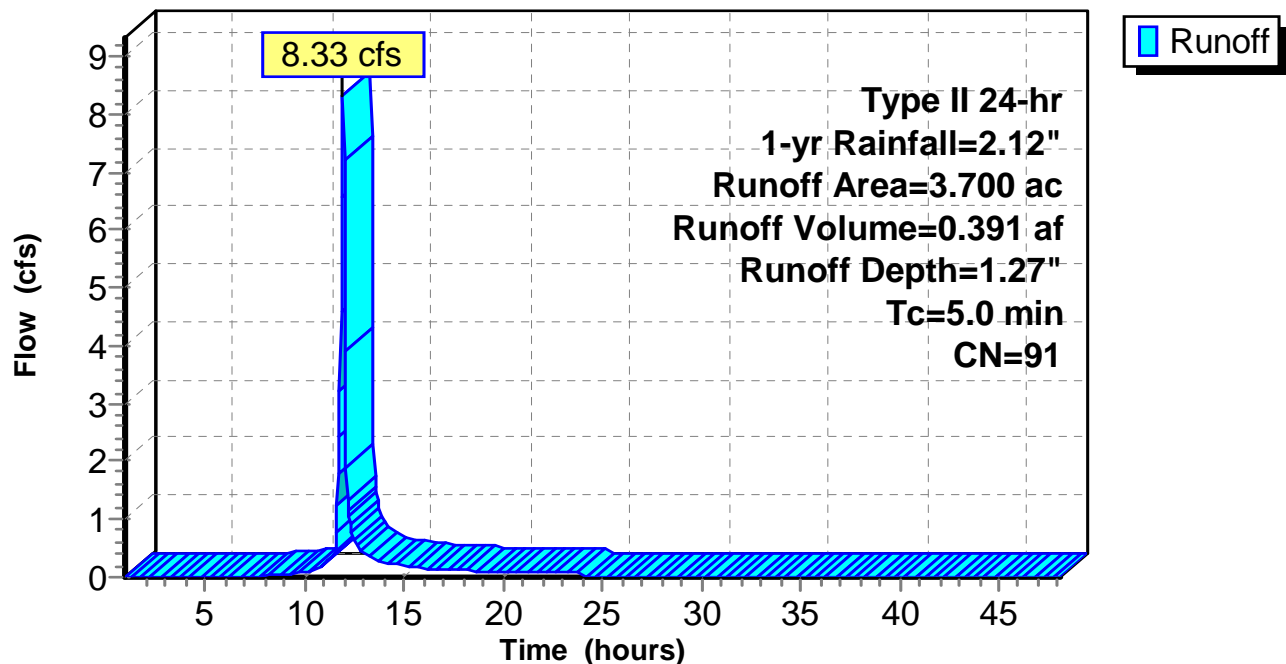
Runoff = 8.33 cfs @ 11.96 hrs, Volume= 0.391 af, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs,  $dt=0.05$  hrs

Type II 24-hr 1-yr Rainfall=2.12"

Area (ac)	CN	Description
2.950	98	Paved parking, HSG B
0.750	61	>75% Grass cover, Good, HSG B
3.700	91	Weighted Average
0.750		20.27% Pervious Area
2.950		79.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Subcatchment POST: post-dev****Hydrograph**

**Summary for Subcatchment POST: post-dev**

[49] Hint:  $T_c < 2dt$  may require smaller  $dt$

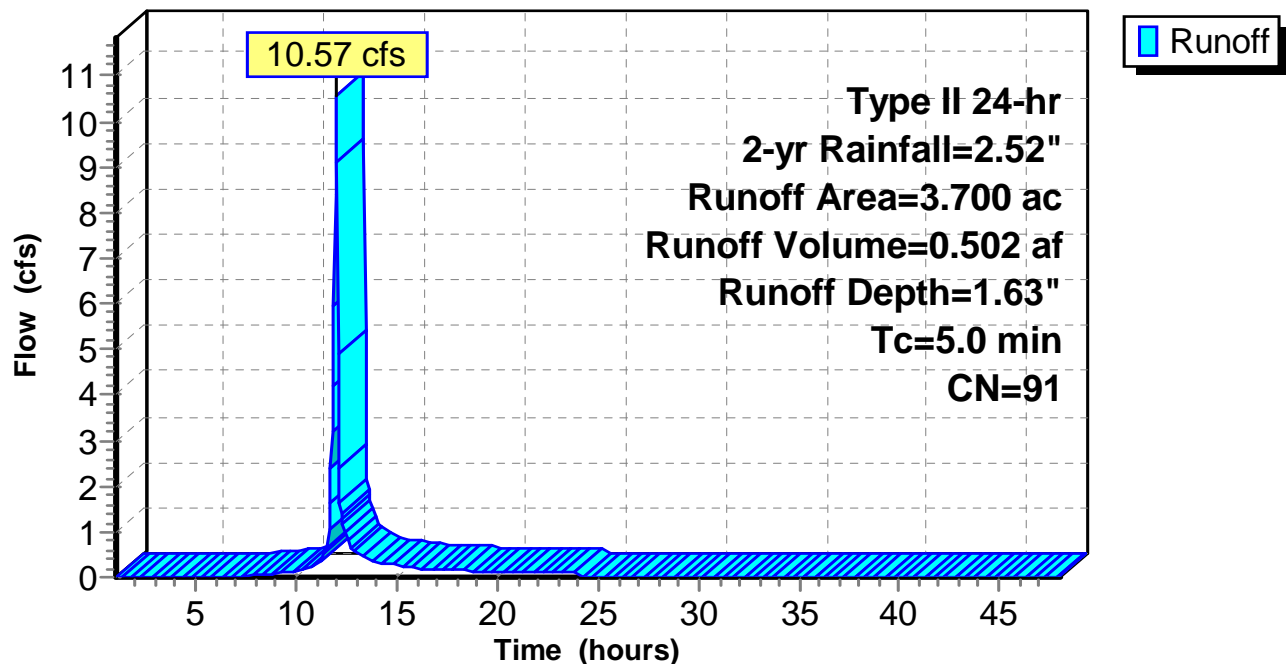
Runoff = 10.57 cfs @ 11.95 hrs, Volume= 0.502 af, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs,  $dt= 0.05$  hrs

Type II 24-hr 2-yr Rainfall=2.52"

Area (ac)	CN	Description
2.950	98	Paved parking, HSG B
0.750	61	>75% Grass cover, Good, HSG B
3.700	91	Weighted Average
0.750		20.27% Pervious Area
2.950		79.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Subcatchment POST: post-dev****Hydrograph**



**Summary for Subcatchment POST: post-dev**

[49] Hint:  $T_c < 2dt$  may require smaller  $dt$

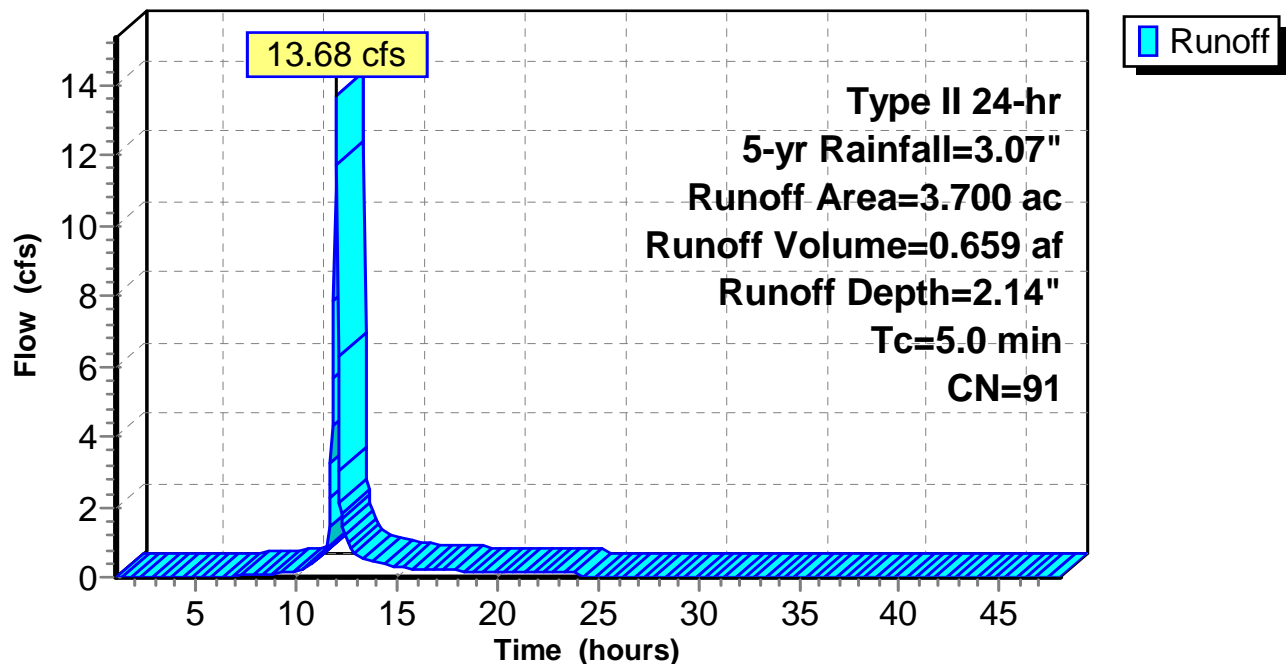
Runoff = 13.68 cfs @ 11.95 hrs, Volume= 0.659 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs,  $dt= 0.05$  hrs

Type II 24-hr 5-yr Rainfall=3.07"

Area (ac)	CN	Description
2.950	98	Paved parking, HSG B
0.750	61	>75% Grass cover, Good, HSG B
3.700	91	Weighted Average
0.750		20.27% Pervious Area
2.950		79.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Subcatchment POST: post-dev****Hydrograph**

**Summary for Subcatchment POST: post-dev**[49] Hint:  $T_c < 2dt$  may require smaller  $dt$ 

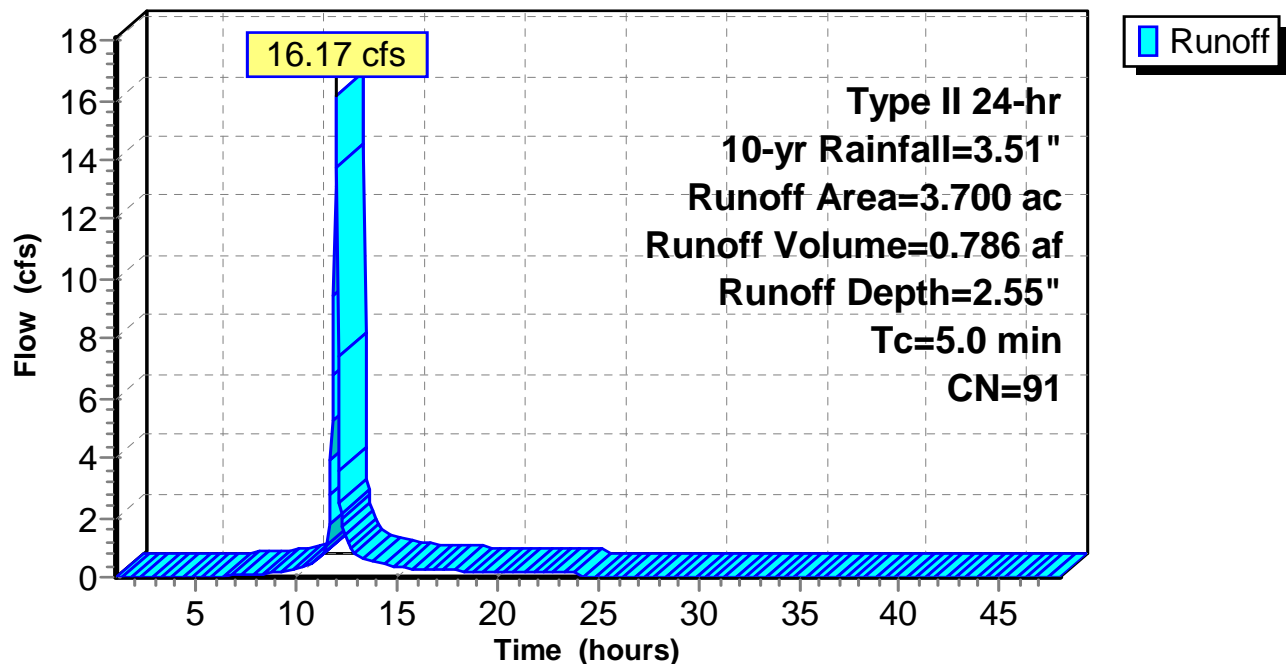
Runoff = 16.17 cfs @ 11.95 hrs, Volume= 0.786 af, Depth= 2.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs,  $dt=0.05$  hrs

Type II 24-hr 10-yr Rainfall=3.51"

Area (ac)	CN	Description
2.950	98	Paved parking, HSG B
0.750	61	>75% Grass cover, Good, HSG B
3.700	91	Weighted Average
0.750		20.27% Pervious Area
2.950		79.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Subcatchment POST: post-dev****Hydrograph**

**Summary for Subcatchment POST: post-dev**[49] Hint:  $T_c < 2dt$  may require smaller  $dt$ 

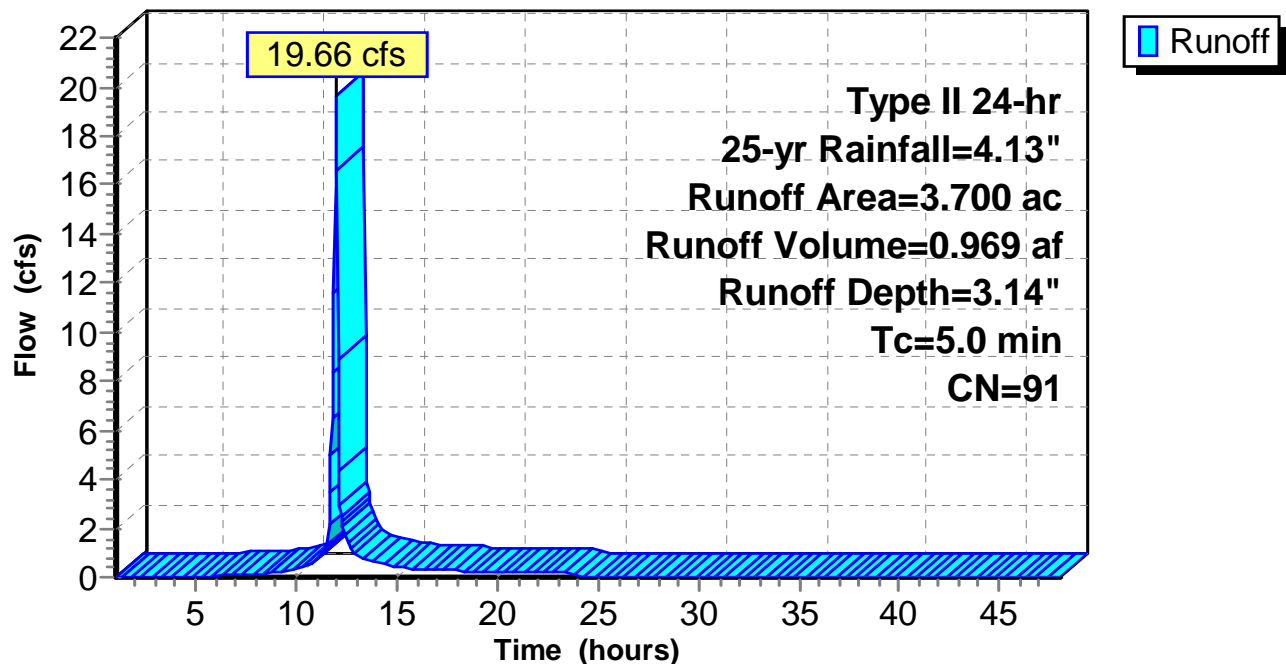
Runoff = 19.66 cfs @ 11.95 hrs, Volume= 0.969 af, Depth= 3.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs,  $dt=0.05$  hrs

Type II 24-hr 25-yr Rainfall=4.13"

Area (ac)	CN	Description
2.950	98	Paved parking, HSG B
0.750	61	>75% Grass cover, Good, HSG B
3.700	91	Weighted Average
0.750		20.27% Pervious Area
2.950		79.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Subcatchment POST: post-dev****Hydrograph**



**Summary for Subcatchment POST: post-dev**[49] Hint:  $T_c < 2dt$  may require smaller  $dt$ 

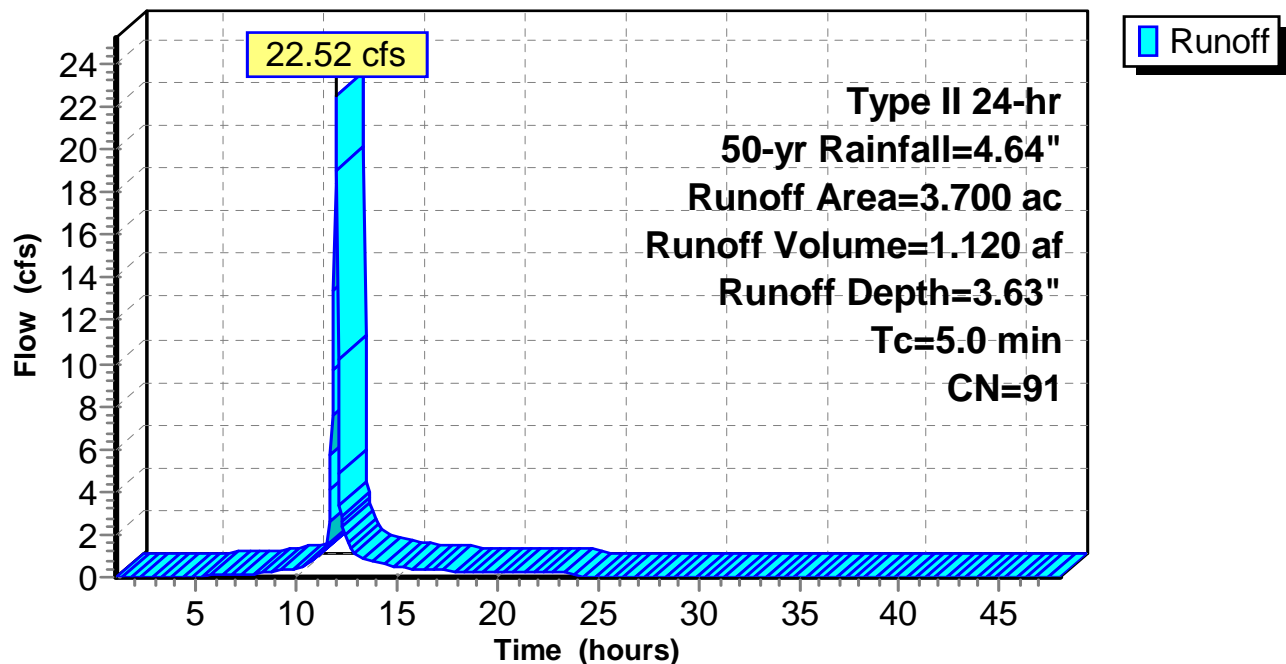
Runoff = 22.52 cfs @ 11.95 hrs, Volume= 1.120 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs,  $dt=0.05$  hrs

Type II 24-hr 50-yr Rainfall=4.64"

Area (ac)	CN	Description
2.950	98	Paved parking, HSG B
0.750	61	>75% Grass cover, Good, HSG B
3.700	91	Weighted Average
0.750		20.27% Pervious Area
2.950		79.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Subcatchment POST: post-dev****Hydrograph**

**Summary for Subcatchment POST: post-dev**[49] Hint:  $T_c < 2dt$  may require smaller  $dt$ 

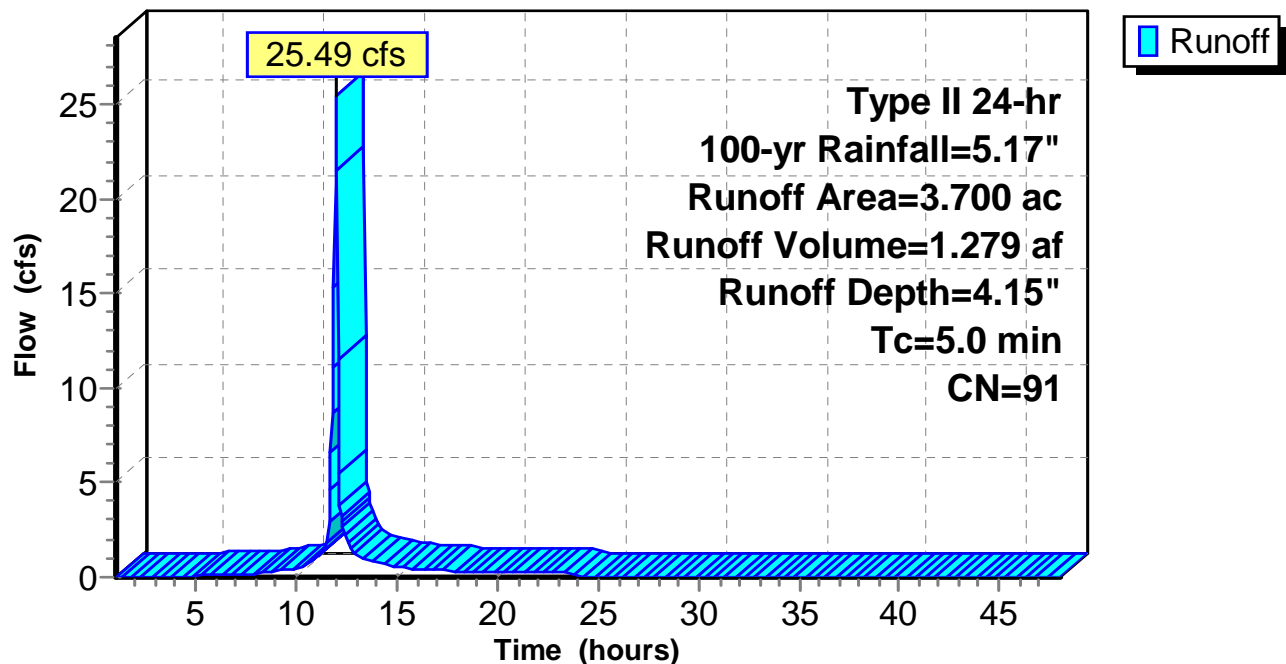
Runoff = 25.49 cfs @ 11.95 hrs, Volume= 1.279 af, Depth= 4.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-48.00 hrs,  $dt=0.05$  hrs

Type II 24-hr 100-yr Rainfall=5.17"

Area (ac)	CN	Description
2.950	98	Paved parking, HSG B
0.750	61	>75% Grass cover, Good, HSG B
3.700	91	Weighted Average
0.750		20.27% Pervious Area
2.950		79.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry,

**Subcatchment POST: post-dev****Hydrograph**

# **Appendix C: Detention Basin Calculations**

**Summary for Pond BASIN: basin**

Inflow Area = 3.700 ac, 79.73% Impervious, Inflow Depth = 1.27" for 1-yr event  
 Inflow = 8.33 cfs @ 11.96 hrs, Volume= 0.391 af  
 Outflow = 0.18 cfs @ 15.59 hrs, Volume= 0.290 af, Atten= 98%, Lag= 217.9 min  
 Primary = 0.18 cfs @ 15.59 hrs, Volume= 0.290 af  
 Secondary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 628.11' @ 15.59 hrs Surf.Area= 0.114 ac Storage= 0.263 af

Plug-Flow detention time= 753.9 min calculated for 0.289 af (74% of inflow)  
 Center-of-Mass det. time= 660.6 min ( 1,475.5 - 814.8 )

Volume	Invert	Avail.Storage	Storage Description
#1	625.00'	0.875 af	<b>32.00'W x 79.00'L x 7.00'H Prismatic Z=3.0</b>

Device	Routing	Invert	Outlet Devices
#1	Primary	624.50'	<b>12.0" Round Culvert</b> L= 60.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 624.50' / 623.90' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	625.00'	<b>1.2" Vert. Orifice/Grate</b> C= 0.600
#3	Device 1	627.39'	<b>2.0" x 2.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Secondary	630.50'	<b>6.0' long x 50.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

**Primary OutFlow** Max=0.18 cfs @ 15.59 hrs HW=628.11' TW=607.90' (Fixed TW Elev= 607.90')

↑ **1=Culvert** (Passes 0.18 cfs of 6.14 cfs potential flow)  
 ↑ **2=Orifice/Grate** (Orifice Controls 0.07 cfs @ 8.42 fps)  
 ↑ **3=Orifice/Grate** (Orifice Controls 0.11 cfs @ 4.08 fps)

**Secondary OutFlow** Max=0.00 cfs @ 1.00 hrs HW=625.00' TW=607.90' (Fixed TW Elev= 607.90')

↑ **4=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

OHIO RIVER  
ORDINARY HIGH  
WATER MARK



**Summary for Pond BASIN: basin**

Inflow Area = 3.700 ac, 79.73% Impervious, Inflow Depth = 1.63" for 2-yr event  
 Inflow = 10.57 cfs @ 11.95 hrs, Volume= 0.502 af  
 Outflow = 0.23 cfs @ 15.46 hrs, Volume= 0.384 af, Atten= 98%, Lag= 210.6 min  
 Primary = 0.23 cfs @ 15.46 hrs, Volume= 0.384 af  
 Secondary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 628.74' @ 15.46 hrs Surf.Area= 0.127 ac Storage= 0.339 af

Plug-Flow detention time= 727.1 min calculated for 0.384 af (76% of inflow)  
 Center-of-Mass det. time= 639.5 min ( 1,447.2 - 807.7 )

Volume	Invert	Avail.Storage	Storage Description
#1	625.00'	0.875 af	<b>32.00'W x 79.00'L x 7.00'H Prismatic Z=3.0</b>

Device	Routing	Invert	Outlet Devices
#1	Primary	624.50'	<b>12.0" Round Culvert</b> L= 60.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 624.50' / 623.90' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	625.00'	<b>1.2" Vert. Orifice/Grate</b> C= 0.600
#3	Device 1	627.39'	<b>2.0" x 2.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Secondary	630.50'	<b>6.0' long x 50.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

**Primary OutFlow** Max=0.23 cfs @ 15.46 hrs HW=628.74' TW=607.90' (Fixed TW Elev= 607.90')

↑ **1=Culvert** (Passes 0.23 cfs of 6.72 cfs potential flow)  
 ↑ **2=Orifice/Grate** (Orifice Controls 0.07 cfs @ 9.25 fps)  
 ↑ **3=Orifice/Grate** (Orifice Controls 0.16 cfs @ 5.60 fps)

**Secondary OutFlow** Max=0.00 cfs @ 1.00 hrs HW=625.00' TW=607.90' (Fixed TW Elev= 607.90')

↑ **4=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

**Summary for Pond BASIN: basin**

Inflow Area = 3.700 ac, 79.73% Impervious, Inflow Depth = 2.14" for 5-yr event  
 Inflow = 13.68 cfs @ 11.95 hrs, Volume= 0.659 af  
 Outflow = 0.28 cfs @ 15.58 hrs, Volume= 0.519 af, Atten= 98%, Lag= 217.5 min  
 Primary = 0.28 cfs @ 15.58 hrs, Volume= 0.519 af  
 Secondary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 629.58' @ 15.58 hrs Surf.Area= 0.145 ac Storage= 0.453 af

Plug-Flow detention time= 752.1 min calculated for 0.518 af (79% of inflow)  
 Center-of-Mass det. time= 669.6 min ( 1,469.6 - 800.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	625.00'	0.875 af	<b>32.00'W x 79.00'L x 7.00'H Prismatic Z=3.0</b>

Device	Routing	Invert	Outlet Devices
#1	Primary	624.50'	<b>12.0" Round Culvert</b> L= 60.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 624.50' / 623.90' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	625.00'	<b>1.2" Vert. Orifice/Grate</b> C= 0.600
#3	Device 1	627.39'	<b>2.0" x 2.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Secondary	630.50'	<b>6.0' long x 50.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

**Primary OutFlow** Max=0.28 cfs @ 15.58 hrs HW=629.58' TW=607.90' (Fixed TW Elev= 607.90')

↑ **1=Culvert** (Passes 0.28 cfs of 7.41 cfs potential flow)  
 ↑ **2=Orifice/Grate** (Orifice Controls 0.08 cfs @ 10.25 fps)  
 ↑ **3=Orifice/Grate** (Orifice Controls 0.20 cfs @ 7.13 fps)

**Secondary OutFlow** Max=0.00 cfs @ 1.00 hrs HW=625.00' TW=607.90' (Fixed TW Elev= 607.90')

↑ **4=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

**Summary for Pond BASIN: basin**

Inflow Area = 3.700 ac, 79.73% Impervious, Inflow Depth = 2.55" for 10-yr event  
 Inflow = 16.17 cfs @ 11.95 hrs, Volume= 0.786 af  
 Outflow = 0.31 cfs @ 15.73 hrs, Volume= 0.628 af, Atten= 98%, Lag= 226.8 min  
 Primary = 0.31 cfs @ 15.73 hrs, Volume= 0.628 af  
 Secondary = 0.00 cfs @ 1.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 630.22' @ 15.73 hrs Surf.Area= 0.160 ac Storage= 0.550 af

Plug-Flow detention time= 796.4 min calculated for 0.628 af (80% of inflow)  
 Center-of-Mass det. time= 715.5 min ( 1,510.5 - 795.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	625.00'	0.875 af	<b>32.00'W x 79.00'L x 7.00'H Prismatic Z=3.0</b>

Device	Routing	Invert	Outlet Devices
#1	Primary	624.50'	<b>12.0" Round Culvert</b> L= 60.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 624.50' / 623.90' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	625.00'	<b>1.2" Vert. Orifice/Grate</b> C= 0.600
#3	Device 1	627.39'	<b>2.0" x 2.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Secondary	630.50'	<b>6.0' long x 50.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

**Primary OutFlow** Max=0.31 cfs @ 15.73 hrs HW=630.22' TW=607.90' (Fixed TW Elev= 607.90')

↑ **1=Culvert** (Passes 0.31 cfs of 7.90 cfs potential flow)  
 ↑ **2=Orifice/Grate** (Orifice Controls 0.09 cfs @ 10.94 fps)  
 ↑ **3=Orifice/Grate** (Orifice Controls 0.22 cfs @ 8.09 fps)

**Secondary OutFlow** Max=0.00 cfs @ 1.00 hrs HW=625.00' TW=607.90' (Fixed TW Elev= 607.90')

↑ **4=Broad-Crested Rectangular Weir** ( Controls 0.00 cfs)

**Summary for Pond BASIN: basin**

Inflow Area = 3.700 ac, 79.73% Impervious, Inflow Depth = 3.14" for 25-yr event  
 Inflow = 19.66 cfs @ 11.95 hrs, Volume= 0.969 af  
 Outflow = 1.03 cfs @ 12.87 hrs, Volume= 0.799 af, Atten= 95%, Lag= 55.3 min  
 Primary = 0.33 cfs @ 12.87 hrs, Volume= 0.700 af  
 Secondary = 0.70 cfs @ 12.87 hrs, Volume= 0.099 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 630.62' @ 12.87 hrs Surf.Area= 0.170 ac Storage= 0.617 af

Plug-Flow detention time= 733.6 min calculated for 0.799 af (83% of inflow)  
 Center-of-Mass det. time= 659.1 min ( 1,448.3 - 789.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	625.00'	0.875 af	<b>32.00'W x 79.00'L x 7.00'H Prismatic Z=3.0</b>

Device	Routing	Invert	Outlet Devices
#1	Primary	624.50'	<b>12.0" Round Culvert</b> L= 60.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 624.50' / 623.90' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	625.00'	<b>1.2" Vert. Orifice/Grate</b> C= 0.600
#3	Device 1	627.39'	<b>2.0" x 2.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Secondary	630.50'	<b>6.0' long x 50.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

**Primary OutFlow** Max=0.33 cfs @ 12.87 hrs HW=630.62' TW=607.90' (Fixed TW Elev= 607.90')

↑ **1=Culvert** (Passes 0.33 cfs of 8.20 cfs potential flow)  
 ↑ **2=Orifice/Grate** (Orifice Controls 0.09 cfs @ 11.37 fps)  
 ↑ **3=Orifice/Grate** (Orifice Controls 0.24 cfs @ 8.66 fps)

**Secondary OutFlow** Max=0.69 cfs @ 12.87 hrs HW=630.62' TW=607.90' (Fixed TW Elev= 607.90')

↑ **4=Broad-Crested Rectangular Weir** (Weir Controls 0.69 cfs @ 0.94 fps)



**Summary for Pond BASIN: basin**

Inflow Area = 3.700 ac, 79.73% Impervious, Inflow Depth = 3.63" for 50-yr event  
 Inflow = 22.52 cfs @ 11.95 hrs, Volume= 1.120 af  
 Outflow = 3.29 cfs @ 12.17 hrs, Volume= 0.557 af, Atten= 85%, Lag= 13.1 min  
 Primary = 0.13 cfs @ 12.17 hrs, Volume= 0.126 af  
 Secondary = 3.17 cfs @ 12.17 hrs, Volume= 0.431 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 630.84' @ 12.17 hrs Surf.Area= 0.175 ac Storage= 0.654 af

Plug-Flow detention time= 301.4 min calculated for 0.556 af (50% of inflow)  
 Center-of-Mass det. time= 189.1 min ( 974.2 - 785.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	625.00'	0.875 af	<b>32.00'W x 79.00'L x 7.00'H Prismatic Z=3.0</b>

Device	Routing	Invert	Outlet Devices
#1	Primary	624.50'	<b>12.0" Round Culvert</b> L= 60.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 624.50' / 623.90' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	625.00'	<b>1.2" Vert. Orifice/Grate</b> C= 0.600
#3	Device 1	627.39'	<b>2.0" x 2.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Secondary	630.50'	<b>6.0' long x 50.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

**Primary OutFlow** Max=0.13 cfs @ 12.17 hrs HW=630.83' TW=630.30' (Fixed TW Elev= 630.30')

↑ **1=Culvert** (Passes 0.13 cfs of 2.50 cfs potential flow)  
 ↑ **2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 3.52 fps)  
 ↑ **3=Orifice/Grate** (Orifice Controls 0.10 cfs @ 3.52 fps)

**Secondary OutFlow** Max=3.11 cfs @ 12.17 hrs HW=630.83' TW=630.30' (Fixed TW Elev= 630.30')

↑ **4=Broad-Crested Rectangular Weir** (Weir Controls 3.11 cfs @ 1.55 fps)

**Summary for Pond BASIN: basin**

Inflow Area = 3.700 ac, 79.73% Impervious, Inflow Depth = 4.15" for 100-yr event  
 Inflow = 25.49 cfs @ 11.95 hrs, Volume= 1.279 af  
 Outflow = 7.87 cfs @ 12.09 hrs, Volume= 0.715 af, Atten= 69%, Lag= 8.1 min  
 Primary = 0.15 cfs @ 12.09 hrs, Volume= 0.129 af  
 Secondary = 7.72 cfs @ 12.09 hrs, Volume= 0.587 af

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.05 hrs  
 Peak Elev= 631.11' @ 12.09 hrs Surf.Area= 0.182 ac Storage= 0.703 af

Plug-Flow detention time= 264.4 min calculated for 0.715 af (56% of inflow)  
 Center-of-Mass det. time= 156.0 min ( 937.5 - 781.5 )

Volume	Invert	Avail.Storage	Storage Description
#1	625.00'	0.875 af	<b>32.00'W x 79.00'L x 7.00'H Prismatic Z=3.0</b>

Device	Routing	Invert	Outlet Devices
#1	Primary	624.50'	<b>12.0" Round Culvert</b> L= 60.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 624.50' / 623.90' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	625.00'	<b>1.2" Vert. Orifice/Grate</b> C= 0.600
#3	Device 1	627.39'	<b>2.0" x 2.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#4	Secondary	630.50'	<b>6.0' long x 50.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

**Primary OutFlow** Max=0.15 cfs @ 12.09 hrs HW=631.10' TW=630.30' (Fixed TW Elev= 630.30')

↑ **1=Culvert** (Passes 0.15 cfs of 3.07 cfs potential flow)  
 ↑ **2=Orifice/Grate** (Orifice Controls 0.03 cfs @ 4.31 fps)  
 ↑ **3=Orifice/Grate** (Orifice Controls 0.12 cfs @ 4.31 fps)

**Secondary OutFlow** Max=7.58 cfs @ 12.09 hrs HW=631.10' TW=630.30' (Fixed TW Elev= 630.30')

↑ **4=Broad-Crested Rectangular Weir** (Weir Controls 7.58 cfs @ 2.10 fps)

**OHIO RIVER 100-YR  
FLOOD ELEVATION**



# **Appendix D: Water Quality Calculations**

# Water Quality Orifice Design for Extended Detention Basin (Version 3/3/2014)

For sizing of single water quality orifice in wet or dry extended detention basin or constructed wetland

Spreadsheet Created by Chris Barnes, PE, CPESC, CPSWQ, CMS4S - Assistant City Engineer, City of Canton, OH

PLEASE MAKE SURE YOU ARE USING THE MOST CURRENT VERSION AVAILABLE AT <http://cantonohio.gov/engineering/?pg=510>

PROJECT LOCATION:

Weavertown

DATE:

3/18/2014

BY:

BAB

See Ohio EPA Construction General Permit & Post-Construction Q&A Document for details

## EXTENDED DETENTION BASIN DESIGN PARAMETERS

Water Quality Volume, WQv = CPA/12 ft<sup>3</sup> or acre-ft

Where Runoff Coefficient, C = value from table:

Industrial & Commercial	0.8
High Density Residential (>8 dwellings/acre)	0.5
Medium Density Residential (4 to 8 dwellings/acre)	0.4
Low Density Residential (<4 dwellings/acre)	0.3
Open Space and Recreational Areas	0.2

= 0.8 (Use composite C accordingly or alternate method approved by Ohio EPA)

Precipitation Depth, P = 0.75 inches

Drainage Area, A = 3.70 acres

WQv = 8,059 ft<sup>3</sup> = 0.19 acre-ft

Type of Extended Detention Basin = Dry Ext. Det. Basin (Select from drop-down list)

Required Extended Detention Volume, EDv = 8,059 ft<sup>3</sup> = WQv for Dry Extended Detention Basin

Minimum required draw-down time = 48 hrs

Add'l 20% volume req'd for sediment storage = 1,612 ft<sup>3</sup> (This volume is below the WQ orifice in the form of forebays and micropools)

Minimum forebay and micropool volume required = 1,612 ft<sup>3</sup> (Each sized at 10% of WQv)

Target permanent pool volume to be provided = 0 cf (For Dry Ext. Det. Basin, enter 0)

Total add'l volume **required** below WQ orifice = 1,612 ft<sup>3</sup> (Minimum 20% of WQv)

1/2 of required EDv = 4,029 ft<sup>3</sup>

(The first 1/2 of the WQv or extended detention volume (EDv) must not discharge in less than 1/3 of the minimum required drain time)

1/3 of required draw-down time = 16.00 hrs

WQ orifice invert elevation = 625.00 ft

(Click on the "Basin Configuration" Tab and enter extended detention basin elevation and volume configuration data...)

EDv elevation = 627.39 ft (corresponds to the required EDv; see "Basin Configuration" worksheet)

Maximum Hydraulic Head, H<sub>max</sub> = 2.39 ft (this is the EDv depth measured from the WQ orifice invert to EDv elevation)

Orifice Coefficient, C = 0.60

Results = Basin elevation-volume configuration OK. Proceed to WQ Orifice calculations.

## WQ ORIFICE CALCULATIONS (Ohio EPA Method #2 from Post-Construction Q&A Document; using design parameters above)

Average Discharge, Q<sub>avg</sub> = 0.05 cfs (this is the average discharge corresponding to the required draw-down time)

Maximum Hydraulic Head, H<sub>max</sub> = 2.39 ft (this is the EDv depth measured from the WQ orifice invert to EDv elevation)

Average Hydraulic Head, H<sub>avg</sub> = 1.20 ft

Orifice Coefficient, C = 0.60

Orifice Area, A = Q<sub>avg</sub>/[C(2gH<sub>avg</sub>)<sup>0.5</sup>]

Orifice Area, A = 0.009 ft<sup>2</sup>

Orifice Diameter, D = 1.27 in **WARNING: Orifice < 2 inches!**

Actual draw-down time = 48.00 hrs

Volume discharged in 1/3 of draw-down time = 2,686 cf (First 1/2 of EDv not discharged in 1/3 of min. draw-down time. OK)

Results = All design parameters met. However, use anti-clogging device or other structural BMP.

## WATER QUALITY ORIFICE CALCULATIONS (Manual Estimate; using design parameters above)

Orifice Diameter, D = 1.25 in **WARNING: Orifice < 2 inches!**

Maximum Hydraulic Head, H<sub>max</sub> = 2.39 ft (this is the EDv depth measured from the WQ orifice invert to EDv elevation)

Orifice Coefficient, C = 0.60

Average Discharge, Q<sub>avg</sub> = 0.04 cfs (this is the average discharge corresponding to D, H<sub>max</sub>, and C)

Actual draw-down time = 49.89 hrs (Draw-down time OK)

Volume discharged in 1/3 of req'd draw-down time = 2,585 cf (First 1/2 of EDv not discharged in 1/3 of min. draw-down time. OK)

Results = All design parameters met. However, use anti-clogging device or other structural BMP.



**BASIN CONFIGURATION** (Volume calculated by elevation - area method)

[illegible]

EDv =	8,059	cf (from "Design Parameters" worksheet)
WQ orifice invert elevation =	625.00	ft (from "Design Parameters" worksheet)
Volume provided below WQ orifice =	2,535	cf = 31.5% of WQv
<b>(Sufficient volume provided below WQ orifice)</b>		
EDv Elevation =	<b>627.39</b>	ft
Volume provided above WQ orifice =	36,495	cf

**Results = Basin elevation-volume configuration OK. Proceed to WQ Orifice calculations.**

**Comments:**

# **Appendix E:**

## **Sediment Basin Calculations**

# SEDIMENT BASIN CALCULATIONS

WEAVERTOWN (CEC#112-048)

March 18, 2014

DESIGN BY: BAB

CHECKED BY: \_\_\_\_\_

DRAINAGE AREA= 3.7 ACRES

DISTURBED AREA= 3.7 ACRES

REQUIRED DEWATERING ZONE= 6,660 CU. FT.  
(1,800 CU. FT./ DRAINAGE AREA)

REQUIRED SEDIMENT ZONE= 3,700 CU. FT.  
(1,000 CU. FT./ DISTURBED AREA)

## SEDIMENT BASIN DESIGN

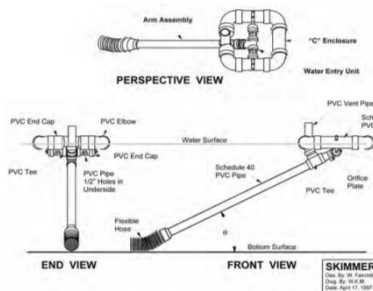
ELEVATION (FT)	AREA (FT^2)	VOLUME (CU. FT.)
623.00	1,340	0
624.00	1,894	1,617
625.00	2,506	3,817
626.00	3,175	6,658
627.00	3,900	10,195
628.00	4,681	14,486
629.00	5,520	19,586
630.00	6,414	25,553
631.00	7,365	32,443
632.00	8,373	40,312

SEDIMENT ZONE = 623.00 TO 625.00

SEDIMENT VOLUME PROVIDED= 3,817 CU. FT.

DEWATERING ZONE = 625.00 TO 627.39

DEWATERING VOLUME PROVIDED= 8,051 CU. FT.



USE A SKIMMER W/ 1.25"  
ORIFICE DRILLED IN THE END  
TO DETWATER THE BASIN  
OVER 48 HOURS @ INV. 625.00

# **Appendix F:**

## **Storm Sewer Design Calculations**



SHEET 1 OF 1  
 JOB # 112-048  
 PROJECT: Weavertown



BY: BAB  
 CHECKED:  
 DATE: 3/18/2014

*Civil & Environmental Consultants, Inc.*

STORM SEWER DESIGN

RP/CC:

STRUCTURES			DRAINAGE AREA (acres)					TIME (min)		I (in/hr)	10 YEAR STORM - SEWER DATA						INVERT IN	INVERT OUT	T.C.
NUM	TYPE	STATION	Δ AREA	Σ AREA	C	Δ CA	Σ CA	Δ t	Σ t		Q (cfs)	LENGTH (ft)	SLOPE %	DIA (in)	V (fps)	CAP (cfs)			
7	CB	806.34	0.65	0.65	0.95	0.61	0.61		10.00	5.04			0.40				628.00		631.60
								0.61			3.09	123.04	0.40	15	3.3	4.10			
6	CB	683.30	0.47	1.11	0.95	0.44	1.05		10.61	4.93			0.40				627.26	627.51	631.60
								0.54			5.20	122.03	0.40	18	3.8	6.7			
5	CB	561.27	0.13	1.24	0.95	0.13	1.18		11.15	4.82			0.40				626.67	626.77	633.50
								0.32			5.69	71.75	0.40	18	3.8	6.7			
4	MH	489.52	0.00	1.27	0.95	0.02	1.20		11.47	4.76			0.20				625.88	626.38	633.57
			0.03		0.95			0.47			5.74	91.75	0.20	24	3.2	10.1			
3	CB	397.77	0.38	1.65	0.95	0.36	1.57		11.94	4.69			0.20				625.60	625.70	632.50
								0.62			7.34	120.46	0.20	24	3.2	10.1			
2	CB	277.31	0.43	2.08	0.95	0.41	1.97		12.57	4.56			0.20				625.26	625.36	631.60
								0.81			9.01	157.85	0.20	24	3.2	10.1			
1	CB	119.46	0.73	2.81	0.95	0.69	2.67		13.38	4.41			0.30				624.84	624.94	631.00
								0.50			11.78	119.46	0.30	24	4.0	12.4			
A	HW	0.00	0.00	2.81	0.95	0.00	2.67		13.88	4.32								624.48	632.00

DESIGN INVERT AT TIE IN STRUCTURE: 624.48  
 DIFFERENCE IN RUN INVERT VS. STRUCTURE INVERT: 0.00

---

**APPENDIX E**

**WASTE PROFILE FORM**

---

# GENERATOR'S WASTE PROFILE

WEG WASTE CODE: \_\_\_\_\_

## Physical Address:

WEAVERTOWN TRANSPORT LEASING, INC.  
WTL TRANSFER STATION  
50810 S.R. 7  
New Matamores, OH 45789  
Phone: 724-746-4850  
Fax: 412-429-0219

## Mailing Address:

WEAVERTOWN TRANSPORT LEASING, INC.  
2 Dorrington Road  
Carnegie, PA 15106  
Phone: 724-746-4850  
Fax 412-429-0219

### 1. GENERATOR INFORMATION

a) Generator's Name: \_\_\_\_\_  
b) Generating Facility's Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
c) Generator's Representative: \_\_\_\_\_  
Title: \_\_\_\_\_  
Tel: \_\_\_\_\_ Fax: \_\_\_\_\_  
d) Emergency Information Contact: \_\_\_\_\_  
Title: \_\_\_\_\_  
Tel: \_\_\_\_\_ Fax: \_\_\_\_\_  
Billing Information:  
g) Customer's Name: \_\_\_\_\_  
h) Customer's Mailing Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
i) Billing Contact: \_\_\_\_\_  
Tel: \_\_\_\_\_ Fax: \_\_\_\_\_

### 3. GENERAL WASTE STREAM INFORMATION

a) Name/Description of the Waste: \_\_\_\_\_  
b) Detailed Description of Process Generating the Waste: \_\_\_\_\_  
c) Waste Properties at 72 F  
Physical State: ☐ Solid ☐ Semi-Solid ☐ Powder ☐ Free Liquid ☐ Combination (Describe) \_\_\_\_\_  
Reactivity: ☐ Water Reactive ☐ Acid Reactive ☐ Alkaline Reactive ☐ Oxidizer ☐ Autopolymerizable ☐ Pyrophoric  
☐ Explosive ☐ Thermally Sensitive ☐ Shock Sensitive ☐ None of the Above  
Flash Point, F: ☐ <72 (D001) ☐ 73-100 (D001) ☐ 101-139 (D001) ☐ 140-200 ☐ >201 ☐ N/A-Solid (i.e., passes paint filter test)  
pH: ☐ <2 (D002) ☐ 2.1-5.0 ☐ 5-9.0 ☐ 9.1-12.4 ☐ >12.5 (D002) ☐ N/A - Solid (i.e., passes paint filter test)  
Odor: ☐ None ☐ Mild ☐ Strong (Describe) \_\_\_\_\_  
Color(s) (Describe): \_\_\_\_\_  
Estimated volume: \_\_\_\_\_ ☐ Cubic yards ☐ Tons ☐ Gallons ☐ Cubic meters ☐ Tonnes(metric) ☐ Other \_\_\_\_\_  
Per: ☐ Year ☐ Month ☐ Week ☐ Day ☐ One time ☐ Other \_\_\_\_\_

### 3. GENERAL WASTE STREAM INFORMATION

d) Waste stream characterization is based on the following:  
☐ Laboratory Analysis (Copy attached if required): ☐ Yes ☐ No  
☐ Generator process knowledge  
☒ MSDS (Copy attached): ☐ Yes ☐ No \*\* (Valid only for pure product)  
☐ Other documentation, (Describe and attach as necessary): \_\_\_\_\_  
e) Is this waste a characteristically hazardous waste per 40 CFR 261.21-23?  
☐ Yes ☐ No Excluded-Citation: \_\_\_\_\_  
f) Is this waste an F, K, P, U listed hazardous waste as per 40 CFR 261.32-33?  
☐ Yes ☐ No Excluded-Citation: \_\_\_\_\_  
g) Is this waste a treatment residue of a waste which was previously a characteristically hazardous waste or a treated hazardous debris residue?  
☐ Yes ☐ No [skip (g)(ii)] If yes, describe the waste, applicable code(s) and the process generating the waste prior to treatment: \_\_\_\_\_  
(ii) If yes, does the waste meet all applicable land disposal restriction treatment standards found under 40 CFR 268, and applicable state, local and provincial regulations?  
☐ Yes ☐ No  
h) Is this a "Hazardous Waste" as defined by state, provincial, or local regulations?  
☐ Yes ☐ No  
If yes, enter the waste identification number if one has been assigned: \_\_\_\_\_



#### 4. WASTE COMPOSITION

[illegible]

- ☐ Organic Solvents
- ☐ OSHA Substances
- ☐ Radioactive Materials
- ☐ Virgin Oils
- ☐ Used Oils
- ☐ Etiological/Infectious Agents
- ☐ PCB's
- ☐ Free Sulfides
- ☐ Free Cyanides
- ☐ Free Ammonia
- ☐ None of the Above

ON

If the waste is a DOT Hazardous Material, complete the following:

Proper USDOT Shipping Name: \_\_\_\_\_

USDOT Hazard Class: \_\_\_\_\_ UN or NA Number: \_\_\_\_\_ PG: \_\_\_\_\_ CERCLA: \_\_\_\_\_

Generator warrants and agrees that: (1) all of the information above and provided pursuant hereto is true, correct and complete, and

---

Arsenic, TCLP - <5.0 mg/L	Tetrachloroethylene, TCLP - <0.7 mg/L	Endrin, TCLP - < 0.02 mg/L
---------------------------	---------------------------------------	----------------------------

[illegible]

The undersigned individual warrants that he/she is authorized to sign this document on behalf of the Corporation.

TITLE: \_\_\_\_\_ DATE: \_\_\_\_\_

TITLE: \_\_\_\_\_ DATE: \_\_\_\_\_



---

**APPENDIX F**

**BRINE TREATMENT EQUIPMENT SPECIFICATIONS**

---



*Easy-to-clean, smooth-wall interior*



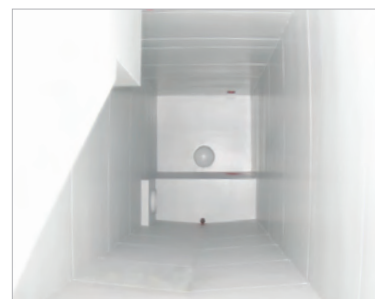
## 21,000 Gallon Closed-Top Frac Tank

Capacity: 21,000 gal (500 bbl)  
Height: 11' 1"  
Width: 8' 6"  
Length: 45'  
Tare Weight: 29,500 lbs

*All sizes are approximate*

At Adler Tank Rentals, we are committed to providing safe and reliable containment solutions for all types of applications where performance matters.

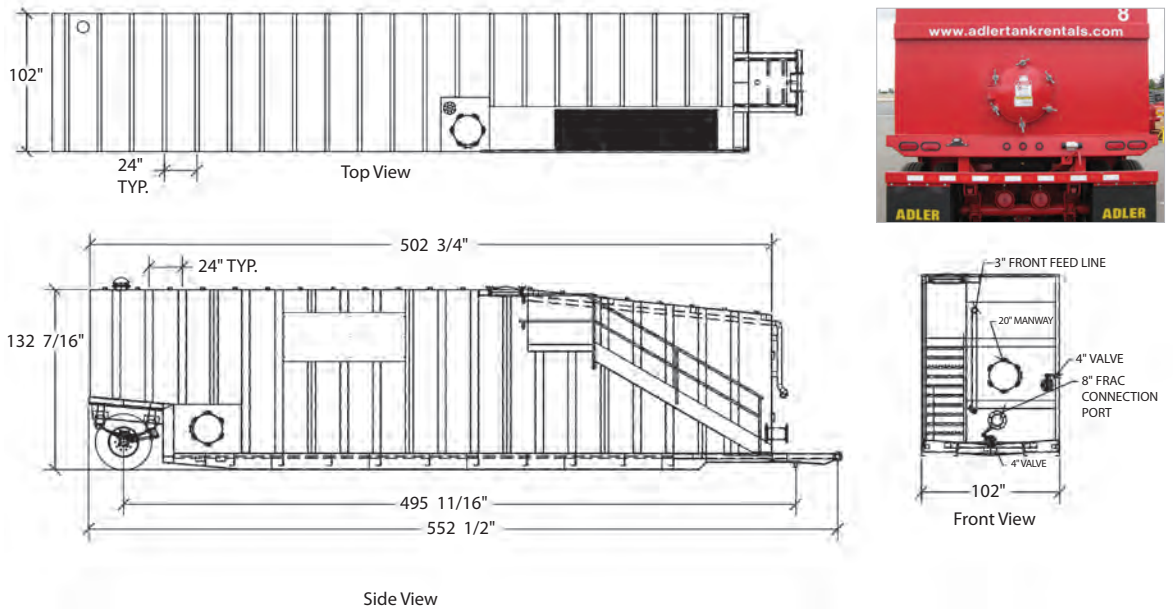
Combined with our standard smooth-wall construction and sloped V bottom for ease of cleaning, the 21,000 Gallon Closed-Top Frac Tank is a top-performing liquid storage solution. It boasts a wide array of safety features including a safety side stairway, non-slip materials on all climbable surfaces and "safety yellow" rails and catwalks for high visibility.



### Mechanical Features

- Epoxy-lined interior
- 3" fill line
- Four (4) standard 22" side-hinged manways
- Multiple 4" valved fill/drain ports, including floor-level valves for low point drain out
- 4" vent with 1 lb pressure/4 oz vacuum pressure relief valve
- Sloped and V bottom for quicker drain out and easier cleaning
- Easy-to-clean design with smooth-wall interior, no corrugations and no internal rods
- Meets Cal/OSHA guidelines
- Fixed rear axle for increased maneuverability
- Nose rail cut-out for easy access when installing hose and fittings on the front/bottom of tank
- One (1) front and one (1) rear 4" valved fill/drain port
- Two (2) top connection ports for vapor recovery

# 21,000 Gallon Closed-Top Frac Tank



## Safety Features

- Non-slip step materials on stairs and catwalks
- "Safety yellow" rails and catwalks for high visibility
- Safe operation reminder decals
- Safety side stairway—no mechanical guard rails to set up
- Strapping charts

## Options

- Round bottom
- Dual manifold
- SS 316 stainless steel
- Bare steel interior
- Heating coils
- Level gauges (fixed or temporary)
- External or internal manifold
- White exterior for MSS compliance
- Audible alarms, strobes and level gauges (digital and mechanical)

## Comprehensive Service

Adler Tank Rentals provides containment solutions for hazardous and non-hazardous liquids and solids. We offer 24-hour emergency service, expert planning assistance, transportation, repair and cleaning services. All of our rental equipment is serviced by experienced Adler technicians and tested to exceed even the most stringent industry standards.



## Applications and Industries

- Metal Plating and Finishing
- Metal Manufacturing and Processing
- Automotive
- Pigment and Dye Manufacturing
- Painting and Coating Processes
- Steel Pickling
- Food Processing
- Mining
- Chemical and Pharmaceutical Processing
- Ground Water Remediation
- Sedimentation
- Produced Water for Oil and Gas



## INCLINED PLATE CLARIFIER

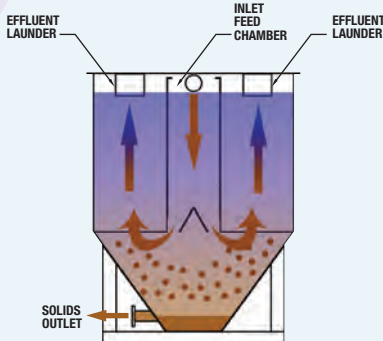
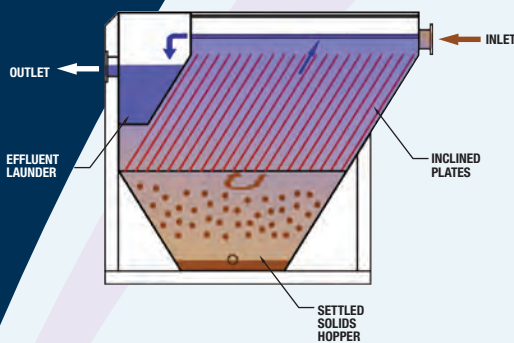
Inclined plate clarifiers are effective for removing precipitates and non-biological solids from wastewater streams. In many applications, a wastewater treatment solution including an inclined plate clarifier is the most economical alternative to remove solids and reduce TSS, TDS, and BOD in the waste stream.

### How does it work?

Once entering the influent chamber, the waste stream operates at low flow velocity and develops an even, laminar flow pattern across multiple parallel plates. The particles slide down the inclined plates and drop into the sludge hopper. Cleaned effluent exits through orifices at the top of the clarifier. The accumulated sludge can be pumped out using either an automated or manually run process.

By determining your flow rates, influent solids loading, and effluent requirements, EPS will calculate the plate surface area, spacing, and overall design to meet the application's needs. Typical loading for our Incline Plate Clarifiers are 0.25 to 0.5 GPM per square foot of effective surface area.

When sizing your solution, EPS will account for several factors, including the type of solids, chemistry available, and the need to use auxiliary equipment and processes. When considering these factors, EPS utilizes our vast accumulated experience and the knowledge of industry partners to provide you with the lowest total solution cost.





# Benefits of the EPS Inclined Plate Clarifier

- The higher effective surface area of the incline plate design allows for lower cost of construction compared to other clarifiers.
- Our Incline plate clarifier's footprint is typically 20% that of a conventional clarifier.
- The EPS design utilizes a 58 degree incline and plate spacing to reduce solids build up that can plug the slots between plates.
- The parallel plates are individually inserted into guides and can be removed without the use of additional equipment.
- Standard plates are constructed from polypropylene or stainless steel, offering excellent chemical and temperature resistance.
- All units are 10' tall or less, allowing lower elevation auxiliary equipment such as reaction tanks and access platforms.

## Standard features and available options

All of our inclined plate clarifiers come with integrated influent chamber, lower and upper clarification zones, effluent collection launders, and sludge collection hopper. EPS builds systems for flow rates from 5 to over 1,000 GPM. Each one has been factory tested and ready to connect via flanged fittings.

Available options and auxiliary equipment:

- Construction from polypropylene, stainless steel, or epoxy-coated carbon steel
- Influent equalization and pH adjustment
- Coagulation
- Flocculation
- Mechanical sludge thickening and control
- Fats, oils, and grease handling
- Filtration
- Solids handling and dewatering
- Full system sampling and monitoring
- Custom control panels designed, programmed, and built in house



Represented By:



Our Mission is to deliver wastewater treatment equipment and solutions that effectively and economically address the needs of our customers, achieving the highest possible level of customer satisfaction.

Our full line of services offered includes: Sample Analysis, Bench Scale Treatability Studies, Water Balance & Waste Characterization, and On-site Piloting

- Inclined Plate Clarifiers
- Oil Water Separators
- Air Flotation Systems
- Triple Cell Media Filters
- UF Systems
- Chemical Mixing/ Flocculation
- Multi-media Filtration
- Heavy Metals Adsorption
- UV, Ozone and Advanced Oxidation

4465 Limaburg Road, Unit 3, Hebron, KY 41048  
(859) 534-5083 • (859) 534-5651 fax • [www.epswastewater.com](http://www.epswastewater.com)

## Applications and Industries

- Heavy Manufacturing
- Automotive parts manufacturing
- Ground water remediation
- Food processing
- Algae removal
- Petroleum refinery
- Metal Plating
- Potable water



## MULTI-MEDIA FILTERS

Multi-media filters (MMF) remove suspended solids from water. They are used as primary treatment for water with low suspended solids, or as a secondary treatment after a primary method of solids removal has been used (such as an inclined plate clarifier).

### How does it work?

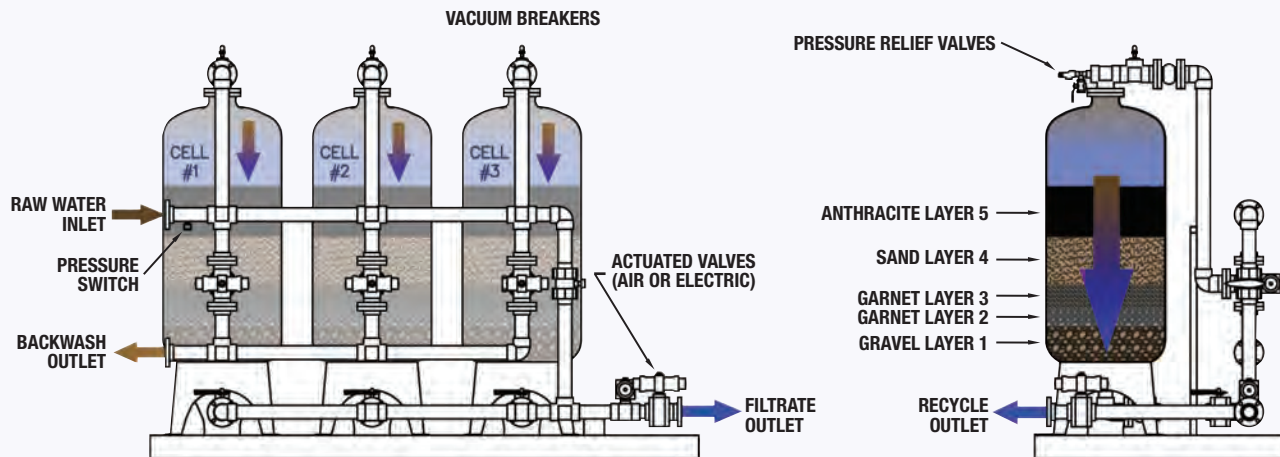
EPS multi-media filters utilize three filter cells and five different layers of media in order to remove different size solid particles from water. As the wastewater moves down through the media the solids are trapped in the media bed, creating a polished effluent. The effluent exits the filter cells into the outlet header for discharge.

Using a header with actuated or manual valves enables three modes of operation: filtration, backwash, and recycle. Backwash mode flushes out trapped solids in the media bed. Recycle mode redirects the water flow back to the filter feed to allow the filtration system to remain under pressure, keeping the media ready to filter while providing additional water polishing.

After a full characterization of your waste stream and level of contaminants, EPS will utilize our experience to size the tanks and assist in selecting from available media to provide you with the lowest total solution cost. Typical loading for a unit is 5 gpm per square foot of surface area with higher rates possible.

## Benefits of an EPS Multi-media Filter

- Compact designs for a small footprint
- Multi-media water filters handle much higher flow rates than single-media sand filters
- Multi-layered media allows more solids capture and a longer operating time in between backwashing
- Captures 90% or more of particles 20 microns and larger
- Significant bed depth solids storage minimizes the amount of backwashing necessary



## Standard Features and Available Options

EPS multi-media filter systems come skid mounted with three filter cells, pre-piped headers, pre-wired NEMA 4x control panels, and three modes of operation: filtration, backwash and recycle. Generally, the maximum influent concentration of solids allowed is 100 mg/l. EPS designs and builds multi-media filter skids for flow rates from 5 to 1,000 GPM. Each one has been factory tested and ready to connect via flanged fittings.

Available options and auxiliary equipment:

- Construction from FRP, polypropylene lined fiberglass, stainless steel, or epoxy-coated carbon steel
- Additional filter vessels piped in series or in parallel
- Influent equalization
- pH adjustment
- Flocculation
- Fats, oil, and grease handling
- Solids handling and dewatering
- Full system sampling and monitoring
- Custom control panels designed, programmed, and built in house



Represented By:



Our Mission is to deliver wastewater treatment equipment and solutions that effectively and economically address the needs of our customers, achieving the highest possible level of customer satisfaction.

Our full line of services offered includes: Sample Analysis, Bench Scale Treatability Studies, Water Balance & Waste Characterization, and On-site Piloting

- Inclined Plate Clarifiers
- Oil Water Separators
- Air Flotation Systems
- Triple Cell Media Filters
- UF Systems
- Chemical Mixing/ Flocculation
- Multi-media Filtration
- Heavy Metals Adsorption
- UV, Ozone and Advanced Oxidation

4465 Limaburg Road, Unit 3, Hebron, KY 41048  
(859) 534-5083 • (859) 534-5651 fax • [www.epswastewater.com](http://www.epswastewater.com)

---

**APPENDIX G**

**RADIATION PROTECTION PLAN**

---



<b>WEAVERTOWN ENVIRONMENTAL GROUP</b>			
<b>TITLE:</b>	<b>Radiation Protection Program Procedure</b>	<b>NO.:</b>	RP-100
		<b>PAGE:</b>	1 of 17
		<b>DATE:</b>	March 2014
<b>APPROVED:</b>  <div style="display: flex; justify-content: space-between; margin-bottom: 10px;"> <div style="border-bottom: 1px solid black; width: 40%;"></div> <div style="border-bottom: 1px solid black; width: 20%; text-align: center;">Date</div> </div> <div style="display: flex; justify-content: space-between;"> <div style="border-bottom: 1px solid black; width: 40%;"></div> <div style="border-bottom: 1px solid black; width: 20%; text-align: center;">Date</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <div style="width: 40%; text-align: center;">Radiation Safety Officer (RSO)</div> <div style="width: 20%; text-align: center;">Date</div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 40%; text-align: center;">Site Safety and Health Officer (SSHO)</div> <div style="width: 20%; text-align: center;">Date</div> </div>			

## 1.0 PURPOSE

The Ohio Department of Natural Resources (ODNR) governs the handling, processing, or generation of technologically enhanced naturally occurring radioactive materials (TENORM) in Ohio through the Ohio Administrative Code (OAC). The Weavertown Environmental Group (WEG) has applied for a radioactive material license for a TENORM down-blending facility to be located in New Matamoras, Ohio. Therefore this Radiation Protection Program (RPP) document describes the major radiation protection (RP) elements to be implemented during operation of this facility.

WEG promotes the philosophy of keeping radiation exposures to workers, the general public, and the environment As-Low-As-Reasonably-Achievable (ALARA) through a comprehensive Radiation Protection Program implemented by a Radiation Safety Officer.

The primary objectives of the Radiation Protection Program are to:

- Ensure that radiation exposures to individuals using or working in the presence of radiations fields and/or radioactive materials are consistent with ALARA,
- Ensure that radiation exposures received by members of the general public, and to the environment from licensed activities are negligible, and
- Maintain control of radioactive materials and sources through documentation of their usage and disposition.

## 2.0 APPLICABILITY

These program descriptions apply to personnel who plan, review, supervise, or perform work involving radiation protection activities during remediation.

### **3.0 REFERENCES**

State of Ohio Department of Health NMS-LIC-18, *Guidance About Service Provider Licenses*, (ODNR 2007)

### **4.0 DEFINITIONS**

NA

### **5.0 RESPONSIBILITIES**

#### **5.1 Radiation Safety Officer (RSO)**

The RSO ensures all radiation safety activities are being performed safely according to approved policies and procedures, and all regulatory requirements are met. The RSO has full access to activities involving the use of licensed material and the authority to terminate any activity in which health and safety appear to be compromised without consulting with executive management.

The following RSO's duties and responsibilities include, but are not limited to the following:

- Ensuring radiological safety and compliance with BRP and the United States Department of Transportation (DOT) regulations and the conditions of the license
- Maintaining an open dialogue with Project Management and facility staff to ensure that RPP issues are quickly addressed and corrective actions are taken.
- Inspect work activities to ensure operations, including off-normal activities, are being conducted according to the approved procedures, applicable regulations, and industry accepted As-Low-As-Reasonably-Achievable (ALARA) principles.
- Reviewing and approving work plans, Radiation Work Permits, and RPP procedures.
- Trending radiation work performance of project personnel including contamination and radiation exposure control.
- Identifying, reviewing, and documenting nonconformance, their causes and corrective actions for incidents associated with radiation protection.
- Ensuring an effective ALARA Program, including conducting onsite radiation safety and health briefings and coordinating ALARA committee meetings.
- Performing periodic safety and quality reviews including weekly inspections and monitoring activities of project operations to ensure compliance with this program and any property-specific SSHP.
- Ensuring documentation of any RPP safety violation.

- Reviewing survey data.
- Conducting briefings concerning radiological work activities.
- Ensuring that radiological records are complete, clear and legible, meet the intended purpose, and are regularly transmitted to document control for archive.
- Ensuring Radiological Areas are correctly identified, posted and marked.
- Performing or coordinating regular internal audits of the RPP.

## **5.2 Radiation Protection Technicians (RPTs)**

RPTs report directly to the RSO. RPTs are assigned by the RSO to provide support to each major work activity for implementation of RPP requirements. RPTs provide guidance in RPP matters to field personnel. RPTs have stop-work authority for radiological safety matters and activities that could result in an unsafe condition being present. RPTs are responsible for the following:

- Conducting routine and job-specific radiological surveys (i.e., radiation, contamination, and airborne radioactivity).
- Establishing radiological postings.
- Implementing the personal protective equipment (PPE) and respiratory protection programs for the purpose of keeping radiation exposures ALARA.
- Maintaining and operating portable Health Physics survey instrumentation used in the performance of Radiation Protection (RP) activities.
- Performing unconditional release surveys of material from the restricted area.
- Performing transportation radiological surveys according to applicable U.S. Department of Transportation (DOT) regulations.

## **5.3 Work Supervisors**

All Supervisors are responsible for:

- Ensuring personnel under their direction comply with RPP requirements.
- Providing information on projected work activities to the RPP organization.
- Notifying RP personnel of any radiological problems encountered.
- Ensuring workers are prepared for tasks with tools, equipment and training to minimize time spent in radiological areas.

#### **5.4 Radiation Workers/Authorized Users**

All Radiation Workers and Authorized Users must have adequate training and experience to use, possess or provide services involving licensed materials. Duration of training and experience should be commensurate with the expected hazards service provider personnel may encounter during routine and 24 emergency conditions, in addition to the following responsibilities:

- Obeying promptly “stop-work” and “evacuate” orders from RP personnel
- Obeying posted, oral, and written radiological control instructions and procedures, including instructions on Radiation Work Permits.
- Immediately reporting unexpected exposure and lost or off-scale dosimetry devices to RP personnel.
- Reporting medical radiation treatments to the RSO and supervisor.
- Keeping track of personal radiation exposure status to ensure that administrative dose limits are not exceeded.
- Notifying RP personnel of faulty or alarming radiation protection equipment, and unsafe radiological conditions.

#### **6.0 PREREQUISITES**

None

#### **7.0 PRECAUTIONS AND LIMITATIONS**

None

#### **8.0 APPARATUS**

None

#### **9.0 RECORDS**

None

#### **10.0 PROCEDURE**

##### **10.1 Radiation Protection Organization**

- The RP Organization will provide appropriate personnel and resources to verify and maintain a radiologically safe working environment.
- RP staffing levels will be periodically reviewed to ensure that adequate staffing levels are maintained consistent with current and planned remediation activities.
- The RP Organization will have access to engineering and other personnel needed to support the Radiation Protection Program.



- The development and control of RP Procedures will be in accordance with the following guidelines:
  - Clearly defined scope, tasks, applicability, limiting conditions, precautions, consideration of special controls, reference to acceptance criteria and quality requirements.
  - Clearly understood text, using standard grammar, nomenclature and punctuation, concise instruction steps in a logical sequence, and references.
  - Review, approval, issuance, and control of changes and permanent revisions.
- New procedures and revisions to existing procedures shall be submitted to BRP for concurrence and be incorporated into the next revision of the RPP.

## **10.2 ALARA Program**

All activities involving radiation and radioactive materials shall be conducted in such a manner that radiation exposure to workers and the general public are maintained As-Low-As-Reasonably-Achievable (ALARA), taking into account current technology and the economics of radiation exposure reduction in relationship to the benefits of health and safety. ALARA concepts are implemented throughout the entire RPP.

- Administrative controls and procedures endeavor to reduce individual and collective radiation exposures ALARA. Minimizing radiation exposure is accomplished by preliminary planning and scheduling, using proven and innovative engineering techniques and performing engineering reviews of proposed work plan changes.
- Worker involvement and acceptance in minimizing radiation exposure is a key component of the ALARA Program. Workers are responsible to incorporate ALARA principles into work performance.
- Work shall be planned in accordance with ALARA principles, involving input from discipline engineers, the project RPP staff and implementing supervisors.

## **10.3 Radiation Protection Audit Program**

- Internal / External Audits of the Radiation Protection Program will be performed and documented at least annually, and be of sufficient scope, depth, and frequency to identify and resolve actual or potential performance deficiencies before significant quality problems are encountered.
- At a minimum, audits will be performed to ensure compliance with BRP and DOT regulations (as applicable), and the terms and

conditions of the license; and that occupational doses and doses to the public are ALARA.

#### 10.4 External and Internal Dosimetry Program

In accordance with OAC 3701:1-38-14, personnel radiation exposure monitoring will be implemented whenever the potential exists for occupational radiation exposures to exceed 10 percent (10%) of the maximum limits established in OAC 3701:1-38-20-H and presented in the following sections. In that event, WEG will provide and issue external whole-body dosimeters to all site personnel entering posted radiological areas to perform work. Internal exposure will be monitored by a combination of general work area and breathing zone air sampling and/or bioassay analyses.

The radiation exposure to Site personnel shall be controlled to ensure that trained site workers do not exceed the limits in the following sections and as specified in OAC 3701:1-38-14. In the interest of adhering to the ALARA concept, the limits presented are considered maximum limits. WEG will take every practical measure to ensure personnel exposures are maintained as far below these limits as is reasonably achievable.

**Table 10-1**  
**Occupational Exposure Limits for Adult**

Total Effective Dose Equivalent	(TEDE = DDE + CEDE)	5.0 rem/yr
Total Organ Dose Equivalent to Maximum exposed organ	(TODE = DDE + CDE)	50.0 rem/yr
Lens of Eye Dose Equivalent	(LDE)	15.0 rem/yr
Shallow Dose Equivalent to Skin or extremity	(SDE)	50.0 rem/yr

Where:

- DDE = Deep dose equivalent (i.e., whole body exposure to external penetrating radiation)
- CEDE = Committed effective dose equivalent (e.g., internal exposure from inhalation, ingestion, injury)
- CDE = Committed dose equivalent

**Table 10-2**  
**Occupational Exposure Limits for Minors**

Radiations exposure to trained minors under the age of 18 shall be maintained in accordance with OAC 3701:1-38-14.

Total Effective Dose Equivalent	(TEDE = DDE + CEDE)	0.1 rem/yr
---------------------------------	---------------------	------------

**Table 10-3**  
**Occupational Exposure Limits Embryo/Fetus**

In the event that a WEG Site worker declares herself pregnant, that worker's task assignments shall be controlled to limit the radiation exposure to the embryo/fetus in accordance with the requirements of OAC 3701:1-38-01. **That limit shall be based on the time from conception to birth.**

Total Effective Dose Equivalent	(TEDE = DDE + CEDE)	0.5 rem
---------------------------------	---------------------	---------

**Table 10-4**  
**Exposure Limits to Visitors and Members of the Public**

Radiation exposures to members of the public shall be maintained in accordance with OAC 3701:1-38-01. A visitor may be a member of the public or may be a representative or employee of a company or agency performing work onsite.

Total Effective Dose Equivalent	(TEDE = DDE + CEDE)	0.1 rem/yr
---------------------------------	---------------------	------------

## **10.5 Radiation Protection Instrumentation Program**

WEG shall ensure that an adequate number of calibrated radiation detection and measurement instruments are available to make radiation measurements. WEG will use instruments that meet the radiation monitoring specifications published in Appendix G to NMS-LIC-18, *Consolidated Guidance about Materials Licenses: Program-Specific Guidance about Service Provider Licenses*.

Instruments shall be maintained and calibrated at least annually in accordance with ANSI N13A-1997 for the types of radiation being measured. Written operating guides for common instruments are provided in **Appendix A**. Additional guides will be added as necessary.

WEG reserves the right to upgrade our survey instruments as necessary.

## **10.6 Access Control and Radiological Posting Requirements**

This program describes the administrative and physical measures used to post and control access to Radiological Areas, the requirements for entry into Radiological Areas, the posting of Radiological Areas, and the use of radiation work permits (RWPs). Access Control protocols are implemented through a written access control procedure. Access to posted radiological areas will be controlled such that:

- only authorized personnel are permitted to enter designated work areas
- physical barriers such as caution ropes or barricades are installed as necessary to prevent inadvertent access
- Caution signs will be conspicuously posted from all angles of approach to notify personnel of hazards
- Implementing sign-in and sign-out protocols for personnel moving in and out of work areas
- Ensuring that personnel are properly trained and qualified to be on site or in specific work areas.

Radiological postings shall be used to delineate areas containing radiological control requirements and to inform personnel of hazards in accordance with O.A.C. 3701:1-38-18. In addition, supplemental or informational postings may be included which provide personnel with entry requirements or protective equipment requirements. Barriers may be used in conjunction with postings to ensure that personnel do not inadvertently enter into an area with a radiological hazard.

- At a minimum, all access / egress points to areas requiring radiological posting shall be conspicuously posted with the appropriate signs which includes area descriptions and specific requirements for entry.
- Appropriate signs should be placed approximately every 40 feet around the perimeter of a posted area. At least one sign should be placed on each side of an area's boundary, visible from any normal avenue of approach. These signs require only area identifiers (e.g., Restricted Area, Radioactive Materials Area, Radiation Area, etc.) in addition to the standard "Caution" or "Warning" and the trefoil.
- Radiation Safety Technicians (RST) with the appropriate field survey instrumentation may serve as the radiological posting in situations where the task is of a short duration or at the discretion of the RSO.
- No radiological control(s) shall be installed in any area that would prevent the rapid evacuation of personnel in an emergency situation.
- Trained emergency response personnel (Fire Dept, Ambulance / EMT, Law Enforcement) responding to on-site emergencies are exempt from the requirements of this procedure.



- Postings should be as clear and concise as possible to prevent confusion on the part of personnel desiring to enter an area.
- Postings should not be hung from ladders, electrical wire, switches, vehicles, or any other item that could be damaged, moved, or could cause injury to personnel.
- If more than one level of radiological posting is required in an area, posting for each unique condition shall be identified starting with the highest hazard potential. However, it is not required to post areas with area identifiers that are superseded by postings identifying a higher hazard potential (e.g., posting a Contamination Area as a Radioactive Materials Area, etc.).
- Radiological postings shall not be moved or altered without approval from the RSO or the RST covering the work.

#### **10.7 Radiation Protection Surveillance Program**

The Radiation Protection Surveillance Program provides for the conduct of radiological surveys in all active process areas of the facility. Its purpose is to identify radiological sources, to determine radiological conditions in the work environments, to ensure equipment and materials are verified acceptable for unconditional release, and to comply with applicable regulations. The Program encompasses both routine and non-routine surveys to be performed within.

WEG will survey the facility and maintain contamination levels in accordance with the survey frequencies and contamination levels published in NRC NMS-LIC, *Program Specific Guidance About Service Provider Licenses*.

#### **10.8 Radioactive Material Control Program**

This Program provides guidance and requirements for control of radioactive materials. The Radioactive Material Control Program includes receipt, inventory, handling, and release of materials. It also provides for radioactive sealed source control, control of materials entering Restricted Areas and control of contaminated tools and equipment. These activities will be governed through a written Radioactive Material Control Procedure.

##### **Procedure for Receipt of Radioactive Material**

- Obtain RSO authorization prior to accepting receipt of radioactive material at the project.
- Radioactive materials which may be received include, but are not limited to, items such as sealed sources, liquid standards, contaminated material and equipment from outside other sites, waste generated outside normal operational activities. This is to ensure that required receipt surveys are scheduled, appropriate ALARA considerations are

implemented, and that the source term is evaluated for possible effects to the facility waste stream criteria.

- The RSO may direct receipt surveys to be performed on any incoming radioactive material shipment.
- RP personnel perform receipt inspections and surveys of incoming radioactive material shipments which exceed a Type A quantity (refer to 10 CFR 71.4 and Appendix A of 10 CFR 71) as follows:
- The inspection and survey shall be performed within three hours of receipt. If received after normal work hours, the survey is required within three hours from the beginning of the next business day.
- Don latex gloves, at a minimum, when performing incoming inspections and surveys.
- Inspect the package for leaks or apparent damage.
- Ensure the contents match the packing slip or shipping papers.
- Perform a radiation survey of the package exterior.
- Perform a removable contamination survey of the package interior and exterior.
- RP Personnel shall store the package in a secure, radiologically posted area, notify the RSO or designee if any the following conditions are observed during receipt of a radioactive material shipment:
- Contents do not match packing slip or shipping papers
- The contents of the package do not contain the isotopes or quantities of material as ordered or expected.
- Package is leaking or sufficiently damaged to compromise package contents.
- The receipt survey results exceed any of the following limits:
- Radiation (mrem/hr) – 200 @ Contact or 10 @ 1 meter from the package
- Removable Contamination (dpm/100 cm<sup>2</sup>) – 2200 Beta-Gamma, 220 Alpha

#### **Procedure for Control of Accountable Radioactive Sources**

- The RSO, or designee shall serve as the Source Custodian and shall be responsible for the following:
- Ensuring that all accountable radioactive sources are stored in their designated storage location when not in use.

- Maintaining a source inventory that includes accountable source identification, isotopic content, activity, assay date, designated storage location, and date and results of most recent semi-annual leak test.
- Any individual planning to procure a radioactive source shall request approval from the RSO in writing. This request shall include a justification for bringing additional sources onto the project and shall include all necessary source information to update the source inventory.
- Source Custodian, or designee shall ensure that a leak test is performed and documented for any accountable source in inventory under any the following conditions:
  - Upon source receipt in inventory
  - Semi-annually
  - Prior to transfer to a new permanent storage location
  - Prior to disposal
  - If source integrity is compromised
- A source leak test consists of a physical source inventory, a visual inspection for source integrity and a contamination survey capable of detecting the presence of 0.005 microcuries (200 Bq) of removable radioactivity.
- If direct contact with the source is impractical (i.e., inaccessible, unsafe from an ALARA standpoint, or could potentially compromise source integrity) the source container or storage location may be surveyed as representative of the leak test.
- All accountable sealed radioactive sources or their individual storage containers shall bear a durable label or tag which includes the following minimum information:
  - Source Identification
  - Radionuclide(s)
  - Source Activity
  - Assay Date
  - Source Custodian Name and Contact Number
- The RSO shall establish designated locations for the storage of accountable radioactive sources using the following guidance:
  - Sources should be stored in a lockable location
  - Sources should be stored to minimize exposure to fire or combustible materials

- Sources should be stored in such a manner to minimize radiation exposure to personnel routinely present in the area.

#### **Procedure for Controlling Tools, Equipment and Material**

- All items to be released from radiological controls shall be surveyed by RP personnel.
- The RSO may authorize the establishment of “Hot Tool” storage areas for reusable contaminated tools, components, equipment and material. If labeling of these items (e.g., hand tools) is impractical, magenta paint may be used to identify the item as radioactive material.
- Radioactive waste receptacles will be established and maintained for the disposal of items.

#### **Procedure for Release of Items from Radioactive Material Controls**

- RP personnel shall perform surveys to release items from radioactive material controls, with the following exception:
- Hand-carried items (e.g., pens, paper, flashlights, logbooks, clipboards, safety glasses, dosimetry, badges, etc.) under a single individual’s control and that are not expected to have come into contact with potentially contaminated surfaces may be monitored by that individual during the personnel frisking process.
- RP personnel will survey items designated for unrestricted release according to

### **10.9 Radiation Surveys**

- Radiation exposure rate surveys shall be conducted in and around posted work areas to establish boundaries and to inform workers of the level of radiological hazards present.
- Exposure rate surveys shall be performed by individuals trained in the operation of radiation detection equipment.
- Radiation survey instruments used shall be capable of measuring gamma radiation levels from 10 micro-roentgens/hour through at least 5,000 milli-roentgens/hour.
- Obtain proper instrumentation. Ensure that the instrument is currently calibrated and has been performance checked prior to the survey.
- When entering areas with known radiation levels, select the appropriate scale.
- Observe the meters as you enter the area. If necessary, change scales to maintain on-scale reading.
- Monitor dose rates from the lower thighs to head level, recording the highest level as General Area Dose Rate.
- Monitor dose rates 30 cm (12 inches) from a significant radiation source recording the highest level as General Area Dose Rate.



- Additional measurement locations should be clearly identified in survey documentation.
- Record all survey results on the appropriate survey forms or in logbooks as directed by the RSO.

### **10.10 Contamination Surveys**

- Routine contamination surveys shall be conducted on personnel and equipment before exiting work areas to ensure contamination controls are maintained at all times.
- Contamination surveys shall be performed by individuals trained in the operation of radiation detection equipment.
- Portable instruments shall be used to monitor personnel upon exiting work areas and used for releasing equipment from radiological controls.
- Instrumentation typically consists of an alpha/beta scintillation detector (100 cm<sup>2</sup>) and/or a Geiger-Mueller (G-M) detector coupled to an appropriate rate meter.
- Similar instruments with an alpha/beta sensitive zinc sulfide scintillation detector configured with a sample holder may be used to count smears for assessing removable contamination.
- All items being surveyed should appear to be clean prior to being surveyed. To the extent possible, all interior and exterior surfaces should be free from oil and visible dirt. The RSO may dictate the required degree of cleanliness, based on the purpose of the survey and the history of the item being surveyed.
- Obtain proper instrumentation for the survey. Ensure that the instruments are currently calibrated and have been performance checked prior to the survey.
- Determine and record the background count in the area to be surveyed. Ensure that the background is representative of the measurement to be taken.
- Calculate and record the minimum detectable activity (MDA) on the appropriate survey form.
- Verify the MDA has been calculated for the background at the point of use and is less than the applicable site release criteria.
- Perform a scanning survey of the item. Concentrate survey measurements on areas most likely to be contaminated. The fraction of the total area scanned is subjective, based on technician experience, an item's use history, and RSO guidance. Typically, the scan frequency is a minimum of 10% of accessible surface areas.

- Obtain static measurements at locations with the highest potential for contamination. The number of survey points selected is subjective, based on the item's use history, and RSO guidance.
- The count time should be consistent with the MDA calculation. A typical count times is one minute for digital scalers and until the meter reading stabilizes for analog rate meters.
- Record and identify all locations surveyed on the appropriate survey form(s). The use of diagrams or sketches is recommended.
- All measurements shall be reported in units of "dpm" unless otherwise directed by the RSO. Examples include "dpm/100 cm<sup>2</sup>," and "dpm/probe."
- Complete the appropriate survey form.
- For the purpose of this field activity, the Ra-226 and Ra-228 Acceptable Surface Contamination Levels established in NRC Regulatory Guide 1.86, *Termination of Operating Licenses for Nuclear Reactors, Table 1*, shall be used as a conservative, best management practice.

#### Acceptable Surface Radioactivity Levels for Release of Equipment

NUCLIDES <sup>a</sup>	AVERAGE <sup>b,c</sup>	MAXIMUM <sup>b,d</sup>	REMOVABLE <sup>b,e</sup>
Ra-226, Ra-228	1.7 Bq/100cm <sup>2</sup> (100 dpm / 100 cm <sup>2</sup> )	5.0 Bq/100cm <sup>2</sup> (300 dpm / 100 cm <sup>2</sup> )	0.3 Bq/100cm <sup>2</sup> (20 dpm / 100 cm <sup>2</sup> )

##### Notes:

a – Where surface radioactivity by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

b – As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with instrumentation.

c – Measurements of average radioactivity should not be averaged over more than one square meter. For objects of less surface area, the average should be derived for each such object.

d – The maximum radioactivity level applies to an area of not more than 100 cm<sup>2</sup>.

e – The amount of removable radioactive material per 100 cm<sup>2</sup> of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable radioactivity on objects of less surface area is determined, the pertinent levels should be reproduced proportionally and the entire surface should be wiped.

### 10.11 Airborne Radioactivity Surveys

- Airborne radioactivity surveys shall be conducted during intrusive activities if there is a reasonable expectation that radioactive materials may become re-suspended.

- Airborne radioactivity surveys for gross alpha and gross beta radiation may consist of General Area (GA) and/or Breathing Zone (BZ) located samplers.
- GA samples are usually taken at Work Zone perimeters; or downwind of intrusive activities to assess compliance with radiological posting requirements.
- BZ samples may be utilized to monitor airborne particulates in the BZ of selected radiation workers with the potential for exposure to airborne radioactivity.
- Results shall be compared to the Derived Air Concentration (DAC) values of FAC 64-5, Attachment 1, ALIs, DACs, & Effluent Concentrations, for natural thorium because the sampling method does not differentiate the radionuclides present in the sample. Therefore, results shall be compared to the most restrictive value, which is for Th-232.
- Any personnel air monitoring shall be performed by a trained RST, in consultation with the RSO
- Select a calibrated air sampler with the appropriate glass fiber air filter and place the sample head into position. (The fuzzy side of the filter should face outwards).
- Turn the sampler ON. At a minimum, document the following information on the air filter envelope or log sheet:
  - Sampling Location
  - Sample Purpose (e.g., “GA” or “BZ”)
  - Sampler model
  - Serial number
  - Date / time on
  - Flow rate
- When air monitoring is complete, observe the sampler flow rate and turn the sampler off. At a minimum, document the following information on the air filter envelope or log sheet:
  - Date / time off
  - Flow rate
  - Total Run Time (if available)
  - Total Volume Sampled (if available)
- Remove and / or replace the sample head and filter using caution to prevent cross contamination.

- Store the filter in a protective container to minimize the loss of collected material.
- Submit sample and associated sample-specific information for analysis.

#### **10.12 Radiation Protection Training Program**

The RP Training Program identifies the Program's organization structure and staff responsibilities, objectives, general course content, and ongoing training requirements. The Program consists of three basic levels of training: General Employee Radiation Training for visitors and non-radiation workers, Radiation Worker Training for workers who access Restricted Areas and Radiation Protection Technician Training. The RP Training Program is detailed through a written Radiological Training Procedure.

#### **10.13 Radiation Protection Records**

Radiation Protection Records are routinely developed to document all aspects of the Radiation Protection Program. Records are generated using clear concise text using standard grammar and punctuation. Records are reviewed for adequacy and completeness and transmitted to the Document Control organization for long-term retention. Radiological Occurrence Reports are generated to document abnormal events and are to be used as tools to identify adverse trends and program weaknesses.

In addition to records described above, WEG will follow the requirements for maintaining records important to decommissioning, including the type of information required, as established in OAC 3701:1-40, OAC 3701:1-44 and OAC 3701:1-56. The RP Records Program will be detailed in a written procedure.



## **APPENDIX A**

# **INSTRUMENT OPERATING GUIDES**

- **Bicron Micro Rem Meter (Regular and Low-Energy Models)**

### **General Description**

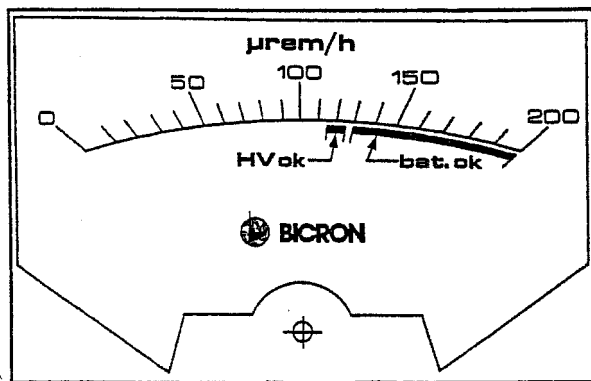
The Bicron Micro Rem Meter (**Error! Reference source not found.**) is a portable survey meter for dose equivalent rate measurements of low photon radiation levels. A tissue-equivalent organic scintillation detector provides a flat energy response in dose-equivalent rate ( $\mu\text{rem/h}$ ) for X-ray and gamma photons in the energy range of approximately 40 keV to 1.3 MeV. This instrument is also available in a “Low-Energy Response” option, which extends the tissue-equivalent response range down to approximately 17 keV.

#### **Bicron Micro Rem Meter with Low Energy Window.**

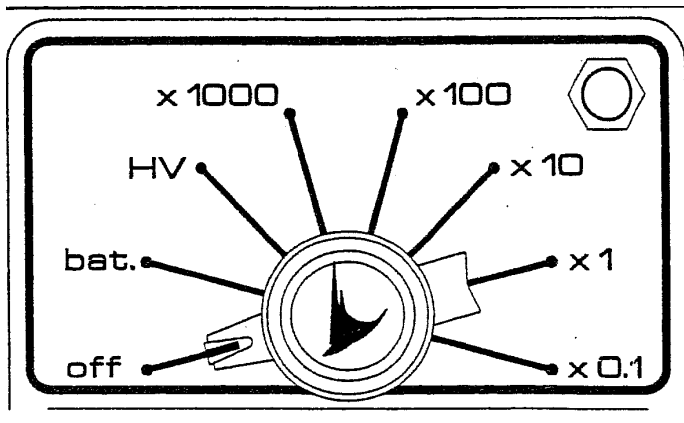


The Bicron Micro Rem Meter survey instrument has an effective measurement range of 0–200 millirem/h (mrem/h). Ranges are: x 0.1 [0–20 microrem/h ( $\mu\text{rem/h}$ )], x 1 (0–200  $\mu\text{rem/h}$ ), x 10 (0–2 mrem/h), x 100 (0–20 mrem/h), and x 1000 (0–200 mrem/h). On-Off, battery test, high voltage check, and five range selections are controlled by the same switch. There is also a reset button on the same panel as the switch control knob. Some models of this instrument are equipped to provide an audible signal with a frequency proportional to the radiation level. An alarm setting is also available on some models.

**Bicron Micro Rem Meter Scale.**



**Bicron Micro Rem Meter Control Knob Functions.**



### **Applications**

The Bicron Micro Rem Meter is used to measure direct radiation levels in units of dose equivalent rate, i.e., microrem ( $\mu\text{rem}$ ). Because of the tissue equivalent response to photon radiation, readings from this instrument accurately indicate the dose equivalent for the range of photon energies typically encountered in ILUKA operations, and measurements can therefore be compared directly with control levels and regulatory limits. The Bicron Micro Rem Meter can be used to accurately measure area radiation levels ranging from typical background values to those expected in all ILUKA operations, except where significant quantities of fission and/or activation products are present.

### **Controls and Displays**

**BAT.**—Power is provided by two 9-volt batteries. Only one battery is required to operate the instrument; however, battery life is extended with both batteries installed. The rotary switch is placed in the **bat.** position to test the battery level; a response of the meter needle in the **bat. ok** range indicates that there is sufficient power to operate the instrument.

**HV**—When the switch is placed in the **HV** position, the needle response in the **HV ok** range indicates that the instrument voltage is acceptable for operation.

**SCALES**—The five ranges are described in General Description, above.

**RESET**—Depressing and releasing this optional pushbutton switch quickly resets the meter to zero.

**DISPLAY**—All measurements and indication of battery and high voltage tests are indicated on the single analog meter display.

### **Additional Features and Auxiliary Equipment**

There are no items of auxiliary equipment required to use this instrument. Optional features on some models may include an audible signal output and an alarm preset.

### **Limitations and Precautions**

The Low-Energy model has a fragile detector covering that must be protected from damage. The range of this instrument limits its applications to measuring radiation levels below 200 millirem/h.

### **Operation**

Confirm that the instrument has a valid and legible calibration label; if not, remove from service and do not use until the condition is corrected.

Determine the lower-photon energy range of interest; if less than 40 keV, select the Low-Energy Response model. Historical, job-process, and other work documents should provide information regarding radio nuclides and types of contamination expected. This will assist in the proper selection of instrumentation.

Assure that the “daily” instrument performance tests have been successfully completed or perform those tests in accordance with established procedure.

Turn the instrument switch to **bat**. Assure that the needle response is in the indicated range of **bat. ok**; if not, remove from service and do not use until condition is correct.

Turn the instrument switch to **HV**. Assure that the needle response is near the center of the indicated range of **HV ok**; if not, remove from service and do not use until condition is corrected.

Holding the instrument away from the body and in the radiation field of interest, turn the scale switch to highest scale allowing several seconds for response. Continue to select lower scales until the meter indication is as high as achievable without being beyond the upper meter scale limit.

After waiting for the meter reading to stabilize (approximately 15 seconds depending on scale), note the indicated value on the meter and multiply by the selected scale to determine the dose equivalent rate in  $\mu\text{rem/h}$ .

When measurements are completed, turn instrument switch to **OFF**.



- **Ludlum Model 19 Micro R Meter**

### **General Description**

The Ludlum Model 19 is a portable survey meter for measurements of exposure rate at low photon radiation levels. The detector is an internal sodium iodide (NaI) detector, which is sensitive to X-ray and gamma photons in the energy range of approximately 70 keV–1.4 MeV. **Error! Reference source not found.**

### **Ludlum Model 19 Micro R Meter.**



The Ludlum Model 19 Micro R Meter has an effective measurement range of 0–5 milliroentgens/h (mR/h). Ranges are: 0–25 microR/h ( $\mu\text{R/h}$ ), 0–50  $\mu\text{R/h}$ , 0–250  $\mu\text{R/h}$ , 0–500  $\mu\text{R/h}$ , and 0–5000  $\mu\text{R/h}$ . On-Off and measurement range selection are controlled by the same switch. Other controls are an **ON-OFF** toggle switch for audio response, a **FAST/SLOW** response toggle switch proportional to the frequency in the radiation level, and pushbutton switches for battery status, meter zeroing, and illumination of the meter face.

### **Applications**

The Ludlum Model 19 Micro R Meter is used to measure radiation levels in units of exposure rate, i.e., /h ( $\mu\text{R/h}$ ). The Ludlum Model 19 Micro R Meter can be used to determine area radiation levels ranging from typical background values to those expected in most ILUKA operations, except where significant quantities of fission and/or activation products are present. The Ludlum Model 19 Micro R Meter is typically calibrated for accurate response at the  $\text{Cs}^{137}$  gamma energy. It will indicate relative radiation levels and identify changes in radiation levels, but, because of the energy dependent response of the NaI detector, this instrument should not be expected to provide accurate exposure rate measurements at other gamma energies.

### **Controls and Displays**

**BAT**—Power is provided by two standard size “D” cell batteries. To test the battery level, depress the pushbutton; a response of the meter needle in the **BAT TEST** range indicates that there is sufficient power to operate the instrument.

**RES**—To zero the needle on the meter, depress the pushbutton; this will adjust the needle to the **zero** mark on the display.

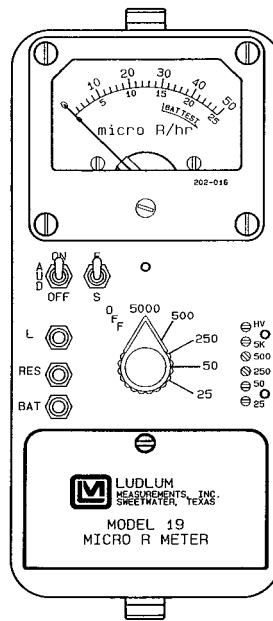
**L**—To illuminate the meter face, depress this pushbutton.

**F/S**—selects meter response time from 4–22 seconds, depending on the range and response selected.

**AUD ON/OFF**—selects audible signal in **ON** position.

**DISPLAY**—All measurements and indication of battery power are indicated on the dual analog meter display.

### **Ludlum Model 19 Micro R Meter Controls and Display.**



### **Additional Features and Auxiliary Equipment**

There are no items of auxiliary equipment required for the Ludlum Model 19 Micro R Meter. There are no auxiliary features for instrument.

### **Limitations and Precautions**

The detector of the Ludlum Model 19 Micro R Meter is energy dependent and the exposure rate indicated by this instrument will overestimate the true level by as much as a factor of 10 at energies below the calibration energy and underestimate the true value by as much as a factor of 5 at energies above the calibration energy.

### **Operation**

Determine the photon energy range of interest; if significantly higher or lower than the energy with which calibration was performed, either be prepared to accept an inaccurate measurement value or select an instrument that is not as energy dependent. Historical, job-process, and other work documents should provide information regarding radio

nuclides and types of contamination expected. This will assist in the proper selection of instrumentation.

Confirm that the instrument has a valid and legible calibration label; if not, remove from service and do not use until the condition is corrected.

Determine the radiation energy range of interest.

Assure that “daily” instrument performance tests have been successfully completed or perform those tests in accordance with ILUKA procedure.

Depress the instrument **BAT** pushbutton. Assure that the needle response is within the “**BAT TEST**” range on the meter; if not, remove from service and do not use until condition is corrected.

Turn the **AUDIO ON/OFF** toggle switch to “**ON**”.

Select the **S** position on the “**F/S**” toggle switch for **slow** response.

Holding the Ludlum Model 19 Micro R Meter away from your body and in the radiation field of interest, turn the scale switch to highest scale allowing several seconds for response. Continue to select lower scales until the meter indication is as high as achievable without beyond the upper meter scale limit.

After waiting for the meter reading to stabilize (approximately 15-22 seconds depending on the scale), note the indicated value on the meter and multiply by the selected scale to determine the exposure rate in  $\mu\text{R/h}$ .

When measurements are complete, turn the Ludlum Model 19 Micro R Meter scale selector switch to **OFF**.

- **Ludlum Model 2221 Count Rate meter/ Scaler**

### **General Description**

The Ludlum Model 2221 Count Scaler/Scaler is a portable combination count rate meter and scaler that provides the electronic circuitry for measurements of alpha, beta, or gamma, radiation levels when connected to the appropriate detector. It is designed for operation with scintillation, proportional, and G-M detectors. The Ludlum Model 2221 Count Scaler/Scaler may also be used for counting smears and can be calibrated for operation as a single channel analyzer.

### **Ludlum Model 2221 Count Scaler/Scaler.**



The Ludlum Model 2221 Count Scaler/Scaler has an effective count rate range of 0 to 500,000 counts per minute (cpm). A rotary switch allows selection of count range. Linear ranges scales are: X1, 0–500 cpm; X10, 0–5000 cpm; X100, 0–50,000 cpm and X1000, 0–500,000 cpm. A logarithmic range scale may also be selected. When this instrument is operated as a scaler, the LCD digital display range is 0–999999 counts.

A toggle switch controls power to the instrument (On-Off). Pushbuttons located on the left side of the face panel are provided for battery test, high voltage indication, energy threshold set point, and energy window set point. Pushbuttons located on the right side of the face panel are provided for meter zeroing and scaler count Start and scaler count Hold. Scaler count time adjustment is made utilizing an 8-position rotary switch located on the right side of the face panel of the instrument. Other controls are toggle switches for power On-Off, Lamp On-Off, for LCD display illumination, Fast/Slow instrument response and selection of digital display in rate meter or scaler mode. A 3-position toggle switch is provided for selection of number of clicks per event and a rotary knob for audio volume control. A plug jack is provided for earphones. A rotary switch is provided for selection of energy window In or energy window Out. The meter face includes both linear and logarithmic scales.



## **Applications**

The Ludlum Model 2221 Count Scaler/Scaler is used to measure radiation levels in units of counts per minute. It can be used to determine area radiation levels, ranging from typical background values to those expected in most ILUKA operations. The Ludlum Model 2221 Count Scaler/Scaler is typically calibrated for accurate response with a particular detector selected for radiation contamination monitoring. The Ludlum Model 2221 Count Scaler/Scaler is suitable for the following types of surveys:

- Personnel contamination
- Equipment surface contamination
- Radiological area identification
- Radioactive material shipments
- Characterization
- Qualitative swipe measurements

When connected to the appropriate detector, the Ludlum Model 2221 Count Scaler/Scaler will indicate relative contamination levels and identify changes in contamination levels.

## **Controls and Displays**

**ON-OFF**—To turn the instrument power on, slide the switch to the **ON** position.

**BAT**—Power is provided by 4 standard size D-cell batteries. To test the battery level, depress the **BAT** pushbutton; a reading on the LCD display of 4.8 or greater indicates that there is sufficient power to operate the Ludlum Model 2221 Count Scaler/Scaler.

**HV**—To obtain an indication of instrument operating voltage, depress this pushbutton. The voltage is indicated on the LCD display.

**ZERO**—To zero the needle on the meter, depress the pushbutton; this will drive the needle to the zero mark on the analog display.

**THR**—To obtain an indication of the preset energy threshold, depress this pushbutton. The threshold will be indicated on the LCD display.

**WIN**—To obtain an indication of the preset energy window, depress this pushbutton. The window will be indicated on the LCD display.

**SCALER / DIG. RATE**—To select indication of counter contents on the LCD display, move this toggle switch to **SCALER**. To select indication of count rate on the LCD display, move this toggle switch to **DIG. RATE**. Note: The scaler and rate meter are active even when not selected; this allows simultaneous use for count collection and obtaining an instantaneous indication of count rate.

**RESP F/S**—To select **Fast** or **Slow** instrument response, move this toggle switch. The toggle switch selects meter response time from 4–22 seconds, depending on the range and response selected.

**RANGE**—To select the cpm range of the instrument analog display, turn this rotary switch to X1, X10, X100, or X1K. Turn the rotary switch to the LOG position to use the logarithmic scale on the analog display.

**MINUTES**—To select the count time for scaler use, turn this rotary switch to 10, 5, 2, 1, 0.5, 0.2, or 0.1 count time in minutes, or CONT. for continuous collection of counts.

**COUNT**—To begin a scaler-counting period, depress this pushbutton.

**HOLD**—To temporarily suspend, or freeze the collection of scaler count, depress this pushbutton. To continue collection of counts, depress this pushbutton.

**VOLUME**—To adjust the audio signal, turn this knob.

**AUDIO DIVIDE**—To select a reduction in the number of audible clicks, move this toggle switch to a divisor of 100, 10, or 1.

**DISPLAY**—All measurements and indications of battery power, threshold set point, window set point, and operating voltage are indicated on the LCD display. All measurements are indicated on the dual analog display.

#### **Ludlum Model 2221 Count Ratemeter/Scaler's Analog Display.**



#### **Additional Features and Auxiliary Equipment**

A headset may be used with the Ludlum Model 2221 Count Scaler/Scaler for audio reception.

#### **Compatible Detectors**

The Ludlum Model 2221 Count Scaler/Scaler is compatible with these detectors, or their equivalents:

Ludlum Model 43-5	Alpha Scintillator
Ludlum Model 43-89	Alpha Scintillator
Ludlum Model 43-65	Alpha Scintillator
Ludlum Model 44-7	G-M
Ludlum Model 44-9	G-M
Ludlum Model 44-40	G-M
Ludlum Model 44-10	Gamma Scintillator
Ludlum Model 44-7	Gamma Scintillator
Ludlum Model 44-110	Gas Proportional
Ludlum Model 44-116	Beta Scintillator

Ludlum Model 43-68	Gas Proportional
--------------------	------------------

### **Limitations and Precautions**

The Ludlum Model 2221 Count Scaler/Scaler is typically used for field measurements in a gross count rate RATEMETER or count collection SCALER mode. Unless job requirements indicate otherwise, operate the Ludlum Model 2221 Count Scaler/Scaler with the WIN rotary switch in the **OUT** position.

The Ludlum Model 2221 Count Scaler/Scaler has no illumination for the analog meter display and should not be used in poorly lit environments.

### **Operation**

Determine the type[s] of contamination to be surveyed. Assure the detector connected to the instrument is suitable for the type of contamination.

Confirm that the Ludlum Model 2221 Count Scaler/Scaler has a valid and legible calibration label; if not, remove from service and do not use until condition is corrected.

Determine the radiation energy range of interest. Historical, job-process, and other work documents should provide information regarding radio nuclides and types of contamination expected. This will assist in the proper selection of instrumentation.

Assure that “daily” instrument performance tests have been successfully completed or perform those tests in accordance with ILUKA procedure.

Assure that the **WIN** rotary switch is in the **OUT** position, unless job requirements indicate otherwise.

Move the **ON-OFF** toggle switch to **ON**. A random number will be indicated on the LCD display, followed by **8.8:8:8:8:8**, then the number of the instrument program version will be indicated on the LCD display, e.g., **26 10 10**.

Depress the **BAT** pushbutton. Assure that the voltage indicated on the LCD display is 4.8 or greater; if not, remove from service and do not use until condition is corrected.

#### ***Rate meter Operation:***

Turn the **RATEMETER** rotary switch to the **X1k** mark.

Depress the **HV** pushbutton. Assure that the voltage indicated on the LCD display is correct for the detector in use; if not, remove from service and do not use until condition is corrected.

Turn the **AUDIO DIVIDE** toggle switch to “1.” Turn the **VOL** knob clockwise until clicks are audible.

Select the **S** position on the **RESP F/S** toggle switch for **Slow** response.

Depress the **ZERO** pushbutton; assure that the analog and LCD meter displays read zero; if not, remove from service and do not use until condition is corrected.

Move the **SCALER- DIG. RATE** toggle switch to the **DIG. RATE** position.

Holding the Ludlum Model 2221 Count Scaler/Scaler away from your body and in the contamination field of interest, with the scale switch to highest scale, allowing several seconds for response. Continue to select lower scales until the analog meter indication is as high as achievable, without being beyond the upper meter scale limit.

After waiting for the meter reading to stabilize (approximately 15–22 seconds, depending on the scale), note the indicated count rate value on the LCD meter display.

When measurements are complete, turn the instrument rotary selector switch to **OFF**.

### ***Scaler Operation:***

Depress the **HV** pushbutton. Assure that the voltage indicated on the LCD display is correct for the detector in use; if not, remove from service and do not use until condition is corrected.

Turn the **AUDIO DIVIDE** toggle switch to “1.” Turn the **VOL** knob clockwise until clicks are audible.

Depress the **ZERO** pushbutton; assure that the analog and LCD meter displays read zero; if not, remove from service and do not use until condition is corrected.

Move the **SCALER- DIG. RATE** toggle switch to the **SCALER** position.

Turn the **MINUTES** rotary switch to the select count collection time, or select **CONT.** for a continuous count.

Holding or placing the Ludlum Model 2221 Count Scaler/Scaler away from your body and in the contamination field of interest, depress the **COUNT** pushbutton.

When the count has been completed, note the indicated value on the LCD display and count time selected on the **MINUTES** rotary switch.

When measurements are complete, move the Ludlum Model 2221 Count Ratemeter/Scaler’s power toggle switch to **OFF**.



- **Ludlum Model 2224 Count Scaler/Scaler**

### **General Description**

The Ludlum Model 2224 Count Scaler/Scaler is a portable combination count rate meter and scaler that provides the electronic circuitry for measurements of alpha and beta radiation levels when connected to the appropriate detector. The Ludlum Model 2224 Count Scaler/Scaler provides the electronics for alpha or beta radiation discrimination. It is designed for operation with scintillation and proportional detectors. The Ludlum Model 2224 Count Scaler/Scaler may also be used for counting smears.

#### **Ludlum Model 2224 Alpha/Beta Scaler/Rate meter.**



The Ludlum Model 2224 Count Scaler/Scaler has an effective count rate range of 0 to 500,000 counts per minute (cpm). A rotary switch allows selection of count range. Linear ranges scales are: X1, 0–500 cpm; X10, 0–5000 cpm; X100, 0–50,000 cpm and X1000, 0–500,000 cpm. When this instrument is operated as a scaler, the LCD digital display range is 0–999999 counts.

A same rotary switch used for range selection controls power to the instrument (On-Off). And can be rotated for battery test. Pushbuttons are provided for high voltage indication, and initiating a scaler count. Scaler count time adjustment is preset internally for 0.1, 0.5, 1, or 2 minutes for the instrument. Other controls are a 3-position toggle switch for alpha counts, beta counts, or alpha and beta counts and a rotary knob for audio volume control.

### **Applications**

The Ludlum Model 2224 Count Scaler/Scaler is used to measure radiation levels in units of counts per minute. It can be used to determine area radiation levels, ranging from typical background values to those expected in most ILLUKA operations. The Ludlum Model 2224 Count Scaler/Scaler is typically calibrated for accurate response with a particular detector selected for radiation contamination monitoring. The Ludlum Model 2224 Count Scaler/Scaler is suitable for the following types of surveys:

- Equipment surface contamination

- Radiological area identification
- Radioactive material shipments
- Characterization
- Qualitative swipe measurements

When connected to the appropriate detector, the Ludlum Model 2224 Count Scaler/Scaler will indicate relative contamination levels and identify changes in contamination levels.

### **Controls and Displays**

**ON – OFF**—To turn the Ludlum Model 2224 Count Ratemeter/Scaler's power on, turn the rotary the switch from the **OFF** position.

**BAT**—Power is provided by two standard size D-cell batteries. To test the battery level, turn the rotary switch to the **BAT** pushbutton; a reading within the **BAT TEST** scale on the meter indicates that there is sufficient power to operate the Ludlum Model 2224 Count Scaler/Scaler.

**HV**—To obtain an indication of instrument operating voltage, depress this pushbutton. The voltage is indicated on the analog meter display in units of kV.

**RES**—To zero the needle on the analog meter, depress the pushbutton; this will drive the needle to the zero mark on the analog display.

**RANGE**—To select the cpm range of the instrument analog display, turn this rotary switch to **X1**, **X10**, **X100**, or **X1K**.

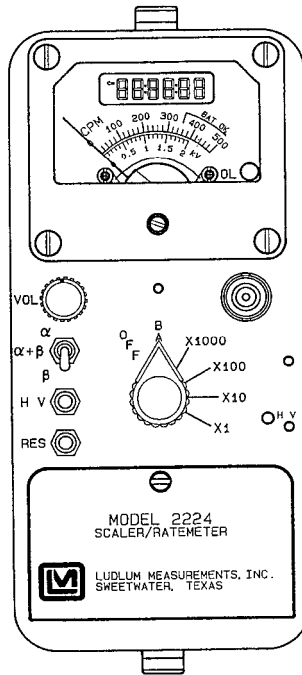
**COUNT**—To begin a scaler-counting period, depress this pushbutton. This pushbutton is located in the carrying handle.

**VOLUME**—To adjust the audio signal, turn this knob.

**OL**—This red lamp, located on the face of the meter display will illuminate when the detector in use reaches saturation or when the detector in use is exposed to a radiation field above the capability of this instrument.

**DISPLAY**—All measurements, indications of battery power and high voltage are indicated on the dual analog meter display. Scaler counts are indicated on the LCD display. The LCD scaler count range is 0–999999 counts.

## **Ludlum Model 2224 Scaler/Rate meter Controls and Display.**



### **Additional Features and Auxiliary Equipment**

There are no additional features or auxiliary equipment for the Ludlum Model 2224 Count Scaler/Scaler.

### **Compatible Detectors**

The Ludlum Model 2224 Count Scaler/Scaler is compatible with these detectors, or their equivalents:

Ludlum Model 43-5	Alpha Scintillator
Ludlum Model 43-89	Alpha Scintillator
Ludlum Model 43-65	Alpha Scintillator
Ludlum Model 44-110	Gas Proportional
Ludlum Model 44-116	Beta Scintillator
Ludlum Model 43-68	Gas Proportional

### **Operation**

Determine the type[s] of contamination to be surveyed. Assure the detector connected to the instrument is suitable for the type of contamination.

Confirm that the Ludlum Model 2224 Count Scaler/Scaler has a valid and legible calibration label; if not, remove from service and do not use until condition is corrected.

Determine the radiation energy range of interest. Historical, job-process, and other work documents should provide information regarding radio nuclides and types of contamination expected. This will assist in the proper selection of instrumentation.

Assure that “daily” instrument performance tests have been successfully completed or perform those tests in accordance with ILUKA procedure.

Turn the rotary switch from the **OFF** position to the    position. Assure that the voltage indicated on the analog meter display is within the **BAT OK** scale; if not, remove from service and do not use until condition is corrected.

Turn the **VOL** knob clockwise until clicks are audible.

Depress the **RES** pushbutton; assure that the analog meter display read zero; if not, remove from service and do not use until condition is corrected.

If the **OL** lamp illuminates, remove from service and do not use until condition is corrected.

#### ***Rate meter Operation:***

Depress the **HV** pushbutton. Assure that the voltage indicated on the analog meter display is correct for the detector in use; if not, remove from service and do not use until condition is corrected.

Move the  $\alpha / \alpha + \beta / \beta$  toggle switch to the  $\alpha$  position for measurement of alpha radiation, the  $\beta$  position for measurement of beta radiation, or the  $\alpha + \beta$  position for making measurements of both alpha and beta radiation.

Holding the Ludlum Model 2224 Count Scaler/Scaler away from your body and in the contamination field of interest, turn the rotary scale switch to the highest scale, allowing several seconds for response. Continue to select lower scales until the analog meter indication is as high as achievable, without being beyond the upper meter scale limit.

After waiting for the meter reading to stabilize (approximately 15–22 seconds, depending on the scale), note the indicated count rate value on the analog meter display and record this value multiplied by the range selected.

If the **OL** lamp illuminates, discontinue taking measurements, remove the Ludlum Model 2224 Count Scaler/Scaler from service and do not use until condition is corrected.

When measurements are complete, turn the instrument rotary selector switch to **OFF**.

#### ***Scaler Operation:***

Depress the **HV** pushbutton. Assure that the voltage indicated on the analog meter display is correct for the detector in use; if not, remove from service and do not use until condition is corrected.

Turn the **VOL** knob clockwise until clicks are audible.

Depress the **ZERO** pushbutton; assure that the analog and LCD meter displays read zero; if not, remove from service and do not use until condition is corrected.

Holding or placing the Ludlum Model 2224 Count Scaler/Scaler away from your body and in the contamination field of interest, depress the **COUNT** pushbutton located in the carrying handle.

If the **OL** lamp illuminates, discontinue taking measurements, remove the Ludlum Model 2224 Count Scaler/Scaler from service and do not use until condition is corrected.

When the count has been completed, note the indicated value on the LCD display and note the count time that is indicated on the calibration label.

When measurements are complete, turn the Ludlum Model 2224 Count Ratemeter/Scaler's rotary switch to **OFF**.



- **Ludlum Model 2360 Count Scaler/Scaler**

### **General Description**

The Ludlum Model 2360 portable dual channel combination count rate meter and scaler, with an alarm, that provides the electronic circuitry for simultaneous measurements of alpha and beta radiation levels when connected to the appropriate detector. This instrument provides the electronics for alpha - beta radiation discrimination through pulse height analysis. This instrument is designed for operation with scintillation and proportional detectors. This instrument may also be used for counting smears.

### **Ludlum Model 2360 Count Scaler/Scaler.**



This rate meter has an effective count rate range of 0 to 1,000,000 counts per minute (cpm). A rotary switch allows selection of count range. Linear ranges scales are: X1, 0-1,000 cpm; X10, 0-10,000 cpm; X100, 0-100,000 cpm and X1000, 0-1,000,000 cpm. When this instrument is operated as a scaler, the LCD digital display range is 0-999,999 counts.

The same rotary switch used for range selection controls power to the instrument (**On-Off**) and can be rotated to a battery test position. A 2-position toggle switch is provided for operating high voltage test and for resetting the analog meter display to zero. A pushbutton switch, located in the carrying handle, is provided for initiating a scaler count and/or logging a scaler count for download via the RS-232 port provided on the end of the instrument housing. A rotary switch is provided for scaler count time selection. Other controls are a 3-position toggle switch for alpha counts, beta counts, or alpha and beta counts and a rotary knob for audio volume control. This instrument provides visible warning lamps for an alarm function and instrument overload.

An audible only beta background subtract function may be enabled through internal switches or count rate division by 10 or 100. This background subtract function collects a 12 second count each time the instrument is turned on and then the measured count rate is subtracted from only the audible beta count rate heard through the speaker or headphones. **Neither the meter reading nor the scaled counts are affected by the background subtract mode.**

## **Applications**

This instrument is used to measure radiation levels in units of counts per minute, ranging from typical background values to those expected in most ILUKA operations. This instrument is typically calibrated for accurate response with a particular detector selected for radiation contamination monitoring. This instrument is suitable for the following types of surveys:

- Equipment surface contamination
- Radiological area identification
- Radioactive material shipments
- Characterization
- Qualitative swipe measurements

When connected to the appropriate detector, this instrument will indicate relative contamination levels and identify changes in contamination levels.

## **Controls and Displays**

**BAT-** To test the battery level, turn the rotary switch to the **BAT** pushbutton; a reading within the **BAT TEST** scale on the meter indicates that there is sufficient power to operate the instrument.

**READ HV-** To obtain an indication of instrument operating voltage, move the toggle switch to the **READ HV** position. The voltage is indicated on the analog meter display in units of kV.

**RESET-** To zero the needle on the analog meter, move the toggle switch to the **RESET** position; this will drive the needle to the zero mark on the display.

**RANGE-** To select the cpm range of the instrument analog display, turn this rotary switch to **X1**, **X10**, **X100**, or **X1K**.

**COUNT-** To begin a scaler-counting period, or log a count rate (if enabled) depress this pushbutton. This pushbutton is located in the carrying handle.

**MIN-** To select scaler count time, turn this rotary switch to 0.1, 0.5, 1, 2, 5, 10, 60 or PC for a specific preprogrammed count time.

**VOLUME-** To adjust the audio signal, turn this knob.

**OVERLOAD-** This red lamp, located on the face of the meter display will illuminate when the detector in use reaches saturation or when the Mylar is punctured resulting in a light leak.

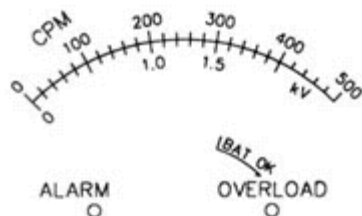
**ALARM-** This red lamp, located on the face of the meter display, will illuminate and the instrument audio signal will be activated when any of the following 6 preset alarm cpm set points is exceeded:

Alpha, or beta or alpha + beta rate meter  
Alpha or beta or alpha + beta scaler.

The set point is set through the RS-232C port and use of the supplied program.

**DISPLAY**-All measurements, indications of battery power and high voltage are indicated on the dual analog meter display. Scaler counts are indicated on the LCD display. The LCD scaler count range is 0-999999 counts.

**Ludlum Model 2360 500-cpm Analog Display Example.**



**Additional Features and Auxiliary Equipment**

**Data Logger** - If enabled by internal switches the results of the last 550 data points are logged each time the count button is depressed. The rate meter, or scaler, or both may be logged. The data retained consists of:

Sample #

Date/Time

Sample measurement (alpha and beta)

“S” or “R” denoting whether the result is from the Scaler or Rate meter

10 character location identifier

**Response Time** - X1 & X10 = 7 seconds; X100 & X1000 = 2 seconds

**Power** - Two D Cells (Alkaline) provide 250 hours of operation

**Headphone Jack** - 1/8" Jack on case. Inserting plug disables internal speaker.

**Tone** - TBD

**Recycle** - TBD

**Compatible Detectors**

This instrument is compatible with these detectors, or their equivalents:

Ludlum Model 43-5	Alpha Scintillator
Ludlum Model 43-89	Alpha Scintillator
Ludlum Model 43-93	Alpha Scintillator
Ludlum Model 44-110	Gas Proportional
Ludlum Model 43-37	Gas Proportional
Ludlum Model 43-68	Gas Proportional

## **Operation**

Determine the type[s] of contamination to be surveyed. Assure the detector connected to the instrument is suitable for the type of contamination.

Confirm that the instrument has a valid and legible calibration label; if not, remove from service and do not use until condition is corrected.

Assure that “daily” instrument performance tests have been successfully completed or perform those tests in accordance with ILUKA procedure.

Turn the rotary switch from the **OFF** position to the **BAT** position. The internal microprocessor will flash "88:8.8:8.8" for about 2 seconds on the LCD display, drive the meter needle to full scale and then start the 12 second background count (if the beta subtract mode is enabled). Assure that the voltage indicated on the analog meter display is within the **BAT OK** scale; if not, remove from service and do not use until condition is corrected.

Turn the **VOL** knob clockwise until clicks are audible. Headphones may be connected to the 1/8" jack.

Move the 2- position toggle switch to **RESET**; assure that the analog meter display read zero; if not, remove from service and do not use until condition is corrected.

If the **OL** lamp illuminates, remove from service and do not use until condition is corrected.

If the **ALARM** lamp illuminates, remove from service and do not use until condition is corrected.

### ***Rate Meter Operation:***

Move the  $\alpha$  / $\alpha+\beta$ /  $\beta$  toggle switch to the     position for measurement of alpha radiation, the  $\beta$  position for measurement of beta radiation, or the  $\alpha+\beta$  position for making measurements of both alpha and beta radiation.

Select the lowest scale until the analog meter indication is as high as achievable, without being beyond the upper meter scale limit.

After waiting for the meter reading to stabilize (approximately 4-15 seconds, depending on the scale), note the indicated count rate value on the analog meter display and record this value multiplied by the range selected.

If the **OL** lamp illuminates, discontinue taking measurements, remove the instrument from service and do not use until condition is corrected.

If the **ALARM** lamp illuminates, discontinue taking measurements, remove the instrument from service and do not use until condition is corrected.

When measurements are complete, turn the instrument rotary selector switch to **OFF**.

### ***Scaler Operation:***

Turn the **VOL** knob clockwise until clicks are audible. Headphones may be connected to the 1/8" jack.

Move the 2- position toggle switch to **RESET**; assure that the analog meter display reads zero; if not, remove from service and do not use until condition is corrected.

Holding or placing the detector away from your body and in the contamination field of interest, depress the **COUNT** pushbutton located in the carrying handle.

If the **OL** lamp illuminates, discontinue taking measurements, remove the instrument from service and do not use until condition is corrected.

Colons, **:**, on the LCD display will turn on and remain on until the count period is completed, note the indicated value on the LCD display and note the count time that is indicated on the calibration label when the count is completed.

When measurements are complete, turn the instrument rotary switch to **OFF**.



- **Ludlum Model 2929 Alpha/Beta Scaler**

### **General Description**

The Ludlum Model 2929 Alpha/Beta Scaler is a portable alpha/beta-gamma dual channel scaler that provides the electronic circuitry for simultaneous measurements of alpha and beta-gamma radiation levels when connected to a Ludlum Model 43-10-1 alpha/beta-gamma scintillator. The Ludlum Model 2929 Alpha/Beta Scaler provides the electronics for alpha or beta-gamma radiation discrimination. It is typically used for counting smears. The Ludlum Model 2929 Alpha/Beta Scaler may also be used for counting other media, provided the sample geometry conforms to the 2-inch diameter sample counting cavity. Typical efficiencies for counting alpha and beta are approximately 38% and 26%, respectively. The Ludlum Model 2929 Alpha/Beta Scaler is operated by 110-volt line power only.

**Ludlum Model 2929 Alpha/Beta Scaler.**



The Ludlum Model 2929 Alpha/Beta Scaler has an effective count range of 0 to 999,999 counts. A thumbwheel allows adjustment for selection of count time from 0–99 minutes. In conjunction with the thumbwheel, a 4-position rotary switch is used for selection of count time. The switch positions allow multiplication of the number of minutes selected with the thumbwheel. The switch positions are: X0.1, X1, X10, and EXT for manual extended timed counts. A toggle switch controls power to the instrument (On-Off). Pushbuttons are provided for initiating a scaler Count and scaler count Hold. A ten-turn friction-locked potentiometer allows adjustment of operating high voltage. Two rotary knobs allow adjustment of alpha and beta audio signal volume. An analog meter is provided for high voltage display. Two LCD displays are provided for Alpha and beta counts. Red lights indicate when AC power is turned on and when a count is in progress.

Two 15-pin connectors, Alpha Out and Beta Out, are provided on the instrument back panel for recorder, printer or software interface connections. A BNC-type connector is also provided on the instrument back panel for a detector pulse amplifier connection.

### **Applications**

The Ludlum Model 2929 Alpha/Beta Scaler is used to measure sample radioactivity in units of counts per minute. It can be used to determine radioactivity levels, ranging from typical background values to those expected in most BJC operations. The Ludlum Model

2929 Alpha/Beta Scaler is typically calibrated using  $\text{Th}^{230}$  and  $\text{Pu}^{239}$  (alpha) and  $\text{Tc}^{99}$  and  $\text{Sr}^{90}$  (beta). The Ludlum Model 2929 Alpha/Beta Scaler is suitable for the following types of survey samples:

- Equipment surface contamination
- Radiological area identification
- Radioactive material shipments
- Characterization
- Quantitative smear sample measurements

### **Controls and Displays**

**ON – OFF**—To turn the instrument power on, move the toggle switch to the **ON** position.

**HV**—The operating voltage is indicated on the LCD display above the **HV** potentiometer in units of kV; the **HV** potentiometer should not be adjusted.

**MINUTES**—To select the count time, rotate the thumbwheel to the desired minutes; turn the rotary switch to X.1, X1, X10, or **EXT** to multiply the minutes selected using the thumbwheel, or perform a manual extended time period count (**EXT**).

**COUNT**—To begin a scaler-counting period, depress this pushbutton. This pushbutton is located in the carrying handle.

**HOLD**—To temporarily suspend, or freeze the collection of scaler counts, depress this pushbutton. To continue collection of counts, depress this pushbutton.

**ALPHA VOL**—To adjust the alpha count audio signal, turn this knob.

**BETA-GAMMA VOL**—To adjust the beta-gamma count audio signal, turn this knob.

**DISPLAY**—Operating high voltage is indicated on the LCD display above the **HV** potentiometer. Scaler counts are indicated on the ALPHA COUNT and **BETA-GAMMA COUNT LCD** displays. Both LCD scaler count ranges are 0–999999 counts.

**Ludlum Model 2929 Alpha/Beta Scaler Meter's Dial.**



### **Additional Features and Auxiliary Equipment**

A Model 264 printer may be connected to this instrument; one printer is required for each channel (alpha and beta-gamma).

### **Limitations and Precautions**

This instrument is designed for use indoors, or in an environment where temperature and humidity can be controlled.

## **Operation**

Determine the type[s] of radioactivity to be measured.

Assure that the Ludlum Model 2929 Alpha/Beta Scaler is located in a low background radiation area.

Confirm that the Ludlum Model 2929 Alpha/Beta Scaler has a valid and legible calibration label; if not, remove from service and do not use until condition is corrected.

Determine the radiation energy range of interest. Historical, job-process, and other work documents should provide information regarding radionuclides and types of contamination expected. This will assist in the proper selection of instrumentation.

Assure that “daily” instrument performance tests have been successfully completed or perform those tests in accordance with BJC procedure.

Turn the toggle switch from the **OFF** position to the **ON** position.

The red light located above the **ON-OFF** toggle switch should illuminate.

Assure that the voltage indicated on the LCD display above the **HV** potentiometer is the same as the H.V. identified on the calibration label; if not, remove from service and do not use until condition is corrected.

Turn the **ALPHA VOL** and/or the **BETA VOL** knobs clockwise until clicks are audible, or turn the knob(s) until the output of the audio signal(s) is acceptable.

Select the desired count time by turning the **MINUTES** thumbwheel switch to indicate the number of minutes; turn the rotary switch to indicate the appropriate count time multiplier for the **MINUTES** selected (e.g., thumbwheel switch indicates **01 MINUTES** and the rotary switch is on the **X10** position = a 10 minute count time).

Rotate the slide lever on the side of the detector drawer to the unlocked position and slide the counting tray drawer open.

Assure that a clean planchet is provided in the detector drawer slide tray.

Placing the sample to be counted in the detector drawer slide tray, close the slide tray and rotate the slide lever on the detector drawer to the locked position.

Depress the **COUNT** pushbutton. The red light located between the **COUNT** and **HOLD** pushbuttons will illuminate, indicating a count is in progress.

When the count has been completed, the red light will turn off.

Note the indicated values on the **ALPHA COUNT** and/or **BETA-GAMMA COUNT** LCD displays.

Multiply the **MINUTES** selected on the thumbwheel switch indicator by the multiplier number selected on the rotary knob and note the resultant count time.

Rotate the slide lever on the side of the detector drawer to the unlocked position and slide the counting tray drawer open.

Remove the sample from the slide drawer tray.

Close the slide tray and rotate the slide lever on the detector drawer to the locked position.

When measurements are complete, turn the instrument power toggle switch to **OFF**.

## **APPENDIX B**

# **FORMULAS AND CALCULATIONS**



## Static MDC

$$MDC_{static} = \frac{3 + 3.29 \sqrt{B_r \cdot t_s \cdot (1 + \frac{t_s}{t_b})}}{t_s \cdot E_{tot} \cdot \frac{A}{100}}$$

Where:

$MDC_{static}$	=	minimum detectable concentration level in dpm/100 cm <sup>2</sup>
$B_R$	=	background count rate in counts per minute
$t_B$	=	background count time in minutes
$t_S$	=	sample count time in minutes
$A$	=	detector probe physical (active) area in cm <sup>2</sup>
$E_{tot}$	=	total detector efficiency for radionuclide emission of
	=	EI x Es, Where:
	$E_i$	= instrument efficiency in counts per disintegration (cpd) based on the source 2π emission rate
	$E_s$	= source (or surface contamination) efficiency

## Scan MDC

$$\text{Scan MDC}_{surveyor} = \frac{d' \sqrt{b_i} (60/i)}{\sqrt{p} \epsilon_i}$$

Where: Scan MDC<sub>surveyor</sub> is the MDC in uR/hr, and

$\epsilon_i$	=	instrument efficiency in cpm/μR/hour, radionuclide specific, see table below
$\rho$	=	surveyor efficiency. Based on laboratory studies documented in References 6 and 7, the value of ρ has been estimated to be between 0.5 and 0.75. The value of 0.5 is conservative
$d'$	=	is the value selected from MARSSIM Table 6.5 based on the required true positive and false positive rates, usually 1.38 corresponding to 5 percent false positives and 40 percent false negatives.
$b_i$	=	the number of background counts in the interval i (1 second)
$i$	=	the scan time interval usually 1 second

In accordance with MARSSIM, the Scan  $MDC_{surveyor}$  can be converted to Scan MDC in volumetric units of picocuries per gram by use of a radionuclide specific conversion factor calculated by use of the code MICROSHIELD. Some of the factors are listed below for 2-inch-by-2-inch sodium iodide detectors.

Radio-nuclide	$\epsilon_i$ (cpm/ $\mu R/hr$ )	CF (pCi/g / $\mu R/h$ )
Cs-137	900	3.81
Co-60	430	0.97
Am-241	13,000	271
Ra-226*	760	1.41
Th-232*	830	0.99

\*In equilibrium with all progeny.

## Smear Sample Activity

$$DPM / 100cm^2 = \frac{\left( \frac{TotalSampleCounts}{SampleCountTime} \right) - \left( \frac{TotalBkgCounts}{BkgCountTime} \right)}{(E) (A)}$$

Where:

E = Instrument Efficiency  
A = Area correction factor, if applicable

## Air Sample Activity

$$Conc. = \frac{cpm_{net}}{E \cdot V \cdot 2.22E6 \cdot SAF \cdot CE \cdot K}$$

Where:

Conc. = airborne radioactivity concentration of sample in  $\mu Ci/ml$   
 $cpm_{net}$  = (gross counts/count time) - background cpm of counting instrument  
V = volume of air in liters  
E = efficiency of counting instrument  
2.22E6 = converts dpm to  $\mu Ci$   
CE = filter collection efficiency (normally 0.998)  
SAF = alpha self-absorption correction factor  
K = other modifying factors and unit conversions

---

**APPENDIX H**

**FINANCIAL ASSURANCE INSTRUMENT**

---

---

## **OPINION OF PROBABLE FINAL CLOSURE COSTS**

---

**TABLE H-1**

**OPINION OF PROBABLE FINAL CLOSURE COST  
WTL PROCESSING FACILITY**

	<b>Closure Activities</b>	<b>Estimated Cost</b>
1	<p><b>SOLIDIFIED WASTE</b></p> <p>Trucking (removal) and disposal of all solidified waste from the facility. Assuming a maximum capacity of 520 cubic yards (C.Y.) in the solidification basin, 50 C.Y. staged on waste handling floor, 1,200 C.Y. staged in roll-off containers (estimated daily waste receipts) and 39 C.Y. in 144 drums (approximately 50 percent of the drum storage capacity at facility at 0.27 C.Y. per drum). Assuming 1 C.Y. equals 1.2 tons, 1,289 C.Y. of solidified sludge is 1,546 tons. Trucking costs are \$11.50 per ton to the Wetzel County Landfill in New Martinsville, WV, which equals \$17,788 to deliver to the landfill. Wetzel County Landfill gate rate is \$32.25 per ton. The total landfill disposal cost is \$41,570. A facsimile from the Wetzel County Landfill providing their current gate rate fee is attached. Also, an email transmittal from David Coe of R&amp;J Trucking, Inc. is attached that provides the current trucking rate for disposal of this waste material cleaned up at the facility.</p>	\$59,360
2	<p>Thorough cleaning of the facility and appurtenances that are not to be removed during the final cleaning to eliminate any remaining constituents. Assumes the waste handling areas and bulk brine storage tanks would be cleaned by pressure washing. Cost includes cleaning of bulk storage tanks and flushing of pipes.</p>	\$5,000
3	<p><b>RECOVERED OIL AND BRINE (RAW AND TREATED)</b></p> <p>Remove and dispose of all remaining oil from 400 bbl above ground bulk oil storage tank. Assume 16,800 gallons stored in bulk tank for transport and disposal.</p> <p>Transportation and re-sale services will be provided EnviroTank of Belpre, Ohio.</p> <p>Transportation costs include estimate of 8,400 gallons per trip with one bulk tanker and one vacuum truck at cost of \$720 per trip (2 x \$720 = \$1,440). Also, a fuel surcharge of \$110 per trip is estimated (2 x \$110 = \$220). Total per trip cost is \$830. 16,800 gallons divided by 8,400 gallons per trip equals 2 trips times \$830 equals total transportation cost of \$1,660.</p> <p><b>Total cost for transportation of recovered oil for re-sale is \$1,660.</b></p> <hr/> <p>Remove and dispose of all remaining brine from above ground bulk storage tanks (rock box = 500 bbl + 400 bbl thickener tank + 4 x 1,000 bulk raw and treated bulk tanks = total 4,900 bbls (205,800 gallons) brine liquid for transport and disposal at UIC well).</p> <p>Transportation and be provided by EnviroTank of Belpre, Ohio.</p> <p>Transportation costs include estimate of 8,600 gallons per trip with one bulk tanker and one vacuum truck at cost of \$720 per trip. Also, a fuel surcharge of \$110 per trip</p>	\$43,630



	<p>is estimated. Total per trip cost is \$830. <b>Total transportation cost for brine is 205,800 gallons divided by 8,600 gallons per trip equals 24 trips times \$830 equals total transportation cost of \$19,920.</b></p> <hr/> <p>Assume disposal cost of \$4.50 per bbl at Green Hunter Class II disposal well. <b>Total brine disposal cost is 4,900 bbls times \$4.50 = \$22,050</b></p> <hr/>	
4	Post signs easily visible at all access gates leading into the facility stating that the facility is closed for all solid waste transfer activities. (Assume one sign at the main access gate to the site)	\$400
5	Modification, removal or sealing of the leachate collection system to prevent unregulated discharges. (Assumes removal of the central manhole sump pump and plugging the catch basins and piping within the Processing Facility Building and Transfer Unload Pad)	\$3,000
6	Bait for rodents and treated for other vectors (Assumes no bait required for the waste handling area)	\$0
7	Certification that the facility has been thoroughly cleaned and closed (Assumes cost for owner to prepare certification document)	\$1,000
8	Written Notice of Intent to close the solid waste facility and documentation of the facility's status as a recycling facility (Assumes cost for owner to prepare written Notice of Intent and documentation of recycling facility status)	\$800
<b>TOTAL</b>		<b>\$113,190</b>

**NOTES:**

1. This Opinion of Probable Final Closure Cost assumes that the WTL Processing Facility will be closed in accordance with its approved final closure plan.
2. This Opinion of Probable Final Closure Cost assumes that the facility building structure, scale, roads, etc. will not be removed after closure.

WETZEL COUNTY LANDFILL  
RT. 1, BOX 156A  
NEW MARTINSVILLE, WV 26155  
(304) 455-3800  
(304) 455-2955 FAX

## FACSIMILE TRANSMITTAL SHEET

TO: Dave Follett FROM:  
COMPANY: DATE:  
Civil & Engineering Consultants 2-5-13  
FAX NUMBER: TOTAL NO. OF PAGES INCLUDING COVER:  
PHONE NUMBER: SENDER'S REFERENCE NUMBER:  
RE: YOUR REFERENCE NUMBER:

☐ URGENT ☐ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ PLEASE RECYCLE

Price per ton of trash

\$32.25 / ton

\$18.00 / min. charge

## Stanley, Roy

---

**From:** Ray E. Lutes <ray.lutes@etcoh.com>  
**Sent:** Wednesday, February 06, 2013 3:25 PM  
**To:** Follett, Dave  
**Cc:** rlutes@suddenlink.net  
**Subject:** Preliminary Quote

Mr. Dave Follett  
Civil & Enviromental Consultants, Inc.  
8740 Orion Place, Suite 100  
Columbus, Ohio 43240

Following is the quote you requested for the transportation and disposal of non hazardous oily waters from a site located in New Matamoras, Ohio.

Quote is based upon waste being chemical / biologically treatable with minimal process involved.

Treatment and disposal of estimated 200,000 gallons of oily non hazardous waste waters at \$0.20 per gallon = \$40,000.00  
Transportation of estimated 8600 gallons per trip with one bulk tanker and one vacuum truck = \$720.00  
(includes one free hour onsite time) Fuel Surcharge per 8600 gallon trip = \$110.00  
Total Estimated transportation cost = \$19,920.00

Note: Final disposal price can be determined after representative sample is provided to Enviro Tank Clean, Inc for treatability study. Please let me extend an invitation to you for a site visit / tour of my facility in Belpre, Ohio.

Thanks for the opportunity to quote this project.

Ray E. Lutes  
Vice President  
Enviro Tank Clean Inc.  
Cell Phone (304) 482-4097  
Sent from my iPhone

**Stanley, Roy**

---

**From:** Ray E. Lutes <ray.lutes@etcoh.com>  
**Sent:** Wednesday, February 06, 2013 4:09 PM  
**To:** Follett, Dave  
**Cc:** rlutes@suddenlink.net  
**Subject:** Re: Hazardous Waste Quote New Matamoras Ohio

David the only thing I could possibly do concerning a quote for disposal is to say the minimum disposal per drum will start at around \$175.00 per drum and the maximum normally would not exceed \$500.00 per drum. Keep in mind that any off spec surcharges issued to my company would be passed on to your company. ( Example already given to you was the elevated mercury contaminated waste drums ended up around \$6,000.00 per drum after off spec charges, very rare to see this kind of charge though)  
Transportation rate would probably be between \$600.00 to \$1,500.00 plus 15% fuel surcharge depending on size of truck.  
Best I can do at this time  
Thanks  
Ray E. Lutes

Sent from my iPhone

On Feb 6, 2013, at 3:43 PM, "Follett, Dave" <[dfollett@cecinc.com](mailto:dfollett@cecinc.com)> wrote:

Ray,

Thank you for responding promptly with the oily waste water quote. As far as I know at this time for the hazardous waste is that it would consist of 384 55-gallon drums of hazardous waste. Half of the drums would be liquid, half would be solids. It is assumed at this time that they would be DOT compliant as far as shipping requirements. I do not have specifics on the type of hazardous waste at this time. Would it be possible to get a ball park range from best to worst case scenario as far as the hazardous waste is concerned?

Thank You,

**David Follett/ Project Scientist**

Civil & Environmental Consultants, Inc.

8740 Orion Place, Suite 100 • Columbus, Ohio 43240

Toll-Free: 888-598-6808 • Direct: 614-310-0179

<http://www.cecinc.com>

---

## **FINANCIAL ASSURANCE INSTRUMENT**

---