AECOM

Run-on/Run-off Control System Plan: Coal Combustion Residuals (CCR) Disposal Facility

Prepared for:

DTE

October 15, 2021

Run-On/Run-Off Control System Plan:
Coal Combustion Residuals (CCR) Disposal Facility – Range Road Landfill, China Twp., St. Clair County, Michigan

Prepared for:

DTE Energy
One Energy Plaza
Detroit, MI 48226

Prepared by:

AECOM

Project No. 60662907

Table of Contents

Appendices

List of Acronyms and Abbreviations

3H:1V	3 horizontal feet to 1 vertical foot
CCR	coal combustion residuals
DTE	DTE Energy
EPA	U.S. Environmental Protection Agency
EGLE	Michigan Department of Environment, Great Lakes, and Energy
H&H	hydrologic and hydraulic
NPDES	National Pollutant Discharge Elimination System
MDEQ	Michigan Department of Environmental Quality
Plan	Run-on/Run-off Control System Plan
RRLF	Range Road Landfill Ash Disposal Facility
WSE	water surface elevation

1 Introduction

This Run-on/Run-off Control System Plan (Plan) was prepared for the existing coal combustion residuals (CCR) disposal facility located at the DTE Electric Company (DTE) Range Road Landfill Ash Disposal Facility (RRLF) in China Township, St. Clair County, Michigan. This Plan serves as the five-year update to the initial Plan issued on October 17, 2016. The CCR disposal facility consists of a 402-acre landfill located on 514 acres of property approximately one mile west of the St. Clair River. The disposal facility currently accepts bottom ash and fly ash generated by plant operations at St. Clair Power Plant, Belle River Power Plant, and Harbor Beach Power Plant.

The Plan was prepared in accordance with 40 CFR Part 257 and specifically addresses the requirements under Subpart D, §257.81 of the U.S. Environmental Protection Agency (EPA) CCR Rule. The disposal facility is an existing landfill currently operating under an operating license approved by the Michigan Department of Environment, Great Lakes, and Energy (EGLE) on May 15, 2020. The operating license was granted in accordance with Part 115 of the Natural Resources and Protection Act of 1994, as amended, which adopts §257.81 by reference. Accordingly, run-on and run-off control system requirements for the disposal facility must meet or exceed those of the CCR Rule.

1.1 Site Location and Description

The CCR disposal facility is located on land currently owned by DTE at the RRLF. The landfill was originally operated by DTE, but operations have since been contracted to Boral. While the landfill operations have continued since the initial Plan was issued, the run-on/run-off control system at the site has generally remained unchanged. The site consists of the landfill with perimeter ditches that drain to a Michigan National Pollutant Discharge Elimination System (NPDES) sedimentation pond and a pump house at the southeast corner of the site. It is approximately a half mile southwest of St. Clair, MI, and is bounded by Range Rd. on the east, King Road and multiple residential properties on the west, residential properties on the north, and Puttygut Rd. on the south. The landfill has been permitted since 1966.

1.2 Description of CCR Landfill Operations

Sheet 3 of the Landfill Development Plan design drawings (Appendix A2) shows the extent of each work area within the landfill. The landfill is designed to cover approximately 402 acres and be constructed in multiple phases. To date, nine work areas within the landfill have been certified closed. Three work areas are currently active, including D3, F3/D3, and G2.

Stormwater and leachate drain from the landfill into a network of perimeter ditches from which it ultimately collects in the NPDES Sedimentation Pond for treatment at the southeast corner of the site. This water is collected in a pump house and discharged to the Belle River Power Plant under a Michigan NPDES permit number MI0038172 issued by the Michigan Department of Environmental

Quality (MDEQ) on January 1, 2018. It should be noted that as of April 7, 2019 MDEQ was renamed as the EGLE via executive order 2019-2.

1.3 CCR Rule Requirements

(40 CFR) *257.81(a) The owner or operator of an existing or new CCR landfill or any lateral expansion of a CCR landfill must maintain:*

(1) A run-on control system to prevent flow onto the active portion of the CCR unit during the peak discharge from a 24-hour, 25-year storm; and

(2) A run-off control system from the active portion of the CCR unit to collect and control at least the water volume resulting from a 24-hour, 25-year storm.

(b) Run-off from the active portion of the CCR unit must be handled in accordance with the surface water requirements under § 257.3–3.

The RRLF disposal facility is an existing landfill that was designed to incorporate run-on and run-off controls systems, which prevent flow from and onto the active portion of the unit during a 24-hour, 25-year storm.

1.4 Plan Content

(40 CFR) *257.81(c) Run-on and run-off control system plan—*

(1) Content of the plan. The owner or operator must prepare initial and periodic run-on and run-off control system plans for the CCR unit according to the timeframes specified in paragraphs (c)(3) and (4) of this section. These plans must document how the run-on and run-off control systems have been designed and constructed to meet the applicable requirements of this section. Each plan must be supported by appropriate engineering calculations. The owner or operator has completed the initial run-on and run-off control system plan when the plan has been placed in the facility's operating record as required by § 257.105(g)(3).

This Plan is the five-year update to the initial run-on/run-off control plan, and it describes how the run-on and run-off control systems have been designed and constructed to meet the applicable requirements of the CCR Rule. A certification statement from a qualified professional engineer verifying that this Plan meets the requirements of this section § 257.81 is provided in **Appendix A1**. In accordance with § 257.81(c)(1), this Plan will be amended each time there is a change in conditions that substantially affect the written plan in effect.

1.5 Documents Reviewed

Background information, design basis information, and other data used in preparing this plan have been provided to AECOM by DTE. AECOM is not responsible for the accuracy of the documents reviewed and has prepared this plan by practicing good engineering judgement based upon the best

available information. The following documents and design drawings were reviewed in the preparation of this plan:

- RMT, Inc., March 16, 2007. Detroit Edison – Range Road Ash Disposal Facility: Storm Water Modeling, Storm Water Management Options Analysis, and Leachate Management Options Analysis, technical memorandum.
- RMT, Inc., June 2008. The Detroit Edison Company Range Road Landfill: As-Built for Detention Pond and Pump Station Installation, design drawings.
- AECOM, October 17, 2016. Run-on/Run-off Control System Plan For Coal Combustion Residuals (CCR) Disposal Facility – Range Road Landfill.
- Geosyntec Consultants, January 2021. 2020 Annual Inspection Report: Range Road Landfill Ash Disposal Facility.

Additional information on the references utilized for this plan can be found in **Section 4.0**.

2 Overview of Run-on/Run-off Control Systems

The run-on and run-off control systems share multiple common control measures and are both required to control the peak flows resulting from a 25-year/24-hour storm. Due to these similarities, one hydrologic and hydraulic (H&H) model was constructed in HydroCAD (version 10.00-20) to analyze both systems in order to evaluate the run-on and run-off control systems' abilities to control the design storm. The H&H model utilized in the initial run-on/run-off control plan was found to sufficiently represent current site conditions, and therefore was used in this Plan with relatively minor changes. The NPDES sedimentation pond and stormwater ditches were found to adequately contain the 25-year/24-hour storm event without overtopping. The resulting output from this model can be found in **Appendix B2**. The components that make up the run-on and run-off control systems are described in detail below.

2.1 Run-on Controls

Run-on controls consist of diversion berms which divert stormwater away from active disposal areas and also direct surface water to receiving flumes or drainage ditches. In addition, the proposed cap system is graded at a minimum of 1% to drain stormwater flows away from active portions of the landfill. The active area of any phase will be minimized to reduce contact water and the potential for fugitive dust emissions. Furthermore, the areas immediately outside of the landfill's perimeter slope away from the perimeter ditch system, preventing run-on from adjacent land from entering the facility.

2.2 Permanent Run-off Management Features

Permanent run-off management features and associated details are provided on Sheets 10 and 11 of the Landfill Development Plan design drawings (**Appendix B2**). The cap system's grade ranges from a minimum slope of 1.3% at the top to a maximum grade of 3 horizontal feet to 1 vertical foot (3H:1V) along the perimeter. V-shaped perimeter ditches are sloped at approximately 0.1% and 3H:1V side slopes. These perimeter ditches direct stormwater flows into the NPDES sedimentation pond at the southeast corner of the site.

The permanent run-off measures are designed to collect and control the peak flow resulting from a 25-year/24-hour storm under final design conditions. Supporting calculations for the surface water control structures are provided in **Appendix B2**.

2.3 Erosion Control

The cap system of the landfill is constructed with a 6-inch thick layer of topsoil in order to promote vegetative growth. This vegetative cover is sufficient to minimize potential erosion on all areas of the cap system where run-off is limited to sheet flow or shallow concentrated flow. Stormwater channels and swales at the facility are lined with permanent erosion matting or riprap as necessary in order to

limit stormwater velocities and reduce erosion. Erosion matting is used as a more robust form of erosion control for any area of the cap system that is designed to convey concentrated flows.

2.4 Collection and Holding Facilities

The stormwater flows are conveyed from the perimeter swales into the existing NPDES sedimentation pond. Stormwater runoff settles within the NPDES sedimentation pond and ultimately discharges through a permitted NPDES outfall at its eastern end (permit number MI0038172 issued by MDEQ [now EGLE]). The existing water surface elevation (WSE) of the sedimentation pond is approximately 580.1 feet and was used as the starting WSE for the model.

3 Frequency for Revising the Plan

(40 CFR) *257.81(c)(4). The owner or operator of the CCR unit must prepare periodic run-on and runoff control system plans required by paragraph (c)(1) of this section every five years. The date of completing the initial plan is the basis for establishing the deadline to complete the first subsequent plan. The owner or operator may complete any required plan prior to the required deadline provided the owner or operator places the completed plan into the facility's operating record within a reasonable amount of time. In all cases, the deadline for completing a subsequent plan is based on the date of completing the previous plan. For purposes of this paragraph (c)(4), the owner or operator has completed a periodic run-on and run-off control system plan when the plan has been placed in the facility's operating record as required by § 257.105(g)(3).*

This Plan represents the first five-year update subsequent to the initial run-on/run-off control system plan published in 2016 as outlined in §257.81(c)(4). As such, the initial run-on/run-off control system plan is superseded by this Plan, and DTE will place it in the facility's operating record.

DTE will continue to update periodic run-on and runoff control system plans every five years and will place the Plan in the facility's operating record. DTE will obtain a certification from a qualified professional engineer stating that the periodic run-on and run-off control system plans meet the requirements of this section.

4 References

AECOM. 2016. Run-on/Run-off Control System Plan for Coal Combustion Residuals (CCR) Disposal Facility – Range Road Landfill.

Geosyntec Consultants. (2021). 2020 Annual Inspection Report: Range Road Landfill Ash Disposal Facility.

HydroCAD Software Solutions LLC. (2017). *HydroCAD*, Version 10.0-20 Computer Program.

NOAA (National Oceanic and Atmospheric Administration). (2017). *Point Precipitation Frequency Estimates,* Atlas 14, Volume 8, Version 2, for East China, Michigan.

RMT, Inc. (2007). Detroit Edison – Range Road Ash Disposal Facility: Storm Water Modeling, Storm Water Management Options Analysis, and Leachate Management Options Analysis. Technical memorandum.

———. (2008). The Detroit Edison Company Range Road Landfill: As-Built for Detention Pond and Pump Station Installation. Design Drawings.

TRC Environmental Corporation. (2013). Landfill Development Plan – Range Road Ash Disposal Facility. Design drawings.

———. (2013). Landfill Development Plan – Range Road Ash Disposal Facility. Report.

APPENDIX A: PLAN DRAWINGS & CERTIFICATION

Appendix A.1: Final CCR Rule Engineer's Certification

Certification Statement 40 CFR § 257.81(c)(5) –Run-on and Run-Off Control System Plan for an Existing CCR Landfill

CCR Unit: DTE Energy Range Road Landfill

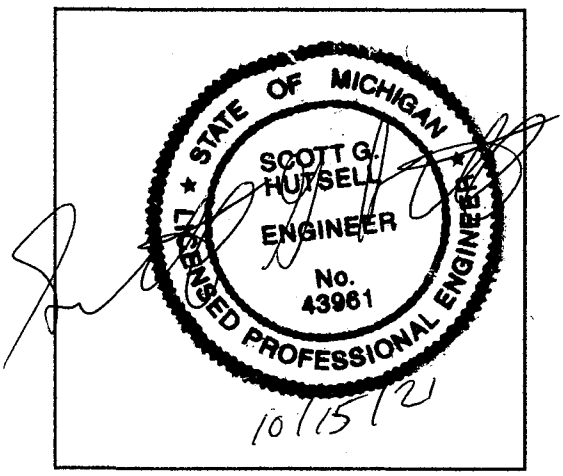
I, Scott G. Hutsell, being a Registered Professional Engineer in good standing in the State of Michigan, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the information contained in the run-on and run-off control system plan dated October 15, 2021 meets the requirements of 40 CFR § 257.81.

Scott G. Hutsell

Printed Name

10/15/21

Date



APPENDIX A: PLAN DRAWINGS & CERTIFICATION

Appendix A.2: Historic Design Drawings

DTE ELECTRIC COMPANY

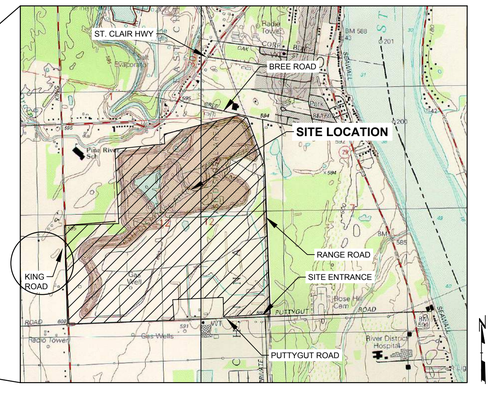
RANGE ROAD LANDFILL - ASH DISPOSAL FACILITY
CHINA TOWNSHIP, ST. CLAIR COUNTY, MICHIGAN
LANDFILL DEVELOPMENT PLAN

PREPARED FOR: DTE ELECTRIC COMPANY

PREPARED BY: TRC ENVIRONMENTAL CORPORATION
ANN ARBOR, MICHIGAN

DATE: NOVEMBER 2013

MICHIGAN



SITE LOCATOR

INDEX

NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY.

NOT FOR CONSTRUCTION

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

File Location: J:\DTE\St Clair Co\197388\0000 **File Name:** 197388.0000.01.SHT01-TS **Layout Name:** SHEET 1
Plot Information: NONE STORMER, LARRY ---- ANSI A (8.50 X 11.00 INCHES) November 6, 2013 0.3869 ----

STANDARD LEGEND

EXISTING	PROPOSED	ROADWAYS
		GRAVEL
		PAVED
		RAILROAD
		CENTERLINE

		WALLS/FENCES
		FENCE LINE

		CONTOURS
1054	1054	INDEX CONTOUR AND TEXT
		INTERMEDIATE CONTOUR
		DEPRESSION
X 1055	X 1055	SPOT ELEVATION

		TREES
		DECIDUOUS
		CONIFER
		BUSH
		TREE LINE

		WATER
		BODIES OF WATER
		RIVER/STREAMS
		DITCH
		DITCH WITH FLOW AND DIRECTION
		CULVERT
		EDGE OF DELINEATED WETLAND PER SURVEYED LOCATION (SEE NOTE 6)
		EDGE OF DELINEATED WETLAND PER NATIONAL WETLAND INVENTORY AND LAND USE MAP SUPPLIED BY LINCOLN COUNTY (SEE NOTE 6)

		BUILDING
		BUILDING

		FEATURES
MW1A OR MW1A	MW1A	MONITORING WELL
B119 OR B119	B119	SOIL BORING
TP-1 OR TP-1	TP-1	TEST PIT
SG14 OR SG14	SG14	STAFF GAUGE
WS-1 OR WS-1	WS-1	WATER SAMPLE LOCATION
GMP12 OR GMP12	GMP12	GAS MONITORING PROBE
GEW20 OR GEW20	GEW20	GAS EXTRACTION WELL
GHW-1 OR GHW-1	GHW-1	HORIZONTAL GAS EXTRACTION WELL
LH1 OR LH1	LH1	LEACHATE HEAD WELL
PW1R OR PW1R		PRIVATE WELL

		UTILITIES
E	OE	OVERHEAD ELECTRIC
UE	UE	UNDERGROUND ELECTRIC
GAS	GAS	GAS
T	T	TELEPHONE
C	C	CABLE

		MISCELLANEOUS
		SEDIMENT CONTAINMENT FENCE
		PERMITTED LIMITS OF WASTE
		LIMITS OF BORROW AREA
	OR	PHASE DELINEATION LINE

		SURVEY DATA
		APPROXIMATE PROPERTY LINE
ROW		RIGHT-OF-WAY LINE
CP-1	CP-3	SURVEY CONTROL POINT
	BM-1	BENCH MARK
		MONUMENT

EXISTING	PROPOSED	PIPE
FM	FM	FORCEMAIN LINE
		COLLECTION SUMP
LMH-1	LMH-1	COLLECTION MANHOLE
		COLLECTION PIPE (PERFORATED)
		COLLECTION PIPE (NON-PERFORATED)
T-9	T-9 OR T-11	TRANSFER MANHOLE
DL-1	DL-1	GAS EXTRACTION DRIPLEG
STS	STS	STORM SEWER LINE
SS-1	SS-1	STORM SEWER MANHOLE
		STORM SEWER INLET
SAN	SAN	SANITARY SEWER LINE
SAN-1	SAN-1	SANITARY SEWER MANHOLE
	PS-1	PUMP-OUT STATION NUMBER AND LOCATION
	RFM	LEACHATE RECIRCULATION FORCEMAIN
	GAS	LANDFILL GAS HEADER PIPE
		LEACHATE CLEANOUT
		GRADIENT CONTROL CLEANOUT
M-105		ABANDONDED MONITORING WELL
		LIMITS OF COMPOSITE LINER CONSTRUCTION
		DRAINAGE LAYER DISCHARGE TRENCH WITH DISCHARGE PIPE

		SURFACE
		PHASE/MODULE DELINEATION BERM
EL.=1040.6	EL.=1040.6	SEDIMENTATION BASIN
		FINAL COVER DIVERSION BERM
		RIPRAP SPILLWAY

		PLAN SHEET
	3000 N	GRID STATION
	172	COORDINATE LOCATION
	1 / 8	DETAIL REFERENCE (DETAIL 1 ON PLAN SHEET 8)
	5%	PERCENT SLOPE AND DIRECTION
		ENGINEERING/GEOLOGIC CROSS-SECTION LOCATION
		SURFACE WATER FLOW ARROW

STANDARD NOTES

NOTES

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH BY KUCERA INTERNATIONAL INC., WILLOUGHBY, OHIO. DATE OF PHOTOGRAPHY APRIL 27, 2013.
2. CONTOURS ARE SHOWN AT A TWO FOOT INTERVAL. ALL ELEVATIONS ARE USGS FEET MEAN SEA LEVEL.
3. PRESERVE AND PROTECT ALL EXISTING MONITORING WELLS AND OTHER EXISTING FEATURES.
4. COORDINATE SYSTEM IS SITE SPECIFIC AND WAS SUPPLIED BY DETROIT EDISON COMPANY.

NO.	NORTH	EAST	DESCRIPTION
CP-1	12,711.1	4,664.5	N.W. CORNER SECTION 13
CP-2	12,706.7	7,364.3	N.1/4 CORNER SECTION 13
CP-3	12,702.2	10,066.1	N.E. CORNER SECTION 13

NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE. THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY.

NOT FOR CONSTRUCTION

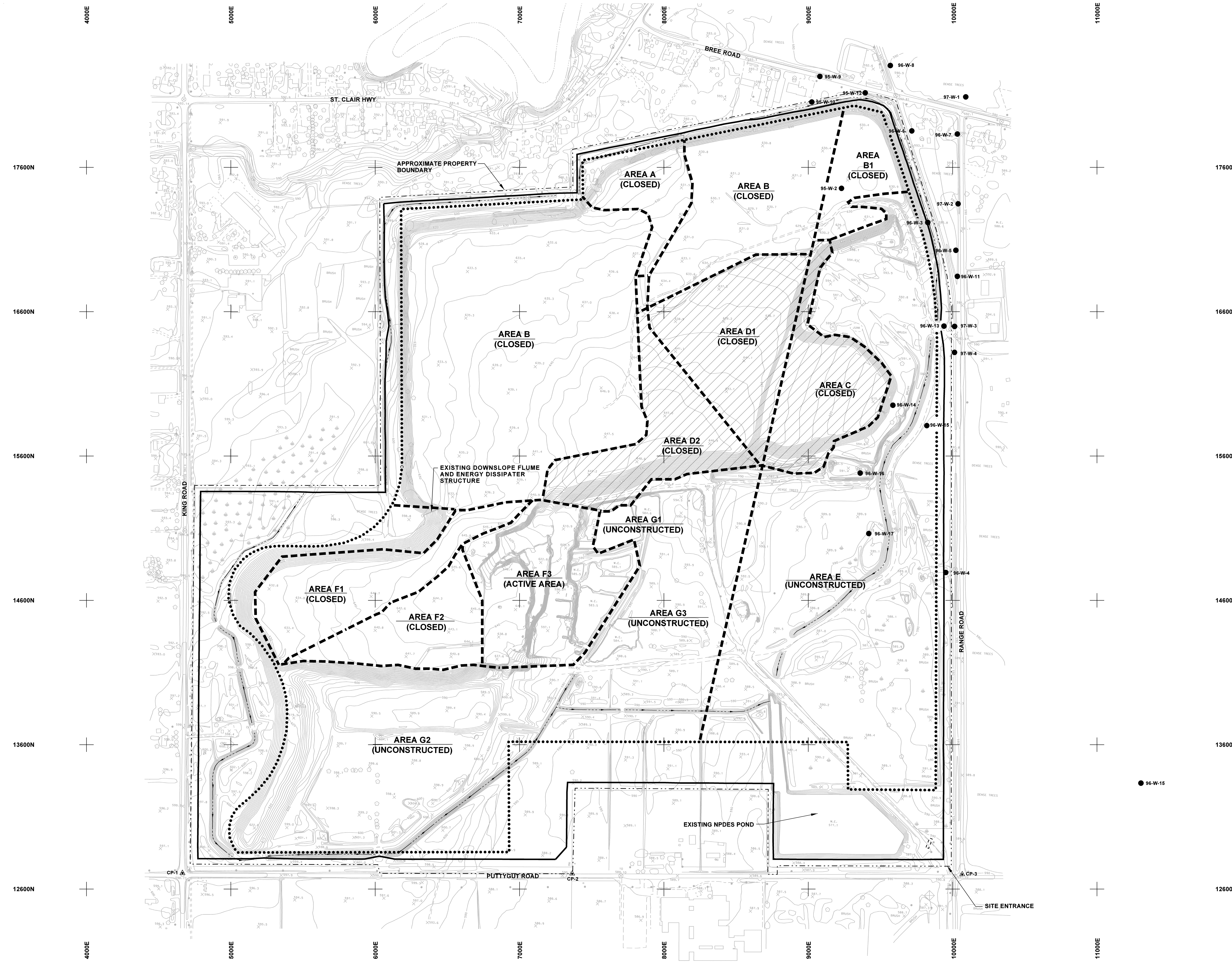
NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT: **DTE ELECTRIC COMPANY**
RANGE ROAD LANDFILL - ASH DISPOSAL FACILITY CHINA TOWNSHIP, ST. CLAIR COUNTY, MICHIGAN LANDFILL DEVELOPMENT PLAN

SHEET TITLE: **STANDARD LEGEND/GENERAL NOTES**

DRAWN BY: Istormer	SCALE: NOT TO SCALE	PROJ. NO. 197388.0000
CHECKED BY: TDH		FILE NO. 197388.0000.SHT02-LG.PLT
APPROVED BY: VB	DATE PRINTED:	SHEET 2 OF 12
DATE: NOVEMBER 2013		

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022



LEGEND

- PROPERTY BOUNDARY
- DESIGN LIMITS OF ASH FILL
- DISPOSAL AREA BOUNDARY
- DRAINAGE DITCH AND DIRECTION
- SLURRY CUTOFF WALL
- **AREA A** — DISPOSAL AREA A

NOTES

1. REFER TO PLAN SHEET 2 FOR STANDARD LEGEND AND NOTES.
2. DISPOSAL AREAS ARE BASED UPON FIGURE 4 WITHIN THE SOLID WASTE AREA OPERATING LICENSE ISSUED BY THE MDEQ ON APRIL 6, 2009. AREAS F AND G HAVE BEEN DIVIDED INTO THREE SEPARATE AREAS.

0 300 600 900 1200

SCALE 1"= 300'

NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE. THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY.

NOT FOR CONSTRUCTION

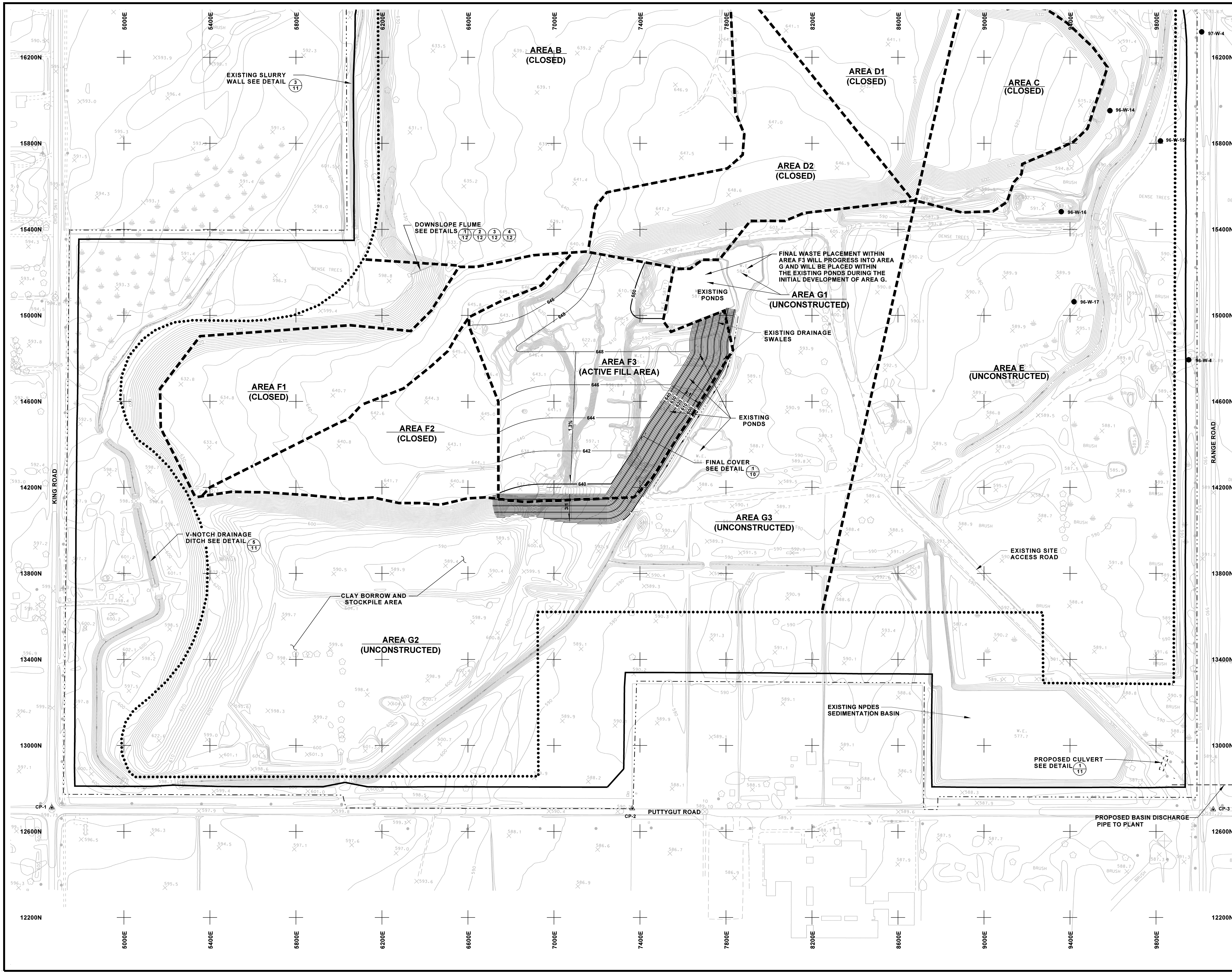
NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT:
DTE ELECTRIC COMPANY
RANGE ROAD LANDFILL - ASH DISPOSAL FACILITY CHINA TOWNSHIP, ST. CLAIR COUNTY, MICHIGAN LANDFILL DEVELOPMENT PLAN

SHEET TITLE:
EXISTING SITE CONDITIONS

DRAWN BY: Istormer	SCALE: 1"=300'	PROJ. NO. 197388.0000
CHECKED BY: TDH		FILE NO. 197388.0000.SHT03-EC.PLT
APPROVED BY: VB	DATE PRINTED:	SHEET 3 OF 12
DATE: NOVEMBER 2013		

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022



LEGEND

- PERIMETER SLURRY WALL LOCATION
- DESIGN LIMITS OF ASH FILL
- DISPOSAL AREA BOUNDARY
- PROPOSED SURFACE WATER CONVEYANCE TRENCH
- AREA D1 — DISPOSAL AREA

NOTES

1. REFER TO PLAN SHEET 2 FOR STANDARD LEGEND AND NOTES

NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE. THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY.

NOT FOR CONSTRUCTION

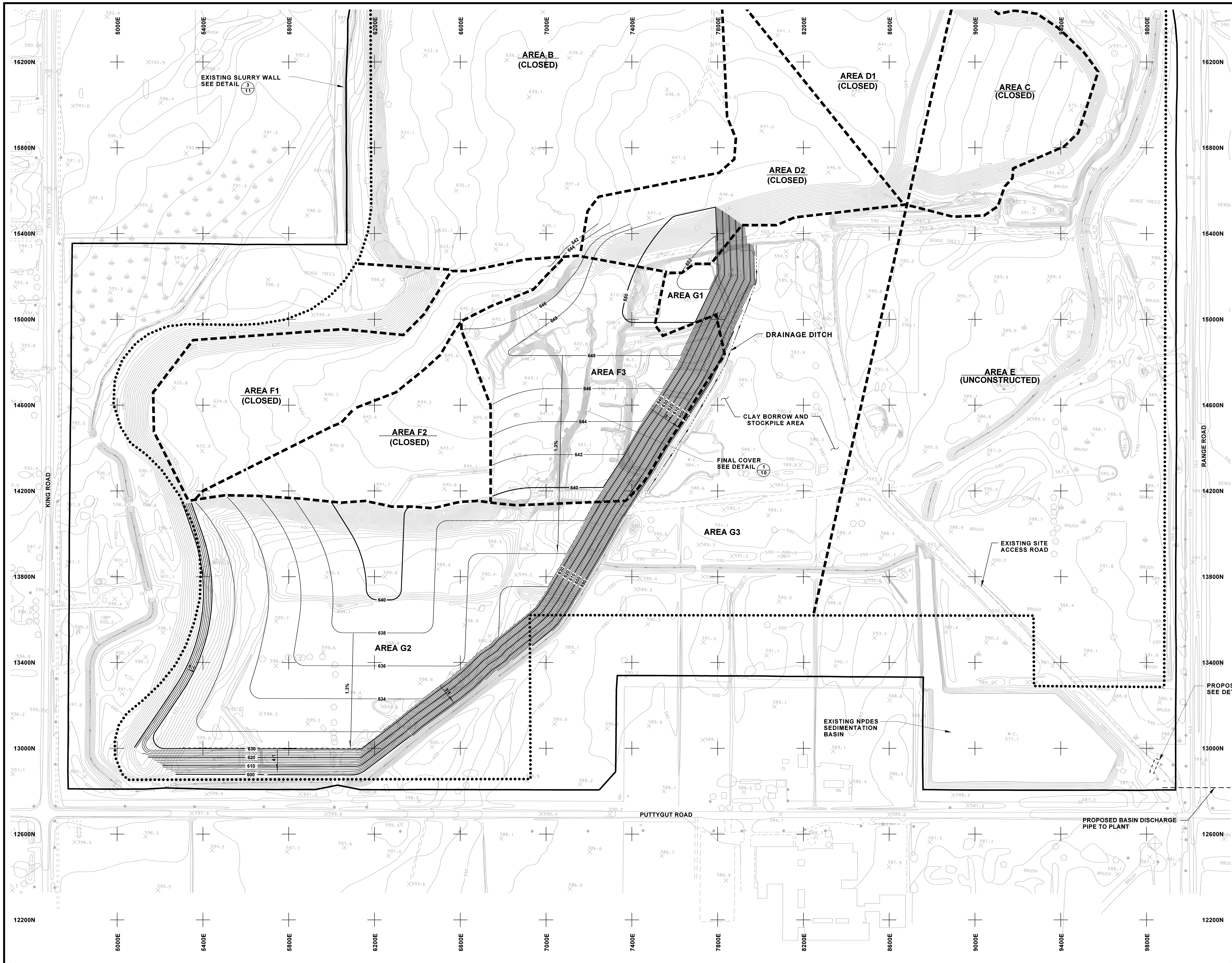
NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT:
DTE ELECTRIC COMPANY
RANGE ROAD LANDFILL - ASH DISPOSAL FACILITY CHINA TOWNSHIP, ST. CLAIR COUNTY, MICHIGAN LANDFILL DEVELOPMENT PLAN

SHEET TITLE:
PHASING PLAN - AREA F

DRAWN BY: lstormer	SCALE:	PROJ. NO. 197388.0000	
CHECKED BY: TDH	1"=200'	FILE NO. 197388.0000.SHT04-PH.PLT	
APPROVED BY: VB	DATE PRINTED:		
DATE: NOVEMBER 2013		SHEET 4 OF 12	

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022



LEGEND

- PERIMETER SLURRY WALL LOCATION
- DESIGN LIMITS OF ASH FILL
- DISPOSAL AREA BOUNDARY
- PROPOSED SURFACE WATER CONVEYANCE TRENCH
- **AREA D1** — DISPOSAL AREA

NOTES

1. REFER TO PLAN SHEET 2 FOR STANDARD LEGEND AND NOTES.
2. WASTE WITHIN AREA G WILL BE PLACED TO DIRECT SURFACE WATER RUNOFF TO THE EXISTING/PROPROSED DRAINAGE CHANNEL.

0 200 400 600 800

SCALE 1"= 200'

NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE. THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY.

NOT FOR CONSTRUCTION

NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT:

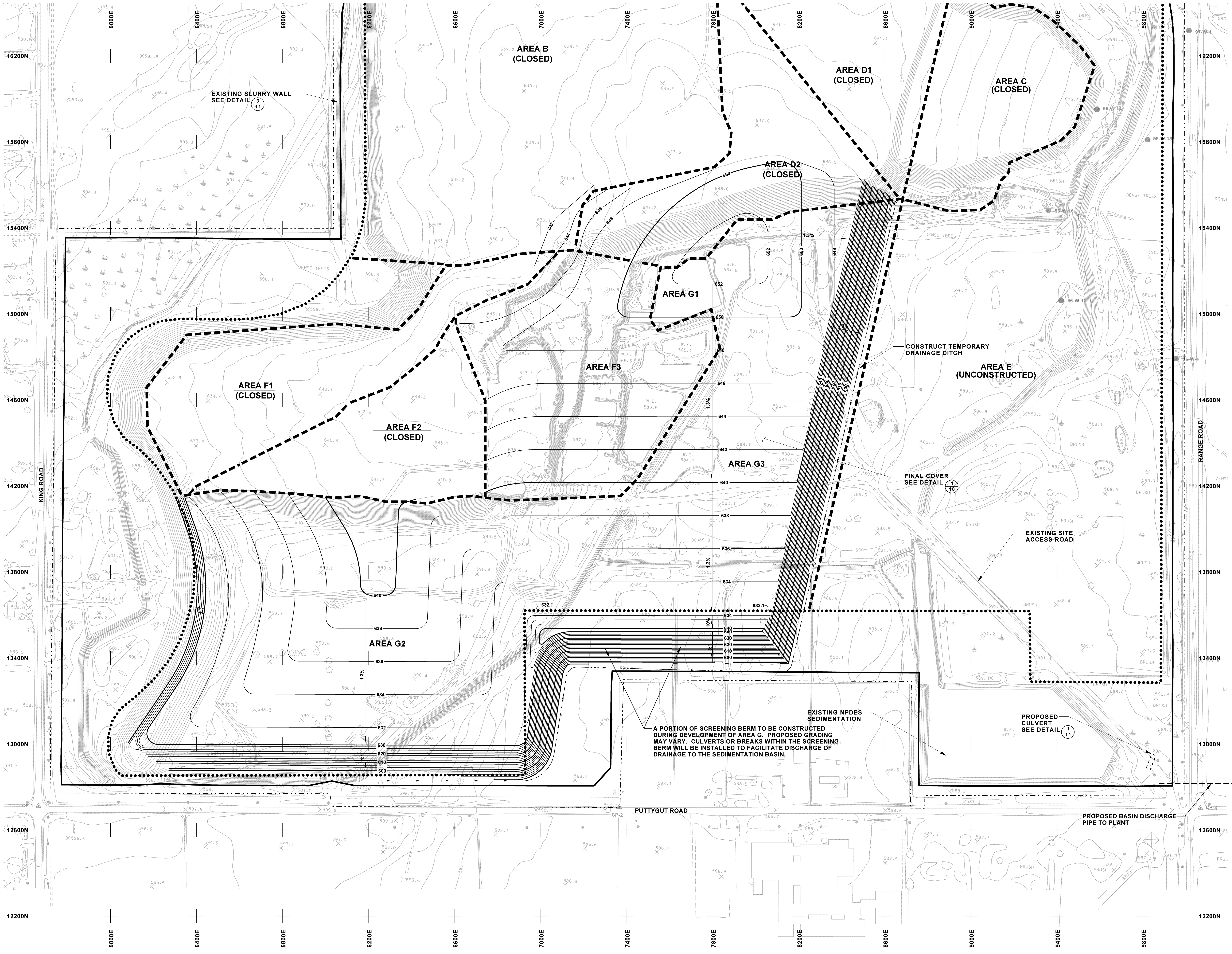
DTE ELECTRIC COMPANY
RANGE ROAD LANDFILL - ASH DISPOSAL FACILITY CHINA TOWNSHIP, ST. CLAIR COUNTY, MICHIGAN LANDFILL DEVELOPMENT PLAN

SHEET TITLE:

PHASING PLAN - AREA G PHASE 2

DRAWN BY: Istormer	SCALE: 1"=200'	PROJ. NO.	197388.0000
CHECKED BY: TDH		FILE NO.	197388.0000.SHT05-PH.PLT
APPROVED BY: VB	DATE PRINTED:	SHEET 5 OF 12	
DATE: NOVEMBER 2013			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022



LEGEND

(solid line)	PERIMETER SLURRY WALL LOCATION
(dotted line)	DESIGN LIMITS OF ASH FILL
(dashed line)	DISPOSAL AREA BOUNDARY
(arrow line)	PROPOSED SURFACE WATER CONVEYANCE TRENCH
AREA D1	DISPOSAL AREA

NOTES

1. REFER TO PLAN SHEET 2 FOR STANDARD LEGEND AND NOTES.
2. WASTE PLACEMENT WITHIN AREA G WILL PROGRESS TO HE SOUTH AND EAST TO DIRECT SURFACE WATER RUNOFF TO A DRAINAGE CHANNEL FOR DISCHARGE TO THE SEDIMENTATION BASIN.

0 200 400 600 800

SCALE 1''= 200'

NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE. THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY.

NOT FOR CONSTRUCTION

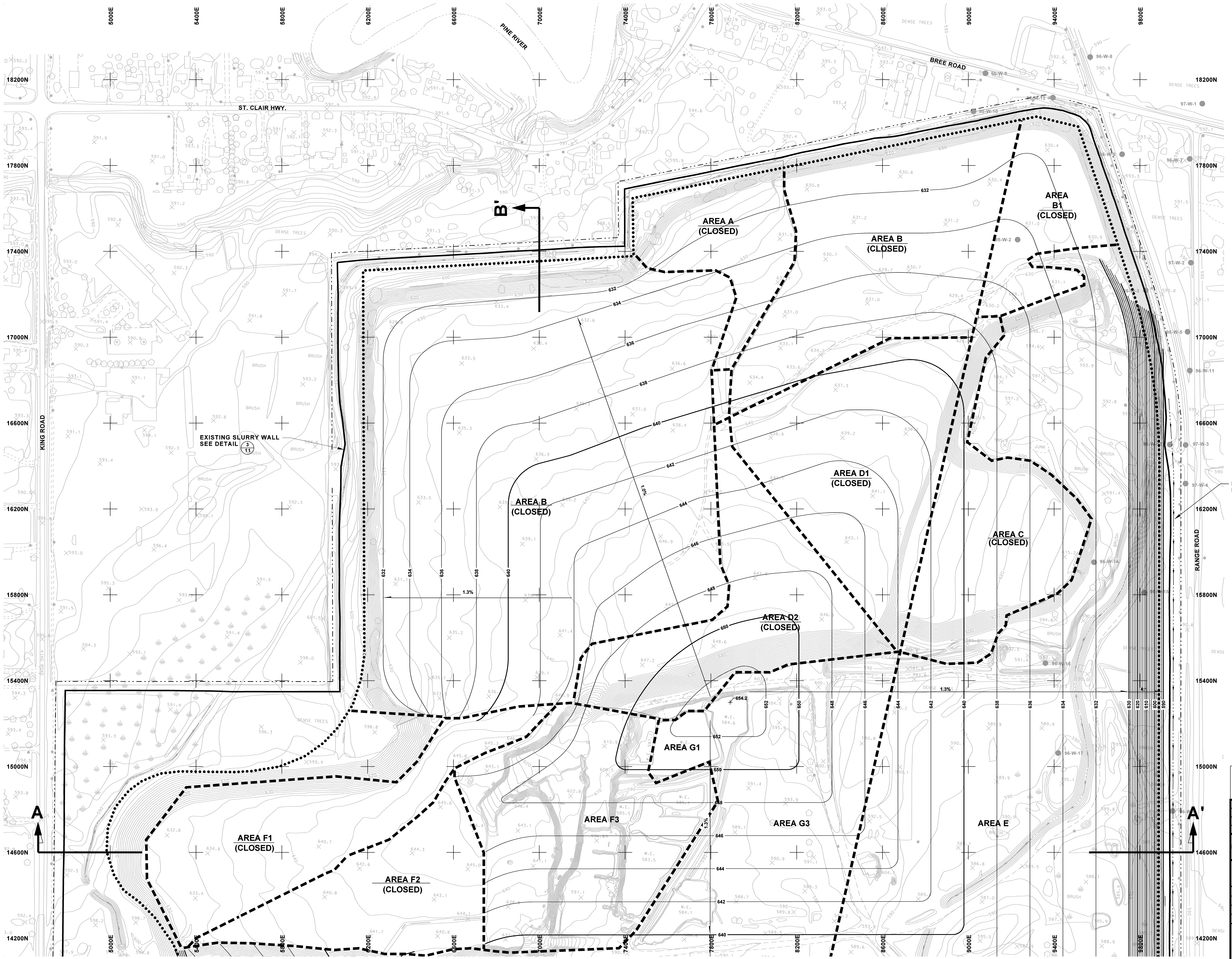
NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT:
DTE ELECTRIC COMPANY
RANGE ROAD LANDFILL - ASH DISPOSAL FACILITY CHINA TOWNSHIP, ST. CLAIR COUNTY, MICHIGAN LANDFILL DEVELOPMENT PLAN

SHEET TITLE:
PHASING PLAN - AREA G PHASE 3

DRAWN BY: lstormer	SCALE: 1"=200'	PROJ. NO. 197388.0000
CHECKED BY: TDH		FILE NO. 197388.0000.SHT06-PH.PLT
APPROVED BY: VB	DATE PRINTED:	SHEET 6 OF 12
DATE: NOVEMBER 2013		

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022



LEGEND

(solid line)	PERIMETER SLURRY WALL LOCATION
(dotted line)	DESIGN LIMITS OF ASH FILL
(dashed line)	DISPOSAL AREA BOUNDARY
(dash-dot line)	PROPOSED SURFACE WATER CONVEYANCE TRENCH
AREA D1	DISPOSAL AREA

NOTES

1. REFER TO PLAN SHEET 2 FOR STANDARD LEGEND AND NOTES.
2. DESIGN OF SURFACE WATER MANAGEMENT SYSTEM WILL BE PREPARED PRIOR TO FINAL COVER CONSTRUCTION.

SCALE 1"= 200'

NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE. THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY.

NOT FOR CONSTRUCTION

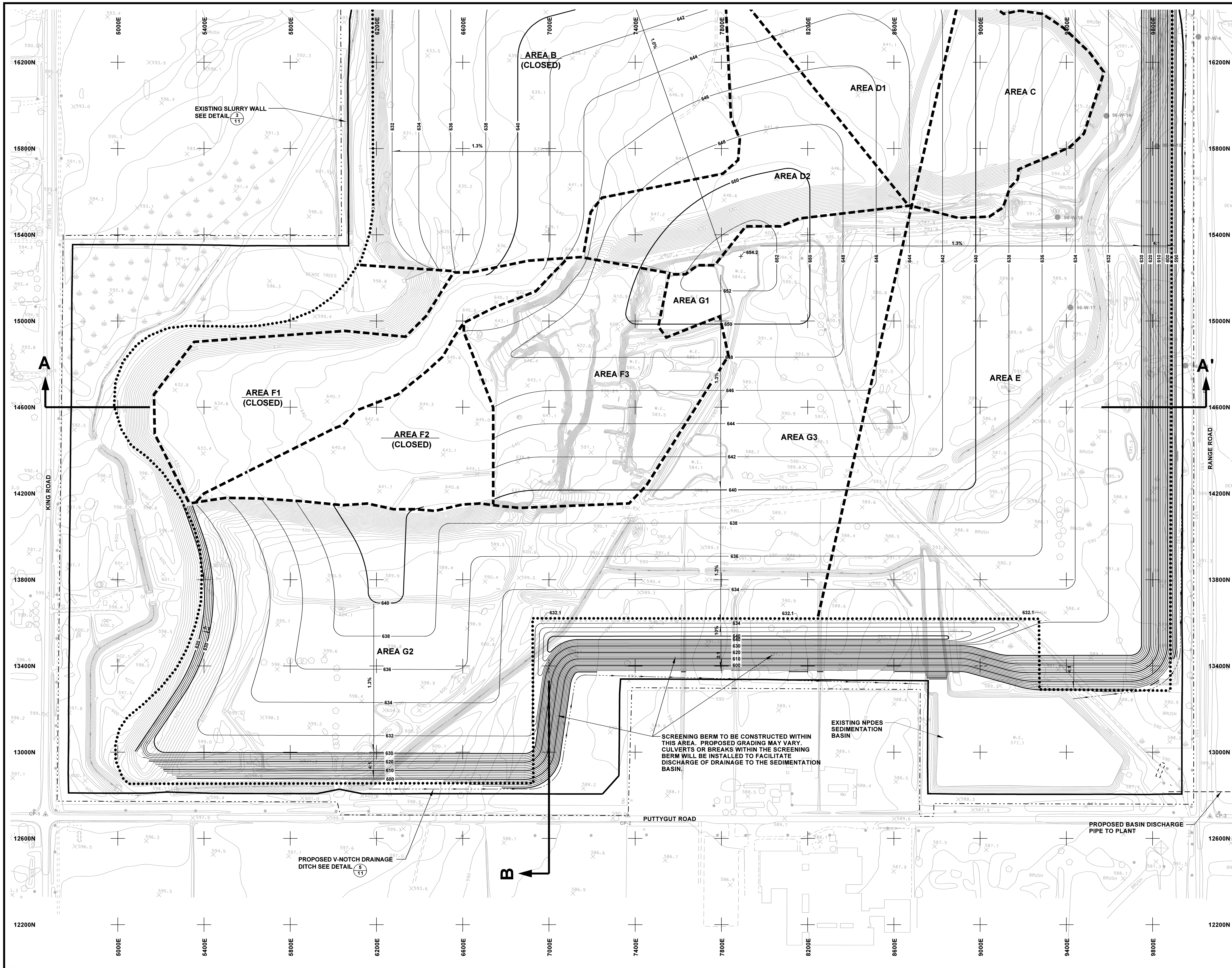
NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT: **DTE ELECTRIC COMPANY RANGE ROAD LANDFILL - ASH DISPOSAL FACILITY CHINA TOWNSHIP, ST. CLAIR COUNTY, MICHIGAN LANDFILL DEVELOPMENT PLAN**

SHEET TITLE: **PROPOSED FINAL GRADES-NORTHERN HALF**

DRAWN BY: lstormer	SCALE: 1"=200'	PROJ. NO. 197388.0000
CHECKED BY: TDH		FILE NO. 197388.0000.SHT07-FC.PLT
APPROVED BY: VB	DATE PRINTED:	SHEET 7 OF 12
DATE: NOVEMBER 2013		

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022



LEGEND

- PERIMETER SLURRY WALL LOCATION
- DESIGN LIMITS OF ASH FILL
- DISPOSAL AREA BOUNDARY
- PROPOSED SURFACE WATER CONVEYANCE TRENCH
- **AREA D1** DISPOSAL AREA

NOTES

1. REFER TO PLAN SHEET 2 FOR STANDARD LEGEND AND NOTES.
2. DESIGN OF SURFACE WATER MANAGEMENT SYSTEM WILL BE PREPARED PRIOR TO FINAL COVER CONSTRUCTION. TYPICAL DETAILS ARE PRESENTED ON PLAN SHEET 12.

0 200 400 600 800

SCALE 1"= 200'

NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE. THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY.

NOT FOR CONSTRUCTION

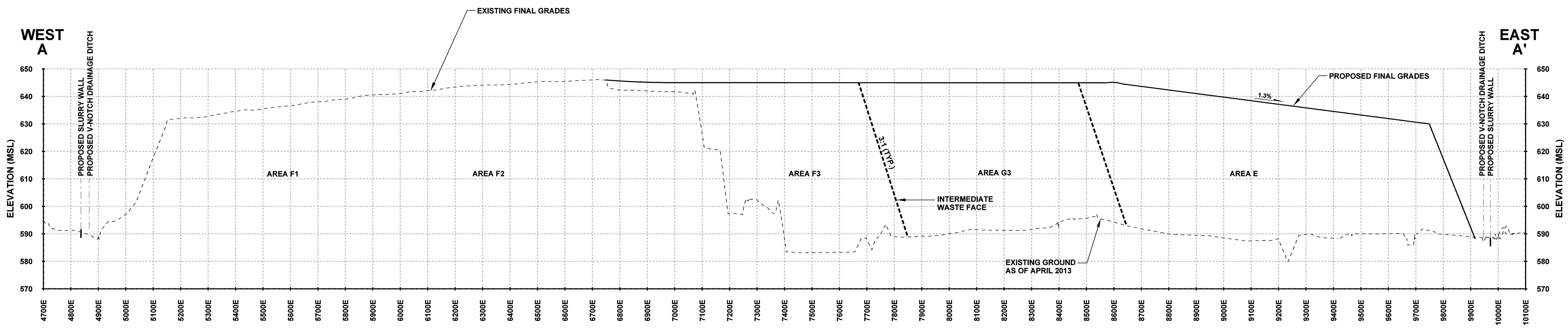
NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT:
DTE ELECTRIC COMPANY
RANGE ROAD LANDFILL - ASH DISPOSAL FACILITY CHINA TOWNSHIP, ST. CLAIR COUNTY, MICHIGAN LANDFILL DEVELOPMENT PLAN

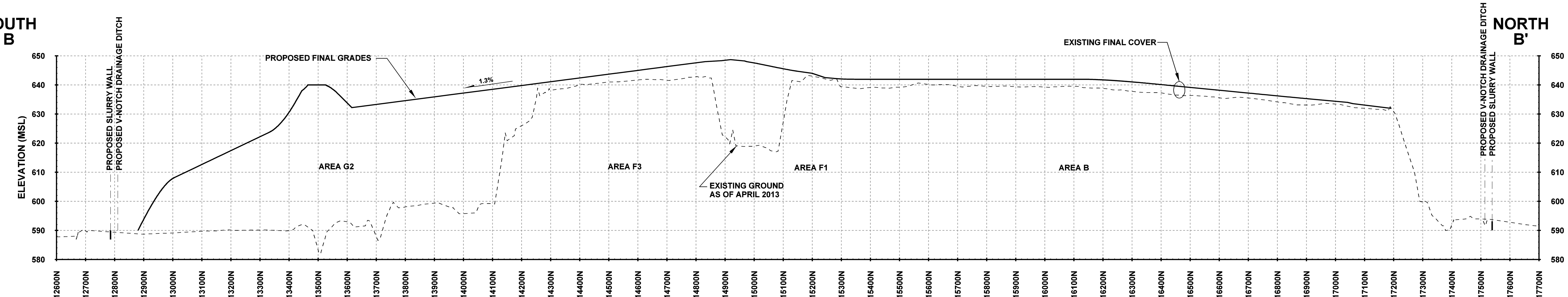
SHEET TITLE:
PROPOSED FINAL GRADES-SOUTHERN HALF

DRAWN BY: lstormer	SCALE: 1"=200'	PROJ. NO. 197388.0000
CHECKED BY: TDH		FILE NO. 197388.0000.SHT08-FC.PLT
APPROVED BY: VB	DATE PRINTED:	SHEET 8 OF 12
DATE: NOVEMBER 2013		

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022



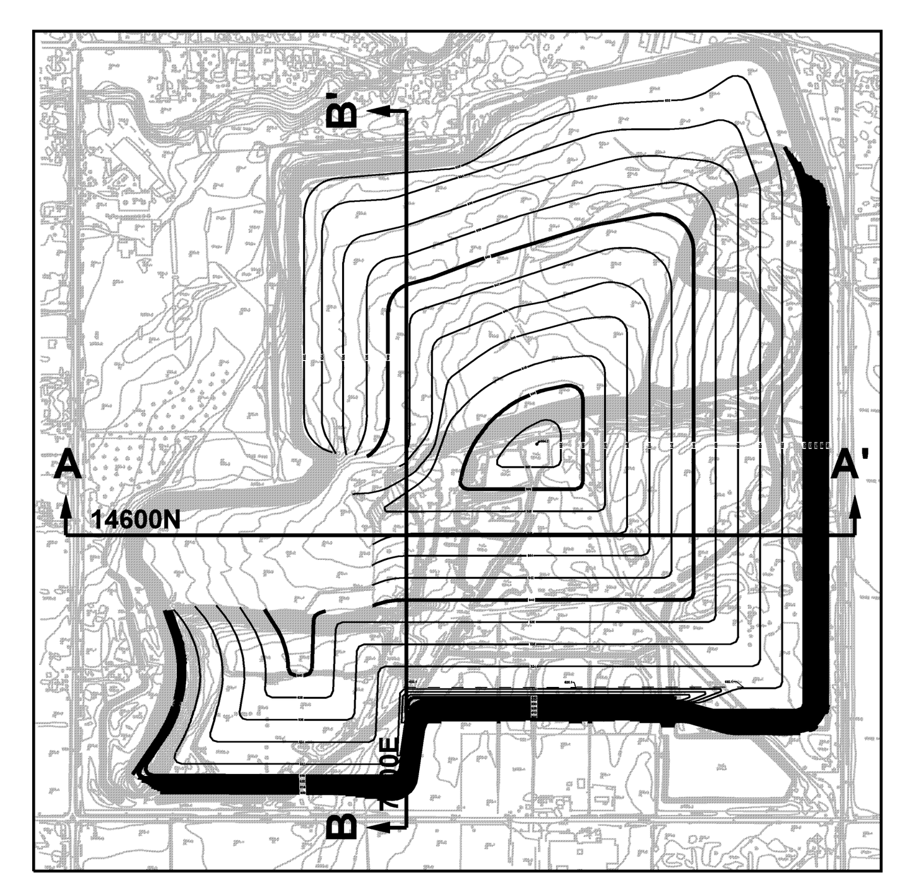
SECTION 14600N



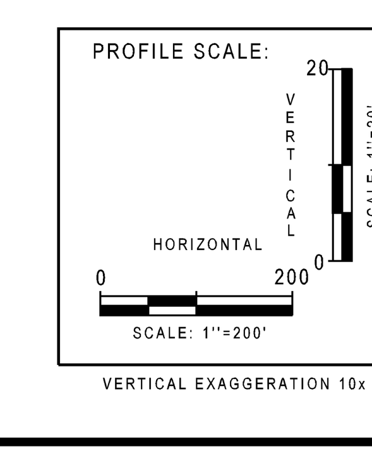
SECTION 7000E

NOTES

1. REFER TO PLAN SHEET 2 FOR STANDARD LEGEND AND NOTES.



CROSS SECTION LOCATOR



NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE. THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY.

NOT FOR CONSTRUCTION

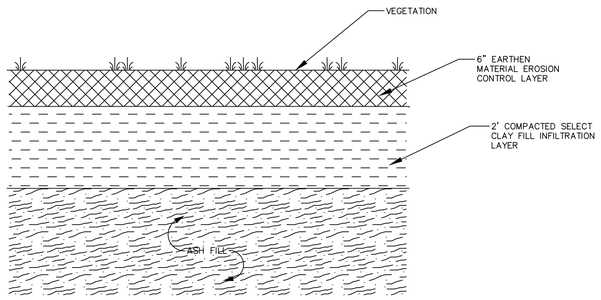
NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT:
DTE ELECTRIC COMPANY
RANGE ROAD LANDFILL - ASH DISPOSAL FACILITY CHINA TOWNSHIP, ST. CLAIR COUNTY, MICHIGAN LANDFILL DEVELOPMENT PLAN

SHEET TITLE:
ENGINEERING CROSS SECTIONS

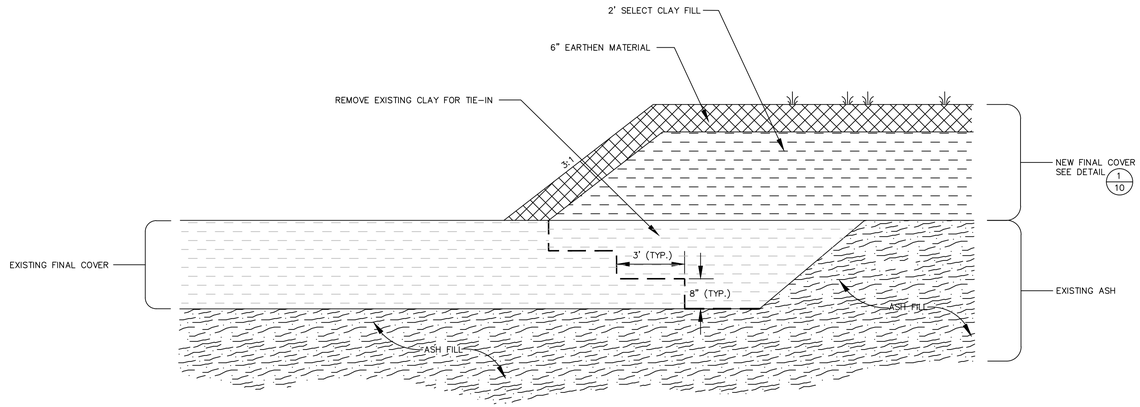
DRAWN BY:	lstormer	SCALE:	PROJ. NO. 197388.0000
CHECKED BY:	TDH	1"=200'	FILE NO. 197388.0000.SHT09-XS.PLT
APPROVED BY:	VB	DATE PRINTED:	SHEET 9 OF 12
DATE:	NOVEMBER 2013		

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022



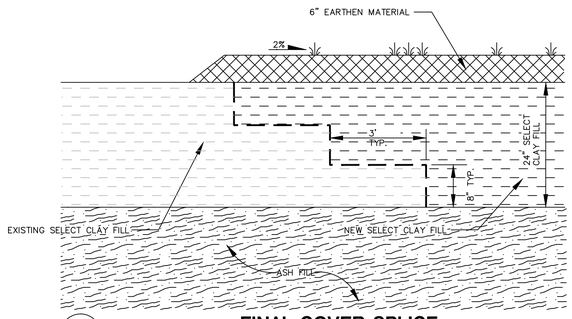
1/10 **FINAL COVER**

(NOT TO SCALE)



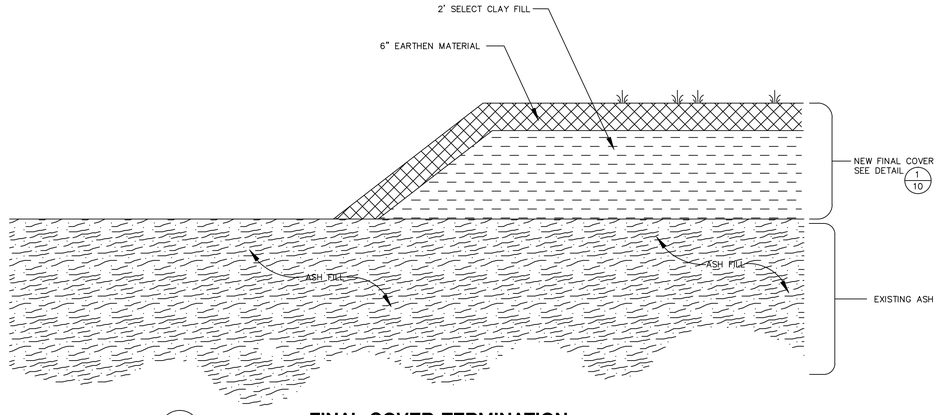
4/10 **FINAL COVER TIE-IN**

(NOT TO SCALE)



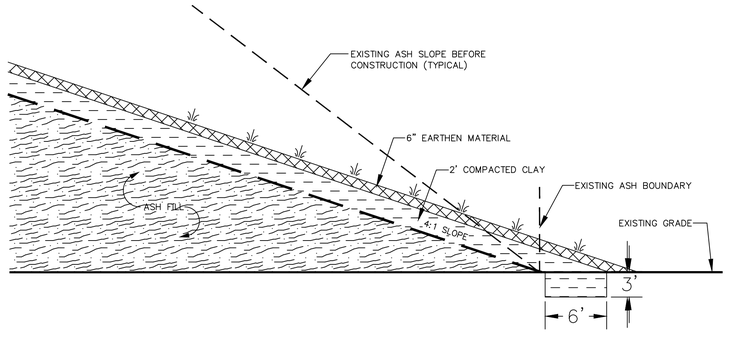
2/10 **FINAL COVER SPLICE**

(NOT TO SCALE)



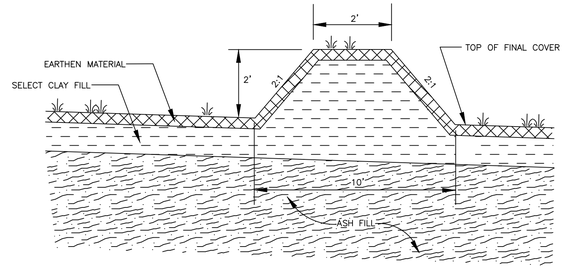
5/10 **FINAL COVER TERMINATION**

(NOT TO SCALE)



3/10 **SLOPE GRADING AND STABILIZATION**

(NOT TO SCALE)



6/10 **SURFACE WATER DIVERSION BERM**

(NOT TO SCALE)

NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY.

NOT FOR CONSTRUCTION

NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT:

DTE ELECTRIC COMPANY

RANGE ROAD LANDFILL - ASH DISPOSAL FACILITY CHINA TOWNSHIP, ST. CLAIR COUNTY, MICHIGAN LANDFILL DEVELOPMENT PLAN

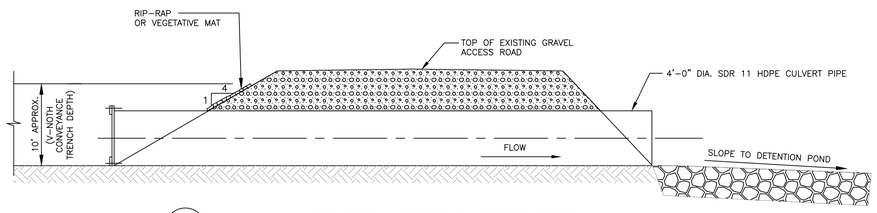
SHEET TITLE:

DETAILS

DRAWN BY:	LSTORMER	SCALE:	PROJ. NO. 197388.0000
CHECKED BY:	TDH	AS SHOWN	FILE NO. 197388.0000.SHT10-DT.dwg
APPROVED BY:	VB	DATE PRINTED:	SHEET 10 OF 12
DATE:	NOVEMBER 2013		

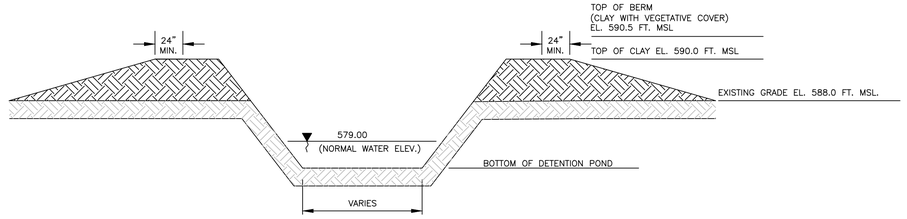
TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

File Location: J:\DTE\St Clair Co\197388\0000 **File Name:** 197388.0000.SHT10-DT **Layout Name:** SHEET 10
Plot Information: NONE STORMER, LARRY — ANSI A (8.50 X 11.00 INCHES) November 6, 2013 0.3869 K:\AUTOCAD_CONFIG\PLOTTERS\PLOT STYLES\RMT COLOR.CTB



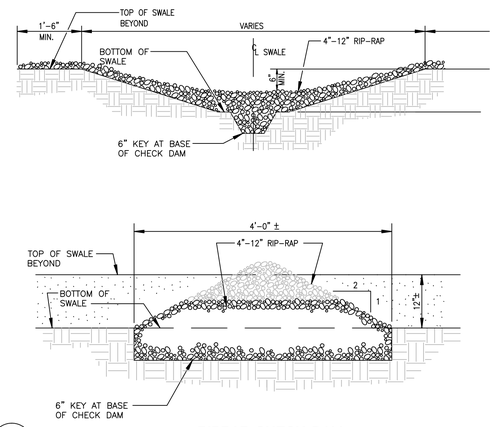
1/11 **CULVERT @ EXISTING ACCESS ROAD**

(NOT TO SCALE)



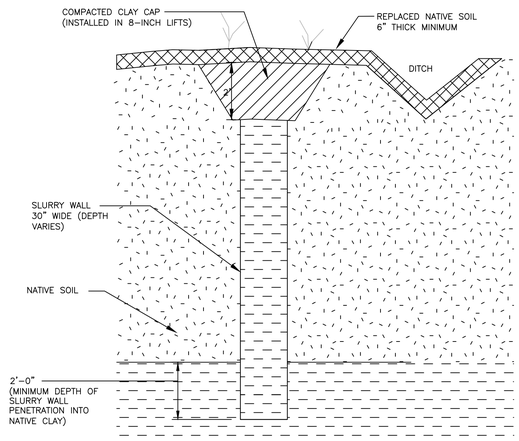
4/11 **DETENTION POND**

(NOT TO SCALE)



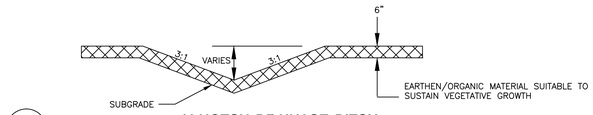
2/11 **RIPRAP CHECK DAM**

(NOT TO SCALE)



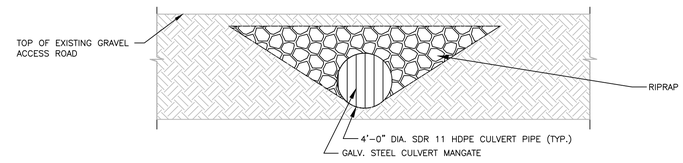
3/11 **EXISTING SLURRY WALL SECTION**

(NOT TO SCALE)



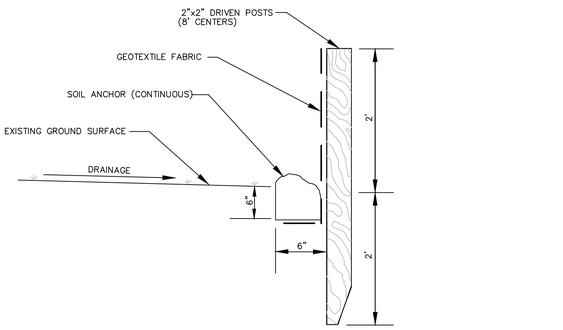
5/11 **V-NOTCH DRAINAGE DITCH**

(NOT TO SCALE)



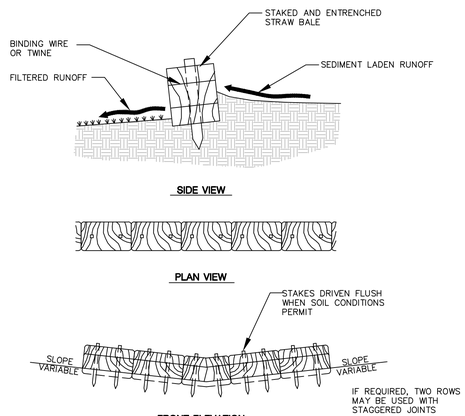
6/11 **CULVERT SECTION @ EXISTING ACCESS ROAD**

(NOT TO SCALE)



7/11 **SEDIMENT CONTROL FENCE**

(NOT TO SCALE)



8/11 **STRAW BALE DITCH CHECK**

(NOT TO SCALE)

NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY.

NOT FOR CONSTRUCTION

NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

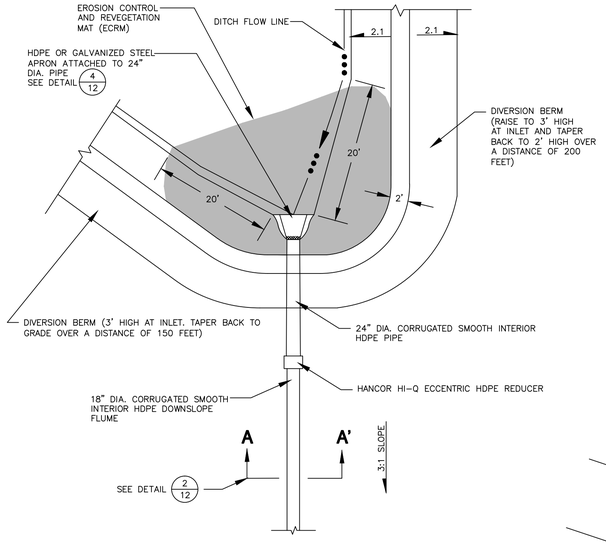
PROJECT:
DTE ELECTRIC COMPANY
RANGE ROAD LANDFILL - ASH DISPOSAL FACILITY CHINA TOWNSHIP, ST. CLAIR COUNTY, MICHIGAN LANDFILL DEVELOPMENT PLAN

SHEET TITLE:
DETAILS

DRAWN BY:	LSTORMER	SCALE: AS SHOWN	PROJ. NO. 197388.0000
CHECKED BY:	TDH		FILE NO. 197388.0000.SHT11-DT.dwg
APPROVED BY:	VB	DATE PRINTED:	**SHEET 11 OF 12**
DATE:	NOVEMBER 2013		

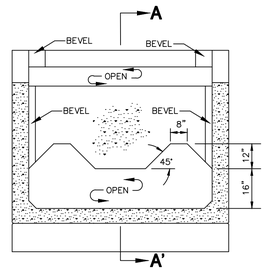
TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

File Location: J:\DTE\St Clair Co\197388\0000 **File Name:** 197388.0000.SHT11-DT **Layout Name:** SHEET 11
Plot Information: NONE STORMER, LARRY — ANSI A (8.50 X 11.00 INCHES) November 6, 2013 0.3869 K:\AUTOCAD_CONFIG\PLOTTERS\PLOT STYLES\RMT COLOR.CTB



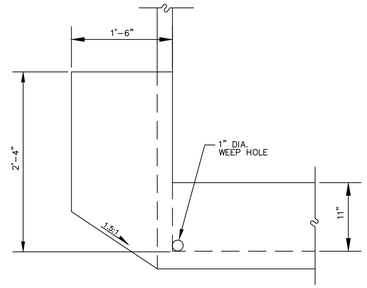
1/12 **DOWNSLOPE FLUME (TYPICAL)**

(NOT TO SCALE)



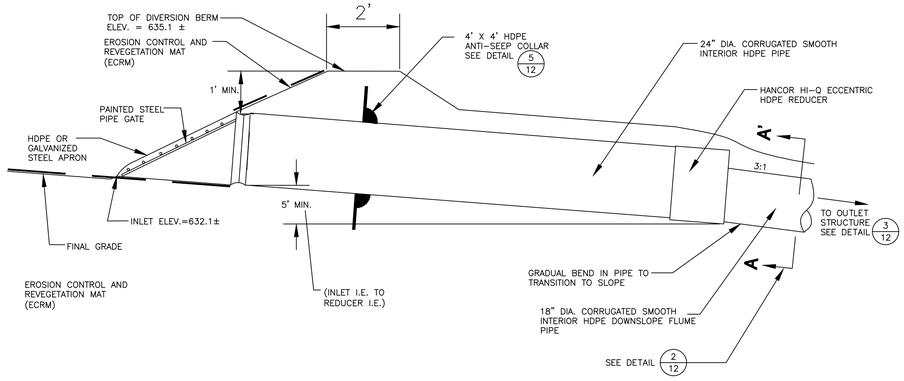
SECTION B-B'

(NOT TO SCALE)



SECTION C-C'

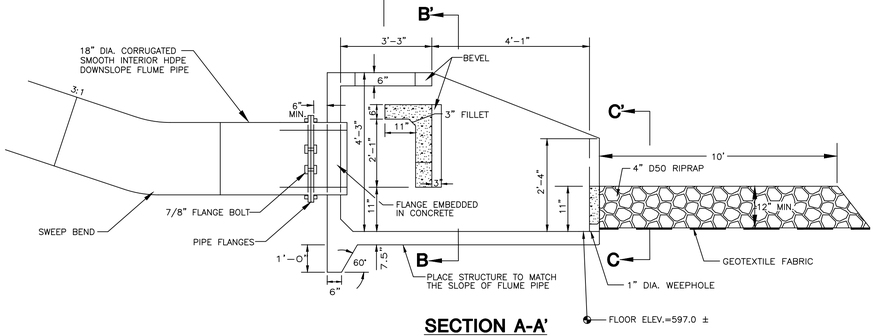
(NOT TO SCALE)



NOTE: DIMENSIONS ARE APPROXIMATE AND MAY VARY AT EACH LOCATION

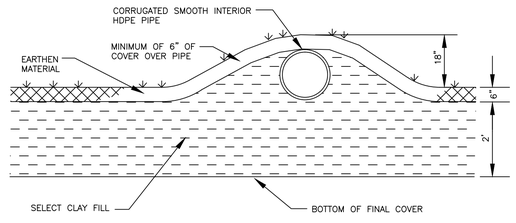
4/12 **DOWNSLOPE FLUME INLET STRUCTURE (TYPICAL)**

(NOT TO SCALE)



SECTION A-A'

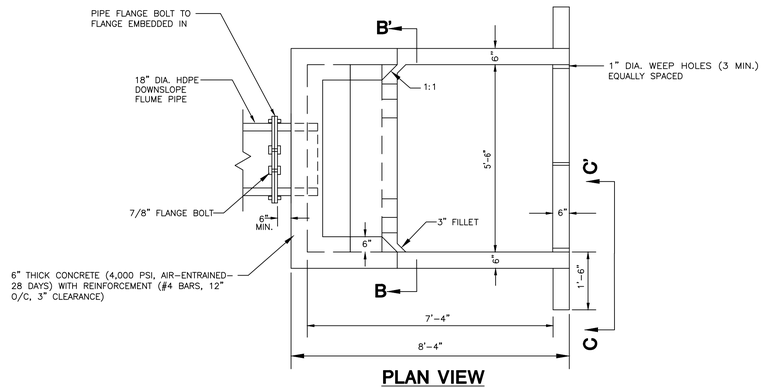
(NOT TO SCALE)



SECTION A-A'

2/12 **FINAL COVER WITH DOWNSLOPE FLUME (TYPICAL)**

(NOT TO SCALE)



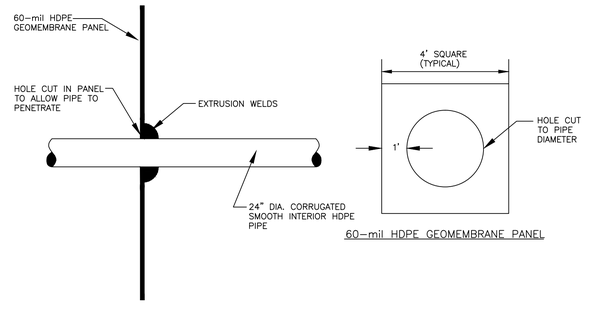
PLAN VIEW

(NOT TO SCALE)

NOTE: DIMENSIONS ARE APPROXIMATE AND MAY VARY AT EACH LOCATION

3/12 **OUTLET STRUCTURE (TYPICAL)**

(NOT TO SCALE)



60-mil HDPE GEOMEMBRANE PANEL

5/12 **HDPE ANTI-SEEP COLLAR (TYPICAL)**

(NOT TO SCALE)

NOTE: THESE PLANS ARE ACCOMPANIED BY A REPORT OF THE SAME TITLE THESE DOCUMENTS ARE INTERRELATED AND ARE INTENDED TO BE USED TOGETHER. THESE DOCUMENTS ARE INTENDED TO BE USED FOR REGULATORY PURPOSES ONLY.

NOT FOR CONSTRUCTION

NO.	BY	DATE	REVISION	APP'D.
3.				
2.				
1.				

PROJECT:

DTE ELECTRIC COMPANY

RANGE ROAD LANDFILL - ASH DISPOSAL FACILITY CHINA TOWNSHIP, ST. CLAIR COUNTY, MICHIGAN LANDFILL DEVELOPMENT PLAN

SHEET TITLE:

DETAILS

DRAWN BY:	LSTORMER	SCALE:	PROJ. NO. 197388.0000
CHECKED BY:	TDH	AS SHOWN	FILE NO. 197388.0000.SHT12-DT.dwg
APPROVED BY:	VB	DATE PRINTED:	SHEET 12 OF 12
DATE:	NOVEMBER 2013		

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022

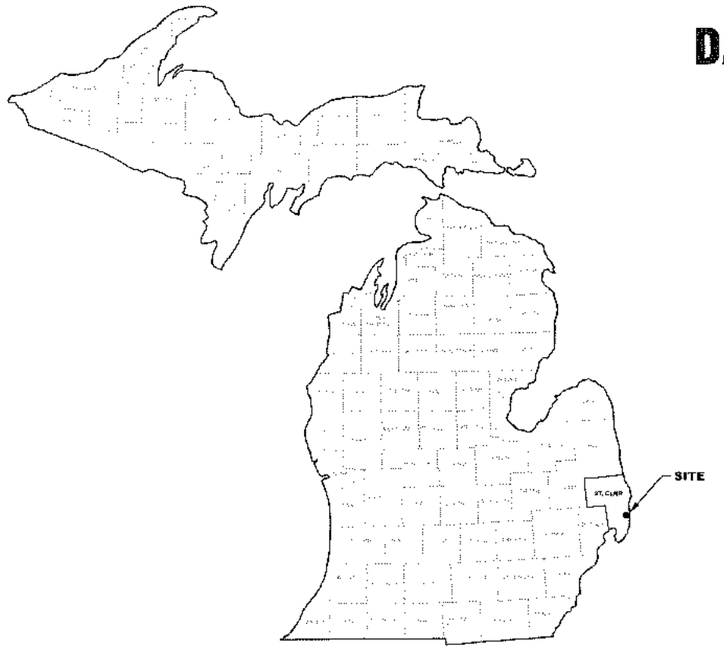
File Location: J:\DTE\St Clair Co\197388\0000 **File Name:** 197388.0000.SHT12-DT **Layout Name:** SHEET 12
Plot Information: NONE STORMER, LARRY — ANSI A (8.50 X 11.00 INCHES) November 6, 2013 0.3869 K:\AUTOCAD_CONFIG\PLOTTERS\PLOT STYLES\RMT COLOR.CTB

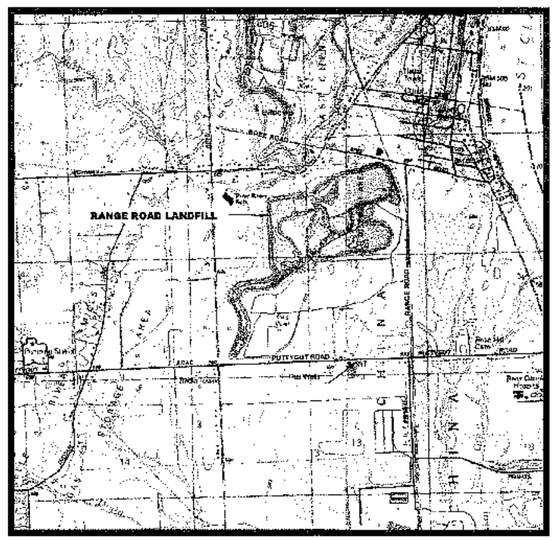
THE DETROIT EDISON COMPANY
RANGE ROAD LANDFILL
AS-BUILT FOR DETENTION POND AND PUMP STATION INSTALLATION
CHINA TOWNSHIP, MICHIGAN

PREPARED FOR: THE DETROIT EDISON COMPANY
DETROIT, MICHIGAN

PREPARED BY: RMT, INC., MICHIGAN
ANN ARBOR, MICHIGAN

DATE: JUNE 2008





SITE LOCATION MAP
BASE MAP DEVELOPED FROM THE RATTLE RUN AND ST. CLAIR, MICHIGAN, 7.5 MINUTE U.S.G.S. TOPOGRAPHIC MAPS, DATED 1991.
0 2000' 4000' 6000' 8000'
APPROXIMATE SCALE IN FEET
1" = 2000'
N

DRAWING INDEX

05-02-07	ISSUED FOR CLIENT REVIEW - 60% WORKING COPY
05-16-07	ISSUED FOR CONSTRUCTION BIDDING PURPOSES
07-25-07	ISSUED FOR CONSTRUCTION
09-05-07	REVISED - ISSUED FOR CONSTRUCTION
06-20-08	AS-BUILT DRAWINGS (SLURRY WALL DRAWINGS NOT INCLUDED IN THIS AS-BUILT SET. SLURRY WALL HAS NOT BEEN BUILT AND WILL BE COMPLETED IN 2008.)

6/24/08

RMT
3714 RANCHERO DRIVE
ANN ARBOR, MI 48108-2771
PHONE 734-971-8080
FAX 734-971-6002

PIPING SYMBOLS [1]

- PIPING
- JACKETED PIPING
- HOT WATER HEAT TRACED AND INSULATED PIPING
- STEAM HEAT TRACED AND INSULATED PIPING
- ELECTRIC HEAT TRACED AND INSULATED PIPING
- INSULATED PIPING
- FLANGED OR UNION CONNECTION
- THREADED OR WELDED CONNECTION
- FLANGE OR UNION
- 1/2 OF FLANGED OR UNION CONNECTION
- PIPE ENDED IN BLIND FLANGE
- PIPE ENDED IN THREADED CAP OR PLUG
- PIPE ENDED IN WELDED CAP OR PLUG
- HOSEBIB
- CONCENTRIC REDUCER OR REDUCING BUSHING
- ECCENTRIC REDUCER OR REDUCING BUSHING WITH FLAT SIDE UP
- ECCENTRIC REDUCER OR REDUCING BUSHING WITH FLAT SIDE DOWN
- VENT
- VENT WITH SCREEN
- PIPE TRAP
- PIPE WITH SPRAY NOZZLES
- PIPE WITH DIFFUSERS
- DRAIN
- SPEC XXXXX / SPEC YYYYY — PIPING SPECIFICATION CHANGE
- A — PIPING CONTINUATION THIS DRAWING
- B SHEET 2 OF 2 — PIPING CONTINUATION ANOTHER DRAWING

VALVE SYMBOLS [2]

- GATE VALVE
- GLOBE VALVE
- ANGLE VALVE
- BALL VALVE
- BUTTERFLY VALVE
- PLUG VALVE
- DIAPHRAGM VALVE
- PINCH VALVE
- NEEDLE VALVE
- CHECK VALVE
- FLOAT OPERATED VALVE WITH FLOAT
- PRESSURE RELIEF VALVE
- VACUUM RELIEF VALVE
- PRESSURE REDUCING VALVE (SELF-CONTAINED)
- BACKPRESSURE VALVE (SELF-CONTAINED)
- 2-WAY SOLENOID VALVE
- 3-WAY SOLENOID VALVE
- QUICK-OPENING VALVE
- STOP CHECK VALVE
- HOSE BIBB
- BACK FLOW PREVENTER
- 3-WAY MANUAL VALVE

SPECIALTY SYMBOLS

- Y-TYPE STRAINER
- TEMPORARY STRAINER
- DIAPHRAGM SEAL
- FLEXIBLE CONNECTOR
- SILENCER
- BAG FILTER
- CARTRIDGE FILTER
- EDUCTOR
- STATIC MIXER
- STATIC MIXER WITH INTEGRAL INJECTION PORT
- PITLESS ADAPTER
- AIR OR GAS FILTER
- SPECTACLE BLIND
- BLIND FLANGE
- RING SPACER
- BLEED RING
- RESTRICTION ORIFICE
- WATER HAMMER ARRESTOR
- PULSATION DAMPENER
- RUPTURE DISC
- MIXING TEE WITH INJECTION QUILL
- QUICK-CONNECT HOSE CONNECTION
- HOSE BARB
- S.S. 304 FLEXIBLE HOSE
- S.S. 304 FLEXIBLE HOSE WITH QUICK-CONNECT FITTINGS
- S.S. 304 FLEXIBLE HOSE WITH THREADED ENDS
- CLAMPED CONNECTION (PIPE-TO-HOSE)
- CLAMPED CONNECTION (HOSE-TO-HOSE)

EQUIPMENT SYMBOLS

- HORIZONTAL CENTRIFUGAL PUMP
- SUMP PUMP
- VERTICAL CENTRIFUGAL PUMP
- SUBMERGED VERTICAL TURBINE PUMP WITH INTEGRAL MOTOR
- CENTRIFUGAL FAN
- CENTRIFUGAL BLOWER
- ROTARY BLOWER OR COMPRESSOR
- ELECTRIC MOTOR
- POSITIVE DISPLACEMENT PROGRESSING CAVITY PUMP

INSTRUMENT LINE SYMBOLS [3]

- INSTRUMENT OR ELECTRIC MOTOR CONNECTION TO PROCESS
- ELECTRIC SIGNAL (ANALOG)
- ELECTRIC BINARY (ON-OFF) SIGNAL
- PNEUMATIC SIGNAL
- PNEUMATIC BINARY (ON-OFF) SIGNAL
- HYDRAULIC SIGNAL
- CAPILLARY TUBE
- ELECTROMAGNETIC OR SONIC SIGNAL (GUIDED)
- ELECTROMAGNETIC OR SONIC SIGNAL (NOT GUIDED)
- INTERNAL SYSTEM LINK (SOFTWARE OR DATA LINK)
- MECHANICAL LINK
- A — INSTRUMENT LINE CONTINUATION THIS DRAWING
- B SHEET 2 OF 2 — INSTRUMENT LINE CONTINUATION ANOTHER DRAWING
- BUBBLE (SINGLE) WITH LEADER
- BUBBLE (DOUBLE) WITH LEADER

TAGGING SYMBOLS

- L-200 — LINE TAG (DEFAULT STYLE)
- L-AAAAB CCC" — LINE TAG - STYLE A
- L-AAAB CC" — LINE TAG - STYLE B
- CC" — LINE TAG - STYLE C
- SL-AAAB CCC" — LINE TAG - STYLE D
- S-200 — SPECIALTY TAG
- V-200 — VALVE TAG

INSTRUMENT PRIMARY ELEMENT SYMBOLS

FLOW ELEMENTS

- FLOW METER
- TURBINE OR PROPELLER TYPE
- MAG — MAGNETIC TYPE
- POSITIVE DISPLACEMENT TYPE
- SONIC (IN-LINE) TYPE
- VORTEX TYPE
- TARGET TYPE
- ANNUBAR OR AVERAGING PITOT TUBE
- ROTAMETER
- FE — SONIC TYPE (OUTSIDE PIPE)
- FE — ORIFICE FLANGE
- S — ELECTRIC SOLENOID VALVE ACTUATOR

TEMPERATURE ELEMENTS

- TW — THERMOWELL

GENERAL SYMBOLS

- AAA — TIE-IN NEW TO EXISTING
- LINE OF SLOPE

INSTRUMENT IDENTIFICATION CHART [3]

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER TO FIRST LETTER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION				
C	USER'S CHOICE			CONTROL	
D	USER'S CHOICE	DIFFERENTIAL			
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		
F	FLOW RATE	RATIO (FRACTION)			
G	USER'S CHOICE		GLASS, VIEWING DEVICE		
H	HAND				HIGH, OPEN
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW, CLOSED
M	USER'S CHOICE	MOMENTARY			MIDDLE, INTERMEDIATE
N	USER'S CHOICE				
O	USER'S CHOICE		ORIFICE, RESTRICTION		
P	PRESSURE, VACUUM		POINT (TEST) CONNECTION		
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMITTER OR TRANSDUCER	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL		
X	UNCLASSIFIED	X-AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE OR PRESENCE	Y-AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION, DIMENSION	Z-AXIS		DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

INSTRUMENT AND FUNCTION SYMBOLS [3]

	LOCALLY MOUNTED	MOUNTED ON PRIMARY CONTROL PANEL (PCP)		MOUNTED ON AUXILIARY CONTROL PANEL (ACP)	
		NORMALLY ACCESSIBLE TO OPERATOR	NORMALLY INACCESSIBLE TO OPERATOR	NORMALLY ACCESSIBLE TO OPERATOR	NORMALLY INACCESSIBLE TO OPERATOR
DISCRETE INSTRUMENTS					
SHARED DISPLAY AND/OR SHARED CONTROL					
COMPUTER FUNCTION					
PROGRAMMABLE OR RELAY LOGIC CONTROL					

TANK SYMBOLS

- VERTICAL TANK CONE TOP-FLAT BOTTOM
- VERTICAL TANK DISHED TOP-DISHED BOTTOM
- VERTICAL TANK DISHED TOP-FLAT BOTTOM
- VERTICAL TANK DISHED TOP-SLOPED BOTTOM
- VERTICAL TANK FLAT TOP-CONE BOTTOM
- VERTICAL TANK FLAT TOP-DISHED BOTTOM
- VERTICAL TANK FLAT TOP-FLAT BOTTOM
- VERTICAL TANK FLAT TOP-SLOPED BOTTOM
- VERTICAL TANK OPEN TOP-CONE BOTTOM
- VERTICAL TANK OPEN TOP-DISHED BOTTOM
- VERTICAL TANK OPEN TOP-FLAT BOTTOM
- VERTICAL TANK OPEN TOP-SLOPED BOTTOM

MISCELLANEOUS INSTRUMENT SYMBOLS

DEFINITIONS OF ABBREVIATIONS

H-O-A	HAND-OFF-AUTOMATIC
ON-OFF	ON-OFF
O-A	OFF-AUTOMATIC

INSTRUMENT DESIGNATION

- AAA — INSTRUMENT IDENTIFICATION
- XXX — LOOP NUMBER (3 DIGITS)
- I — GENERAL INTERLOCK LOGIC

NOTES:

(1) INCLUDES PIPING, TUBING, AND DUCTING.

(2) VALVE SYMBOLS ARE FOR VALVES WITH MANUAL OPERATOR, EXCEPT WHERE A VALVE IS SHOWN WITH A HANDWHEEL EXTENTION OR WITH AN AUTOMATIC OPERATOR.

(3) ADAPTED FROM INSTRUMENT SOCIETY OF AMERICA STANDARD ISA-S5.1-1984 "INSTRUMENT SYMBOLS AND IDENTIFICATION".

Dave Bramlett 6/24/08

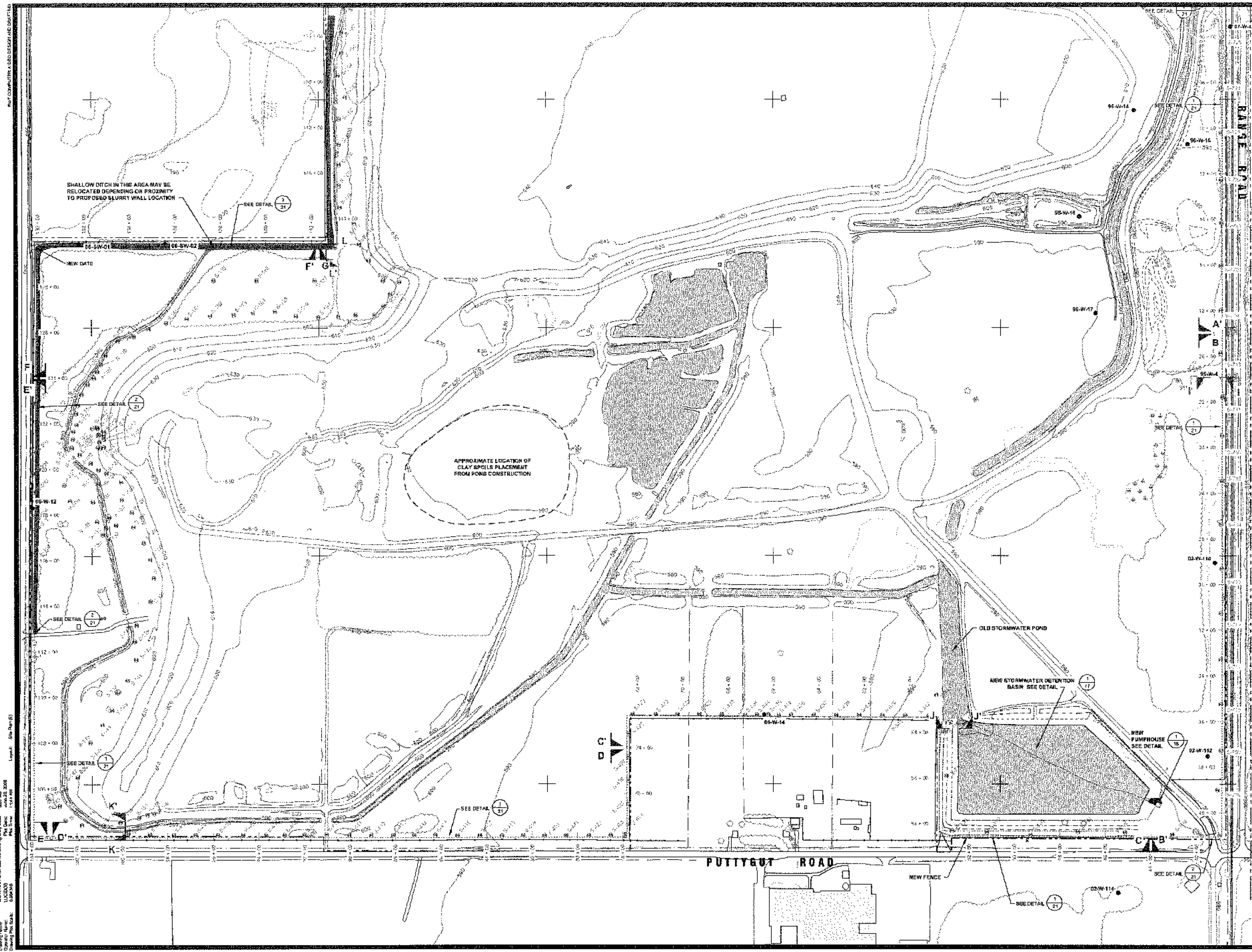
NO.	BY	DATE	REVISION	APP'D.
5.	SL	05-20-2008	AS-BUILT DRAWINGS	DW,VB
4.	SL	09-05-2007	REVISED – ISSUED FOR CONSTRUCTION	DW,VB
3.	SL	07-25-2007	ISSUED FOR CONSTRUCTION	DW,VB
2.	SL,BR	05-16-2007	ISSUED FOR CONSTRUCTION PRICING PURPOSES	DW,VB
1.	SL,BR	05-02-2007	ISSUED FOR CLIENT REVIEW – 60% WORKING COPY	DW,VB

THE DETROIT EDISON COMPANY- RANGE ROAD LANDFILL SLURRY WALL, DETENTION POND, AND PUMP STATION INSTALLATION

ABBREVIATIONS, LEGEND, AND GENERAL NOTES

DRAWN BY: SL	DRAWING SCALE:	PROJECT NO. [?]2407.027	
CHECKED BY: VB,DW		FILE NO. 24079.27.07.dwg	
APPROVED BY: DW	DATE PRINTED:	**Sheet 2 of 23**	
DATE: May 2008			

RMT
3754 Ranchero Drive
Ann Arbor, Michigan 48108-2771
Phone: 734-971-7080
Fax: 734-971-9022



LEGEND

06-W-01	MONITORING WELL LOCATION AND NUMBER FIRST TWO DIGITS INDICATE YEAR WELL WAS INSTALLED (i.e. 06 = 2006)
SW-02	SURFACE WATER SAMPLING POINT LOCATION AND NUMBER
	SOIL BORING LOCATION AND NUMBER
	STAFF GAUGE LOCATION AND NUMBER
	WATER / DITCH
	POWER POLES
	PROPERTY BOUNDARIES
	EXISTING SLURRY WALL
	PROPOSED SLURRY WALL
	FENCE
	CSX RAILROAD
A'	CROSS SECTION LINE
F'	TRANSECT LINE

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE DETROIT EDISON COMPANY, ENGINEERING DEPT., DRAWING NUMBER RANGE_RD-2007.DGN, DATE OF PHOTOGRAPHY 03-13-07.
2. OFF-SITE PROPERTY FEATURES AND PROPERTY LINES ARE NOT INCLUSIVE OF ALL STRUCTURES AND FEATURES.
3. SOIL BORING LOCATIONS DERIVED FROM SURVEY DATA PROVIDED BY DETROIT EDISON CO., PROJECT NO. 200617036, DATED 7-26-2006 AND 3-16-2007.
4. S-210, S-310A, S-310B, S-311A, S-311B, S-316, S-317, S-319, S-320, S-321, S-501, AND S-503 THROUGH S-513 ARE APPROXIMATE.

N

0 200' 400' 600' 800'

SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D.
5.				
4.	SL	06-20-2008	AS-BUILT DRAWINGS	DM,VB
3.	SL	07-25-2007	ISSUED FOR CONSTRUCTION	DM,VB
2.	SL,DR	05-16-2007	ISSUED FOR CONSTRUCTION BIDDING PURPOSES	DM,VB
1.	SL,DR	05-02-2007	ISSUED FOR CLIENT REVIEW-60% WORKING COPY	DM,VB

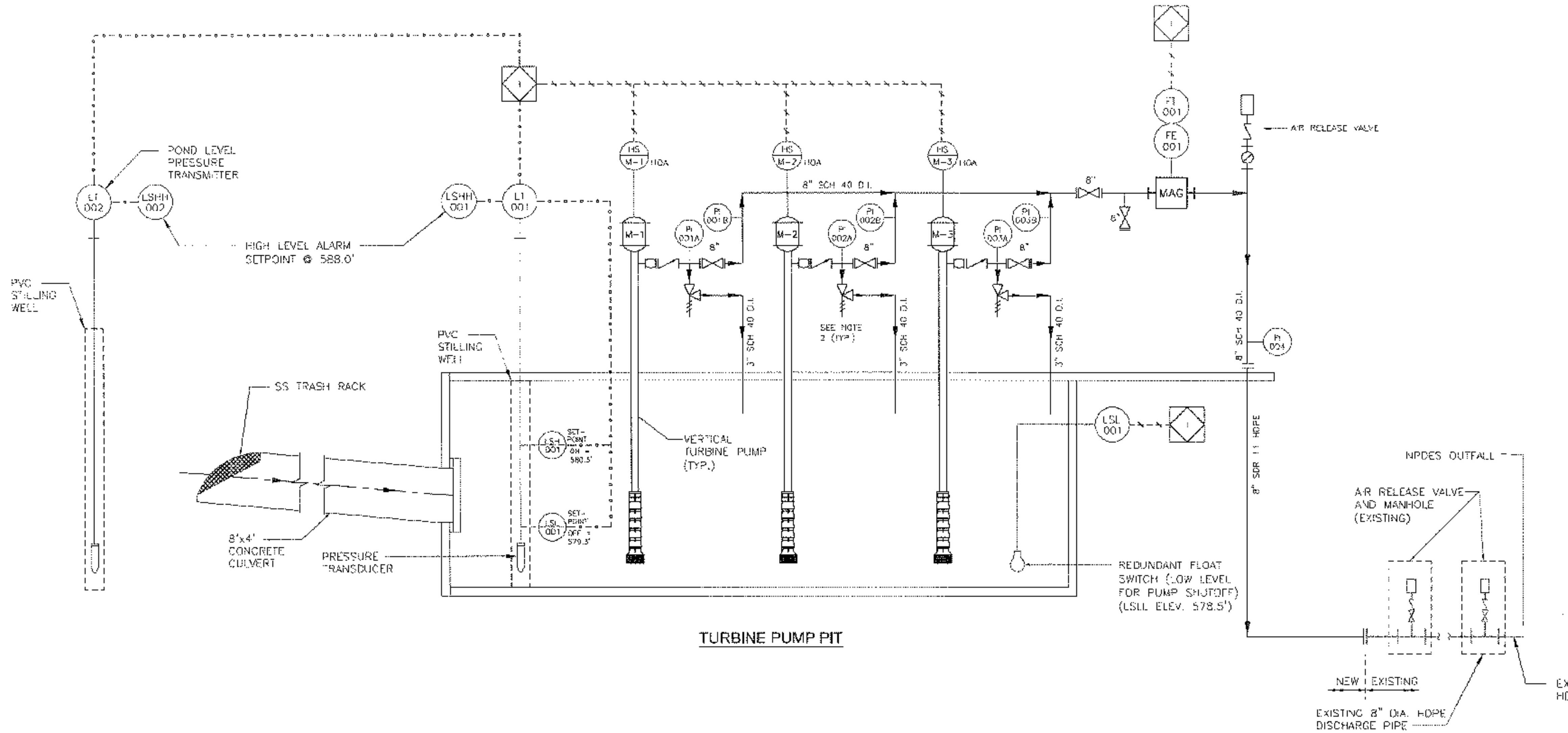
THE DETROIT EDISON COMPANY- RANGE ROAD LANDFILL SLURRY WALL, DETENTION POND, AND PUMP STATION INSTALLATION

SITE PLAN (SOUTH)

DRAWN BY:	SL	DRAWING SCALE: 1" = 200'	PROJECT NO. J1340?9.27
CHECKED BY:	SB,VB		FILE NO. 340?9.27.05-06.dwg
APPROVED BY:	DM	DATE PRINTED:	Sheet 6 of 23
DATE:	May 2008		

RMT

3754 Ranchero Drive
Ann Arbor, Michigan 48108-2711
Phone: 734-971-7080
Fax: 734-971-9022



TURBINE PUMP PIT

LEGEND

- M-X — MOTOR
- FLEX CONNECTOR
- CHECK VALVE
- GATE VALVE
- PI 003 — PRESSURE GAUGE
- LT 001 — LEVEL TRANSMITTER
- FT 001 / FE 001 / MAG — MAGNETIC FLOW METER (FLOW ELEMENT)
- FT 001 — FLOW TRANSMITTER
- LSL 001 — LOW LEVEL SWITCH (LOW,MEDIUM,HIGH)
- CONTROL INTERLOCK
- POWER WIRING
- ANALOG SIGNAL WIRING
- AIR RELEASE VALVE
- PRESSURE RELIEF VALVE

NOTES

1. DIFFERENTIAL WATER LEVEL MEASUREMENT BETWEEN POND LEVEL AND WETWELL LEVEL WILL PROVIDE INDICATION OF POTENTIAL BLOCKAGE AT CONCRETE CULVERT / TRASH RACK.
2. PRESSURE RELIEF VALVE TO BE SET AT 170 PSI, PER DTE MEETING NOTES, SEPTEMBER 5, 2007.

Don C Bramlett 6/24/08

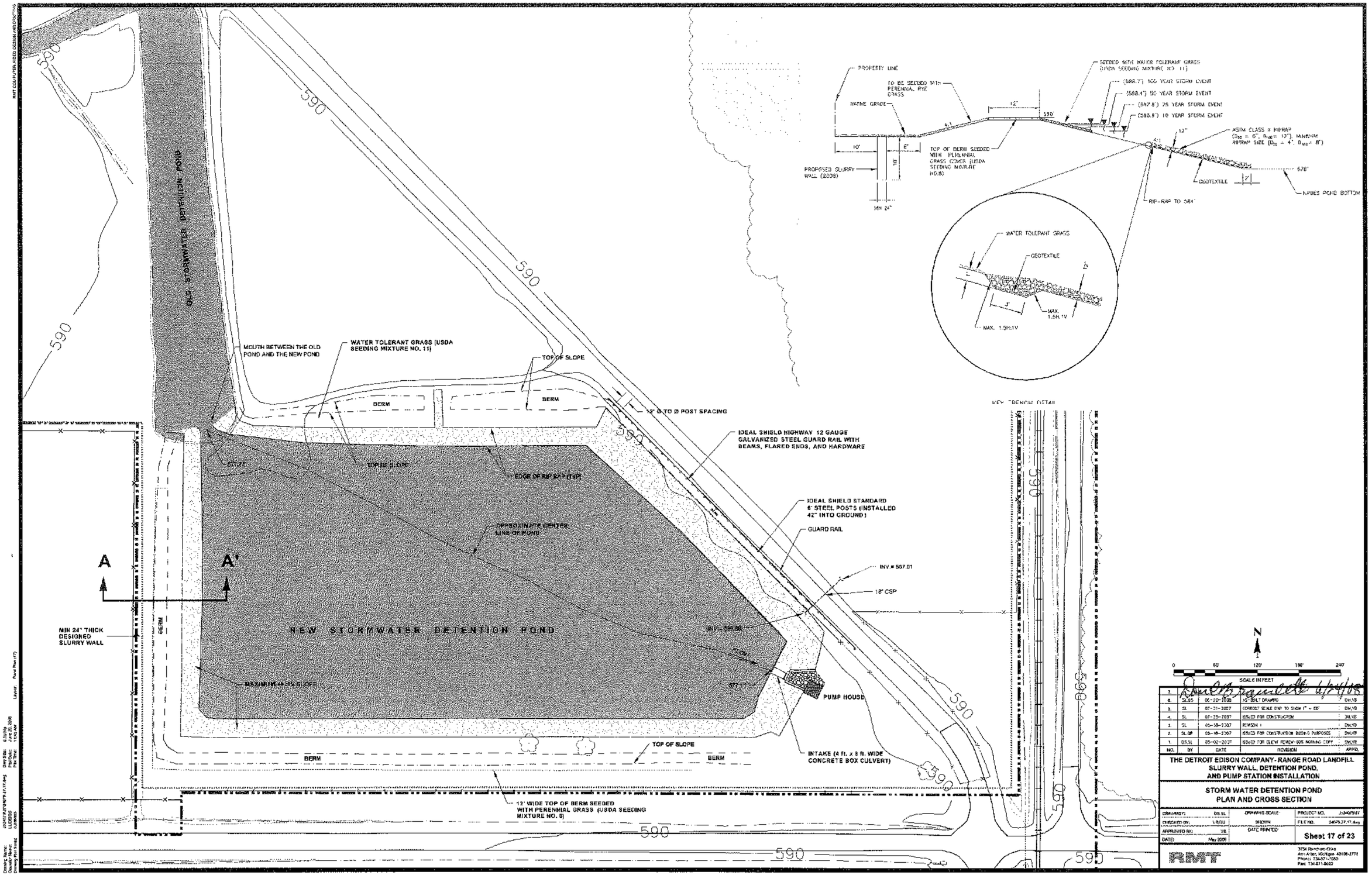
NO.	BY	DATE	REVISION	APP'D.
7.				
6.	SL	06-30-2008	AS-BUILT DRAWINGS	DM,VB
5.	DSS	01-22-2008	GENERAL REVISIONS	DM,VB
4.	DSS	10-10-2007	GENERAL REVISIONS	DM,VB
3.	DSS	09-12-2007	RE-ISSUED FOR CONSTRUCTION	DM,VB
2.	SL,DH	05-16-2007	ISSUED FOR CONSTRUCTION BIDDING PURPOSES	DM,VB
1.	SL,DR	03-02-2007	ISSUED FOR CLIENT REVIEW-60% WORKING COPY	DM,VB

THE DETROIT EDISON COMPANY- RANGE ROAD LANDFILL SLURRY WALL, DETENTION POND, AND PUMP STATION INSTALLATION

SYSTEM PROCESS & INSTRUMENTATION DIAGRAM

DRAWN BY: SIEWERTD	DRAWING SCALE:	PROJECT NO.	[illegible]
CHECKED BY: VB,DM	SHOWN	FILE NO.	24019.2T.07.dwg
APPROVED BY: DM	DATE PRINTED:	Sheet 7 of 23	
DATE: May 2008			

RMT
3754 Ranchero Drive
Ann Arbor, Michigan 48108-2771
Phone: 734-971-7080
Fax: 734-971-9022



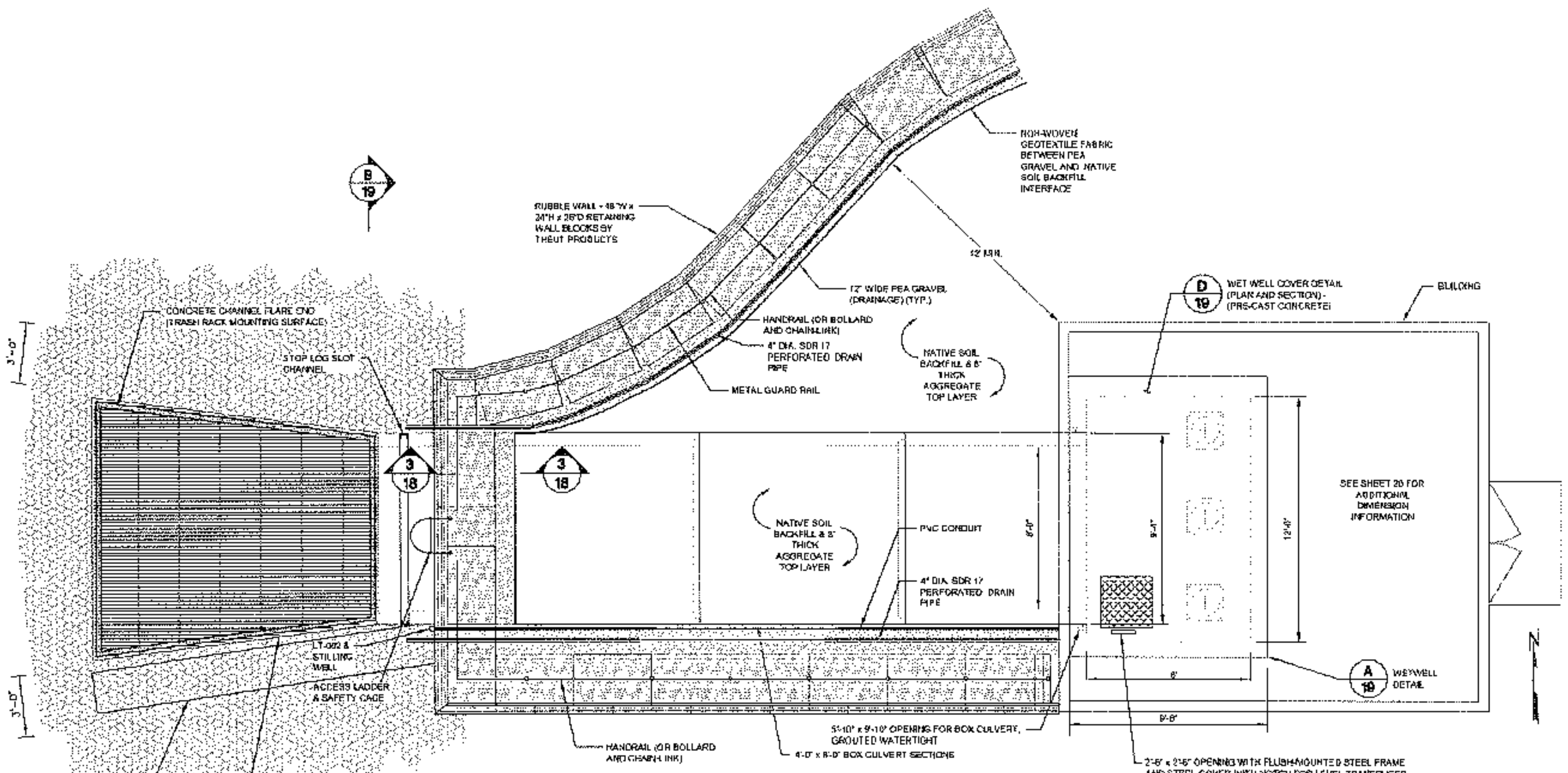
NO.	BY	DATE	REVISION	APPD.
7.				
6.	SL/DS	06-20-2008	AS-BUILT DRAWING	DM/VB
5.	SL	07-31-2007	CORRECT SCALE EXP. TO SHOW 1" = 60'	DM/VB
4.	SL	07-25-2007	ISSUED FOR CONSTRUCTION	DM/VB
3.	SL	05-18-2007	REVISION 1	DM/VB
2.	SL/DS	03-16-2007	ISSUED FOR CONSTRUCTION BIDDING PURPOSES	DM/VB
1.	DS/SL	05-02-2007	ISSUED FOR CLIENT REVIEW-95% NORMAL COPY	DM/VB

THE DETROIT EDISON COMPANY- RANGE ROAD LANDFILL SLURRY WALL, DETENTION POND, AND PUMP STATION INSTALLATION

STORM WATER DETENTION POND PLAN AND CROSS SECTION

DRAWN BY:	DS/SL	DRAWING SCALE:	PROJECT NO. 24575.27.17.4wg
DESIGNED BY:	VB/DU	SHOWN	FILE NO. 24575.27.17.4wg
APPROVED BY:	VB	DATE PRINTED:	Sheet 17 of 23
DATE:	May 2008		

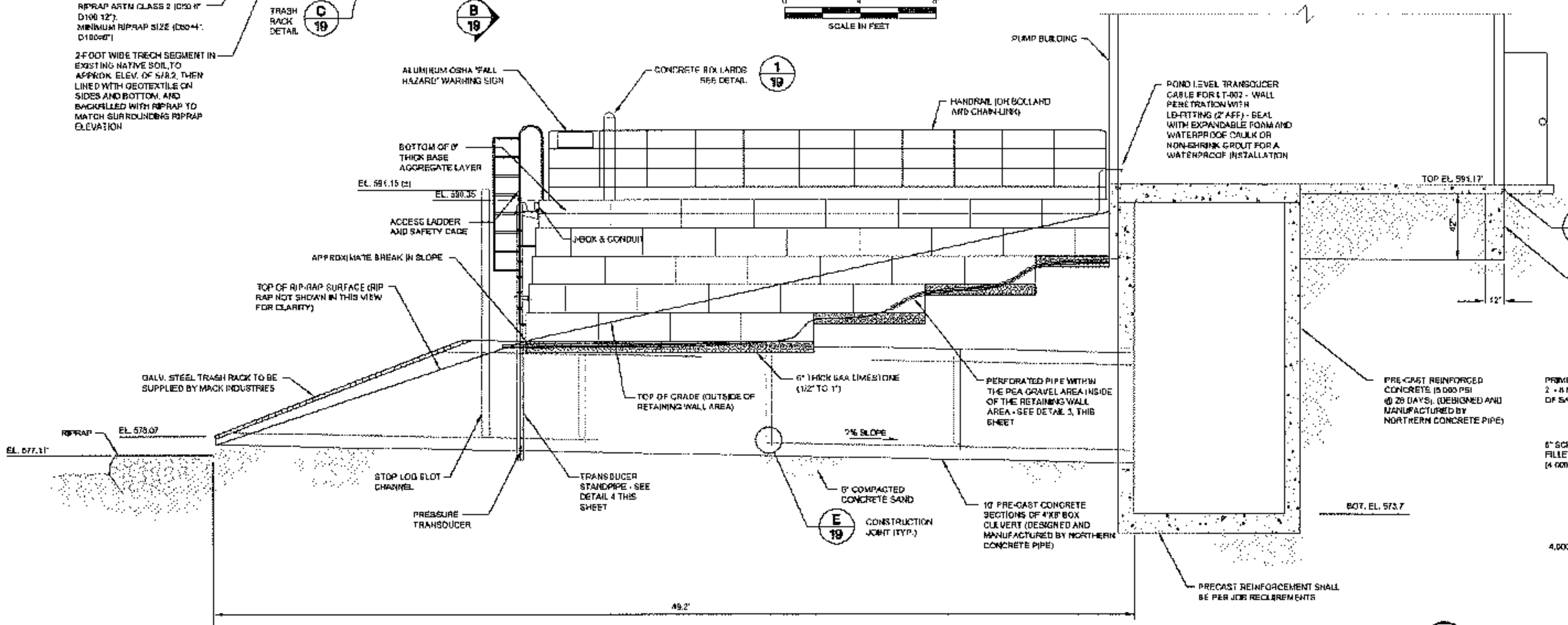
RMT
3754 Ranchero Drive
Ann Arbor, Michigan 48108-2771
Phone: 734-971-7080
Fax: 734-971-9022



1/18 PUMP STATION, CULVERT, AND RETAINING WALL SECTION

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

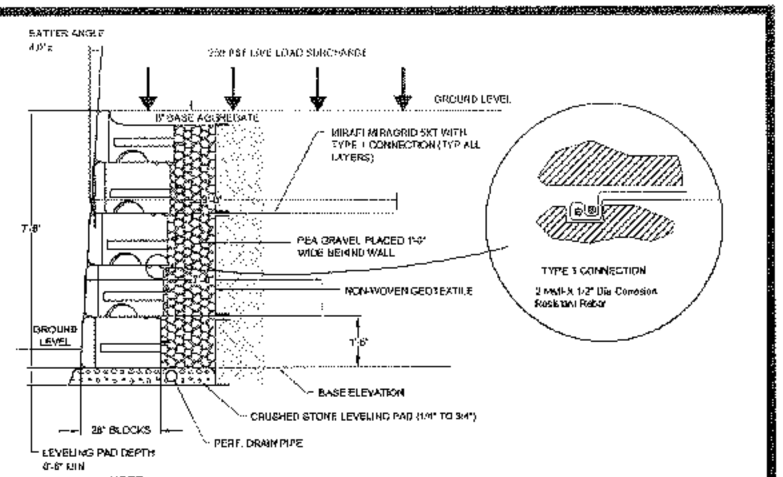
SCALE IN FEET



2/18 PUMP STATION, CULVERT, AND RETAINING WALL ELEVATION

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

SCALE IN FEET

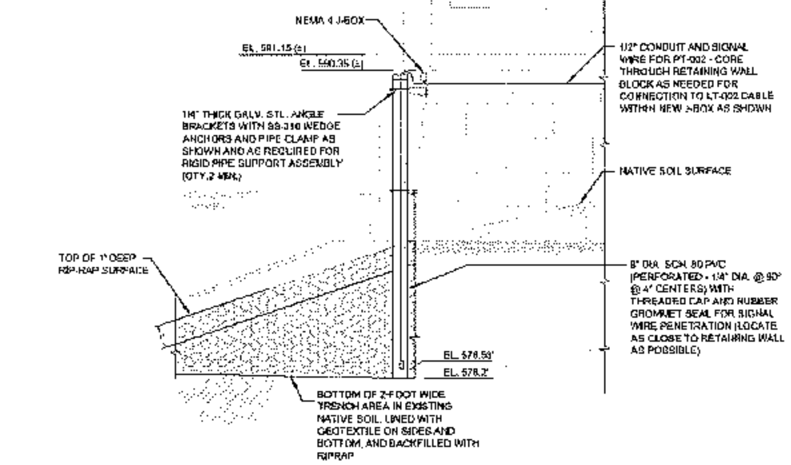


NOTE:

1. VERTICAL PLACEMENT FOR GEOGRID LAYERS IS MEASURED FROM THE BASE ELEVATION.
2. LENGTH OF GEOGRID IS MEASURED FROM THE FRONT FACE OF THE BLOCK.

3/18 DETAIL

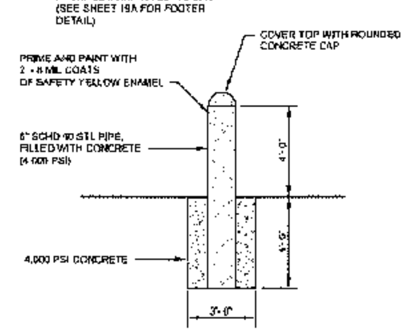
NOT TO SCALE



4/18 TRANSDUCER INSTALLATION DETAIL

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

SCALE IN FEET



5/18 CONCRETE BOLLARD

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

SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D
10.				
9.	SL	06-20-2008	AS-BUILT DRAWINGS	DM,VB
8.	DSS	05-02-2008	CONSTRUCTION DOCUMENTATION	DM,VB
7.	DSS	03-18-2008	CONSTRUCTION DOCUMENTATION	DM,VB
6.	DSS	01-22-2008	ADDED BUILDING FOOTER DETAIL	DM,VB
5.	DSS	10-10-2007	GENERAL REVISIONS	DM,VB
4.	DSS	09-26-2007	REVISED WETWELL SIZE TO 12'-0" WIDE	DM,VB
3.	SL	08-12-2007	ISSUED FOR CONSTRUCTION	DM,VB
2.	DS,S.	05-16-2007	ISSUED FOR CONSTRUCTION BIDDING PURPOSES	DM,VB
1.	DS,S.	05-02-2007	ISSUED FOR CLIENT REVIEW - 60% WORKING COPY	DM,VB

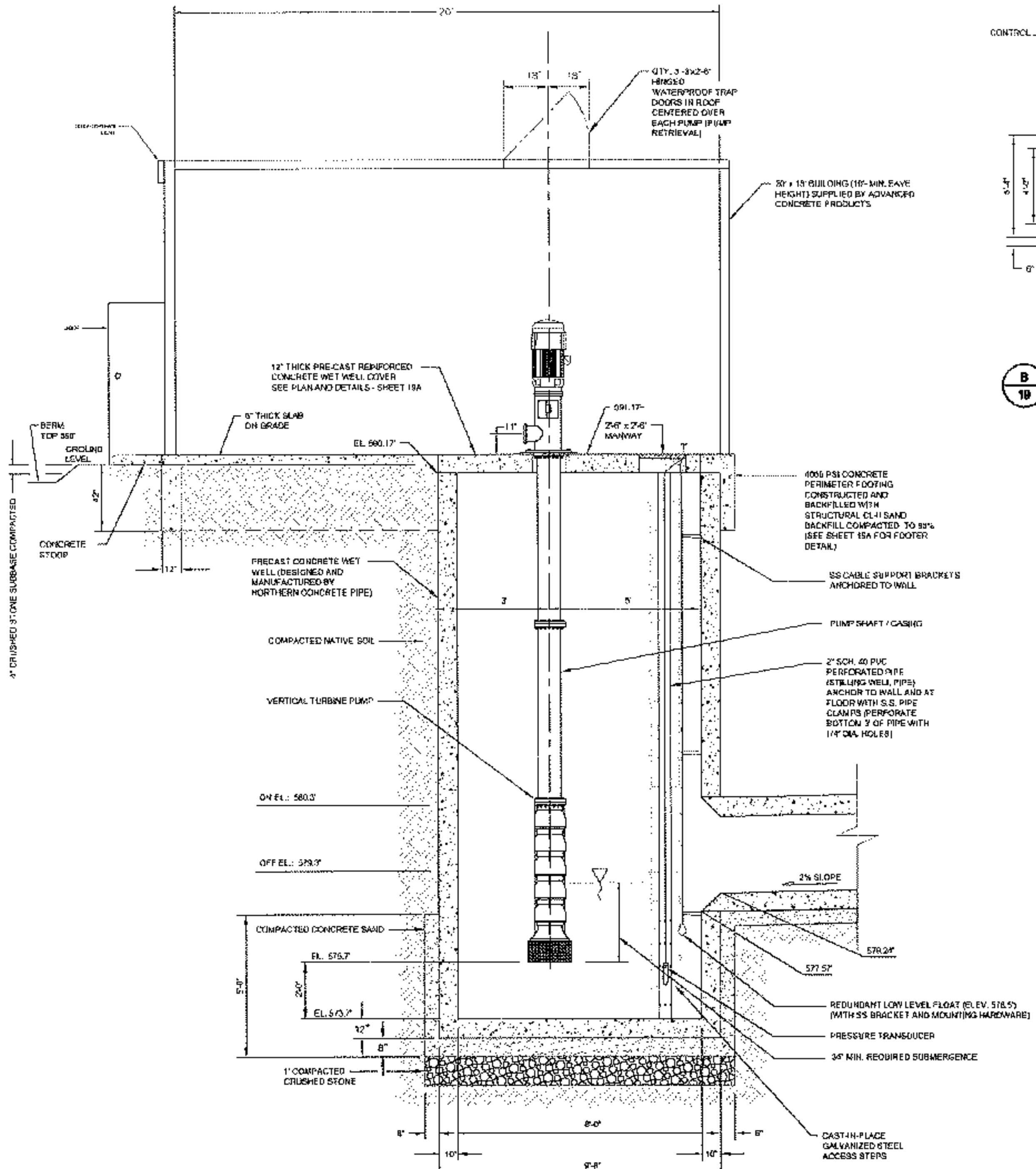
THE DETROIT EDISON COMPANY- RANGE ROAD LANDFILL SLURRY WALL, DETENTION POND, AND PUMP STATION INSTALLATION

PUMP STATION LAYOUT

DRAWN BY: SIEWERTD	DRAWING SCALE: 1/4" = 1'	PROJECT NO.	
CHECKED BY: VB,DM		FILE NO.	24079.27.18.dwg
APPROVED BY: DM	DATE PRINTED:	**Sheet 18 of 23**	
DATE: NOV 2006			

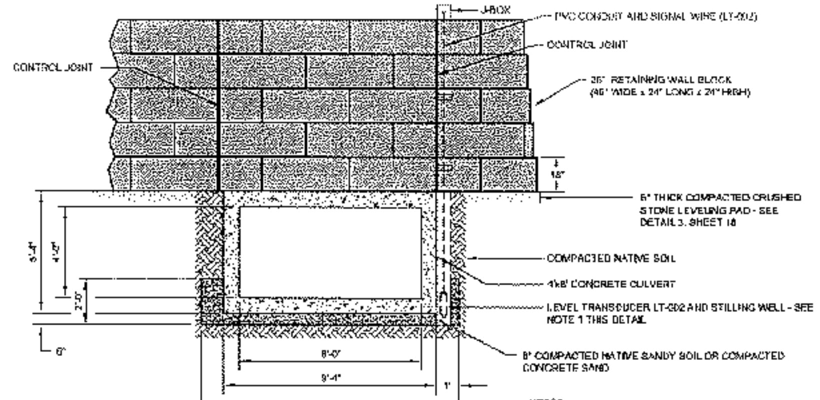
RMT INC.

3754 Ranchero Drive
Ann Arbor, Michigan 48108-2771
Phone: 734/971-7080
Fax: 734/971-9022



A / 19 — **WET WELL DETAIL**

NOT TO SCALE

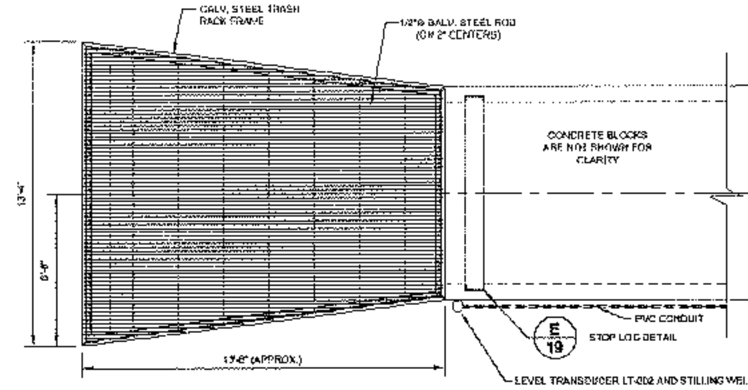


NOTES
1. 6" SCH. 80 PERFORATED PVC PIPE AND 2 SS-316 PIPE CLAMPS AND SS CONCRETE WEDGE - ANCHORS FOR STILLING WELL MOUNT - TRANSDUCER WIRING CONNECTED TO SHIELDED SIGNAL WIRE INSIDE J-BOX, AND ROUTED INSIDE 1/2" PVC CONDUIT AT 2-FOOT DEPTH MIN. TO CONTROL PANEL

B / 19 — **BOX CULVERT SECTION**

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

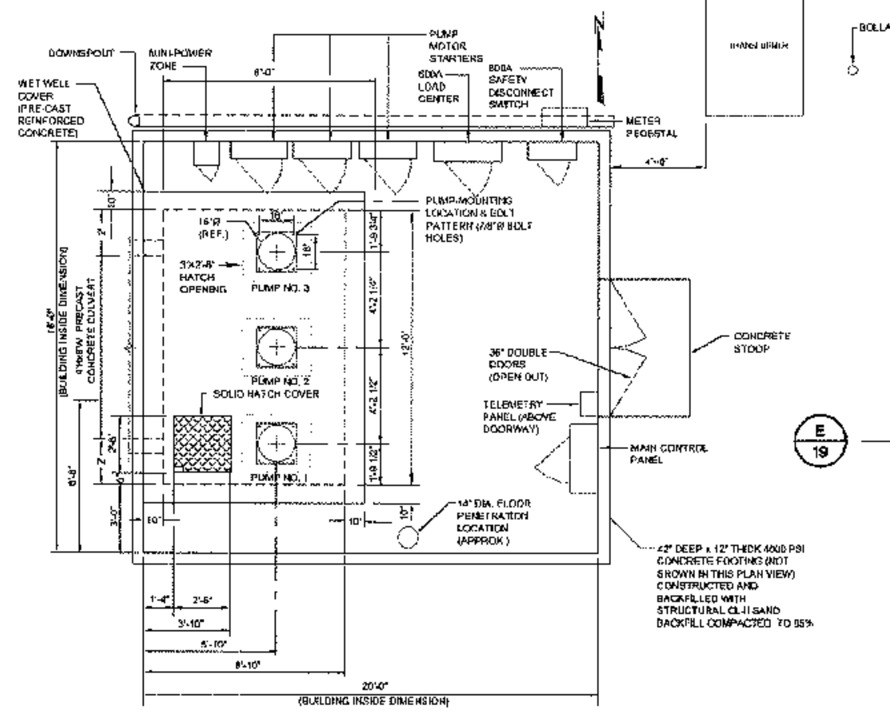
0 4' 8' SCALE IN FEET



C / 19 — **TRASH RACK DETAIL**

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

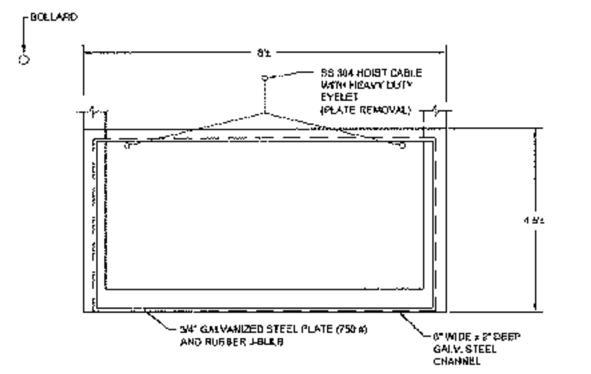
0 4' 8' SCALE IN FEET



D / 19 — **PUMP BUILDING - CONCRETE PAD DETAIL**

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

0 4' 8' SCALE IN FEET

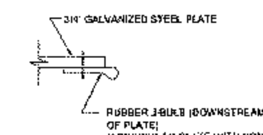


E / 19 — **STOP LOG DETAIL**

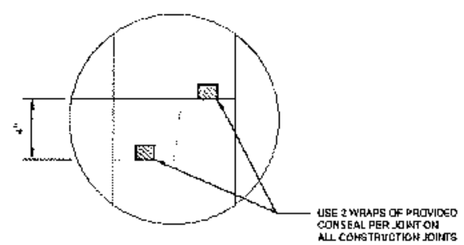
SCALE: 1/2"=1'-0"

0 2' 4' SCALE IN FEET

THIS ASSEMBLY SHALL BE ORDERED AND SUPPLIED BY CONTRACTOR



NOTE: SEE SHEET 19A AND 19B FOR ADDITIONAL INFORMATION



E / 19 — **CONSTRUCTION JOINT DETAIL**

(NOT TO SCALE)

NO.	BY	DATE	REVISION	APP'D.
10.	SL	09-30-2008	AS-BUILT DRAWINGS	DM,VB
9.	DSS	05-02-2008	CONSTRUCTION DOCUMENTATION	DM,VB
8.	DSS	03-18-2008	CONSTRUCTION DOCUMENTATION	DM,VB
7.	DSS	01-22-2008	ADDED BUILDING FOOTER DETAIL	DM,VB
6.	DSS	10-10-2007	GENERAL REVISIONS	DM,VB
5.	DSS	09-38-2007	REVISED WET WELL SIZE TO 12'-0" WIDE	DM,VB
4.	SL	08-30-2007	ISSUED FOR CONSTRUCTION	DM,VB
3.	SL	05-18-2007	REVISION 1	DM,VB
2.	DS,SL	05-15-2007	ISSUED FOR CONSTRUCTION BIDDING PURPOSES	DM,VB
1.	DS,SL	05-02-2007	ISSUED FOR CLIENT REVIEW - 90% WORKING COPY	DM,VB

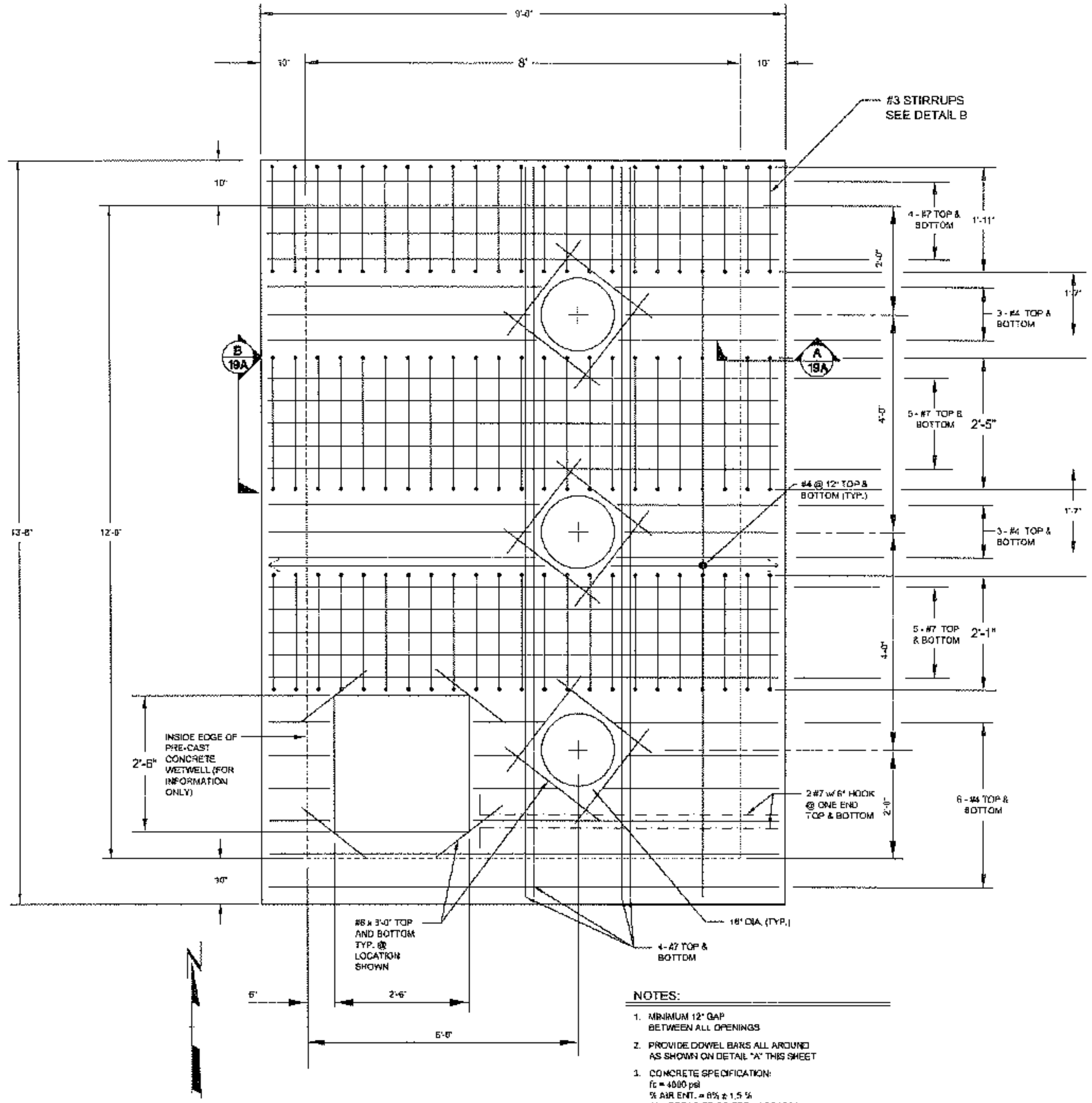
THE DETROIT EDISON COMPANY- RANGE ROAD LANDFILL SLURRY WALL, DETENTION POND, AND PUMP STATION INSTALLATION

PUMP STATION DETAILS

DRAWN BY: DS	DRAWING SCALE:	PROJECT NO. JA24078127	
CHECKED BY: VH,BM	1/4" = 1'	FILE NO. 24078127.19.DWG	
APPROVED BY: DM	DATE PRINTED:	**Sheet 19 of 23**	
DATE: June 2008			

RMT INC.

3754 Ranchero Drive
Ann Arbor, Michigan 48108-2771
Phone: 734-971-7080
Fax: 734-971-9022



NOTES:

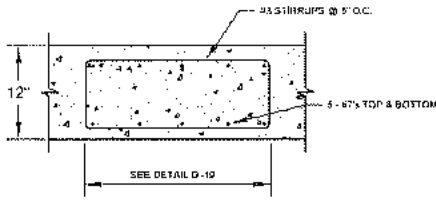
1. MINIMUM 12" GAP BETWEEN ALL OPENINGS
2. PROVIDE DOWEL BARS ALL AROUND AS SHOWN ON DETAIL "A" THIS SHEET
1. CONCRETE SPECIFICATION:
   fc = 4000 psi
   % AIR ENT. = 6% ± 1.5 %
   ALL REBAR TO BE EPOXY COATED

D / 19 **WET WELL COVER DETAIL**

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

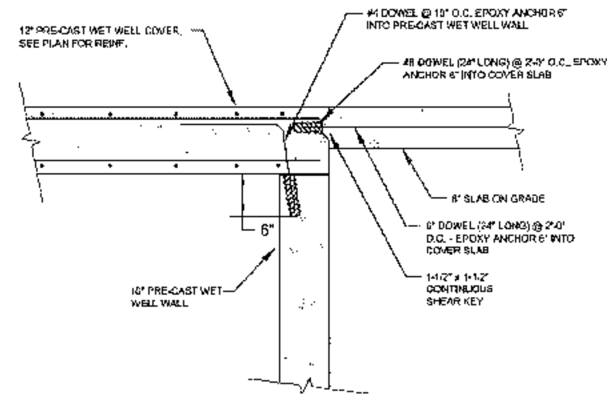
0 1.5' 3'

SCALE IN FEET



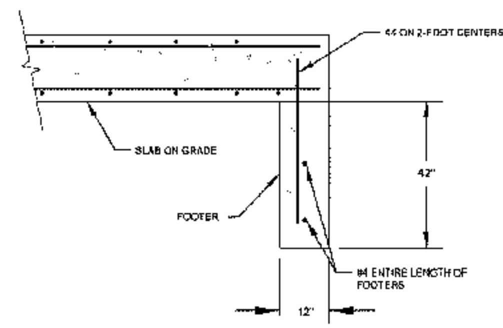
B / 19A **SECTION - BEAM ELEMENT**

NOT TO SCALE



A / 19A **SECTION - WET WELL COVER @ WALL**

NOT TO SCALE



C / 19A **CONCRETE FOOTER DETAIL**

NOT TO SCALE

NO.	BY	DATE	REVISION	APP'D.
5.				
4.	SL	06-20-2008	AS-BUILT DRAWINGS	DM,VB
3.	DSS	01-22-2008	ADDED BUILDING FOOTER DETAIL	DM,VB
2.	DSS	10-10-2007	GENERAL REVISIONS	DS,VB
1.	SL	08-30-2007	ISSUED FOR CONSTRUCTION	DM,VB

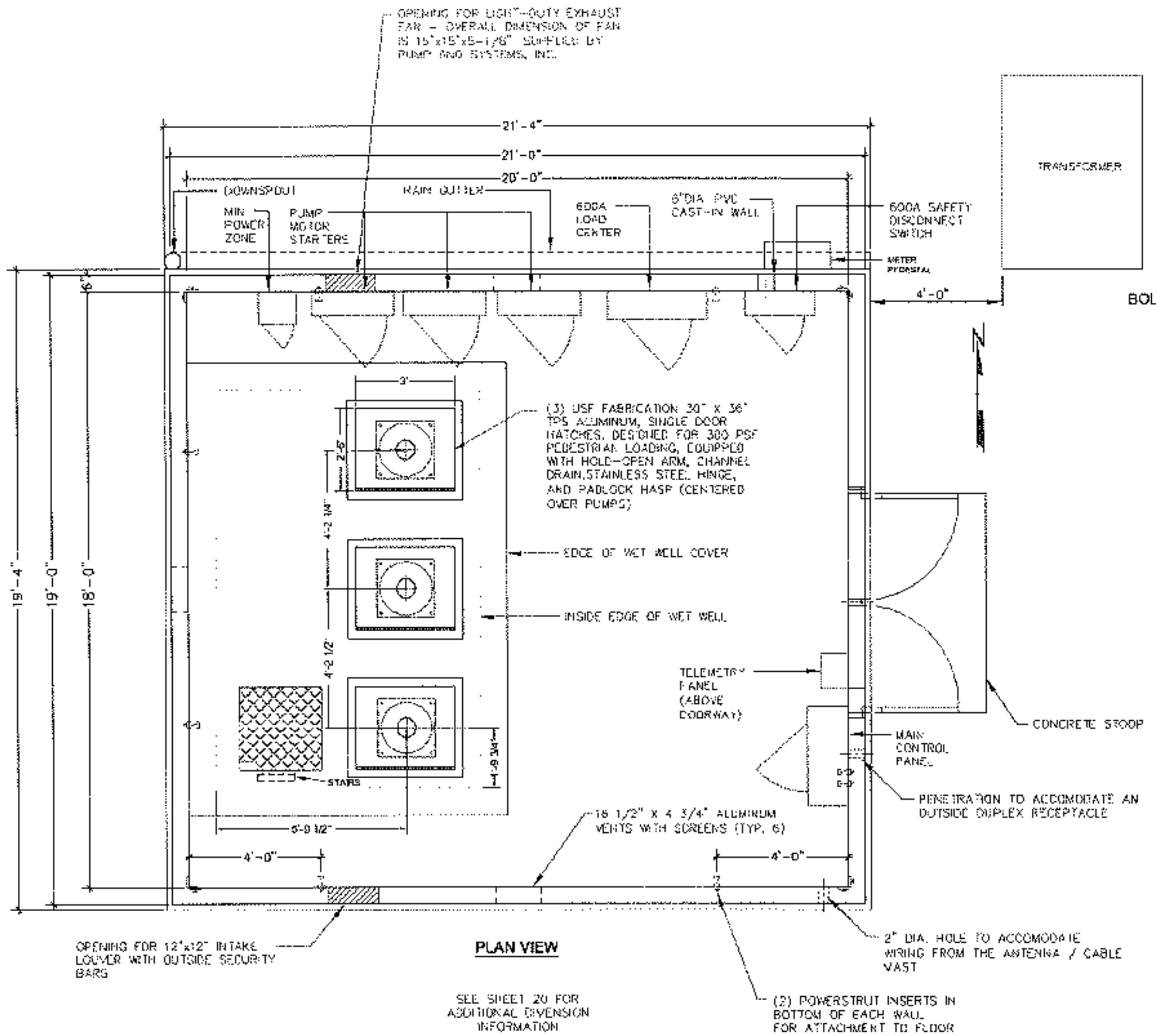
THE DETROIT EDISON COMPANY- RANGE ROAD LANDFILL SLURRY WALL, DETENTION POND, AND PUMP STATION INSTALLATION

WET WELL COVER DETAILS

DRAWN BY: DS	DRAWING SCALE: SHOWN	PROJECT NO. 00407927
CHECKED BY: VB,DM		FILE NO. 24079.27.19A.dwg
APPROVED BY: DM	DATE PRINTED:	**Sheet 19A of 23**
DATE: May 2008		

RMT

3754 Ranchero Drive
Ann Arbor, Michigan 48108-2771
Phone: 734-971-7080
Fax: 734-971-9022



STRUCTURAL NOTES: (PROVIDED BY ADVANCED CONCRETE PRODUCTS CO.)

CONCRETE: 5000 P.S.I. @ 28 DAYS
ACI318-83 GRADE 60 REINFORCING STEEL

ROOF:
#7 BAR @ 10" O.C. WALL TO WALL, FIRST LAYER, I.F.
#5 BAR @ 10" O.C. WALL TO SEAM, SECOND LAYER, I.F.
(2) EXTRA #7 BARS @ EDGE OF EACH HATCH OPENING, 5' LONG, I.F.

WALLS:
#6 BAR @ 12" O.C. EACH WAY, I.F.
(2) EXTRA #7 BARS FULL HEIGHT @ EACH EDGE OF ENTRY DOORS
(2) EXTRA #7 BARS X 9' LONG ABOVE DOORS

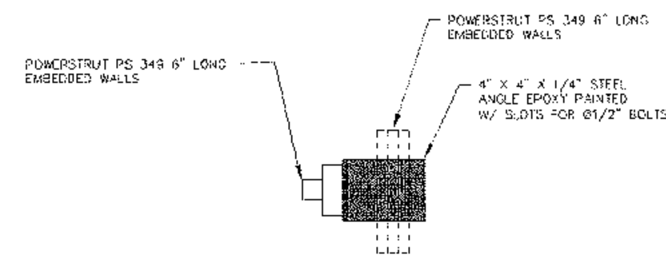
ROOF LOAD 70 PSF
WIND LOAD 27 PSF OR 130 MPH
FIRE RESISTANCE RATING: 1 1/2 HOURS

EXPOSED 174 LIMESTONE AGGREGATE EXTERIOR FINISH

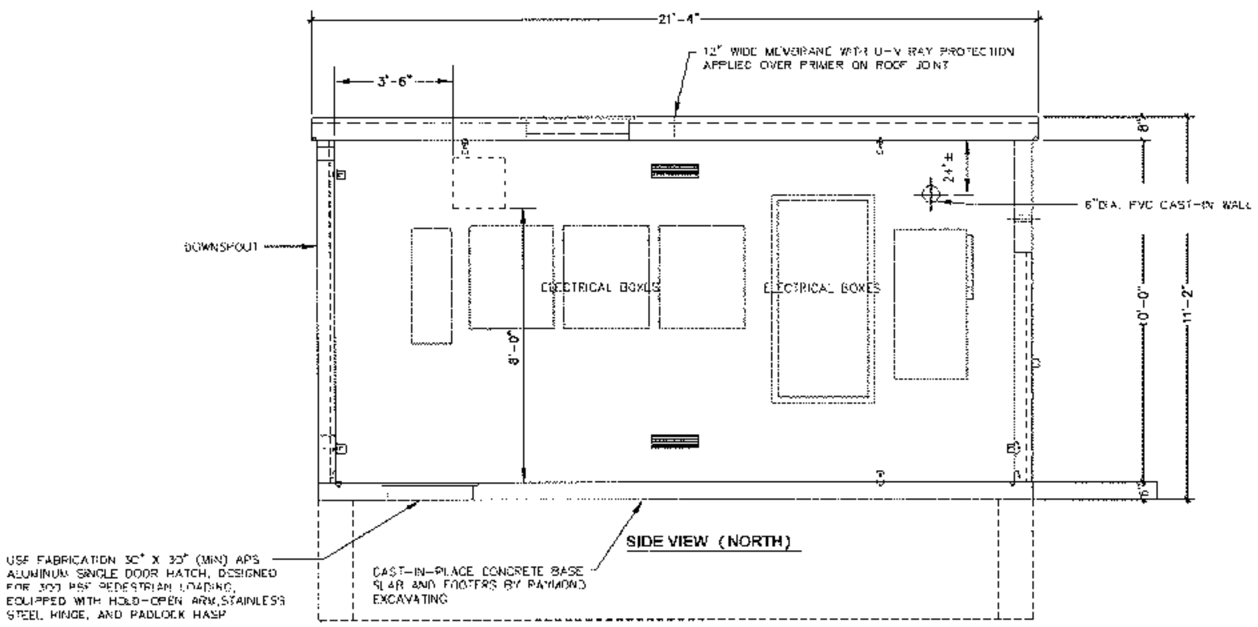
STEEL DOORS MANUFACTURED BY CECO DOOR DIVISION
16 GAUGE STEEL, 1 3/4" THICK, PRIMED FOR PAINT.

THE BUILDING IS SUPPLIED BY PUMPS AND SYSTEMS, INC. (ADVANCED CONCRETE PRODUCTS, CO. HIGHLAND, MICHIGAN TO SUPPLY THE BUILDING TO PUMPS AND SYSTEMS, INC.)

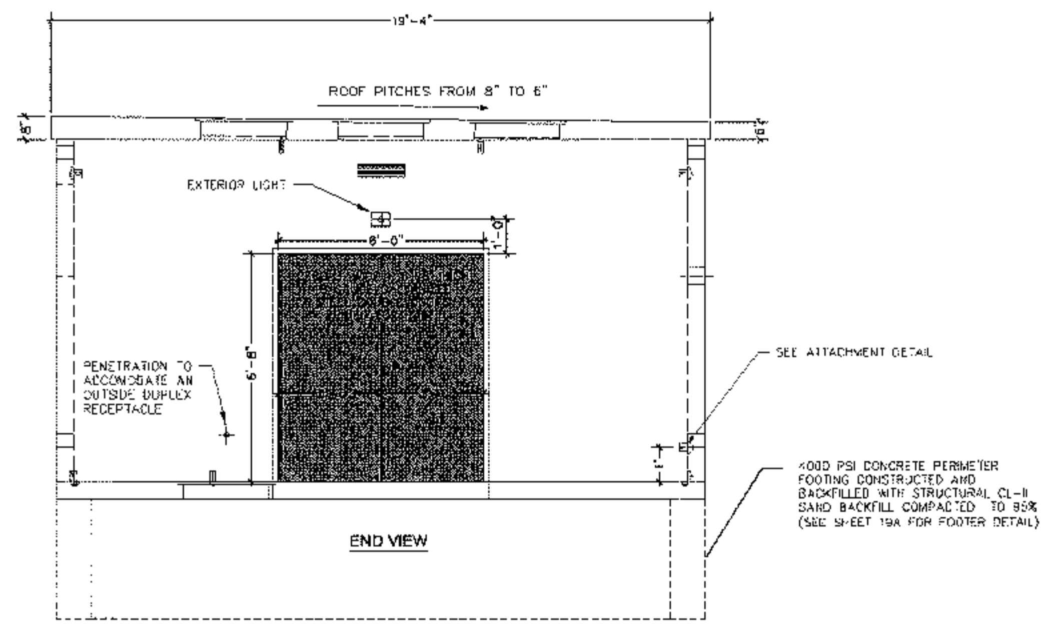
ADVANCE CONCRETE PRODUCTS CO.
HIGHLAND, MI (248)887-4173
(800)824-8351
FAX# (248)887-2755



PANEL TO PANEL ATTACHMENT DETAIL
VIEW LOOKING AT THE INTERIOR CORNER



SIDE VIEW (NORTH)



END VIEW

Don Brancott 6/24/08

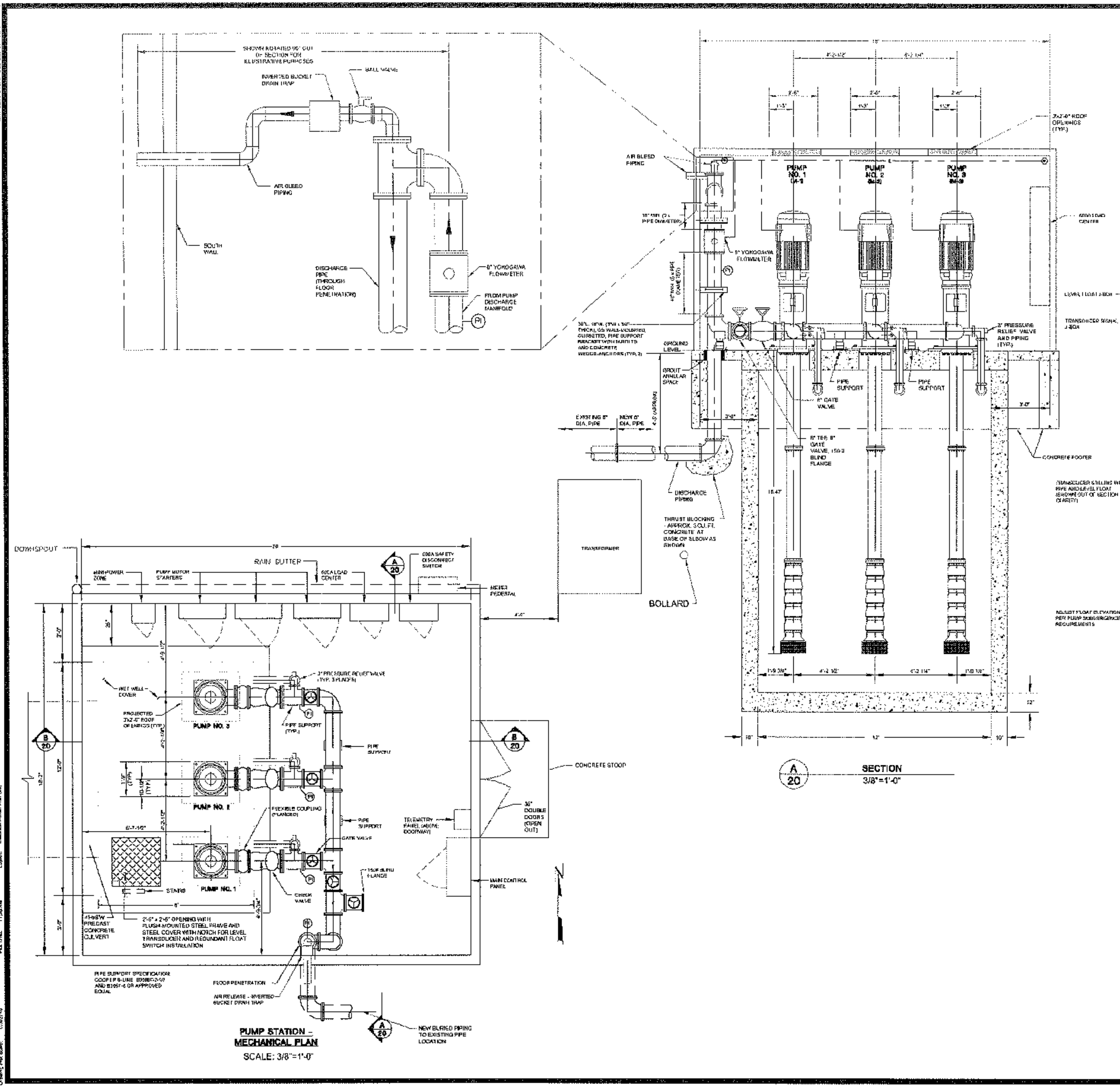
NO	BY	DATE	REVISION	APP'D.
7.				
6.	DSS	06-20-2008	AS-BUILT DRAWINGS	DM,VB
5.	DSS	05-07-2008	CONSTRUCTION DOCUMENTATION	DM,VB
4.	DSS	03-18-2008	CONSTRUCTION DOCUMENTATION	DM,VB
3.	DSS	01-22-2008	ADDED BUILDING FOOTER DETAIL	DM,VB
2.	DSS	10-10-2007	GENERAL REVISIONS	DS,VB
1.	S.	08-30-2007	ISSUED FOR CONSTRUCTION	DM,VB

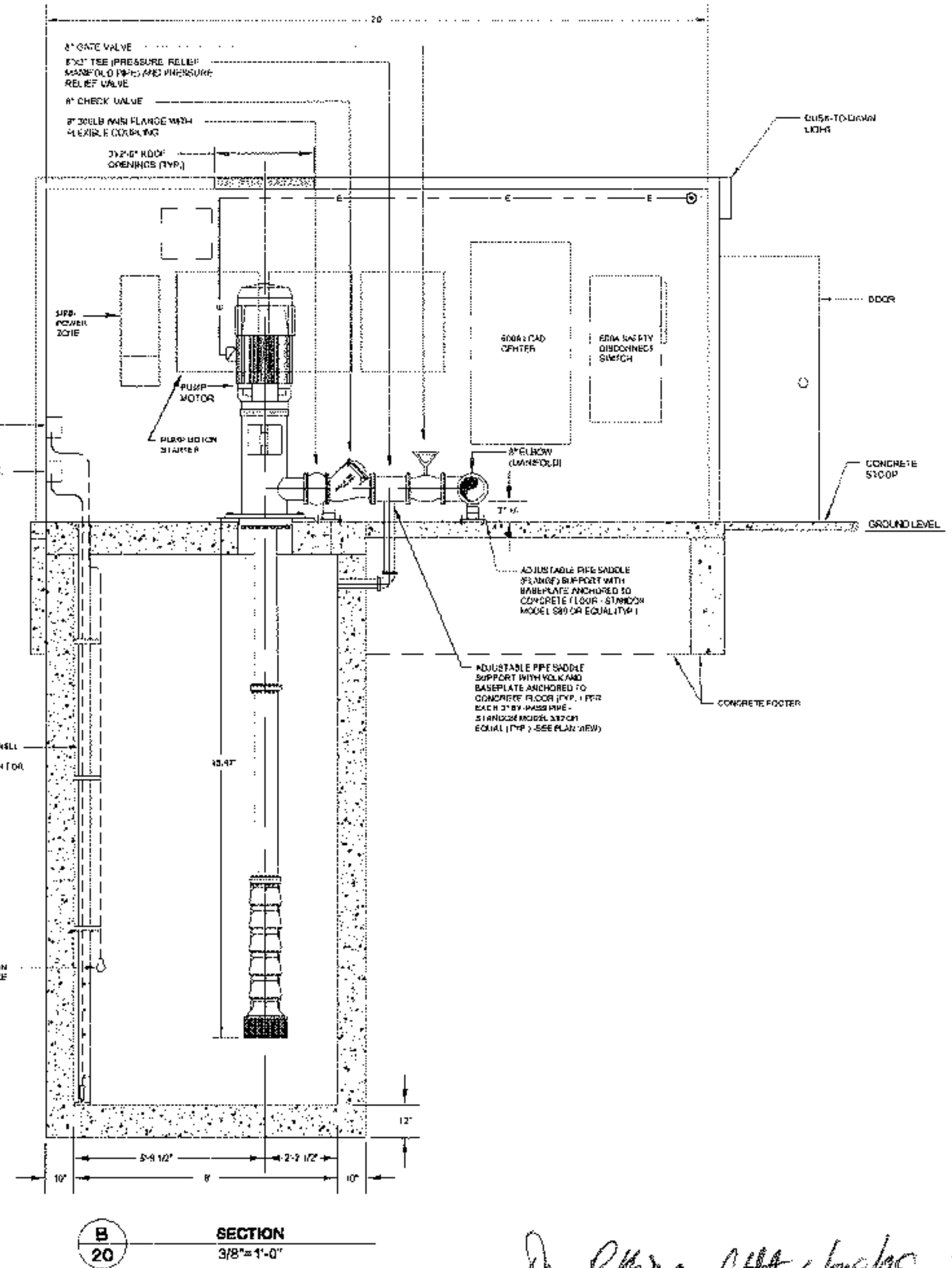
THE DETROIT EDISON COMPANY- RANGE ROAD LANDFILL SLURRY WALL, DETENTION POND, AND PUMP STATION INSTALLATION

PUMP BUILDING

DRAWN BY:	SIEWERTD	DRAWING SCALE:	PROJECT NO. J24078027
CHECKED BY:	VB,DM	3/8"=1'-0"	FILE NO. 24078.27.19B.dwg
APPROVED BY:	DM	DATE PRINTED:	**Sheet 19B of 23**
DATE:	June 2008		

RMT
3754 Ranchero Drive
Ann Arbor, Michigan 48108-2771
Phone: 734-971-7080
Fax: 734-971-9022





Don C Bramlett 6/24/08

NO.	BY	DATE	REVISION	APP'D.
12.	DSS	06-20-2008	AS-BUILT DRAWINGS	DM,VB
11.	DSS	02-02-2008	CONSTRUCTION DOCUMENTATION	DM,VB
10.	DSS	03-18-2008	CONSTRUCTION DOCUMENTATION	DM,VB
9.	DSS	01-22-2008	ADDED BUILDING FOOTER DETAIL	DM,VB
8.	DSS	10-10-2007	GENERAL REVISIONS	DM,VB
7.	DSS	09-28-2007	REVISED WETWELL SIZE TO 12'-6" WIDE	DM,VB
6.	DSS	09-12-2007	RE-ISSUED FOR CONSTRUCTION	DM,VB
5.	SL	07-25-2007	ISSUED FOR CONSTRUCTION	DM,VB
4.	SL	01-09-2007	REVISION 2	DM,VB
3.	SL	05-18-2007	REVISION 1	DM,VB
2.	DS,SL	05-16-2007	ISSUED FOR CONSTRUCTION BIDDING PURPOSES	DM,VB
1.	DS,SL	05-07-2007	ISSUED FOR CLIENT REVIEW - NOT WORKING COPY	DM,VB

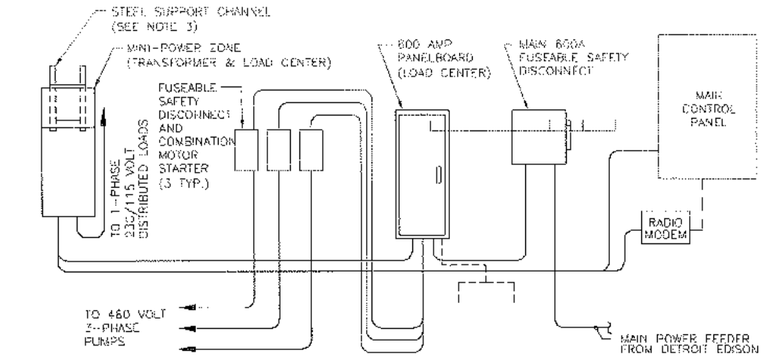
THE DETROIT EDISON COMPANY- RANGE ROAD LANDFILL SLURRY WALL, DETENTION POND, AND PUMP STATION INSTALLATION

PUMP STATION MECHANICAL PLAN AND SECTIONS

DRAWN BY:	DS	DRAWING SCALE:	PROJECT NO.	J2407920
CHECKED BY:	VB DM	3/8" = 1'	FILE NO.	24079.27.20.dwg
APPROVED BY:	DM	DATE PRINTED:	Sheet 20 of 23	
DATE:	May 2008			

RMT

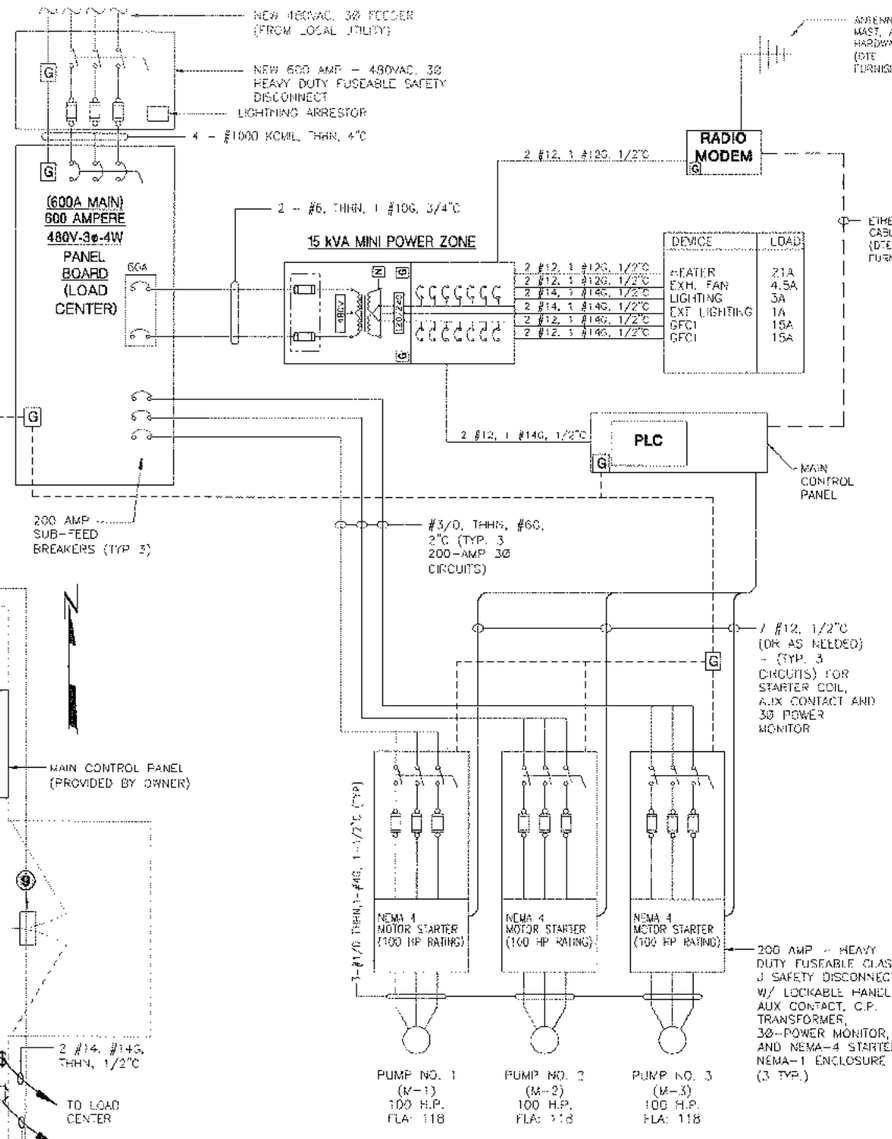
3754 Ranchero Drive
Ann Arbor, Michigan 48108-2771
Phone: 734-971-7080
Fax: 734-971-9022



NOTE: REFER TO DTE TECHNICAL REQUIREMENTS FOR BUILDING GROUND SYSTEM

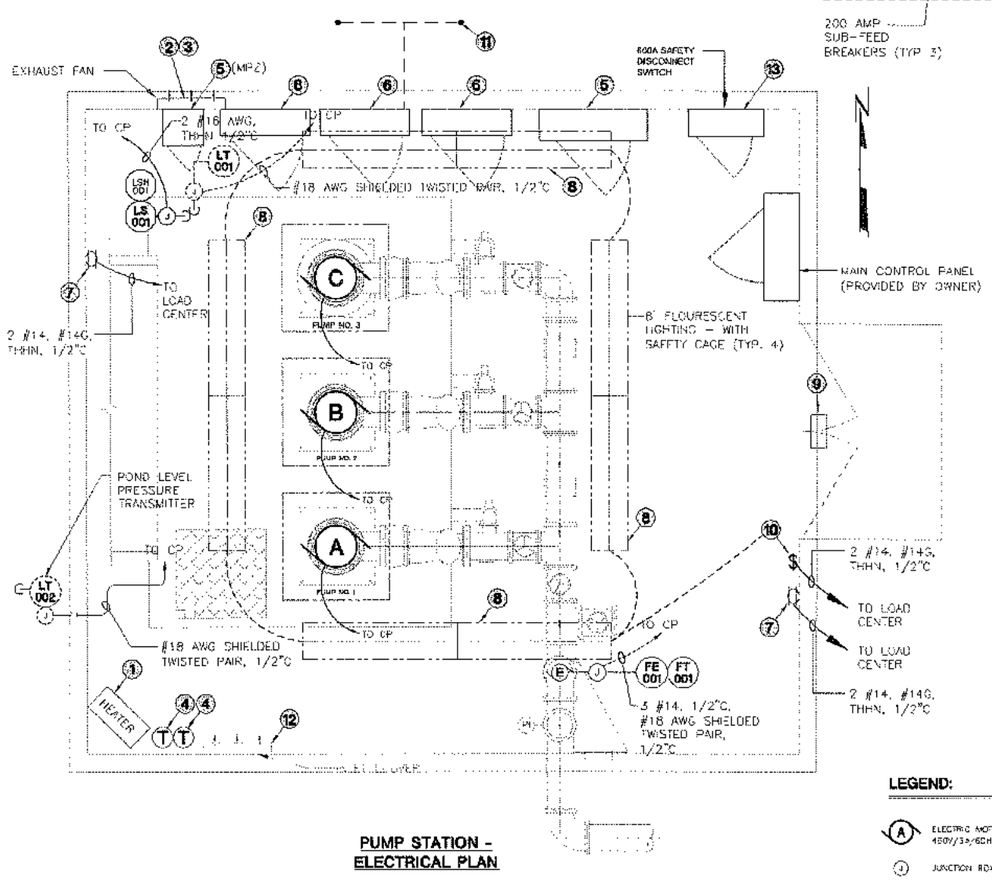
ELECTRICAL EQUIPMENT ELEVATION DETAIL

NOT TO SCALE



ELECTRICAL RISER DIAGRAM

NOT TO SCALE



PUMP STATION - ELECTRICAL PLAN

LEGEND:

- (A) ELECTRIC MOTOR 480V/3Ø/60Hz
- (J) JUNCTION BOX
- DIGITAL/DISCRETE SIGNAL
- ANALOG SIGNAL
- $ LIGHT SWITCH
- (T) THERMOSTAT
- DUPLEX RECEPTACLE

MOTOR DATA SCHEDULE

	MOTOR DESCRIPTION	H.P.	VOLT/PHASE	F.L.A.	RPM	MAKE	MODEL	SERIAL #
A	PUMP NO. 1	100	480/3	118	1800	NATIONAL		
B	PUMP NO. 2	100	480/3	118	1800	NATIONAL		
C	PUMP NO. 3	100	480/3	118	1800	NATIONAL		
E	FLOW METER	-	120/1	5A	N/A			

ELECTRICAL EQUIPMENT SPECIFICATIONS

1. MARLEY ELECTRICAL UNIT HEATER (UH-1) MODEL VE-150, 21.0 FLA, 230 VOLT 1-PHASE, MOUNT TOP OF HEATER APPROX. 2'-0" FROM CEILING CONTROL FROM THERMOSTAT, SEE NOTE 4.
2. EXHAUST FAN (EF-1) 12" DIA. x 24.00 CFM AT 0" STATIC PRESSURE WITH 1/8 H.P., 12SV, (1.1 AMPS LOAD AMPS), SINGLE PHASE, MOTOR WITH STEEL FRAME AND GUARD, MOUNT AS HIGH AS POSSIBLE, CONTROL FROM THERMOSTAT, SEE NOTE 4.
3. ALUMINUM LOUVER (EXHAUST) WITH FLANGED FRAME IS INTEGRAL TO EXHAUST FAN.
4. THERMOSTAT SHALL BE MANUFACTURED BY WHITE-ROGERS OR EQUIVALENT, MOUNT 48" ABOVE FINISHED FLOOR. THERMOSTAT CONNECTED TO EXHAUST FAN SHALL ENERGIZE FAN WHEN SELECTABLE HIGH TEMPERATURE LIMIT IS REACHED. THERMOSTAT CONNECTED TO ELECTRICAL HEATER SHALL ENERGIZE HEATER WHEN SELECTABLE LOW TEMPERATURE IS REACHED. PROVIDE (2) THERMOSTATS FOR THIS ROOM.
5. 600 AMP PANELBOARD SHALL BE SQUARE D NEMA 1 RATED, 30-4W WITH MAIN 600A BREAKER, (480Y/3/60). MPZ SHALL BE SQUARE D CLASS 7106 MINI-POWER ZONE, OD TYPE, 15 KVA TRANSFORMER MODEL NO. MPZ15S40F, WITH 24 SINGLE POLE BREAKERS, 480 VOLT PRIMARY, AND 240/120 VOLT SECONDARY. PROVIDE BRANCH FEED CIRCUIT BREAKERS AS SHOWN IN MINI-POWER ZONE CIRCUIT BREAKER SCHEDULE. BALANCE LOADS IN PANELBOARD AS MUCH AS POSSIBLE.
6. FUSEABLE SAFETY DISCONNECT (130A FUSES) AND MOTOR STARTER UNITS (1 FOR EACH PUMP MOTOR) (480v/3Ø/60Hz) TO BE PROVIDED BY OWNER. FEED POWER FROM MAIN LOAD CENTER. SIZE MOTOR STARTER THERMALS TO MATCH MOTOR F.L.A.
7. DUPLEX RECEPTACLE SHALL BE 3-WIRE, 20A RATING, WITH WEATHERPROOF COVER.
8. METALUX 110 WATT, 120 VOLT FLOURESCENT LIGHT FIXTURE WITH LENS GAURD.
9. 70 WATT WALL-LIGHTER HPS WALL PACK EXTERIOR BUILDING LIGHT WITH DUSK-TO-DAWN SENSOR SWITCH AS MANUFACTURED BY G.E. OR EQUIVALENT.
10. LIGHT SWITCH – LEVITON, WHITE-HOLDERS OR EQUAL.
11. PROVIDE TWO (2) 10' x 3/4" COPPER WELD GROUND RODS, LOCATE 10' APART CONNECT TOGETHER AND TO BUILDING FRAME, LOAD CENTERS AND CONTROL PANEL SERVICE WITH #1 BARE COPPER GROUND WIRE. SEE NOTE 15.
12. INTAKE WALL SHUTTER – SINGLE PANEL, GRAVITY BACKDRAFT DAMPER, DAYTON OR EQUAL. PROVIDE EXTERIOR BIRD SCREEN. MOUNT 1 FT ABOVE FLOOR.
13. PROVIDE SQUARE D – 800 AMP HEAVY DUTY FUSEABLE SAFETY DISCONNECT SWITCH WITH CLASS J FUSES.

ELECTRICAL NOTES:

1. FEED LIGHTS, RECEPTACLES, EXHAUST FAN, AND HEATER EACH WITH A SEPARATE CIRCUIT.
2. ALL ELECTRICAL DISTRIBUTION EQUIPMENT SHALL BE MOUNTED A MINIMUM OF THREE (3) FEET ABOVE THE FINISHED FLOOR AS NEEDED.
3. MINI POWER ZONE LOAD CENTER/TRANSFORMER (MPZ) WEIGHS APPROXIMATELY 400 POUNDS. MPZ CAN BE FLOOR MOUNTED, HOWEVER, IF NECESSARY, CONTRACTOR SHALL PROVIDE MOUNTING BRACKETS AS SHOWN TO SAFELY SECURE MINI POWER-ZONE TO WALL.
4. ELECTRICAL WORK SHALL BE PERFORMED UNDER THE SUPERVISION OF A MASTER ELECTRICIAN. WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC), AND ALL APPLICABLE STATE AND LOCAL ELECTRICAL CODES
5. SIZE ELECTRICAL EQUIPMENT FOR AVAILABLE FAULT CURRENT (AIC). ELECTRICAL SUBCONTRACTOR TO VERIFY WITH LOCAL UTILITIES.
6. THE MAIN SYSTEM VOLTAGE FOR THIS PUMP STATION IS 480 VOLTS, 3-PHASE, 60 Hz. 600 AMP SERVICE FROM DTE. PROVIDE SERVICE ENTRANCE WIRES TO NEW 600 SAFETY DISCONNECT. PROVIDE EITHER OVERHEAD TO WEATHERHEAD AND SERVICE MAST OR UNDERGROUND TO SAFETY DISCONNECT.
7. PROVIDE REQUIRED AIC (FAULT CURRENT) FOR ALL BREAKERS AND POWER DISTRIBUTION EQUIPMENT AS REQUIRED TO MEET LOCAL UTILITY REQUIREMENTS FOR FAULT CURRENT AT THIS SITE.
8. E.C. TO PROVIDE ALL ELECTRICAL CONDUITS, WIRING, PULL BOXES, JUNCTION BOXES, MINI POWER ZONE, LOAD CENTER, SAFETY DISCONNECT SWITCH, THERMOSTATS, HEATER, EXHAUST FAN, LIGHT FIXTURES AND SWITCHES, GROUNDING COMPONENTS, RECEPTACLES, AND COVERS AS SHOWN
9. PROVIDE PERMANENT PLASTIC WIRE TAG NUMBER AT EACH END OF EACH WIRE ON THIS PROJECT.
10. PROVIDE BUILDING GROUND SYSTEM PER DTE REQUIREMENTS. PROVIDE FOR AN ENTIRE POSITIVE GROUND BOND SYSTEM FOR THE EQUIPMENT AT THIS NEW TREATMENT FACILITY. INDEPENDENT GROUND NETWORK WILL INCLUDE GROUNDING TO MAIN CONTROL PANEL, JUNCTION BOXES, DISCONNECTS, PUMPS, TRANSDUCERS, AND EARTH-GROUND AS SHOWN. ALL SYSTEM GROUND CONDUCTORS SHALL BE TERMINATED TO MAIN CONTROL PANEL GROUND BUSS, AND SERVICE ENTRANCE GROUND FEED SIZED AS SHOWN ON DRAWINGS.
11. EMT CONDUIT SHALL BE USED FOR ALL PUMP STATION BUILDING ELECTRICAL WIRING.
12. ALL POWER CONDUCTORS SHALL BE SIZED AS SHOWN, USING 90°C INSULATION RATING
13. T-STAT WIRING INSIDE OF MOTORS (IF PROVIDED BY MANUFACTURER) SHALL BE ROUTED TO CONTROL PANEL AND TERMINATED AS REQUIRED. CONTROL PANEL SHALL HAVE PROVISIONS FOR THIS MOTOR THERMAL PROTECTION. THIS THERMAL PROTECTION SHALL BE IN SERIES WITH MOTOR STARTER THERMAL OVERLOAD).
14. BALANCE LOADS IN MINI-POWER ZONE.
15. ELECTRICAL GROUNDING SHALL BE PERFORMED IN ACCORDANCE WITH DETROIT EDISON COMPANY SPECIFICATIONS TITLED "GROUNDING NOTES, SYMBOLS, AND DETAILS (GNSAD)" INCLUDED AS ATTACHMENT D IN THE PROJECT DESIGN MANUAL.

Donald Brandt 6/24/08

NO.	BY	DATE	REVISION	APPD.
8.	DB/BL	08-20-2008	AS-BUILT DRAWINGS	DW/VB
7.	DBS	10-16-2007	GENERAL REVISIONS	DW/VB
6.	DBS	09-12-2007	CHANGED TO 600 AMP SYSTEM, 118A PUMPS	DW/VB
5.	JL	07-25-2007	ISSUED FOR CONSTRUCTION	DW/VB
4.	SL	07-06-2007	REVISION (ADDED NOTE 13, BLDG PIPING REV	DW/VB
3	SL	05-18-2007	REVISION	DW/VB
2.	DB/SL	05-11-2007	ISSUED FOR CONSTRUCTION BIDDING PURPOSES	DW/VB
1.	DB/SL	05-02-2007	ISSUED FOR CLIENT REVIEW - 90% ARCHIVE COPY	DW/VB

THE DETROIT EDISON COMPANY- RANGE ROAD LANDFILL SLURRY WALL, DETENTION POND, AND PUMP STATION INSTALLATION

ELECTRICAL POWER PLAN AND RISER DIAGRAM

DRAWN BY:	DB, BL	DRAWING SCALE:	PROJECT NO. 2004079.01
CHECKED BY:	VB/DW	1/2" = 1'	FILE NO. 2407927 23.dwg
APPROVED BY:	DW	DATE PRINTED:	**Sheet 23 of 23**
DATE:	May 2008		

3134 Ranchero Drive
Ann Arbor, Michigan 48108-3171
Phone: 734-477-1660
Fax: 734-477-9822

APPENDIX B: STORM WATER CALCULATIONS

Appendix B.1: NOAA Rainfall Data

Appendix B.2: HydroCAD 25-year/24-hour Output

APPENDIX A: STORM WATER CALCULATIONS

Appendix B.1: NOAA Rainfall Data

NOAA Atlas 14, Volume 8, Version 2
Location name: East China, Michigan, USA*
Latitude: 42.8021°, Longitude: -82.4929°
Elevation: 594.03 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.289** (0.229-0.369)	**0.341** (0.270-0.436)	**0.431** (0.339-0.551)	**0.508** (0.398-0.653)	**0.619** (0.470-0.825)	**0.709** (0.524-0.955)	**0.802** (0.571-1.10)	**0.900** (0.613-1.27)	**1.03** (0.677-1.50)	**1.14** (0.725-1.67)
10-min	**0.424** (0.336-0.541)	**0.500** (0.396-0.639)	**0.630** (0.497-0.807)	**0.744** (0.583-0.956)	**0.907** (0.688-1.21)	**1.04** (0.767-1.40)	**1.18** (0.837-1.62)	**1.32** (0.898-1.86)	**1.52** (0.991-2.19)	**1.67** (1.06-2.44)
15-min	**0.516** (0.409-0.659)	**0.610** (0.483-0.779)	**0.769** (0.606-0.984)	**0.907** (0.711-1.17)	**1.11** (0.839-1.47)	**1.27** (0.936-1.71)	**1.43** (1.02-1.97)	**1.61** (1.10-2.27)	**1.85** (1.21-2.67)	**2.04** (1.29-2.98)
30-min	**0.723** (0.573-0.923)	**0.853** (0.675-1.09)	**1.08** (0.847-1.38)	**1.27** (0.994-1.63)	**1.55** (1.18-2.06)	**1.77** (1.31-2.39)	**2.01** (1.43-2.77)	**2.26** (1.54-3.19)	**2.60** (1.70-3.76)	**2.87** (1.82-4.20)
60-min	**0.932** (0.738-1.19)	**1.10** (0.869-1.40)	**1.39** (1.09-1.77)	**1.64** (1.28-2.10)	**2.00** (1.52-2.68)	**2.30** (1.70-3.11)	**2.62** (1.87-3.61)	**2.95** (2.01-4.17)	**3.42** (2.23-4.94)	**3.78** (2.40-5.53)
2-hr	**1.14** (0.915-1.44)	**1.34** (1.08-1.69)	**1.69** (1.35-2.14)	**2.00** (1.59-2.54)	**2.46** (1.89-3.24)	**2.83** (2.12-3.78)	**3.23** (2.33-4.39)	**3.65** (2.52-5.08)	**4.23** (2.80-6.04)	**4.69** (3.01-6.77)
3-hr	**1.27** (1.02-1.59)	**1.49** (1.20-1.87)	**1.88** (1.51-2.35)	**2.22** (1.77-2.79)	**2.72** (2.11-3.57)	**3.14** (2.37-4.16)	**3.59** (2.61-4.85)	**4.06** (2.82-5.62)	**4.72** (3.15-6.70)	**5.26** (3.40-7.52)
6-hr	**1.51** (1.23-1.86)	**1.75** (1.42-2.16)	**2.17** (1.77-2.69)	**2.56** (2.07-3.18)	**3.14** (2.47-4.06)	**3.62** (2.77-4.73)	**4.13** (3.05-5.52)	**4.69** (3.30-6.42)	**5.48** (3.70-7.67)	**6.11** (4.00-8.62)
12-hr	**1.76** (1.46-2.14)	**2.01** (1.66-2.45)	**2.46** (2.02-3.01)	**2.87** (2.35-3.52)	**3.50** (2.79-4.47)	**4.02** (3.12-5.19)	**4.59** (3.42-6.05)	**5.20** (3.71-7.02)	**6.07** (4.15-8.39)	**6.78** (4.49-9.43)
24-hr	**2.01** (1.69-2.42)	**2.30** (1.92-2.76)	**2.80** (2.33-3.37)	**3.25** (2.69-3.93)	**3.93** (3.16-4.94)	**4.49** (3.51-5.70)	**5.09** (3.84-6.61)	**5.74** (4.14-7.63)	**6.65** (4.60-9.05)	**7.39** (4.95-10.1)
2-day	**2.28** (1.93-2.70)	**2.62** (2.22-3.11)	**3.21** (2.70-3.81)	**3.72** (3.12-4.44)	**4.47** (3.63-5.52)	**5.07** (4.01-6.34)	**5.71** (4.35-7.28)	**6.38** (4.65-8.33)	**7.30** (5.11-9.78)	**8.04** (5.46-10.9)
3-day	**2.49** (2.13-2.93)	**2.85** (2.42-3.35)	**3.45** (2.93-4.07)	**3.98** (3.36-4.71)	**4.74** (3.88-5.81)	**5.37** (4.28-6.64)	**6.01** (4.62-7.61)	**6.70** (4.92-8.68)	**7.65** (5.39-10.1)	**8.40** (5.75-11.3)
4-day	**2.68** (2.30-3.14)	**3.04** (2.60-3.55)	**3.65** (3.11-4.27)	**4.18** (3.54-4.91)	**4.95** (4.07-6.03)	**5.58** (4.47-6.87)	**6.24** (4.82-7.85)	**6.94** (5.13-8.94)	**7.91** (5.61-10.4)	**8.68** (5.97-11.6)
7-day	**3.18** (2.76-3.67)	**3.55** (3.07-4.10)	**4.18** (3.61-4.85)	**4.74** (4.06-5.51)	**5.55** (4.61-6.67)	**6.21** (5.03-7.55)	**6.90** (5.38-8.57)	**7.63** (5.70-9.71)	**8.64** (6.19-11.3)	**9.45** (6.57-12.4)
10-day	**3.63** (3.16-4.16)	**4.02** (3.50-4.61)	**4.70** (4.07-5.40)	**5.29** (4.56-6.10)	**6.14** (5.14-7.32)	**6.84** (5.57-8.24)	**7.56** (5.94-9.32)	**8.33** (6.26-10.5)	**9.39** (6.77-12.1)	**10.2** (7.16-13.4)
20-day	**4.92** (4.35-5.56)	**5.43** (4.79-6.14)	**6.27** (5.51-7.11)	**7.00** (6.11-7.96)	**8.03** (6.79-9.40)	**8.85** (7.30-10.5)	**9.70** (7.71-11.7)	**10.6** (8.04-13.1)	**11.8** (8.59-15.0)	**12.7** (9.01-16.4)
30-day	**6.03** (5.37-6.76)	**6.66** (5.92-7.47)	**7.70** (6.82-8.65)	**8.56** (7.53-9.66)	**9.76** (8.29-11.3)	**10.7** (8.86-12.5)	**11.6** (9.29-13.9)	**12.6** (9.61-15.4)	**13.8** (10.2-17.4)	**14.8** (10.6-18.9)
45-day	**7.47** (6.70-8.30)	**8.30** (7.43-9.22)	**9.61** (8.57-10.7)	**10.7** (9.46-11.9)	**12.1** (10.3-13.8)	**13.1** (10.9-15.2)	**14.1** (11.4-16.7)	**15.1** (11.7-18.3)	**16.4** (12.1-20.4)	**17.3** (12.5-21.9)
60-day	**8.72** (7.86-9.63)	**9.73** (8.76-10.7)	**11.3** (10.1-12.5)	**12.5** (11.2-13.9)	**14.1** (12.1-16.0)	**15.3** (12.8-17.5)	**16.4** (13.2-19.2)	**17.4** (13.4-20.8)	**18.6** (13.8-22.9)	**19.4** (14.1-24.4)

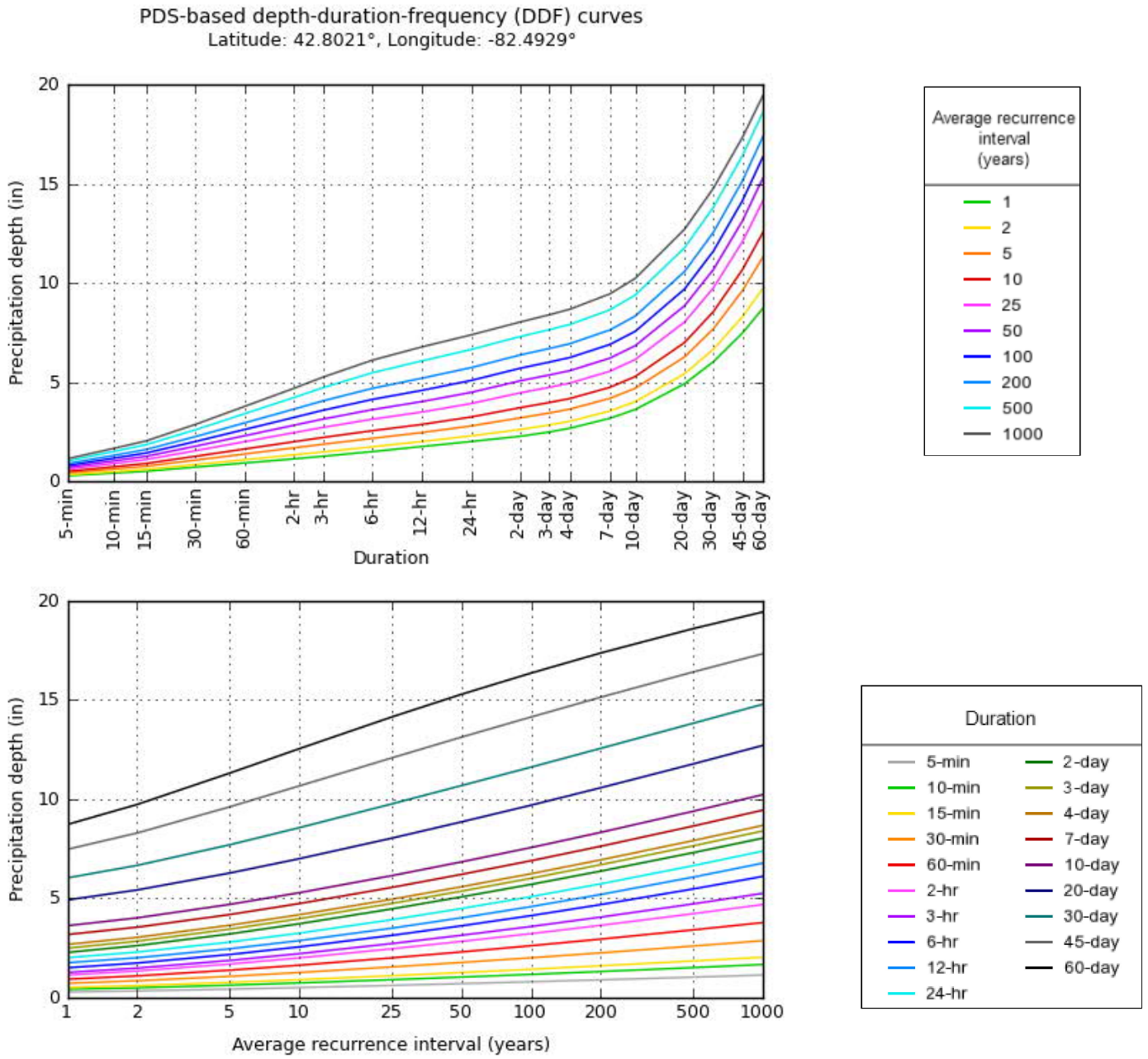
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



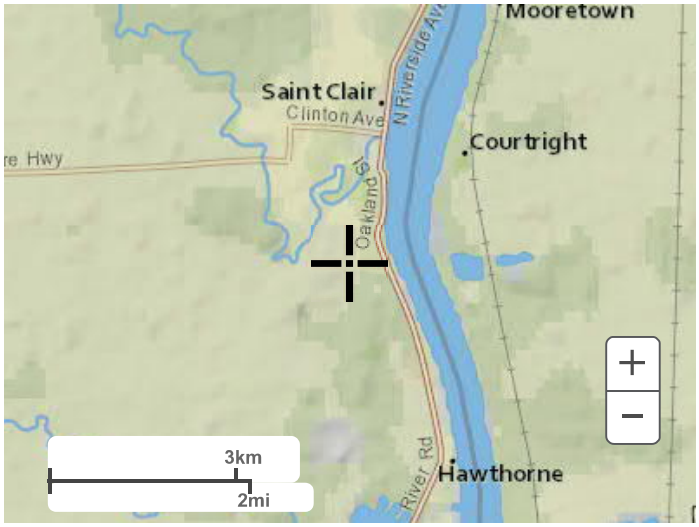
NOAA Atlas 14, Volume 8, Version 2

Created (GMT): Sun Jul 25 20:56:40 2021

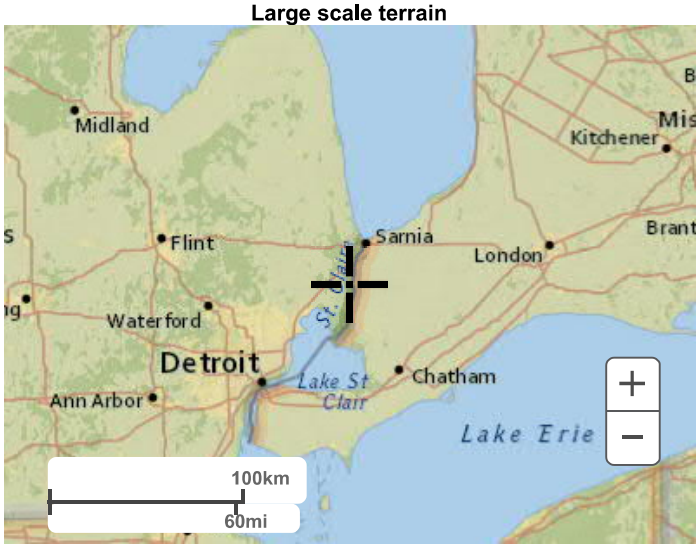
Back to Top

Maps & aerials

Small scale terrain



Large scale terrain



Large scale map

Large scale aerial

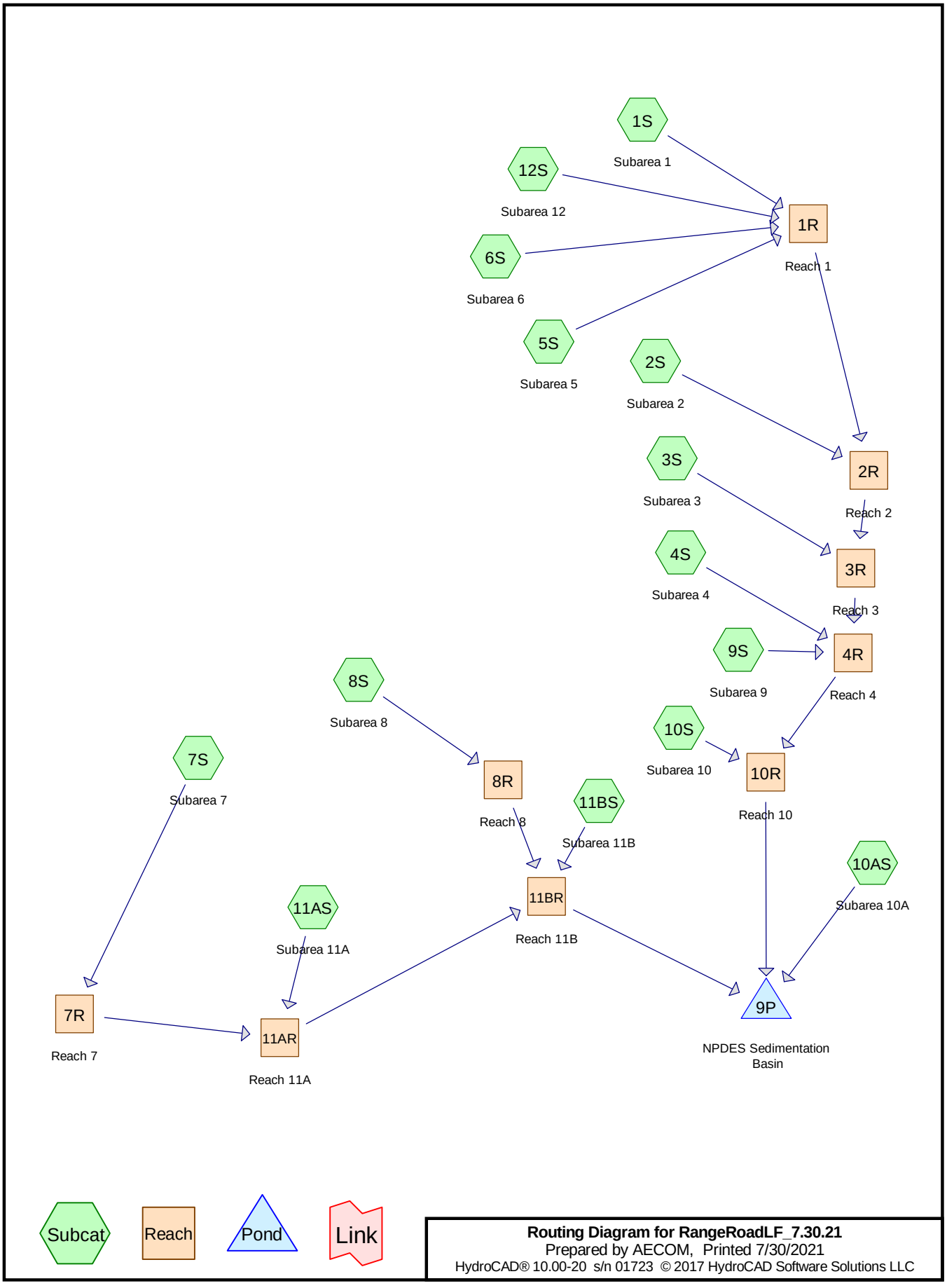
Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

APPENDIX A: STORM WATER CALCULATIONS

Appendix B2: HydroCAD 25-year/24-hour Output


1S
Subarea 1
12S
Subarea 12
1R
Reach 1
6S
Subarea 6
5S
Subarea 5
2S
Subarea 2
2R
Reach 2
3S
Subarea 3
3R
Reach 3
4S
Subarea 4
4R
Reach 4
9S
Subarea 9
8S
Subarea 8
8R
Reach 8
7S
Subarea 7
10S
Subarea 10
10R
Reach 10
11BS
Subarea 11B
11BR
Reach 11B
10AS
Subarea 10A
11AS
Subarea 11A
7R
Reach 7
11AR
Reach 11A
9P
NPDES Sedimentation Basin
Subcat
Reach
Pond
Link
Routing Diagram for RangeRoadLF_7.30.21
Prepared by AECOM, Printed 7/30/2021
HydroCAD® 10.00-20 s/n 01723 © 2017 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
104.700	78	(2S, 3S, 4S, 6S, 12S)
99.100	72	(2S, 3S, 9S, 10AS, 10S)
3.800	83	(9S)
64.300	78	Meadow- cont. grass (non-grazed) (1S, 5S)
81.700	94	Newly graded area (pervious only) (8S)
100.100	84	Pasture, grassland, or range - fair (7S, 11AS, 11BS)
20.300	77	Woods - good (7S)
12.500	82	Woods - grass combination (poor) (1S)
486.500	**81**	**TOTAL AREA**

Summary for Subcatchment 1S: Subarea 1

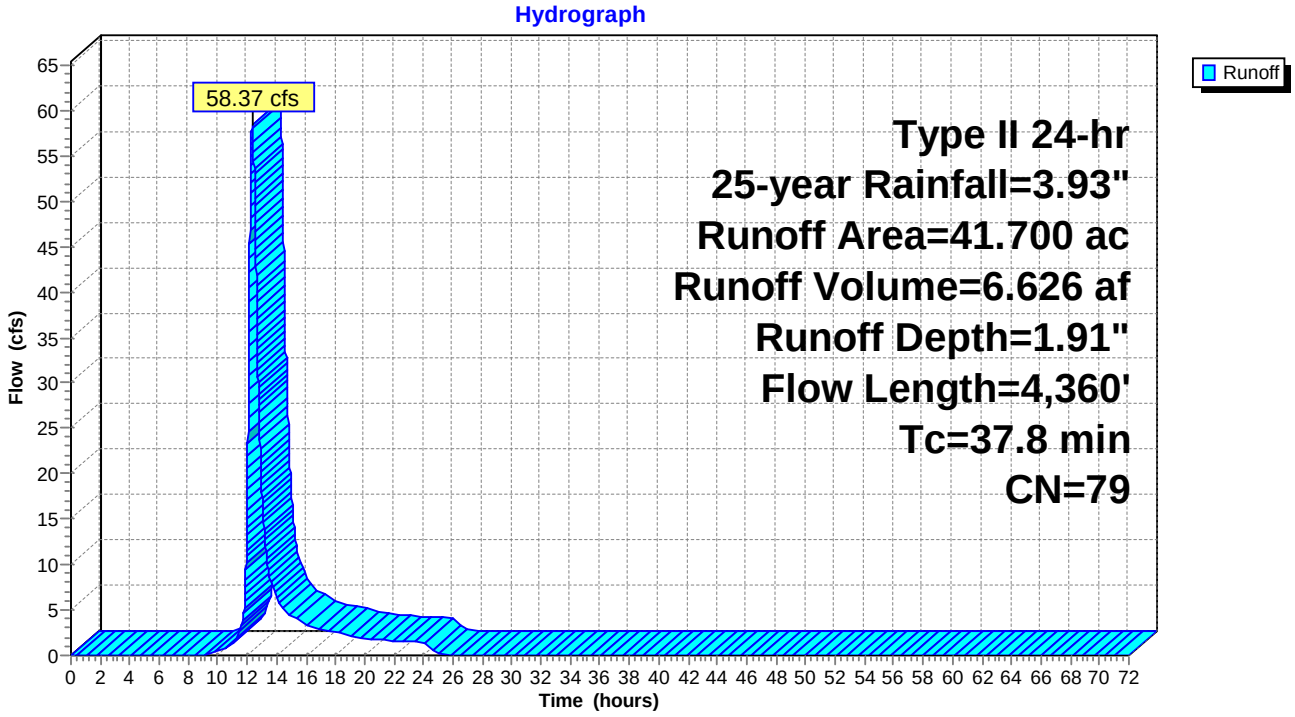
Runoff = 58.37 cfs @ 12.35 hrs, Volume= 6.626 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	29.200	78	Meadow- cont. grass (non-grazed)
*	12.500	82	Woods - grass combination (poor)
	41.700	79	Weighted Average
	41.700		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	1,100	0.0400	1.40		**Shallow Concentrated Flow, (640-596)/1100** Short Grass Pasture Kv= 7.0 fps
24.7	3,260	0.0018	2.20	59.41	**Channel Flow, (596-590)/3260** Area= 27.0 sf Perim= 20.0' r= 1.35' n= 0.035 Earth, dense weeds
37.8	4,360	Total			

Subcatchment 1S: Subarea 1



Summary for Subcatchment 2S: Subarea 2

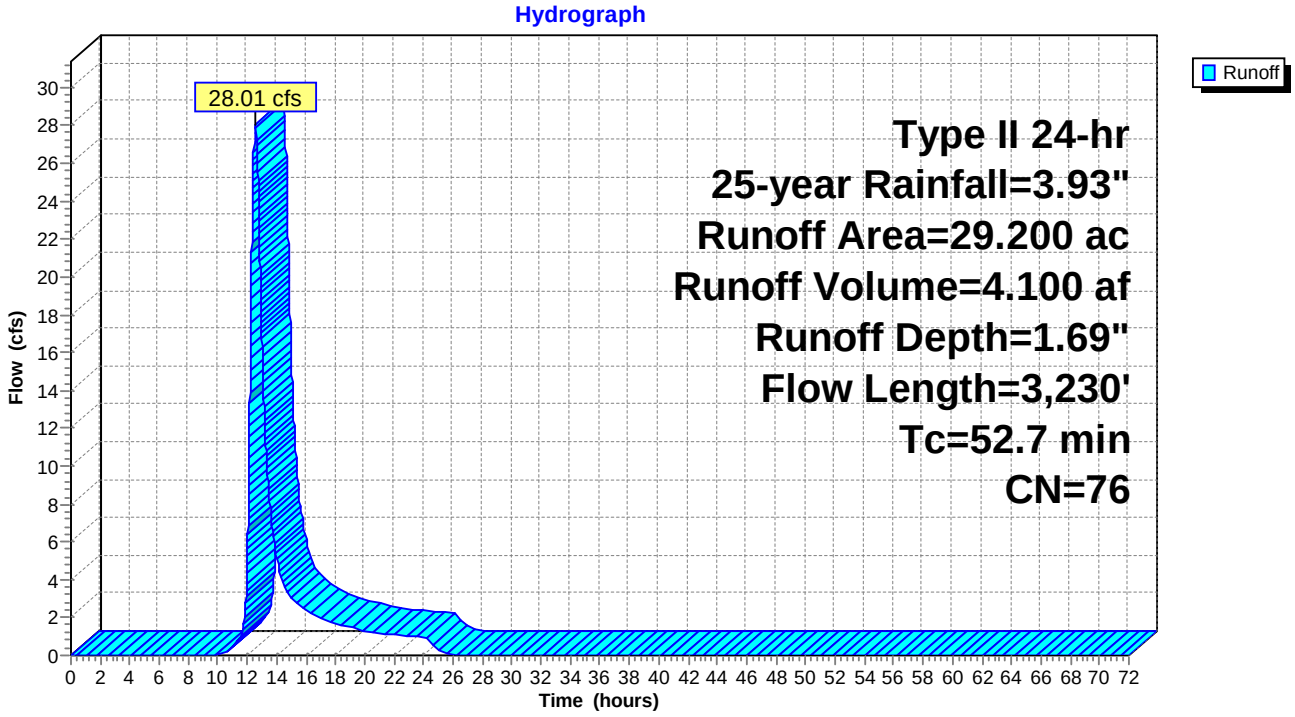
Runoff = 28.01 cfs @ 12.54 hrs, Volume= 4.100 af, Depth= 1.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	20.400	78	
*	8.800	72	
	29.200	76	Weighted Average
	29.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
51.1	2,849	0.0176	0.93		**Shallow Concentrated Flow, (642-592)/2849** Short Grass Pasture Kv= 7.0 fps
1.6	381	0.0020	4.10	557.76	**Channel Flow, (586-585.22)/381** Area= 136.2 sf Perim= 43.0' r= 3.17' n= 0.035 Earth, dense weeds
52.7	3,230	Total			

Subcatchment 2S: Subarea 2



Summary for Subcatchment 3S: Subarea 3

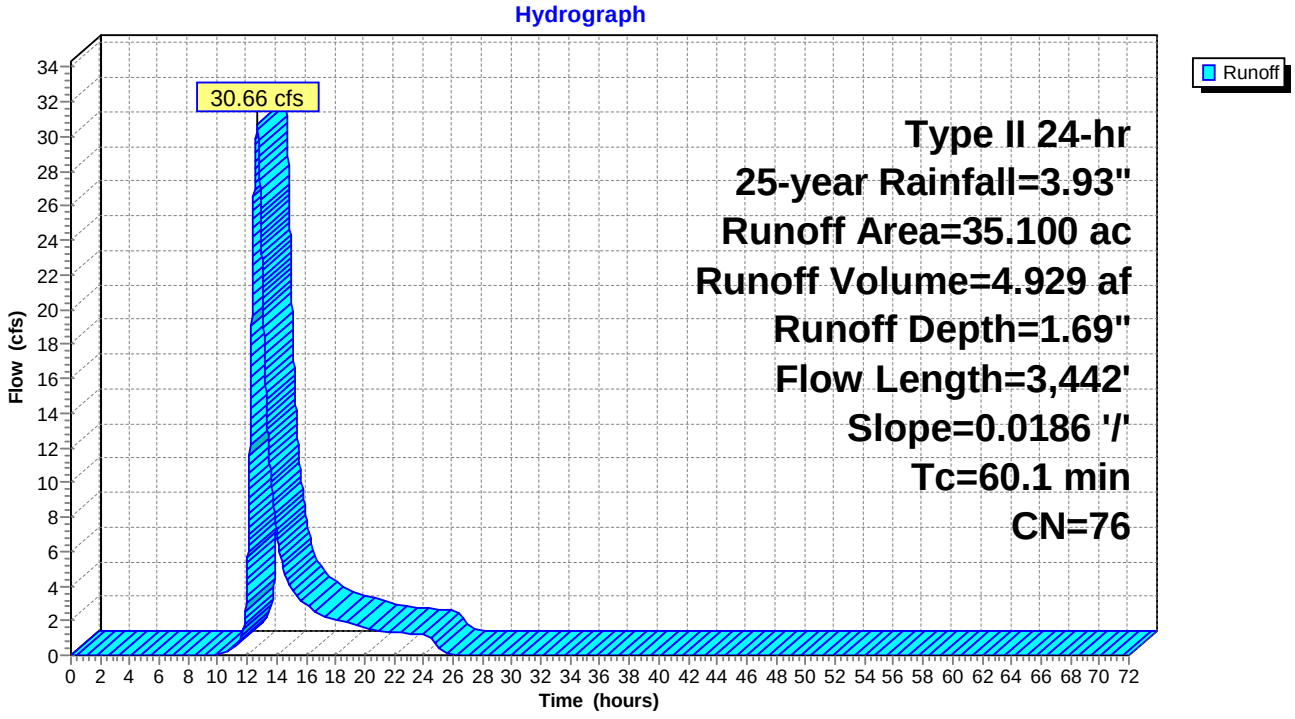
Runoff = 30.66 cfs @ 12.62 hrs, Volume= 4.929 af, Depth= 1.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	10.500	72	
*	24.600	78	
	35.100	76	Weighted Average
	35.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
60.1	3,442	0.0186	0.95		**Shallow Concentrated Flow, (648-584)/3442**
					Short Grass Pasture Kv= 7.0 fps

Subcatchment 3S: Subarea 3



Summary for Subcatchment 4S: Subarea 4

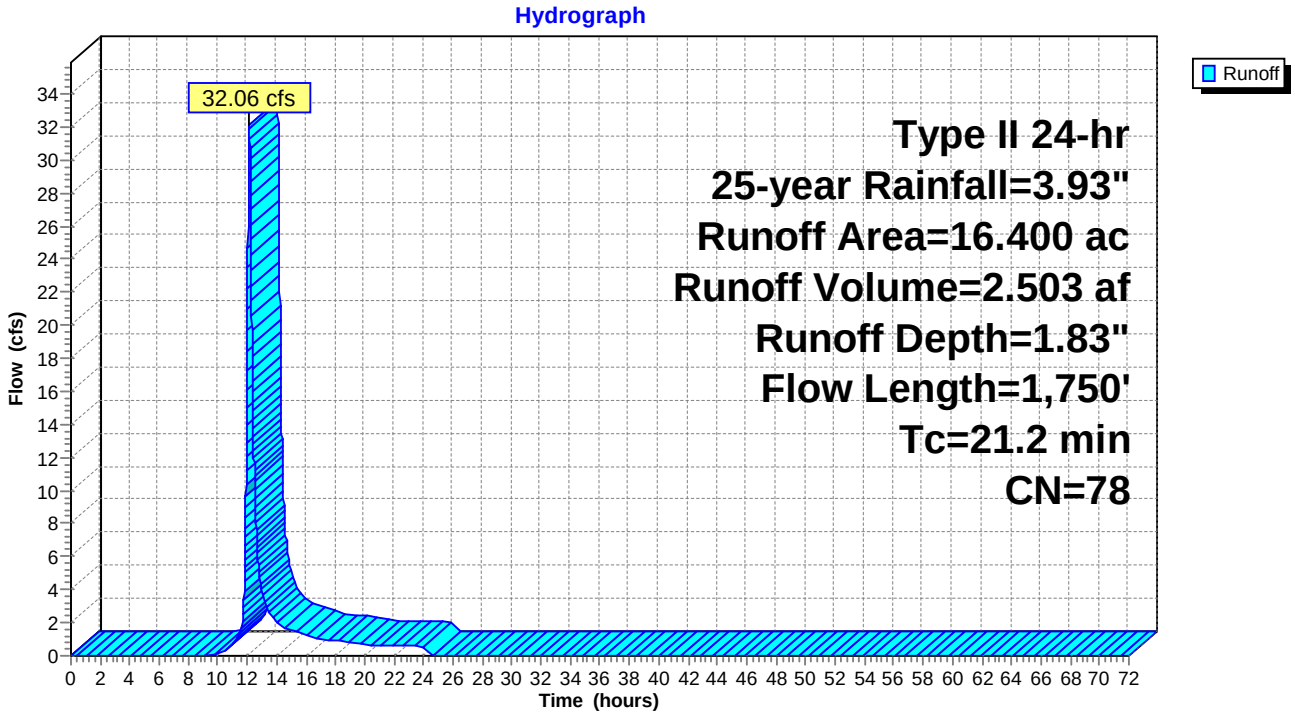
Runoff = 32.06 cfs @ 12.14 hrs, Volume= 2.503 af, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	16.400	78	
	16.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.1	1,710	0.0374	1.35		**Shallow Concentrated Flow, (648-584)/1710** Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0025	4.89	822.13	**Channel Flow, (583.8-583.7)/40** Area= 168.0 sf Perim= 48.0' r= 3.50' n= 0.035
21.2	1,750	Total			

Subcatchment 4S: Subarea 4



Summary for Subcatchment 5S: Subarea 5

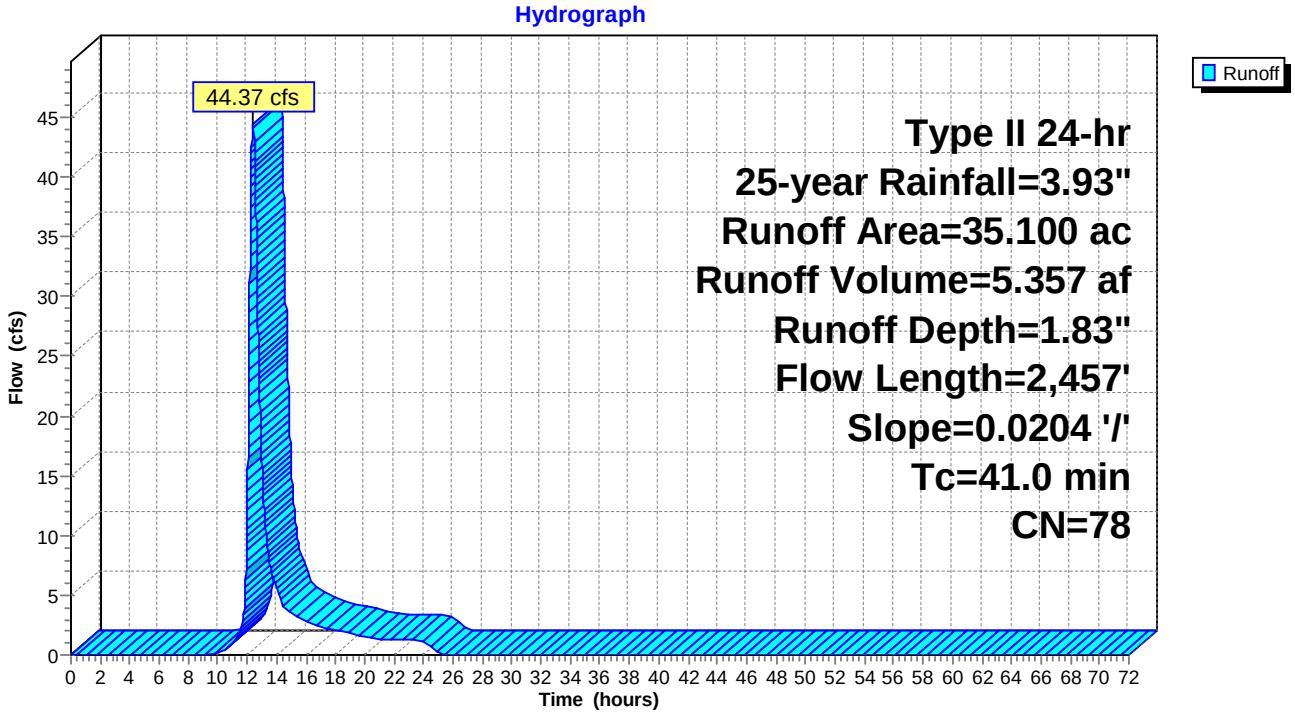
Runoff = 44.37 cfs @ 12.39 hrs, Volume= 5.357 af, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	35.100	78	Meadow- cont. grass (non-grazed)
	35.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.0	2,457	0.0204	1.00		**Shallow Concentrated Flow, (648-598)/2457** Short Grass Pasture Kv= 7.0 fps

Subcatchment 5S: Subarea 5



Summary for Subcatchment 6S: Subarea 6

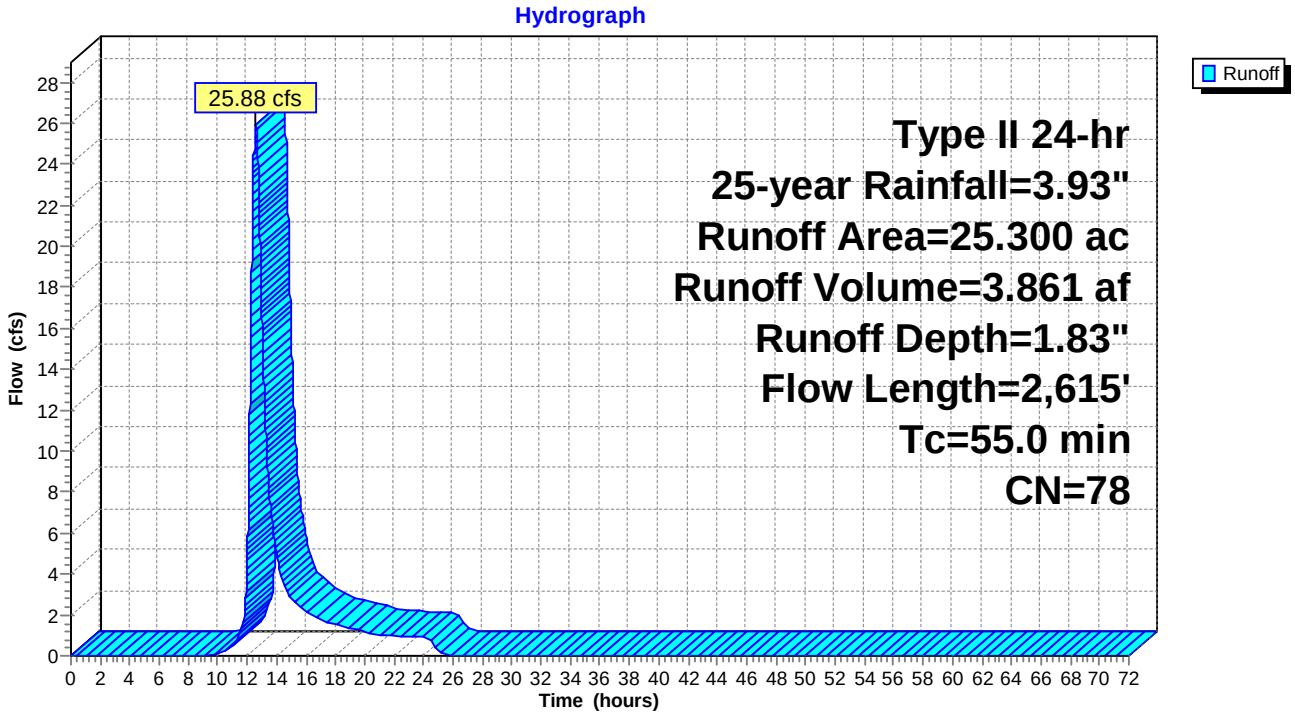
Runoff = 25.88 cfs @ 12.58 hrs, Volume= 3.861 af, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	25.300	78	
	25.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.2	1,343	0.0149	0.85		**Shallow Concentrated Flow, (648-628)/1343** Short Grass Pasture Kv= 7.0 fps
28.8	1,272	0.0024	0.73		**Shallow Concentrated Flow, (628-625)/1272** Grassed Waterway Kv= 15.0 fps
55.0	2,615	Total			

Subcatchment 6S: Subarea 6



Summary for Subcatchment 7S: Subarea 7

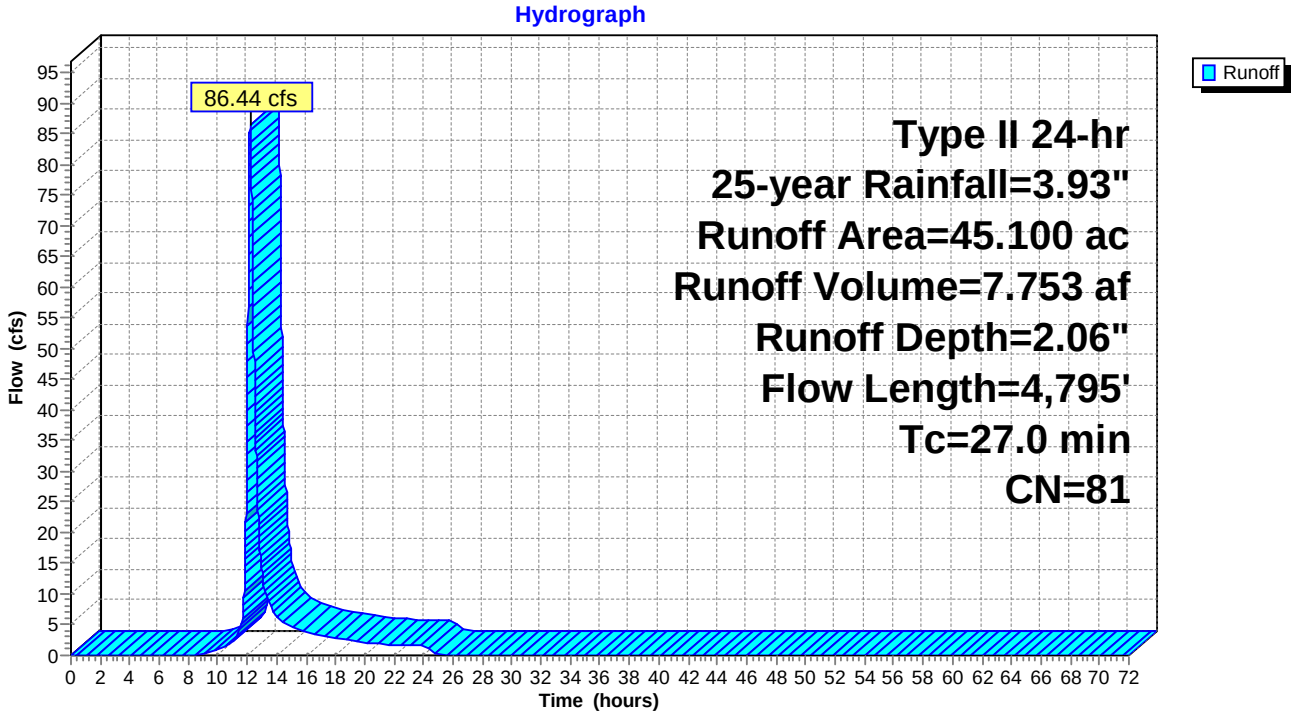
Runoff = 86.44 cfs @ 12.21 hrs, Volume= 7.753 af, Depth= 2.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	24.800	84	Pasture, grassland, or range - fair
*	20.300	77	Woods - good
	45.100	81	Weighted Average
	45.100		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.2	1,160	0.0440	1.47		**Shallow Concentrated Flow, (641-590)/1160** Short Grass Pasture Kv= 7.0 fps
13.8	3,635	0.0013	4.39	1,388.22	**Channel Flow, (590-586)/3000** Area= 316.0 sf Perim= 65.0' r= 4.86' n= 0.035 Earth, dense weeds
27.0	4,795	Total			

Subcatchment 7S: Subarea 7



Summary for Subcatchment 8S: Subarea 8

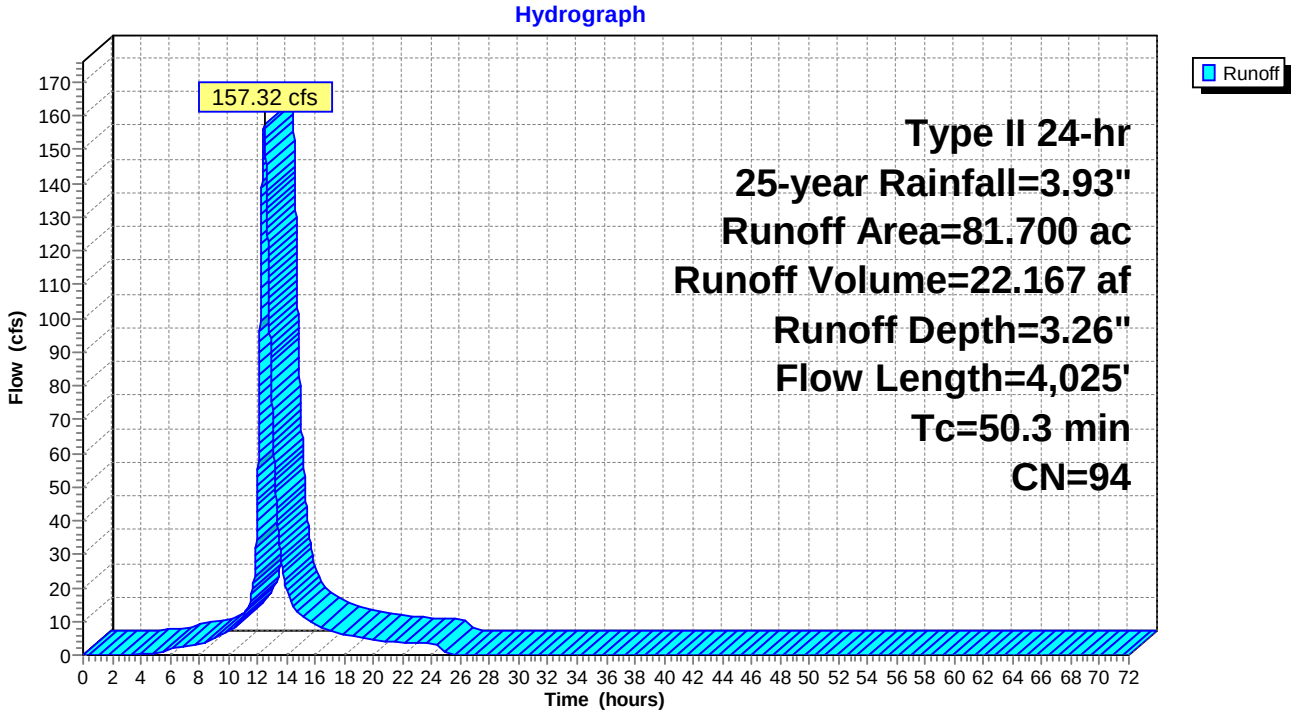
Runoff = 157.32 cfs @ 12.46 hrs, Volume= 22.167 af, Depth= 3.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	81.700	94	Newly graded area (pervious only)
	81.700		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.2	3,325	0.0144	1.20		**Shallow Concentrated Flow, (634-586)/3325** Nearly Bare & Untilled Kv= 10.0 fps
4.1	700	0.0032	2.86	74.38	**Channel Flow, (586 - 584)/630** Area= 26.0 sf Perim= 20.0' r= 1.30' n= 0.035 Earth, dense weeds
50.3	4,025	Total			

Subcatchment 8S: Subarea 8



Summary for Subcatchment 9S: Subarea 9

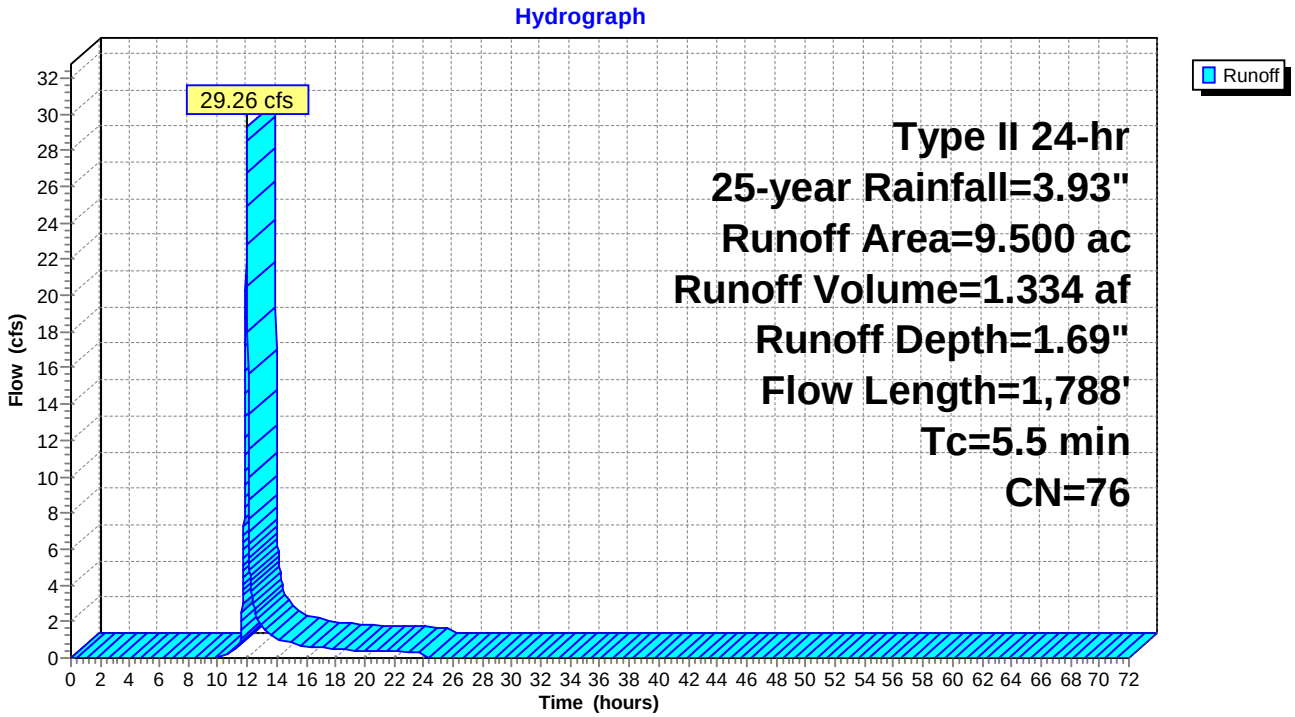
Runoff = 29.26 cfs @ 11.97 hrs, Volume= 1.334 af, Depth= 1.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	5.700	72	
*	3.800	83	
	9.500	76	Weighted Average
	9.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	272	0.2132	3.23		**Shallow Concentrated Flow, (646-588)/272** Short Grass Pasture Kv= 7.0 fps
4.1	1,516	0.0026	6.21	1,963.24	**Channel Flow, (588-584)/1516** Area= 316.0 sf Perim= 65.0' r= 4.86' n= 0.035
5.5	1,788	Total			

Subcatchment 9S: Subarea 9



Summary for Subcatchment 10AS: Subarea 10A

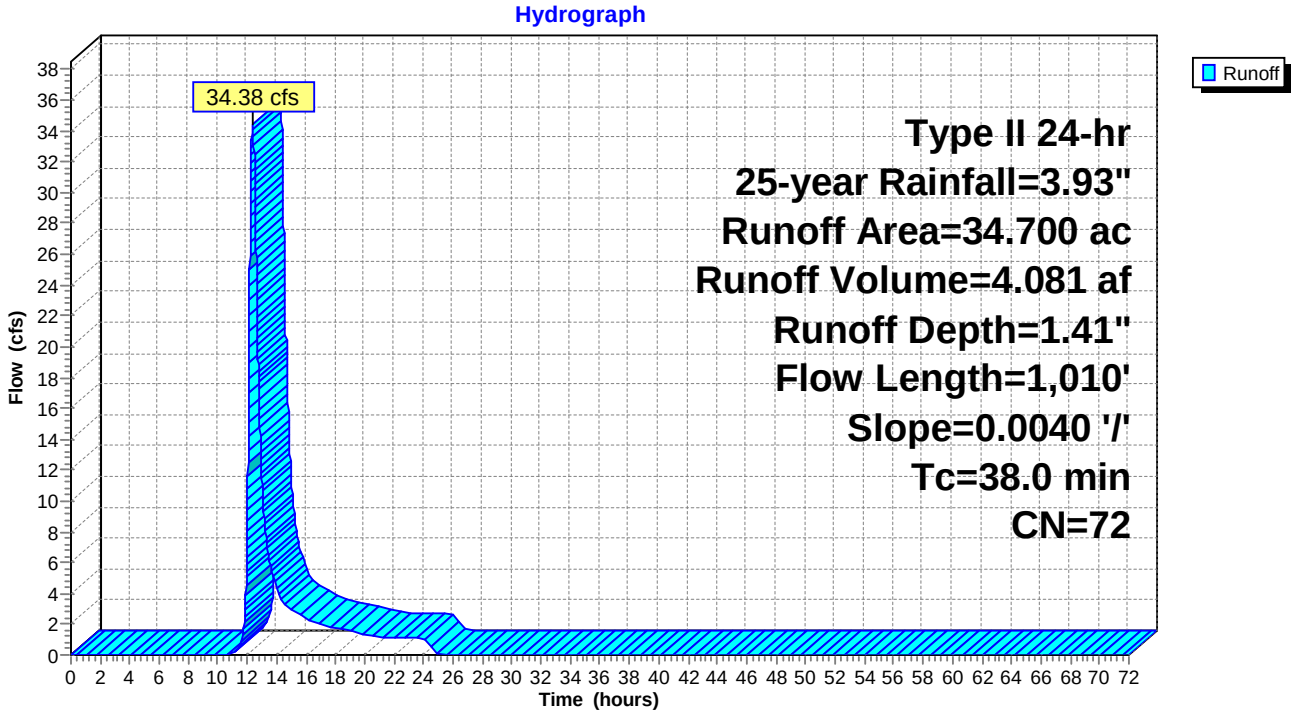
Runoff = 34.38 cfs @ 12.37 hrs, Volume= 4.081 af, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	34.700	72	
	34.700		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
38.0	1,010	0.0040	0.44		**Shallow Concentrated Flow, (594-590)/1010** Short Grass Pasture Kv= 7.0 fps

Subcatchment 10AS: Subarea 10A



Summary for Subcatchment 10S: Subarea 10

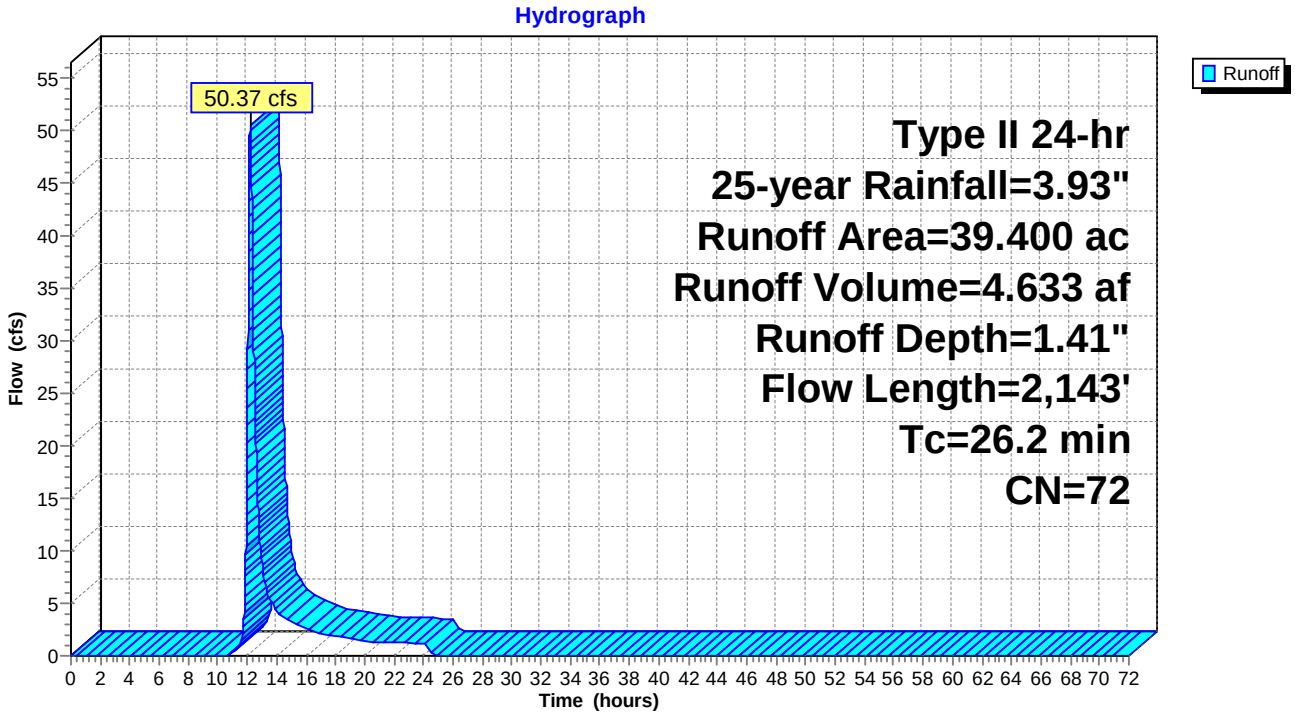
Runoff = 50.37 cfs @ 12.20 hrs, Volume= 4.633 af, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	39.400	72	
	39.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.0	1,250	0.0168	0.91		**Shallow Concentrated Flow, (603-582)/1250** Short Grass Pasture Kv= 7.0 fps
3.2	893	0.0022	4.58	751.34	**Channel Flow, (582-580)/893** Area= 164.0 sf Perim= 47.0' r= 3.49' n= 0.035
26.2	2,143	Total			

Subcatchment 10S: Subarea 10



Summary for Subcatchment 11AS: Subarea 11A

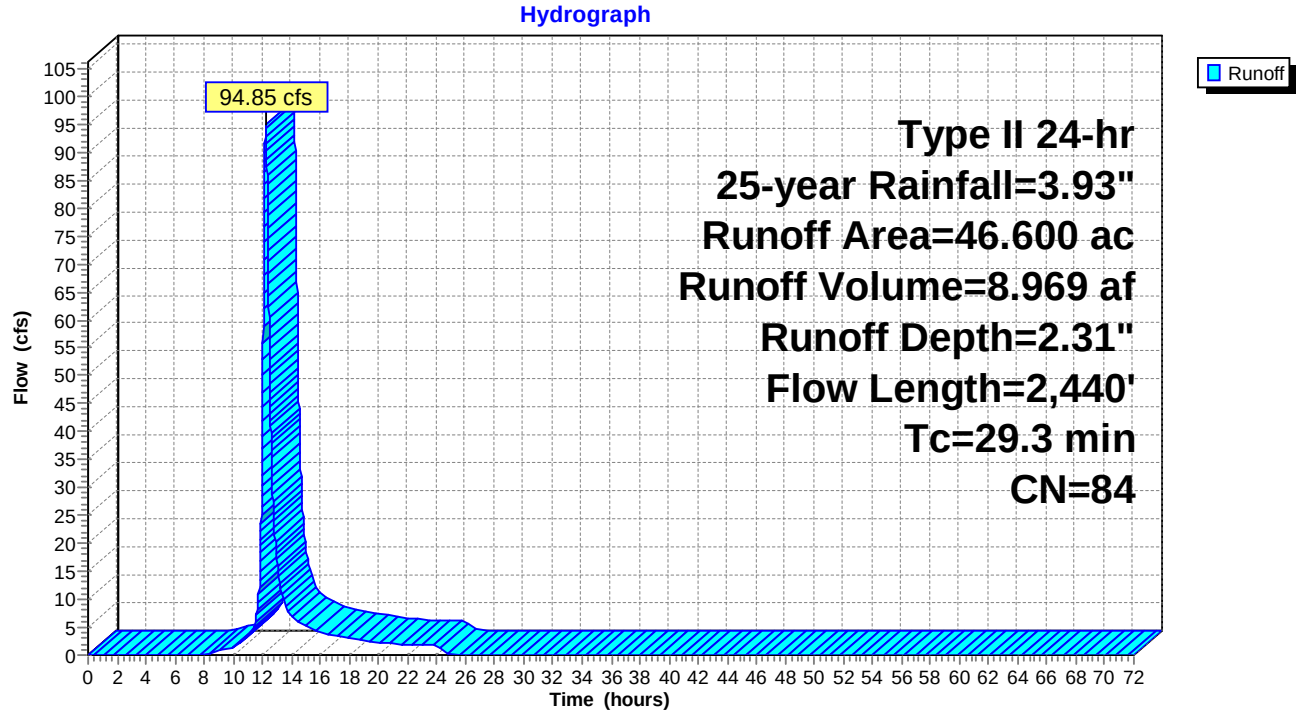
Runoff = 94.85 cfs @ 12.24 hrs, Volume= 8.969 af, Depth= 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	46.600	84	Pasture, grassland, or range - fair
	46.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.1	1,650	0.0210	1.01		**Shallow Concentrated Flow, (618-584)/1650** Short Grass Pasture Kv= 7.0 fps
2.2	790	0.0025	6.03	1,874.62	**Channel Flow, (584-582)/790** Area= 311.0 sf Perim= 65.0' r= 4.78' n= 0.035 Earth, dense weeds
29.3	2,440	Total			

Subcatchment 11AS: Subarea 11A



Summary for Subcatchment 11BS: Subarea 11B

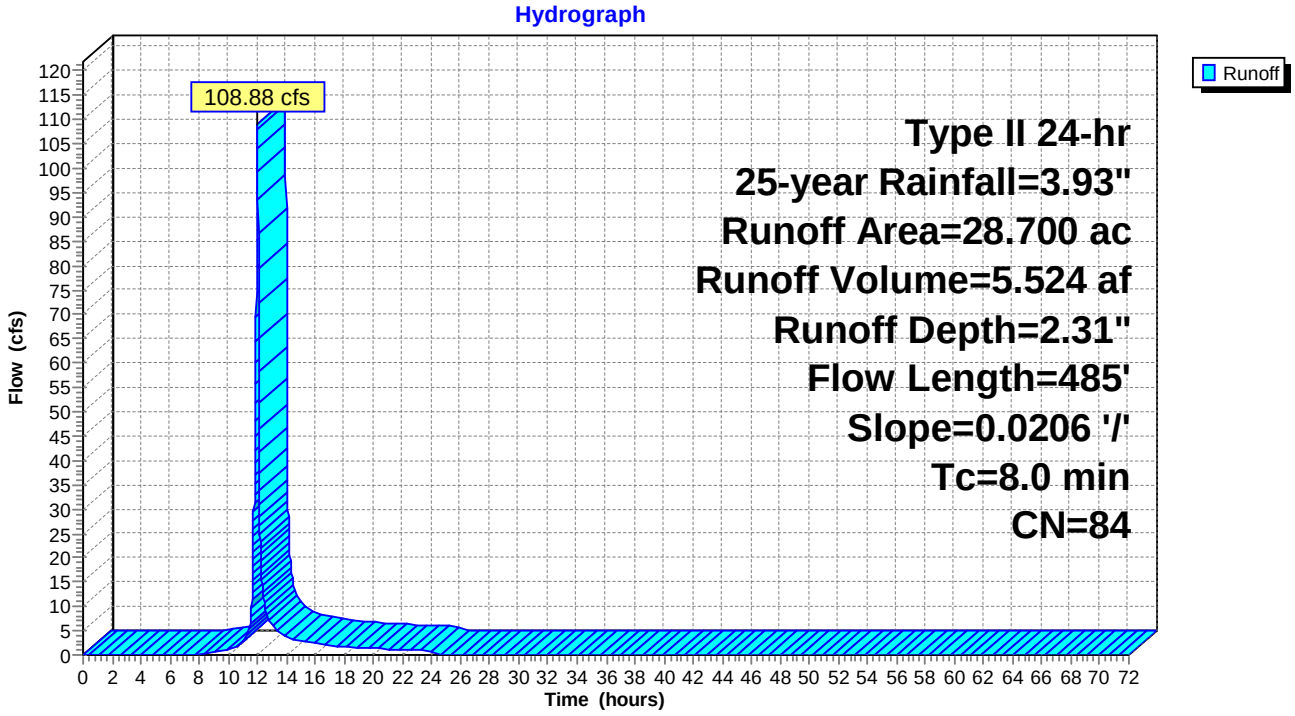
Runoff = 108.88 cfs @ 11.99 hrs, Volume= 5.524 af, Depth= 2.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	28.700	84	Pasture, grassland, or range - fair
	28.700		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	485	0.0206	1.00		**Shallow Concentrated Flow, (592-582)/485** Short Grass Pasture Kv= 7.0 fps

Subcatchment 11BS: Subarea 11B



Summary for Subcatchment 12S: Subarea 12

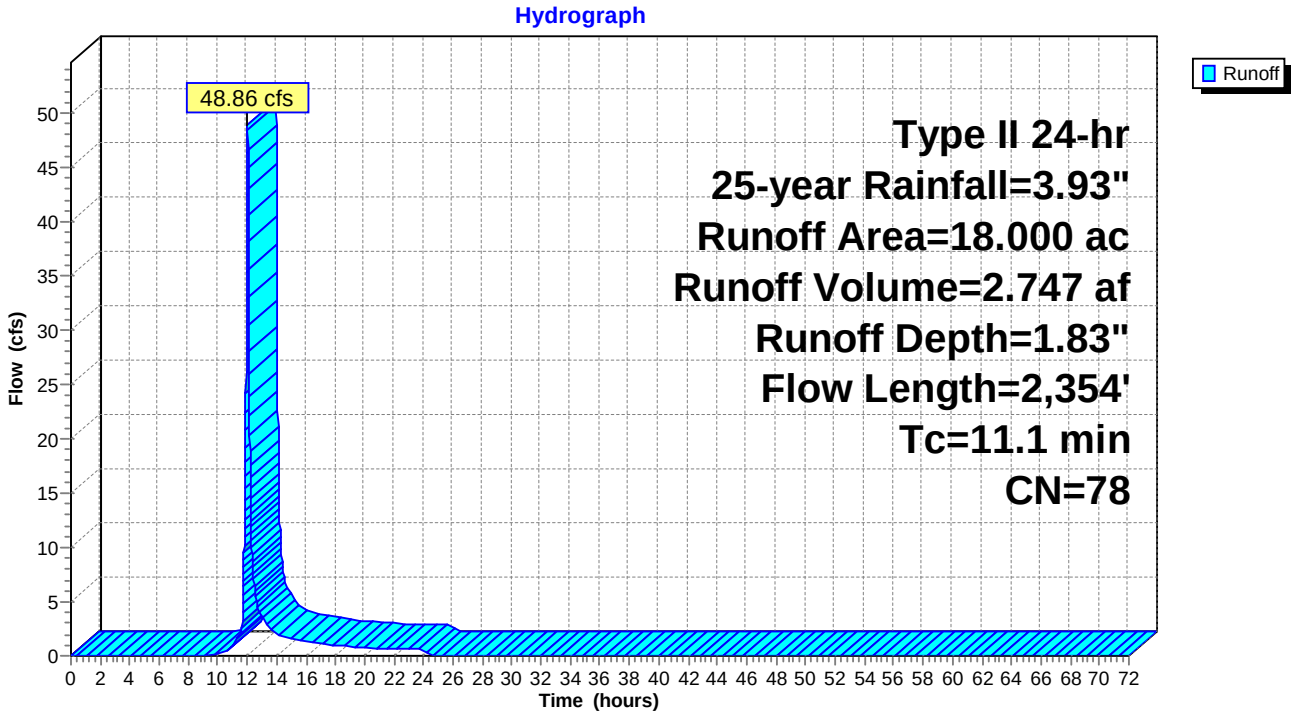
Runoff = 48.86 cfs @ 12.03 hrs, Volume= 2.747 af, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-year Rainfall=3.93"

	Area (ac)	CN	Description
*	18.000	78	
	18.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	540	0.0704	1.86		**Shallow Concentrated Flow, (630-592)/540** Short Grass Pasture Kv= 7.0 fps
6.3	1,814	0.0020	4.78	744.79	**Channel Flow, (590-586)/1814** Area= 155.8 sf Perim= 39.0' r= 3.99' n= 0.035
11.1	2,354	Total			

Subcatchment 12S: Subarea 12



Summary for Reach 1R: Reach 1

Inflow Area = 120.100 ac, 0.00% Impervious, Inflow Depth = 1.86" for 25-year event
Inflow = 132.73 cfs @ 12.39 hrs, Volume= 18.591 af
Outflow = 109.29 cfs @ 12.59 hrs, Volume= 18.591 af, Atten= 18%, Lag= 12.1 min

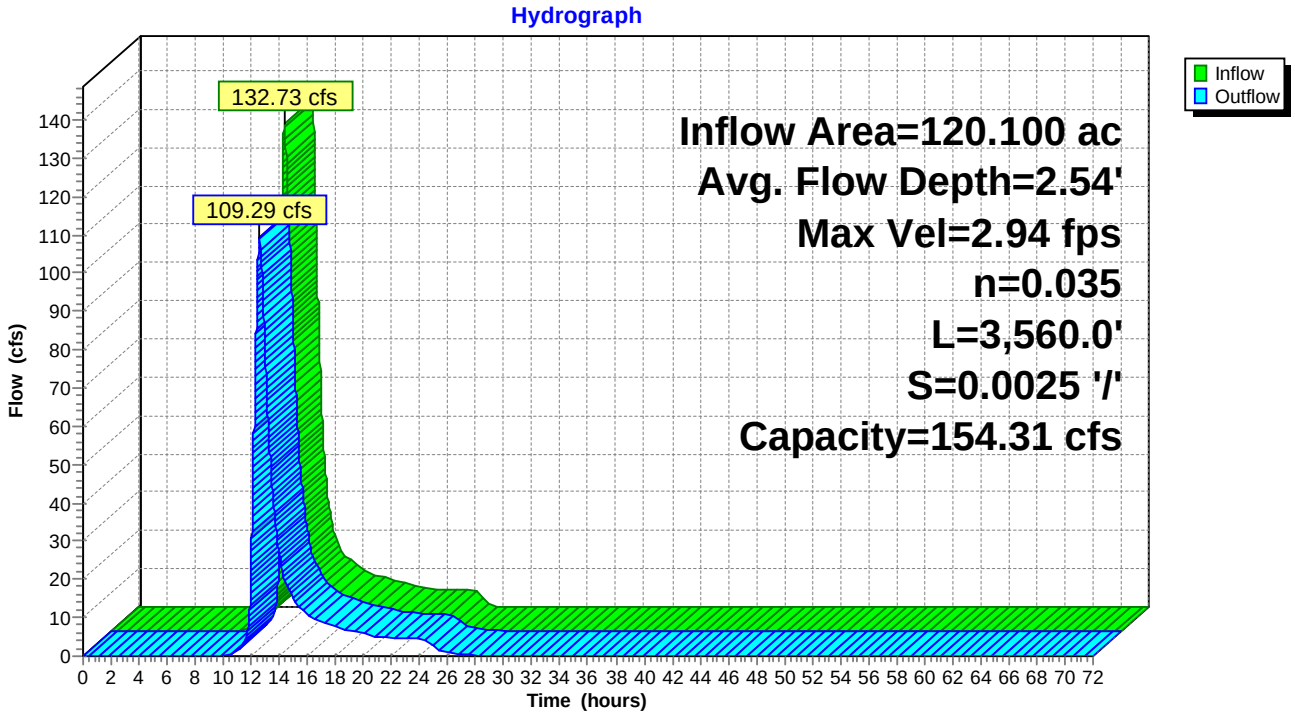
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.94 fps, Min. Travel Time= 20.2 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 111.1 min

Peak Storage= 132,547 cf @ 12.59 hrs
Average Depth at Peak Storage= 2.54'
Bank-Full Depth= 3.00' Flow Area= 48.0 sf, Capacity= 154.31 cfs

7.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 25.00'
Length= 3,560.0' Slope= 0.0025 '/'
Inlet Invert= 598.00', Outlet Invert= 589.00'

‡

Reach 1R: Reach 1



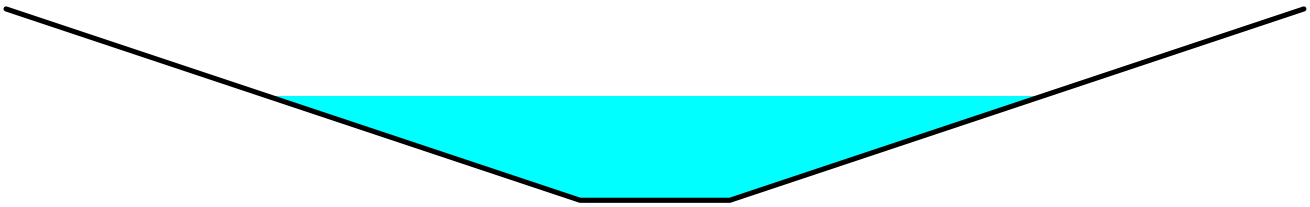
Summary for Reach 2R: Reach 2

Inflow Area = 149.300 ac, 0.00% Impervious, Inflow Depth = 1.82" for 25-year event
Inflow = 137.26 cfs @ 12.58 hrs, Volume= 22.691 af
Outflow = 136.85 cfs @ 12.61 hrs, Volume= 22.691 af, Atten= 0%, Lag= 1.4 min

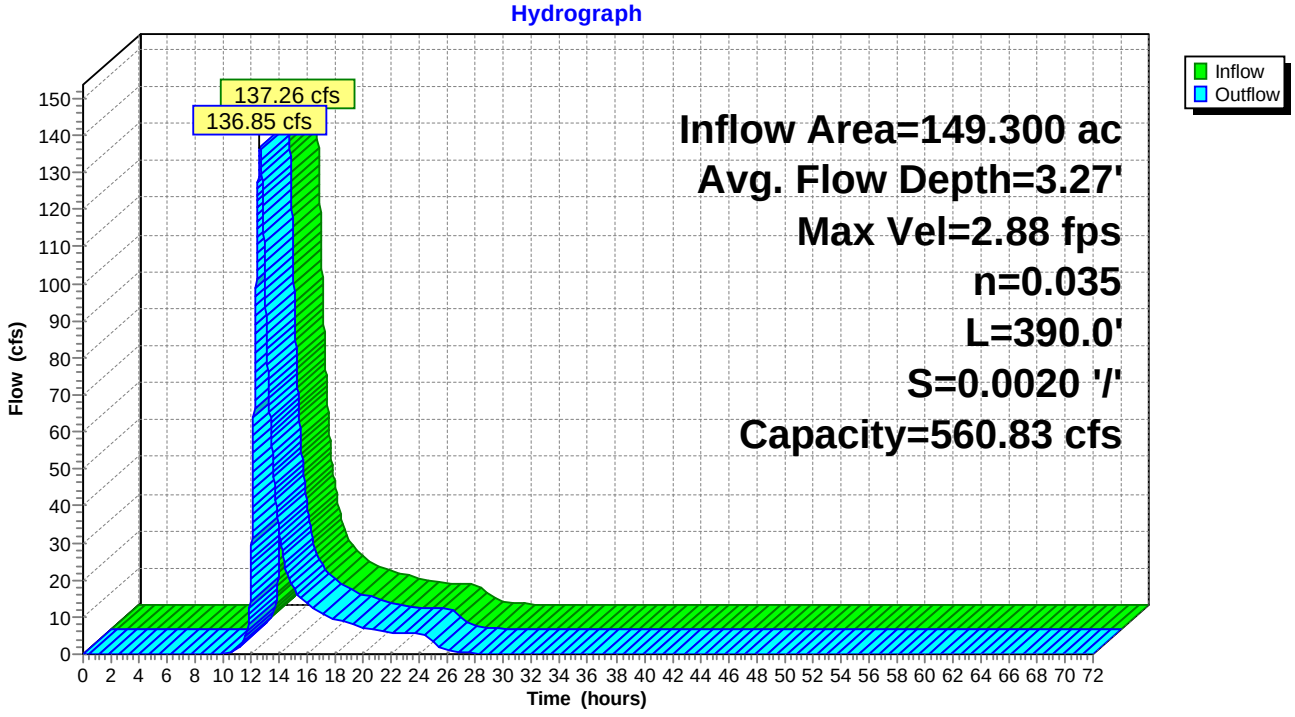
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.88 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 0.60 fps, Avg. Travel Time= 10.7 min

Peak Storage= 18,517 cf @ 12.61 hrs
Average Depth at Peak Storage= 3.27'
Bank-Full Depth= 6.00' Flow Area= 136.2 sf, Capacity= 560.83 cfs

4.70' x 6.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 40.70'
Length= 390.0' Slope= 0.0020 '/'
Inlet Invert= 586.00', Outlet Invert= 585.22'



Reach 2R: Reach 2



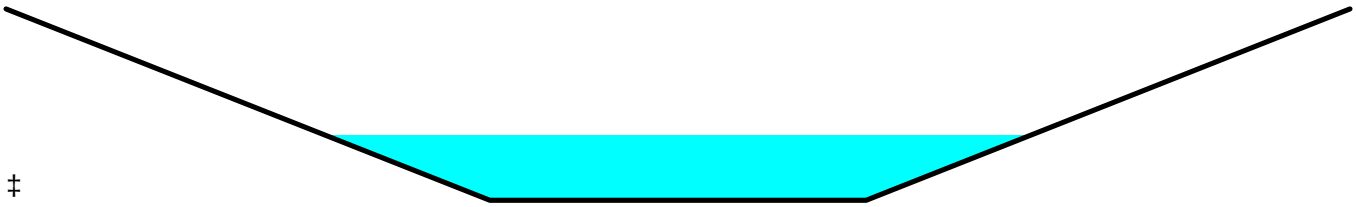
Summary for Reach 3R: Reach 3

Inflow Area = 184.400 ac, 0.00% Impervious, Inflow Depth = 1.80" for 25-year event
Inflow = 167.42 cfs @ 12.62 hrs, Volume= 27.620 af
Outflow = 167.17 cfs @ 12.63 hrs, Volume= 27.620 af, Atten= 0%, Lag= 1.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 4.06 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.83 fps, Avg. Travel Time= 7.8 min

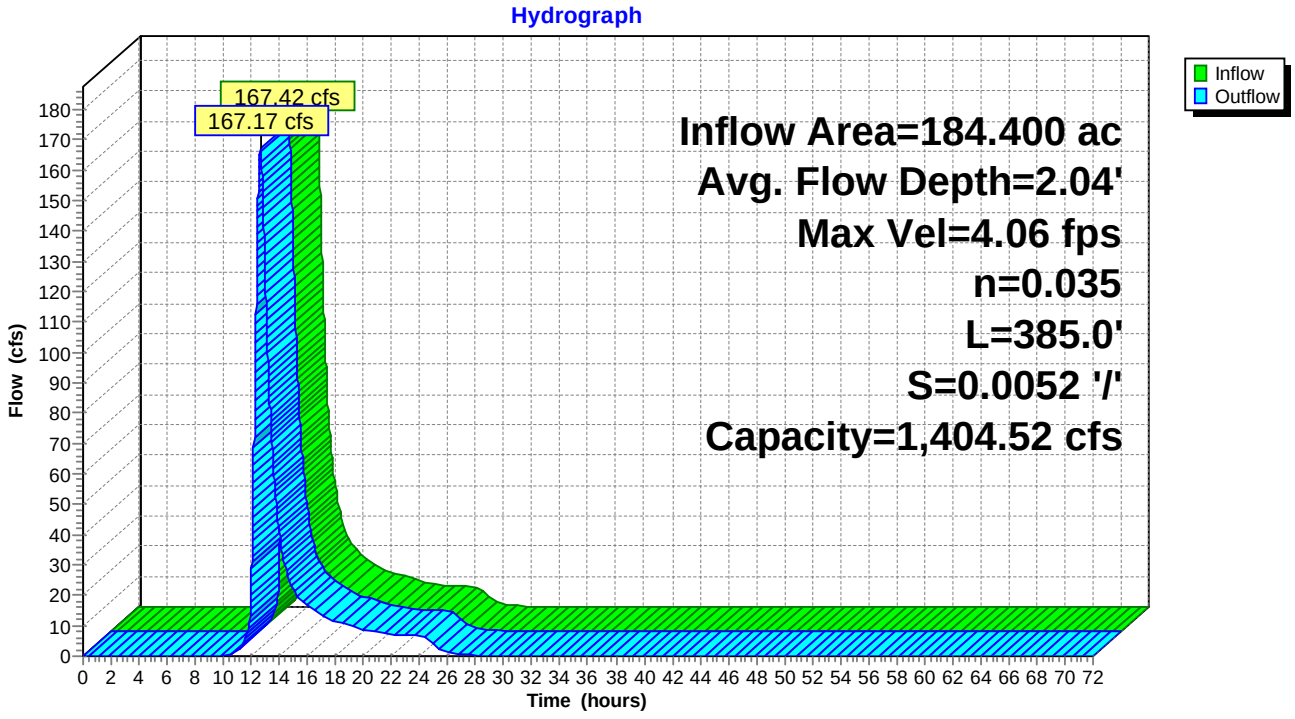
Peak Storage= 15,850 cf @ 12.63 hrs
Average Depth at Peak Storage= 2.04'
Bank-Full Depth= 6.00' Flow Area= 192.0 sf, Capacity= 1,404.52 cfs

14.00' x 6.00' deep channel, n= 0.035
Side Slope Z-value= 3.0 '/' Top Width= 50.00'
Length= 385.0' Slope= 0.0052 '/'
Inlet Invert= 586.00', Outlet Invert= 584.00'



‡

Reach 3R: Reach 3



Summary for Reach 4R: Reach 4

Inflow Area = 210.300 ac, 0.00% Impervious, Inflow Depth = 1.79" for 25-year event
Inflow = 176.54 cfs @ 12.62 hrs, Volume= 31.457 af
Outflow = 176.23 cfs @ 12.64 hrs, Volume= 31.457 af, Atten= 0%, Lag= 1.3 min

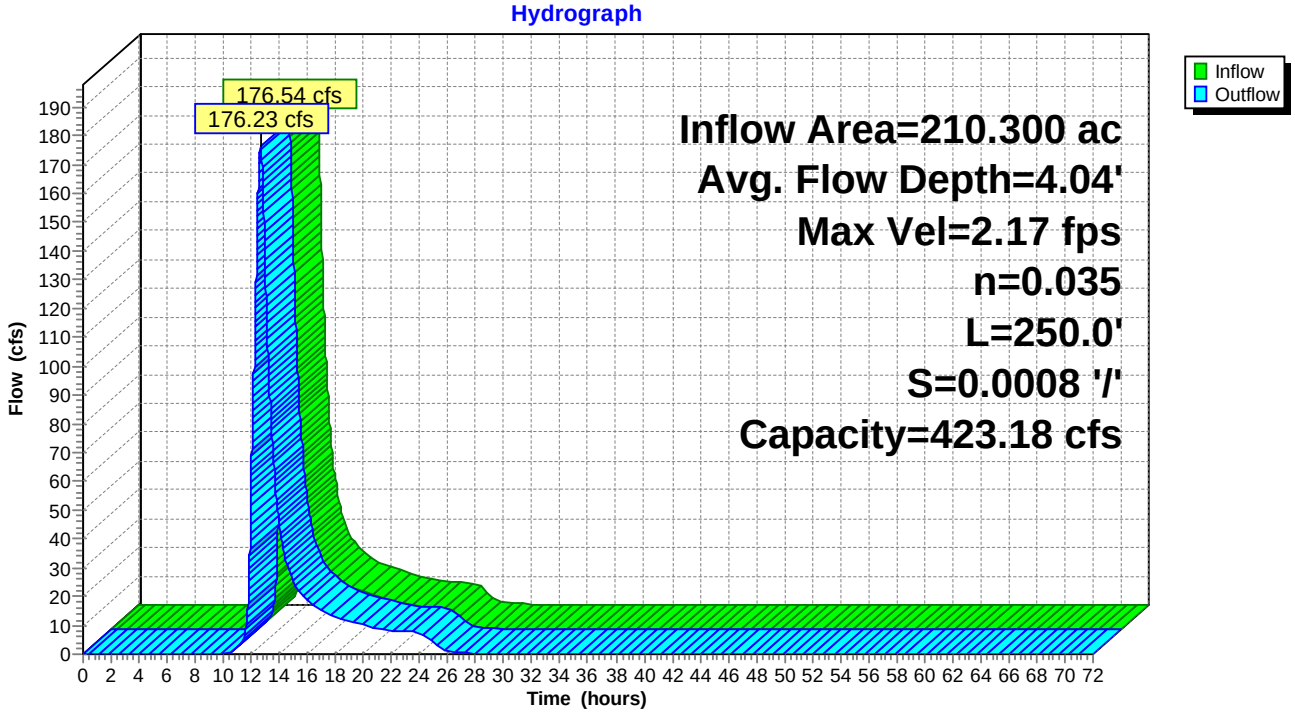
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.17 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 0.42 fps, Avg. Travel Time= 9.9 min

Peak Storage= 20,334 cf @ 12.64 hrs
Average Depth at Peak Storage= 4.04'
Bank-Full Depth= 6.00' Flow Area= 156.0 sf, Capacity= 423.18 cfs

8.00' x 6.00' deep channel, n= 0.035
Side Slope Z-value= 3.0 '/' Top Width= 44.00'
Length= 250.0' Slope= 0.0008 '/'
Inlet Invert= 584.00', Outlet Invert= 583.80'

‡

Reach 4R: Reach 4



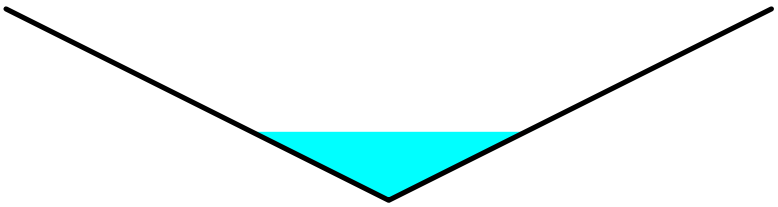
Summary for Reach 7R: Reach 7

Inflow Area = 45.100 ac, 0.00% Impervious, Inflow Depth = 2.06" for 25-year event
Inflow = 86.44 cfs @ 12.21 hrs, Volume= 7.753 af
Outflow = 54.71 cfs @ 12.42 hrs, Volume= 7.753 af, Atten= 37%, Lag= 12.7 min

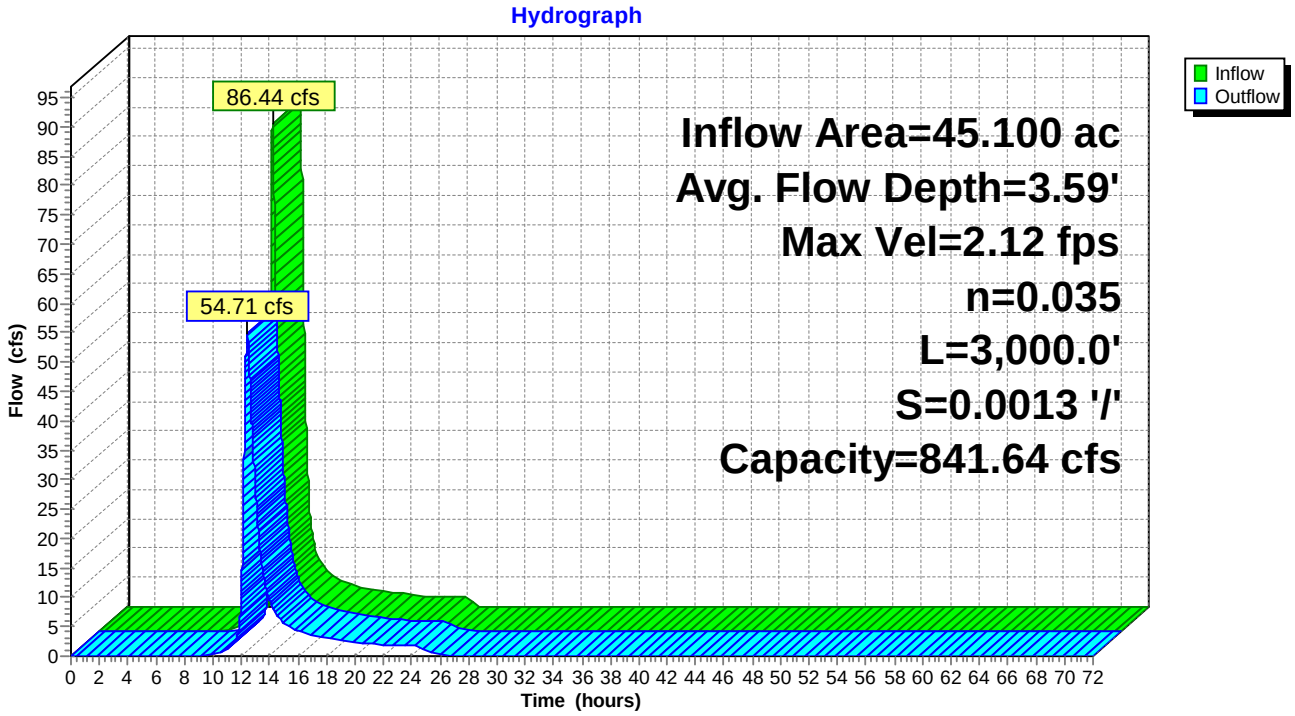
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.12 fps, Min. Travel Time= 23.5 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 98.1 min

Peak Storage= 77,239 cf @ 12.42 hrs
Average Depth at Peak Storage= 3.59'
Bank-Full Depth= 10.00' Flow Area= 200.0 sf, Capacity= 841.64 cfs

0.00' x 10.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 2.0 '/' Top Width= 40.00'
Length= 3,000.0' Slope= 0.0013 '/'
Inlet Invert= 590.00', Outlet Invert= 586.00'



Reach 7R: Reach 7



Summary for Reach 8R: Reach 8

Inflow Area = 81.700 ac, 0.00% Impervious, Inflow Depth = 3.26" for 25-year event
Inflow = 157.32 cfs @ 12.46 hrs, Volume= 22.167 af
Outflow = 156.34 cfs @ 12.50 hrs, Volume= 22.167 af, Atten= 1%, Lag= 1.9 min

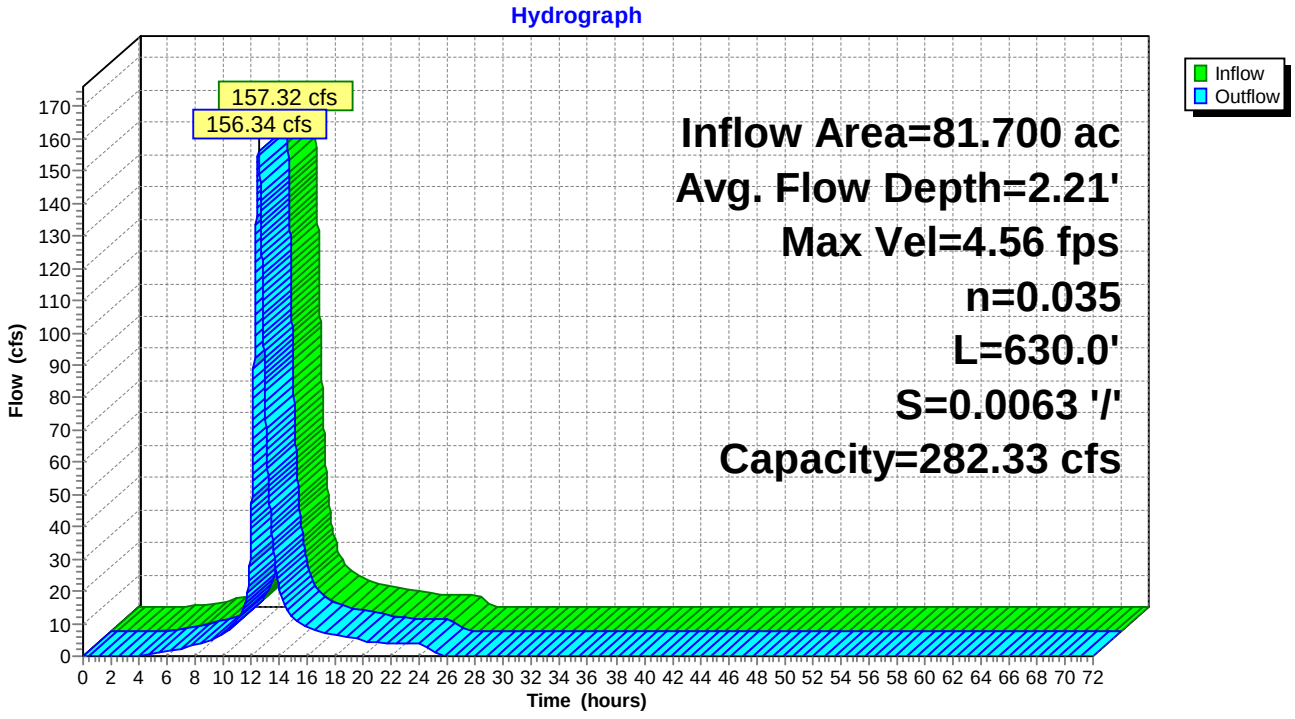
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 4.56 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 1.36 fps, Avg. Travel Time= 7.7 min

Peak Storage= 21,606 cf @ 12.50 hrs
Average Depth at Peak Storage= 2.21'
Bank-Full Depth= 3.00' Flow Area= 52.5 sf, Capacity= 282.33 cfs

10.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 2.0 '/' Top Width= 25.00'
Length= 630.0' Slope= 0.0063 '/'
Inlet Invert= 586.00', Outlet Invert= 582.00'

‡

Reach 8R: Reach 8



Summary for Reach 10R: Reach 10

Inflow Area = 249.700 ac, 0.00% Impervious, Inflow Depth = 1.73" for 25-year event
Inflow = 194.39 cfs @ 12.60 hrs, Volume= 36.090 af
Outflow = 186.07 cfs @ 12.73 hrs, Volume= 36.090 af, Atten= 4%, Lag= 8.1 min

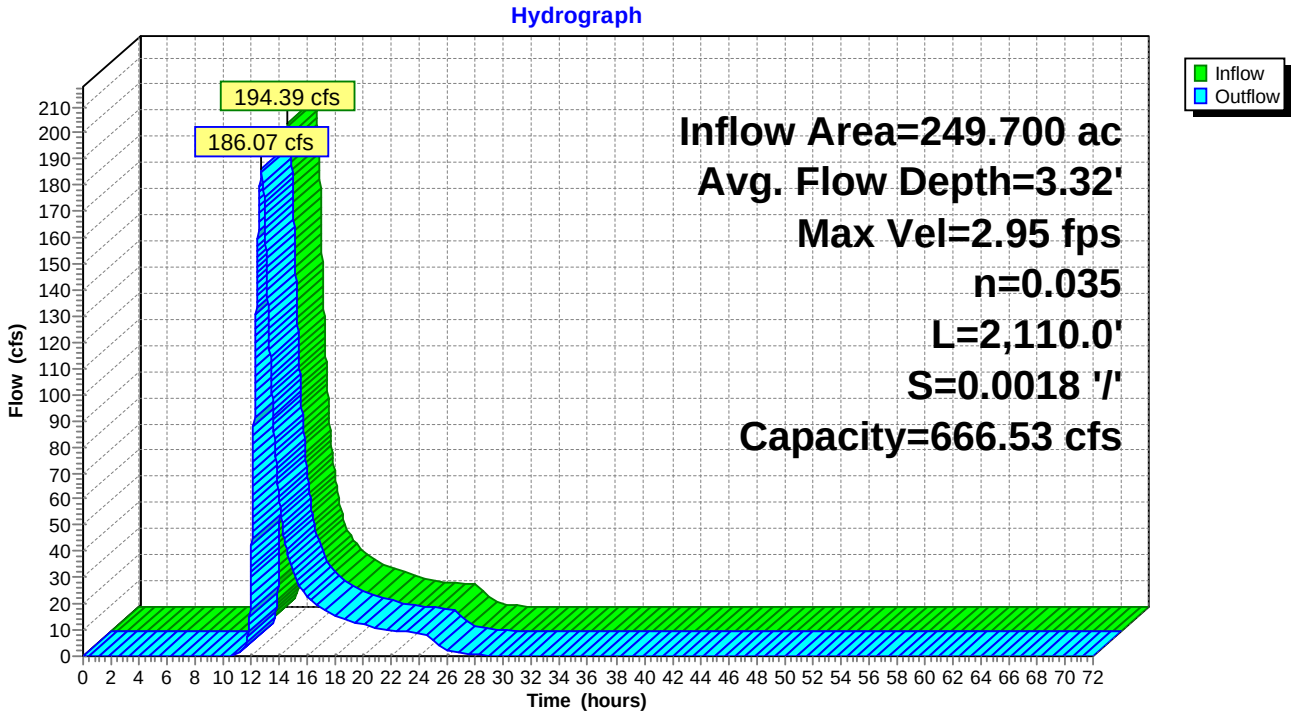
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.95 fps, Min. Travel Time= 11.9 min
Avg. Velocity = 0.59 fps, Avg. Travel Time= 59.7 min

Peak Storage= 132,908 cf @ 12.73 hrs
Average Depth at Peak Storage= 3.32'
Bank-Full Depth= 6.00' Flow Area= 162.0 sf, Capacity= 666.53 cfs

9.00' x 6.00' deep channel, n= 0.035
Side Slope Z-value= 3.0 '/' Top Width= 45.00'
Length= 2,110.0' Slope= 0.0018 '/'
Inlet Invert= 583.80', Outlet Invert= 580.00'

‡

Reach 10R: Reach 10



Summary for Reach 11AR: Reach 11A

Inflow Area = 91.700 ac, 0.00% Impervious, Inflow Depth = 2.19" for 25-year event
Inflow = 139.75 cfs @ 12.28 hrs, Volume= 16.721 af
Outflow = 110.90 cfs @ 12.48 hrs, Volume= 16.721 af, Atten= 21%, Lag= 11.9 min

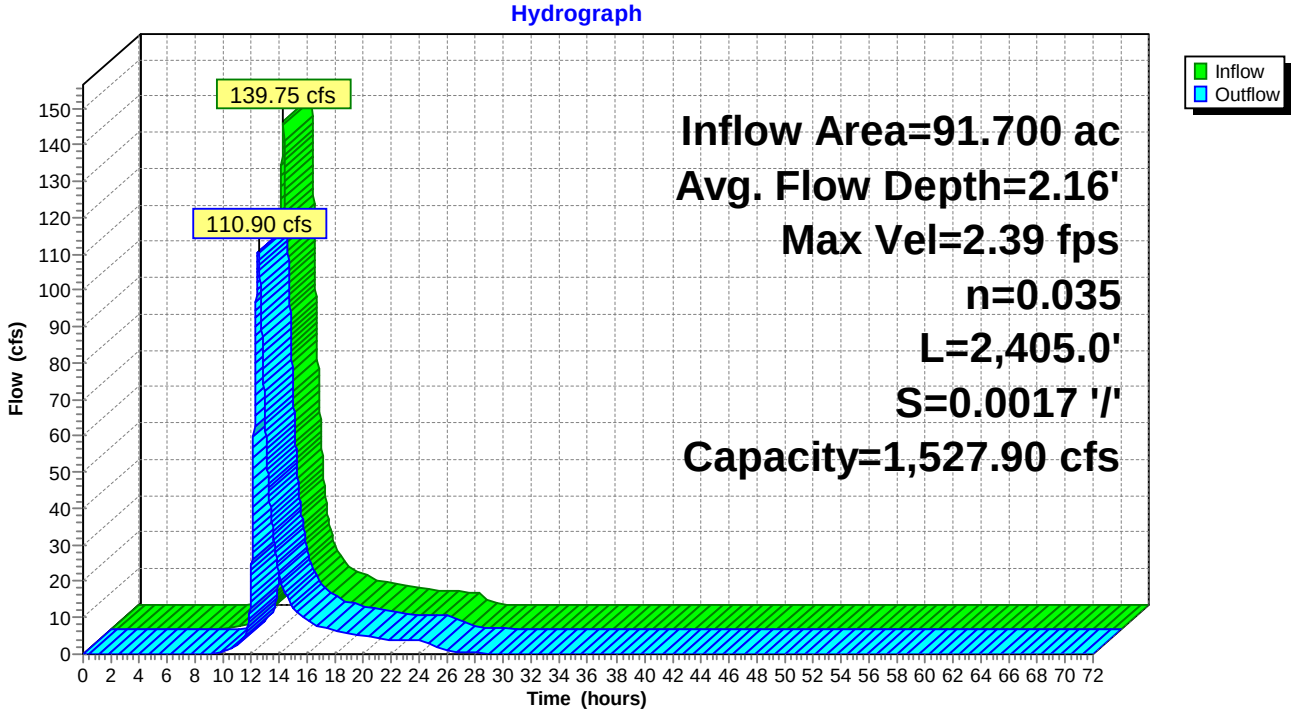
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 2.39 fps, Min. Travel Time= 16.8 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 75.3 min

Peak Storage= 111,680 cf @ 12.48 hrs
Average Depth at Peak Storage= 2.16'
Bank-Full Depth= 8.00' Flow Area= 312.0 sf, Capacity= 1,527.90 cfs

15.00' x 8.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 63.00'
Length= 2,405.0' Slope= 0.0017 '/'
Inlet Invert= 586.00', Outlet Invert= 582.00'

‡

Reach 11AR: Reach 11A



Summary for Reach 11BR: Reach 11B

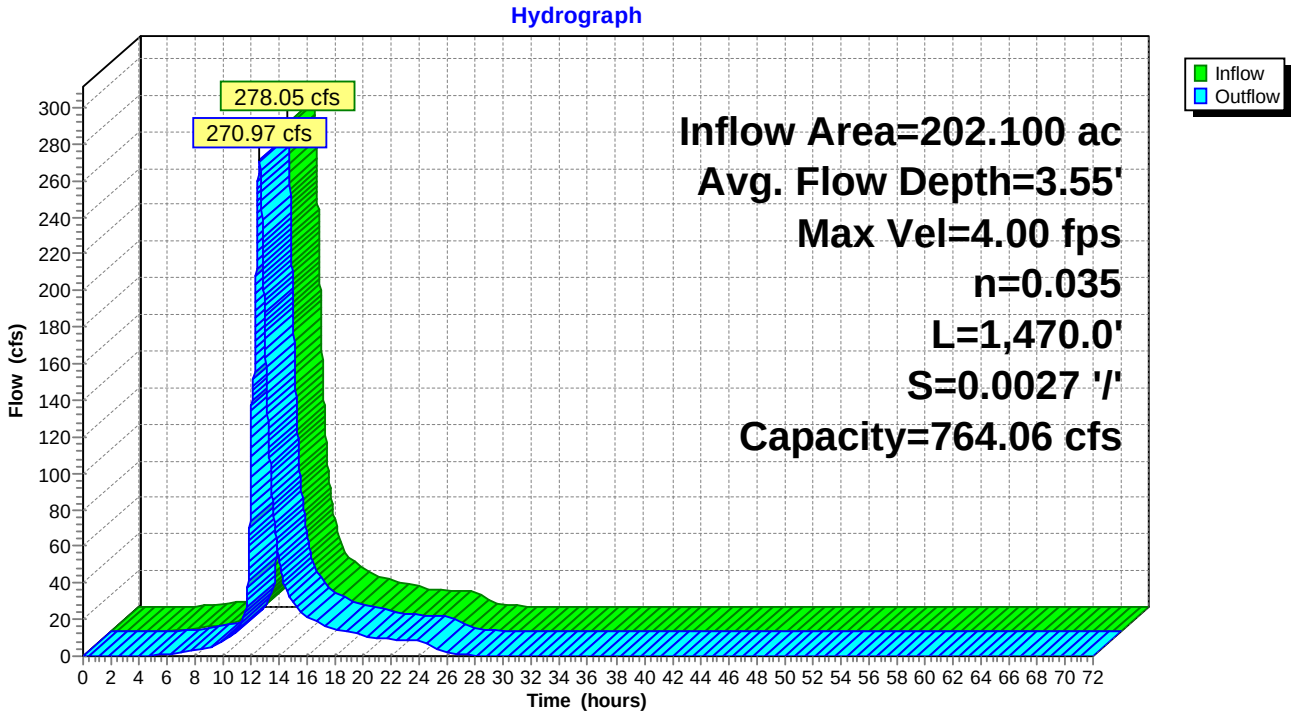
Inflow Area = 202.100 ac, 0.00% Impervious, Inflow Depth = 2.64" for 25-year event
Inflow = 278.05 cfs @ 12.48 hrs, Volume= 44.411 af
Outflow = 270.97 cfs @ 12.56 hrs, Volume= 44.411 af, Atten= 3%, Lag= 4.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 4.00 fps, Min. Travel Time= 6.1 min
Avg. Velocity = 0.80 fps, Avg. Travel Time= 30.6 min

Peak Storage= 99,505 cf @ 12.56 hrs
Average Depth at Peak Storage= 3.55'
Bank-Full Depth= 6.00' Flow Area= 144.0 sf, Capacity= 764.06 cfs

12.00' x 6.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 2.0 '/' Top Width= 36.00'
Length= 1,470.0' Slope= 0.0027 '/'
Inlet Invert= 582.00', Outlet Invert= 578.00'

Reach 11BR: Reach 11B



Summary for Pond 9P: NPDES Sedimentation Basin

The pumps at the pump house are three National Pump Company J11MC five stage pumps.

Starting WSE of 579.3 was selected from the pump off switch.

Inflow Area = 486.500 ac, 0.00% Impervious, Inflow Depth = 2.09" for 25-year event
Inflow = 474.10 cfs @ 12.59 hrs, Volume= 84.583 af
Outflow = 5.70 cfs @ 25.57 hrs, Volume= 28.711 af, Atten= 99%, Lag= 778.8 min
Primary = 5.70 cfs @ 25.57 hrs, Volume= 28.711 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Starting Elev= 580.10' Surf.Area= 8.702 ac Storage= 17.829 af
Peak Elev= 587.72' @ 25.57 hrs Surf.Area= 13.531 ac Storage= 94.814 af (76.984 af above start)

Plug-Flow detention time= 2,936.8 min calculated for 10.882 af (13% of inflow)
Center-of-Mass det. time= 1,602.0 min (2,483.7 - 881.7)

Volume	Invert	Avail.Storage	Storage Description
#1	578.00'	98.676 af	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Perim. (feet)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
578.00	8.284	3,734.0	0.000	0.000	8.284
580.00	8.678	3,762.0	16.960	16.960	8.704
582.00	9.167	5,177.0	17.843	34.803	31.812
584.00	9.860	5,810.0	19.023	53.826	44.520
586.00	10.510	6,225.0	20.367	74.193	53.649
588.00	14.059	11,378.0	24.483	98.676	219.359

Device	Routing	Invert	Outlet Devices
#1	Primary	580.30'	**Pump (National Pump J11MC x 3) X 3.00** Discharges@929.30' Turns Off@579.30' Flow (gpm)= 600.0 720.0 735.0 840.0 1,008.0 Head (feet)= 390.00 375.00 350.00 345.00 300.00
#2	Device 1	578.07'	**96.0" W x 48.0" H Box Culvert** L= 49.2' RCP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 578.07' / 577.09' S= 0.0199 '/' Cc= 0.900 n= 0.013, Flow Area= 32.00 sf
#3	Secondary	590.00'	**1,000.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=5.70 cfs @ 25.57 hrs HW=587.72' (Free Discharge)
↑—**1=Pump (National Pump J11MC x 3)** (Pump Controls 5.70 cfs)
↑—**2=Culvert** (Passes 5.70 cfs of 408.15 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=580.10' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 9P: NPDES Sedimentation Basin