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JUN 21 2011

DEP Central Dist.

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Transmittal

Attention: Tom Lubozynski, PE | Date: June 20, 2011 | Job No: 195-97785-002

To: Florida Department of Environmental Protection
Central District
3319 Maguire Blvd, Suite 232
Orlando, FL 32803

Phone:

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DEP Central Dist.

Regarding: Volusia County – Tomoka Farms Road Landfill
North Cell Toe Drain & Temporary Runoff Containment Berm Certification of Construction Completion

We are sending you: ☒ **Attached** ☐ **Under separate cover via _____ the following items**

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change Order ☒ Other Report

Copies	Date	No.	Description
4	6/17/2011	1	Supplemental Information to Certification of Construction Completion Report

These are transmitted as checked below:

☐ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☒ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review/comment ☐ Other

☐ For bids due _____ ☐ Prints returned after loan to us

Remarks: Please find attached, four copies of the supplemental information to the Certification of Construction Completion report for the Toe Drain and Temporary Runoff Containment Berm construction project. Please add these files to the originally submitted report dated May 27, 2011.

Copy to: Volusia County, file | Signed: Ashley Evans

If enclosures are not as noted, please notify us at once

C:\Documents and Settings\cdaigle\My Documents\Work Files\Project Management\Forms\Transmittal.doc

HDR Engineering, Inc.
200 West Forsyth Street
Suite 800
Jacksonville, FL 32202-4321
Phone: (904) 598-8900
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JUN 21 2011
DEP Central Dist.

June 17, 2011

Mr. Tom Lubozynski, P.E.
Waste Management
Florida Department of Environmental Protection
Central District
3319 Maguire Blvd, Suite 232
Orlando, FL 32803

RE: Volusia County – Tomoka Farms Road Landfill
Class I – North Cell Toe Drain and Temporary Runoff Containment Berm Certification of Construction Completion – Supplemental Information
Permit Number: SF64-0078767-027

Dear Mr. Lubozynski:

On behalf of the Volusia County Solid Waste Division, HDR Engineering, Inc. is pleased to submit the requested supplemental information for the Class I – North Cell Toe Drain and Temporary Runoff Containment Berm Certification of Construction Completion report for the Tomoka Farms Road Landfill. The construction was authorized by FDEP to correct a leachate seepage problem. The plans were approved during a meeting held between FDEP, Volusia County, and HDR on March 16, 2011 and documented in e-mails dated March 30, 2011. On June 13, 2011, FDEP issued a letter stating the Closure of Non-Compliance Letter OCD-SW-11-045 has been resolved. The letter requested the certification of construction completion form be submitted for the toe drain and run-off containment berm construction and future smaller leachate seepage events are to be addressed according to the modified Operations Plan.

As requested by FDEP in an email dated May 27, 2011, enclosed with this letter is the revised Table of Contents for the Certification of Construction Completion, FDEP form 62-701.900(2), F.A.C., meeting minutes, approved pre-construction engineering design, construction specifications, construction design plans, and modifications to the Operations Plan. These documents have been divided into separate appendices that are intended to be filed along with the original Certification of Construction Completion report dated May 27, 2011.

If you have any questions, please contact me at (904) 598-8941.

Sincerely,

Ashley Evans, PE
Project Engineer

Cc: Lenny Marion, Volusia County Solid Waste Director
Mark Roberts, P.E.

Encl: Revised Table of Contents
Appendix E – FDEP Form 62-701.900(2), F.A.C.
Appendix F – Meeting Minutes dated 03-16-2011
Appendix G – Pre-construction Engineering Design
Appendix H – Modification to Operations Plan

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Table of Contents

Appendices

Appendix E

FDEP Form 62-701.900(2), F.A.C.

Florida Department of Environmental Protection
Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, FL 32399-2400

DEP Form # 62-701.900(2)
Form Title Certification of Construction Completion
Effective Date May 19, 1994

DEP Application No. _____
(Filled by DEP)

Certification of Construction Completion of a Solid Waste Management Facility

DEP Construction Permit No: N/A County: Volusia

Name of Project: Toe Drain and Temporary Runoff Containment Berm Construction on North Cell

Name of Owner: Volusia County Solid Waste Division

Name of Engineer: HDR Engineering, Inc.

Type of Project: Construction of a segment of the Toe Drain per the Closure Permit and construction of a temp. runoff containment berm surrounding the toe drain. FDEP authorized to correct a leachate seep

Cost: Estimate $ N/A Actual $ 65,668.42*

Site Design: Quantity: N/A ton/day Site Acreage: N/A Acres

Deviations from Plans and Application Approved by DEP: No.

Address and Telephone No. of Site: 1990 Tomoka Farms Road, Port Orange, FL 32124
(386) 947-2952

Name(s) of Site Supervisor: Chester Purves

Date Site inspection is requested: Inspection already performed on May 11, 2011 by FDEP.

This is to certify that, with the exception of any deviation noted above, the construction of the project has been completed in substantial accordance with the plans authorized by Construction

Permit No. N/A :Dated: N/A

Date: 6/17/2011

ASHLEY V. EVANS LICENSE No. 71630 STATE OF FLORIDA PROFESSIONAL ENGINEER

Signature of Professional Engineer

* Actual Cost includes Contractor, Materials, CQA Oversight, and County expenses for the construction of the entire project.

Northwest District
160 Governmental Center
Pensacola, FL 32501-5794
850-595-8360

Northeast District
7825 Baymeadows Way, Ste. B200
Jacksonville, FL 32256-7590
904-448-4300

Central District
3319 Maguire Blvd., Ste. 232
Orlando, FL 32803-3767
407-894-7555

Southwest District
3804 Coconut Palm Dr.
Tampa, FL 33619
813-744-6100

South District
2295 Victoria Ave., Ste. 364
Fort Myers, FL 33901-3881
941-332-6975

Southeast District
400 North Congress Ave.
West Palm Beach, FL 33401
561-681-6600

Appendix F

Meeting Minutes dated 03-16-2011

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Meeting Minutes

Subject: Tomoka Farms Road Landfill – Seeps within the North Cell	
Client: Volusia County	
Meeting Date: March 16th, 2011	Meeting Location: FDEP – Central District Office
Notes by: Carlo Lebron	

Attendees:

Tom Lubozynski, Brad Whidden, Gloria Jean DePradine, Janine Kraemer, Lenny Marion, Patrick McCormack, Chet Perves, Jennifer Stirk, Mark Roberts, and Carlo Lebron

Topics Discussed:

- Scenarios of addressing the leachate seeps within the North Cell and timelines to implement. The scenarios presented were:
  - Sequence 1 Closure of the North Cell per the Permit Drawing Set
  - Revising the Permit Drawings to allow closure of the south sideslope of the North Cell and closing the south sideslope
  - Installing the permitted toe drain along the entire south sideslope and maintaining the temporary berm
  - Installing ~200 ft of the permitted toe drain in the region of concern and revising the existing berm to collect runoff from the area of concern (reducing length of berm)
- It was agreed that installing ~200 ft of the permitted toe drain in the region of concern and revising the existing berm to collect runoff from the area of concern (reducing length of berm) was the appropriate scenario to implement at the site

Action/Notes:

- FDEP requested construction as-built drawings of the berm to be submitted
  - The berm needs to tie into existing grades of the south face of the North slope
  - Height, width, depth, length, etc. of the berm should be provided in the as-builts
- The existing berm is needed within the 200 ft area of concern (purple area in the drawings provided). The unneeded portions of the berm can be removed
- Stormwater calculations for the bermed area shall be submitted to the FDEP
  - Calculations shall be based on 25 yr – 24 hr storm
  - Appropriate height of the berm should be determined based on the drainage area, toe drain, berm, and assume percolation rates
- Formalized meeting minutes to be submitted within 2 weeks to FDEP
- Construction Certification Report (sealed and signed) shall be submitted to FDEP
- At commencement of Sequence 1 of the final closure construction the Contactor will be directed to construct/begin with south slope closure
  - Need to provide construction phasing/sequence plan
- Design drawings for the installation of the toe drain and berm modifications will be submitted to the Contractor and a copy provided to FDEP prior to construction
- Written approval from FDEP is not required for the proposed work
- Volusia County will email FDEP notification of leaving the approved fill sequence plan and to fill within the south sideslope.
- Volusia County will update the operations plan to discuss management of leachate outbreaks
  - Describe actions taken (e.g., notify FDEP)

- Ascertain extent and strength of seep and develop corrective actions based on strength of seep (excavate and fill with gravel, berm immediate area)
- If berm is selected as corrective action then provide dimension criteria and general specifications

- Provide formal response to corrective action questions 1 through 3 in the FDEP non compliance letter dated Feb 18, 2011 (begin on page 7 of 10)
  - Q 1(a): It was field constructed
  - Q 1(b): During ... excavation indicated the edge of liner marker is located in the middle of anchor berm
  - Q 1(c): No staining was noted on the backside of the berm
  - Q 1(d): No
  - Q 2: Yes
  - Q 3: Yes, hence HDR was at the meeting
- Corrective Action will be deemed complete once submittals noted above, revised operations plan, and the certification report are submitted to the FDEP
- After toe drain is constructed, this portion of the final closure design can be removed from the closure assurance funds.

Appendix G

Pre-Construction Engineering Design

- Stormwater Calculations
- Construction Specifications
- Construction Drawings

Job No.	97785	Calc No.	

Computation

HDR

Project	Tomoka Farms Road Landfill - North Cell	Computed	A. Evans
System	South Slope Runoff Berm	Date	
Component	Berm Design/Stormwater Calculations	Reviewed	
Task		Date	

Purpose

Verify the Runoff Berm is adequately sized to handle the 25-year, 24-hour storm event.

Methodology

The stormwater runoff was determined using the SCS Method and the Rational Method. The SCS Method estimated a higher flow than the Rational Method, therefore the SCS Method was utilized in calculations because it was more conservative. The parameters for the calculations are shown in Step 1. These values were input into the Hydraflow Hydragraph Modeling Program (Hydraflow) to determine the peak flowrate. In Step 2, the volume or storage capacity of the bermed area was calculated using AutoCAD and input into Hydraflow. The model output of the design provides stage-storage tables. The infiltration rates for both solid waste and gravel were determined in Step 3. The volume required to saturate the materials is determined and compared to the total volume of runoff from the 25-year,24-hour storm. If the volume required to saturate is greater than the volume of runoff, then the design and media is adequate to handle the runoff.

In Hydraflow two berm designs were modeled. The Senerio 1 berm design incorporates the use of a gravel toe drain and the Senerio 2 berm design does not use a gravel toe drain (current conditions - channel in soil/waste mix). The 25-year, 24-hour storm is routed to the bermed area to verify if the design is adequate. Details provided in Step 4 and Attachment G.

Assumptions

1) Use procedures in the FDOT Drainage Manual.

Calculation

Step 1 - Determine Flow to Bermed Area

Flow from Sideslope to Bermed Area using Rational Method

Contributing area of the sideslope = 0.56 ac *(Attachment A)*

Maximum Discharge (25-yr) = Q = CiA

Q = Maximum Discharge, cfs

C = Runoff Coefficient → Steep Slopes, Sandy Soils, Bare Earth = 0.60 *(Attachment B-1)*

Adjust by 1.1 for 25-yr return period

C = 0.66 *(Attachment B-2)*

i = rainfall intensity for 25-yr storm = 8.57 in/hr *(Attachment C)*

Time of Concentration (Tc) using TR-55

Manning's n = 0.24 *(Attachment E)*

Tc = 6.57, use 8 minutes

Q (25-yr) = 3.17 cfs

Flow from Sideslope to Bermed Area using SCS Method

Contributing area of the sideslope = 0.56 ac *(Attachment A)*

CN = 79 *(Attachment D)*

Time of Concentration (Tc) using TR-55

Manning's n = 0.24 *(Attachment E)*

Tc = 6.57 *(Attachment G)*

24 Hr Storm, Type III

Computation

Project	Tomoka Farms Road Landfill - North Cell	Computed	A. Evans
System	South Slope Runoff Berm	Date	
Component	Berm Design/Stormwater Calculations	Reviewed	
Task		Date	

See Flow Results in Hydroflow Hydragraph Output *(Attachment G)*

Q (25-yr) = 3.768 cfs

Step 2 - Determine Storage Volume of Berm

Berm diamensions, contour areas, and compents determined from construction drawings

See Hydroflow Hydragraph Output *(Attachment G)*

Step 3 - Determine Berm Area Recovery Rate

Given: k(sat) of waste = 3.4E-04 cm/s *(Attachment F)*

k(sat) of gravel = 20,000 ft/day = 7.056 cm/s *(Attachment F)*

Required Factor of Safety = 2

Elevation of Bottom Liner = 23.3 ft *(from site drawings)*

Area of Berm Bottom = 746 sf (3 ft wide ~248 ft long)

Porosity (f) of waste = 0.5 *(Attachment F)*

Porosity (f) of gravel = 45.4 *(Attachment F)*

Area of Drainage Basin = 0.56 ac *(Attachment A)*

Design Infiltration Rate for Waste

k(vu) = 2/3 k(sat) = 0.33 x 0.00034 cm/s = 0.0001122 cm/s = 0.01325 ft/hr

Id = k(vu) / FS = 0.01325 ft/hr / 2 = 0.00663 ft/hr = **0.07951 in/hr**

Time to Saturate for Waste

hb = bottom elevation of toe drain - elevation of bottom liner = 32 ft - 23.3 ft = 8.7 ft

t(sat) =(f x hb) / Id = (2 x 8.7 ft) / 0.00663 ft/hr = 2,626 hr

Volume Required to Saturate Waste

Vu = Ab x hb x f = 746 sf x 8.7 ft x 0.5 = 3,245 cf

Design Infiltration Rate for Gravel

k(vu) = 2/3 k(sat) = 0.33 x 7.05556 cm/s = 2.33 cm/s = 275.00 ft/hr

Id = k(vu) / FS = 275.00 ft/hr / 2 = 137.50 ft/hr = **1,650.0 in/hr**

Time to Saturate for Gravel

hb = surface elevation - bottom elevation of toe drain = 34 ft - 32 ft = 2 ft

t(sat) =(f x hb) / Id = (45.4 x 2 ft) / 137.50 ft/hr = 0.660 hr

Volume Required to Saturate for Gravel

Vu = Ab x hb x f = 746 sf x 2 ft x 45.4 = 67,737 cf

Total Volume Necessary to Saturate Waste and Gravel

Vu (total) = Vu (waste) + Vu(gravel) = 3,245 cf + 67,737 cf = **70,982 cf**

Computation

HDR

Project	Tomoka Farms Road Landfill - North Cell	Computed	A. Evans
System	South Slope Runoff Berm	Date	
Component	Berm Design/Stormwater Calculations	Reviewed	
Task		Date	

Treatment/Collection Volume

Vt = volume of 25-year hydrograph = **13,102 cf**

Step 3 Conclusion

Since Vu(total) > Vt, Bermed Area Will Recover

Step 4 - Model Design in Hydraflow

Using the infiltration rates determined in Step 3, Hydraflow provides accurate modeling of the bermed area.

Senerio 1 is a berm which incorporates the use of the gravel toe drain and waste to release the runoff through percolation. This model does not incorporate the 6-inch perforated pipe which provides a more conservative model. As shown in the Hydraflow Model output, the runoff is percolated and the height of runoff accumulated in the bermed area is less than 1 foot for the 25 year-24 hour storm. The collected runoff is percolated within the required 72 hours.

Senerio 2 is a berm without the use of a toe drain but does include the percolation rates of solid waste. This model represents the current conditions found onsite. This scenario shows that the berm provides enough volume to handle the entire 25-year, 24-hour storm. The storage capacity of the berm is 13,608 cubic feet which is greater than the storm event volume of 13,102 cubic feet. The maximum height of ponded runoff in this scenario would be 3.82 feet which is below the 4 ft berm height. The waste will slowly allow the runoff to percolate into the landfill. If this scenario, current conditions, remained, the runoff collected in the bermed area would not fully infiltrate within 72 hours. Therefore, collected runoff in this senerio would need to be pumped from the bermed area to the leachate treatment system.

Step 4 Conclusion

The proposed berm design (Senerio 1) with the toe drain adequately handles the 25-year, 24 hour storm.

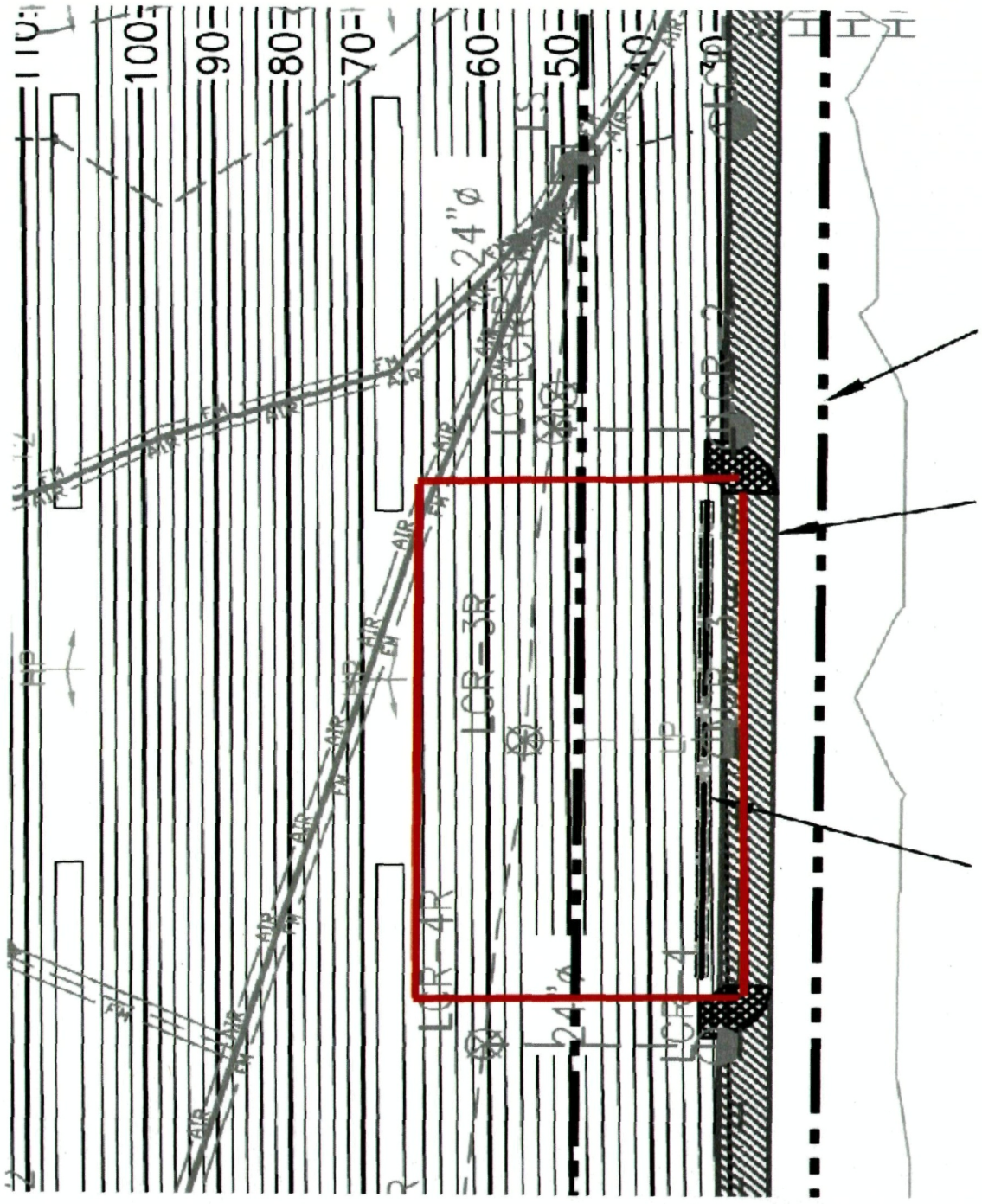
Job No.	97785	Calc No.	

Computation

HDR

Project	Tomoka Farms Road Landfill - North Cell	Computed	A. Evans
System	South Slope Runoff Berm	Date	
Component	Attachment A	Reviewed	
Task		Date	

Attachment A Berm Drainage Basin



Scale: NTS

Attachment is for reference

Job No.	97785	Calc No.	

Computation

Project	Tomoka Farms Road Landfill - North Cell	Computed	A. Evans
System	South Slope Runoff Berm	Date	
Component	Attachment B	Reviewed	
Task		Date	

Attachment B.1 Source: FDOT Drainage Handbook Hydrology

Hydrology Handbook
January 2004

Table T-4
Runoff Coefficients For A Design Storm Return Period Of 10 Years Or Less[a]

Slope	Land Use	Sandy Soils Min.	Sandy Soils Max.		Clay Soils Min.	Clay Soils Max.
Flat (0-2%)	Woodlands	0.10	0.15		0.15	0.20
	Pasture, grass, and farmland [b]	0.15	0.20		0.20	0.25
	Bare Earth	0.30	0.50		0.50	0.60
	Rooftops and pavement	0.95	0.95		0.95	0.95
	Pervious pavements [c]	0.75	0.95		0.90	0.95
	SFR: 1/2-acre lots and larger	0.30	0.35		0.35	0.45
	Smaller lots	0.35	0.45		0.40	0.50
	Duplexes	0.35	0.45		0.40	0.50
	MFR: Apartments, townhouses, and condominiums	0.45	0.60		0.50	0.70
	Commercial and Industrial	0.50	0.95		0.50	0.95
Rolling (2-7%)	Woodlands	0.15	0.20		0.20	0.25
	Pasture, grass, and farmland [b]	0.20	0.25		0.25	0.30
	Bare Earth	0.40	0.60		0.60	0.70
	Rooftops and pavement	0.95	0.95		0.95	0.95
	Pervious pavements [c]	0.80	0.95		0.90	0.95
	SFR: 1/2-acre lots and larger	0.35	0.50		0.40	0.55
	Smaller lots	0.40	0.55		0.45	0.60
	Duplexes	0.40	0.55		0.45	0.60
	MFR: Apartments, townhouses, and condominiums	0.50	0.70		0.60	0.80
	Commercial and Industrial	0.50	0.95		0.50	0.95
Steep (7%+)	Woodlands	0.20	0.25		0.25	0.30
	Pasture, grass, and farmland [b]	0.25	0.35	Use	0.30	0.40
	Bare Earth	0.50	0.70	0.60	0.70	0.80
	Rooftops and pavement	0.95	0.95		0.95	0.95
	Pervious pavements [c]	0.85	0.95		0.90	0.95
	SFR: 1/2-acre lots and larger	0.40	0.55		0.50	0.65
	Smaller lots	0.45	0.60		0.55	0.70
	Duplexes	0.45	0.60		0.55	0.70
	MFR: Apartments, townhouses, and condominiums	0.60	0.75		0.65	0.85
	Commercial and Industrial	0.60	0.95		0.65	0.95

[a] Weighted coefficient based on percentage of impervious surfaces and green areas must be selected for each site.

[b] Coefficients assume good ground cover and conservation treatment.

[c] Depends on depth and degree of permeability of underlying strata.

Note: SFR = Single Family Residential
MFR = Multi-Family Residential

Job No.	97785	Calc No.	

Computation

Project	Tomoka Farms Road Landfill - North Cell	Computed	A. Evans
System	South Slope Runoff Berm	Date	
Component	Attachment B	Reviewed	
Task		Date	

Attachment B.2 Source: FDOT Drainage Handbook Hydrology

Hydrology Handbook
January 2004

Table T-5
Design Storm Frequency Factors For Pervious Area Runoff Coefficients *

Return Period (years)	Design Storm Frequency Factor, X_T
2 to 10	1.0
25	1.1
50	1.2
100	1.25

Reference: Wright-McLaughlin Engineers (1969).

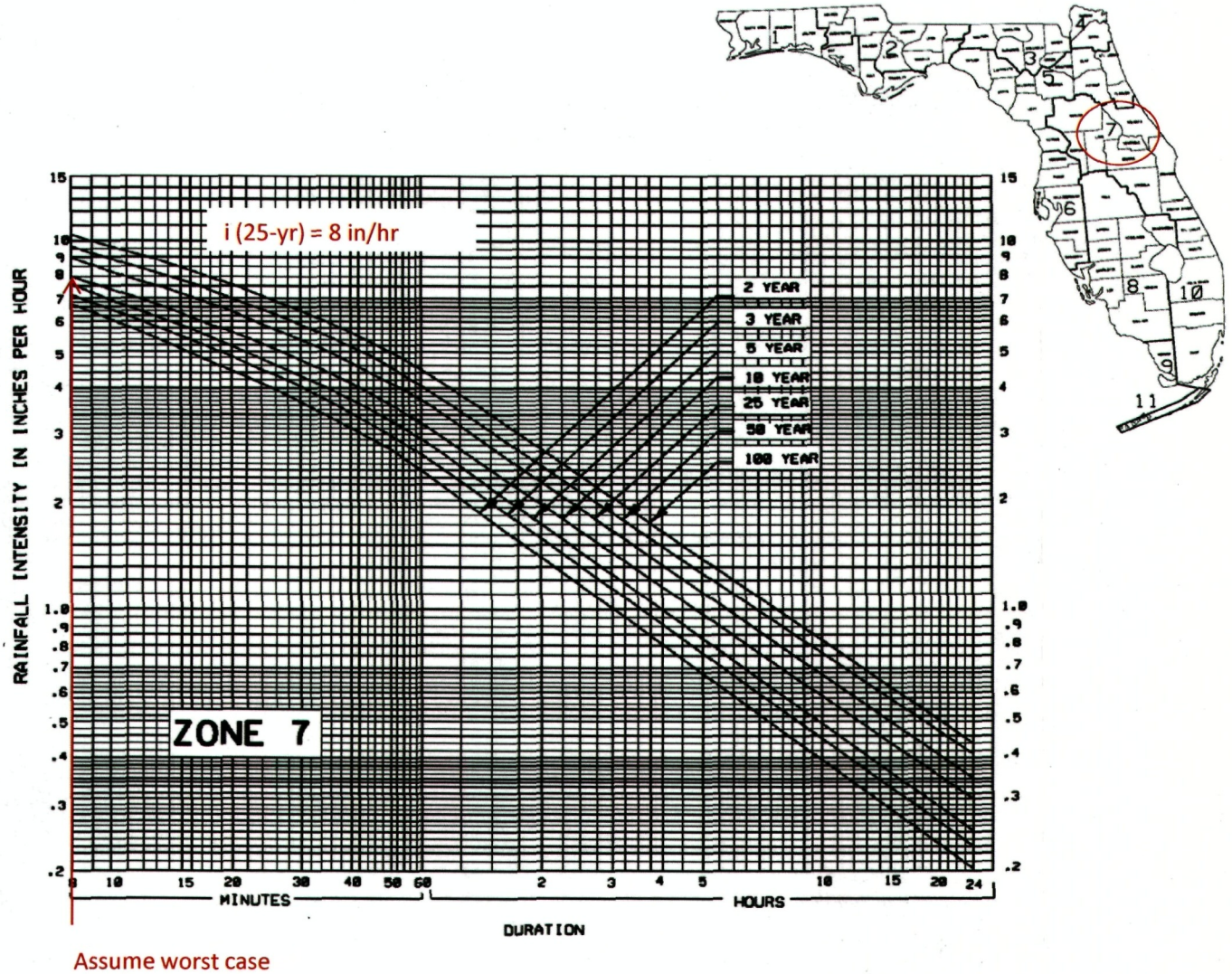
* DUE TO THE INCREASE IN THE DURATION TIME THAT THE PEAK OR NEAR PEAK DISCHARGE RATE IS RELEASED FROM STORMWATER MANAGEMENT SYSTEMS, THE USE OF THESE SHORT DURATION PEAK RATE DISCHARGE ADJUSTMENT FACTORS IS NOT APPROPRIATE FOR FLOOD ROUTING COMPUTATIONS.

Job No.	97785	Calc No.	

Computation

Project	Tomoka Farms Road Landfill - North Cell	Computed	A. Evans
System	South Slope Runoff Berm	Date	
Component	Attachment C	Reviewed	
Task		Date	

Attachment C Source: FDOT Drainage Handbook Hydrology



Assume worst case
Tc = 8 min

Job No.	97785	Calc No.

Computation

Project	Tomoka Farms Road Landfill - North Cell	Computed	A. Evans
System	South Slope Runoff Berm	Date	
Component	Attachment D	Reviewed	
Task		Date	

Attachment D SCS Runoff Curve Numbers

Hydrology Handbook
January 2004

Table T-7
SCS Runoff Curve Numbers for Selected Agricultural, Suburban, and Urban Land Use

Land Use Description		Hydrologic Soil Group A	B	C	D
Cultivated Land[a]:					
Without conservation treatment		72	81	88	91
With conservation treatment		62	71	78	81
Pasture or range land:					
Poor condition		68	79	86	89
Good condition		39	61	74	80
Meadow: good condition		30	58	71	78
Wood or Forest Land:					
Thin stand, poor cover, no mulch		45	66	77	83
Good cover[b]		25	55	70	77
Open Spaces, Lawns, Parks, Golf Courses, Cemeteries:					
Good condition: grass cover on 75% or more of the area		39	61	74	80
Fair condition: grass cover on 50% to 75% of the area		49	69	79	84
Poor condition: grass cover on 50% or less of the area		68	79	86	89
Commercial and Business Areas (85% impervious)		89	92	94	95
Industrial Districts (72% impervious)		81	88	91	93
Residential[c]					
Average lot size	Average % Impervious[d]				
1/8 acre or less	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
Paved Parking Lots, Roofs, Driveways[e]:		98	98	98	98
Streets and Roads:					
Paved with curbs and storm sewers[e]		98	98	98	98
Gravel		76	85	89	91
Dirt		72	82	87	89
Paved with open ditches		83	89	92	93
Newly graded area (no vegetation established)[f]		77	86	91	94

Use CN=79 for grassed landfill. Most conservative

[a] For a more detailed description of agricultural land use curve numbers, refer to Table T-8.
[b] Good cover is protected from grazing and litter and brush cover soil.
[c] Curve numbers are computed assuming the runoff from the house and driveway is directed toward the street with a minimum of roof water directed to lawns where additional infiltration could occur. Depends on depth and degree of permeability of underlying strata.
[d] The remaining pervious areas (lawn) are considered to be in good pasture condition for these curve numbers.
[e] In some warmer climates of the country, a curve number of 96 may be used.
[f] Use for temporary conditions during grading and construction.
Note: These values are for Antecedent Moisture Condition II, and $I_a = 0.2S$.

Reference: USDA, SCS, TR-55 (1984).

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Computation

Project	Tomoka Farms Road Landfill - North Cell	Computed	A. Evans
System	South Slope Runoff Berm	Date	
Component	Attachment E	Reviewed	
Task		Date	

Attachment E Roughness Coefficients for Channels and Overland Flow

Hydrology Handbook
January 2004

Table T-3
Recommended Manning's n Values for Artificial Channels with Various Linings

Channel Lining	Lining Description	Design Manning's n Value
Bare Earth or Vegetative Linings		
Bare earth, fairly uniform	Clean, recently completed	0.022
Bare earth, fairly uniform	Short grass and some weeds	0.028
Dragline excavated	No vegetation	0.030
Dragline excavated	Light brush	0.040
Channels not maintained	Dense weeds to flow depth	0.100
Channels not maintained	Clear bottom, brush sides	0.080
Maintained grass or sodded ditches	Good stand, well maintained 2" - 6"	0.060*
Maintained grass or sodded ditches	Fair stand, length 12" - 24"	0.200*
Rigid Linings		
Concrete paved	Broomed**	0.016
Concrete paved	"Roughened" - standard	0.020
Concrete paved	Gunite	0.020
Concrete paved	Over rubble	0.023
Asphalt concrete	Smooth	0.013
Asphalt concrete	Rough	0.016

* Decrease 30% for flows > 0.7' (maximum flow depth 1.5').

** Because this is not the standard finish, it must be specified.

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HDR

Project	Tomoka Farms Road Landfill - North Cell	Computed	A. Evans
System	South Slope Runoff Berm	Date	
Component	Attachment E	Reviewed	
Task		Date	

Hydrology Handbook
January 2004

Table T-1
Overland Flow Manning's n Values

	Value	Recommended Range of Values
Concrete	0.011	0.010 -0.013
Asphalt	0.012	0.010 -0.015
Bare sand [a]	0.010	0.010 -0.016
Graveled surface [a]	0.012	0.012 -0.030
Bare clay-loam (eroded) [a]	0.012	0.012 -0.033
Fallow (no residue) [b]	0.05	0.006 -0.16
Chisel plow (<1/4 tons/acre residue)	0.07	0.006 -0.17
Chisel plow (1/4 - 1 tons/acre residue)	0.18	0.070 -0.34
Chisel plow (1 - 3 tons/acre residue)	0.30	0.190 -0.47
Chisel plow (>3 tons/acre residue)	0.40	0.340 -0.46
Disk/Harrow (<1/4 tons/acre residue)	0.08	0.008 -0.41
Disk/Harrow (1/4 - 1 tons/acre residue)	0.16	0.100 -0.25
Disk/Harrow (1 - 3 tons/acre residue)	0.25	0.140 -0.53
Disk/Harrow (>3 tons/acre residue)	0.30	-- --
No till (</4 tons/acre residue)	0.04	0.030 -0.07
No till (1/4 - 1 tons/acre residue)	0.07	0.010 -0.13
No till (1 - 3 tons/acre residue)	0.30	0.160 -0.47
Plow (Fall)	0.06	0.020 -0.10
Coulter	0.10	0.050 -0.13
Range (natural)	0.13	0.010 -0.32
Range (clipped)	0.08	0.020 -0.24
Grass (bluegrass sod)	0.45	0.390 -0.63
Short grass prairie [a]	0.15	0.100 -0.20
Dense grass [c]	0.24	0.170 -0.30
Bermuda grass [c]	0.41	0.300 -0.48
Woods	0.45	-- --

All values are from Engman (1983), unless noted otherwise.

[a] Woolhiser (1975).

[b] Fallow has been idle for one year and is fairly smooth.

[c] Palmer (1946). Weeping love grass, bluegrass, buffalo grass, blue gamma grass, native grass mix (OK), alfalfa, lespedeza.

Note: These values were determined specifically for overland flow conditions and are not appropriate for conventional open channel flow calculations. See the open channel handbook for open channel flow procedures.

Job No.	97785	Calc No.	

Computation

Project	Tomoka Farms Road Landfill - North Cell	Computed	A. Evans
System	South Slope Runoff Berm	Date	
Component	Attachment F	Reviewed	
Task		Date	

Attachment F Hydraulic Conductivity and Porocity

Solid Waste

The hydraulic conductivity of landfilled waste at 7.8 m depth was estimated in the range of 3.4×10^{-4} cm/s to 4.0×10^{-4} cm/s. In the previous studies, the hydraulic conductivity values have been reported in the range of 6.7×10^{-5} cm/s to 9.8×10^{-4} cm/s by Shank 1993; 10^{-5} cm/s to 10^{-3} cm/s by Gabr 1995; 2.9×10^{-4} cm/s to 2.9×10^{-3} cm/s by Jang et al., 2002; 5.4×10^{-6} cm/s to 6.1×10^{-5} cm/s Jain 2005; 1.2×10^{-2} cm/s to 6.9×10^{-2} cm/s by Koerner et al., 2005; and 1.2×10^{-4} cm/s to 1.2×10^{-2} cm/s by Durmusoglu 2006. Therefore the estimated values of the hydraulic conductivity falls in the range of the reported values of the hydraulic conductivity of landfilled MSW.

Value used for hydraulic conductivity is 3.4 x 10-4 cm/s

Porosity values for solid waste range between 0.40 to 0.55. (Hudson A. P., White J. K., Beaven R. P., Powrie W. (2004). "Modelling the compression behaviour of landfilled domestic waste." Waste Management 24, 259-269.) The waste for this project is less than 15 feet deep therefore a concertative value of 0.50 was utilized.

Value used for porosity is 0.50

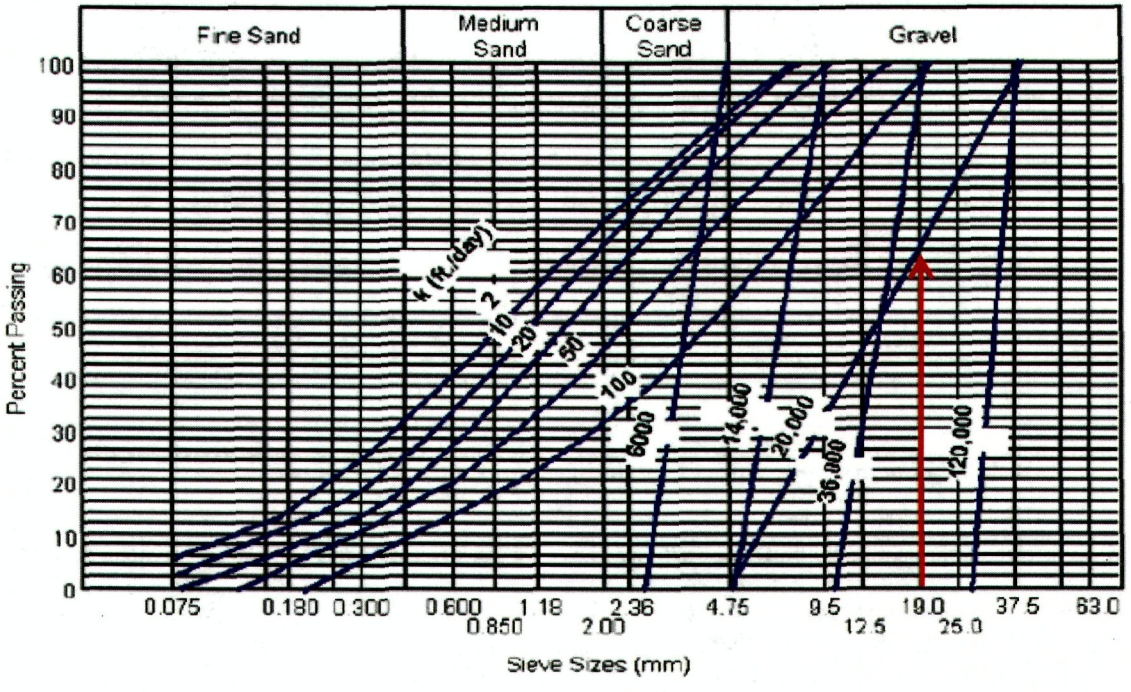
Job No.	97785	Calc No.	

Computation

Project	Tomoka Farms Road Landfill - North Cell	Computed	A. Evans
System	South Slope Runoff Berm	Date	
Component	Attachment F	Reviewed	
Task		Date	

No. 57 Stone

Typical Aggregate Gradations and Permeabilities (after Ridgeway, 1982)



Value used for No. 57 stone hydraulic conductivity is 20,000 ft/day

Job No.	97785	Calc No.	

Computation

HDR

Project	Tomoka Farms Road Landfill - North Cell	Computed	A. Evans
System	South Slope Runoff Berm	Date	
Component	Attachment F	Reviewed	
Task		Date	

Compilation of Known Test Data: for Porosity

Sample	Data Source	Porosity	Bulk Density	Test / Description
AASHTO # 4	StormTech lab	39.9%	94.3 lbs/ft^3	dumped, corrected[1]
AASHTO # 57	StormTech lab	45.4%	87.2 lbs/ft^3	dumped, corrected[1]
AASHTO # 4	StormTech lab	37.4%	103.0 lbs/ft^3	jigged & tamped, corrected[1]
AASHTO # 57	StormTech lab	38.7%	97.7 lbs/ft^3	jigged & tamped, corrected[1]
AASHTO # 57	NTH lab	50 - 51%		tapped & agitated, dried[2]
AASHTO # 57	NTH lab	50 - 52 %		tapped & agitated, dried[2]
AASHTO # 3	NTH lab	53 - 54%		tapped & agitated, dried[2]
-1 ½"	Anderson Eng. Cons.	41.9%	96.8 lbs/ft^3	dry rodded, C29[3]
-1 ½"	Anderson Eng. Cons.	35.3%	101.7 lbs/ft^3	dry rodded, C29[3]
-1 ½"	Anderson Eng. Cons.	37.8%	98.6 lbs/ft^3	dry rodded, C29[3]
-1 ½"	Anderson Eng. Cons.	41.3%	93.6 lbs/ft^3	dry rodded, C29[3]
-1 ½"	Anderson Eng. Cons.	38.2%	98.7 lbs/ft^3	dry rodded, C29[3]
-3/4"	Anderson Eng. Cons.	38.5%	100.3 lbs/ft^3	dry rodded, C29[3]
-3/4"	Anderson Eng. Cons.	38.9%	97.9 bs/ft^3	dry rodded, C29[3]
AASHTO # 4	Universal Eng. Serv.	44.3%	78.6 lbs/ft^3	rodded C29[4]
AASHTO # 57	Universal Eng. Serv.	43.2%	79.8 lbs/ft^3	rodded C29[4]
AASHTO # 4	Universal Eng. Serv.	46.1%	70.8 lbs/ft^3	rodded C29[5]
AASHTO # 57	Universal Eng. Serv.	42.8%	74.8 lbs/ft^3	rodded C29[5]
-1 ½" Crushed Rock	CTL Thompson TX	46%	90.5 lbs/ft^3	rodded C29[6]
-1" Crushed Rock	CTL Thompson TX	45%	91.6 lbs/ft^3	rodded C29[6]
-1 ½" Crushed Conc	CTL Thompson TX	48%	77.1 lbs/ft^3	rodded C29[6]

1 Testing was conducted by StormTech in October, 2003 using aggregate from Connecticut. Water was used to fill voids and a correction factor that reduced porosities by 3 to 16% was calculated and applied to correct for wall effects of the test container.

2 Testing was conducted by NTH Consultants, Exton, PA in December, 2002 for ADS. This was dry testing in accordance with the "Civil Engineering Reference Manual, Sixth Edition" by Michael R. Lindburg, PE.

3 Testing was conducted by Anderson Engineering Consultants, Inc., Little Rock, AR in February, 2000 for 7 different aggregate samples from four suppliers in Arkansas.

4 The material tested was lime rock from central Florida. Testing was conducted by University Engineering Sciences in Orlando, FL in November, 2005.

5 The material tested was recycled, crushed concrete from central Florida. Testing was conducted by Universal Engineering Sciences in Orlando, FL in November, 2005.

6 Testing was conducted by CTL | Thompson Texas, LLC in August, 2006.

ASTM C29 is the "Standard Test Method for Bulk Density (Unit Weight) and Voids in Aggregate".

Porosity References:

- "Urban Runoff Quality Management" WEF MOP 23 / ASCE MOP 87. Table 5.12 lists uniform sized gravel at 40%.
- "Controlling Urban Runoff:" by Thomas R. Schueler, July 1987 describes storage volume of the void space in the trench at 40% of the excavated trench volume.
- "On-site Stormwater Management: Applications for Landscape and Engineering" Second Edition by Bruce Ferguson and Thomas Debo states that open graded crushed stone has 40% void space.

Value used for No. 57 stone porosity is 45.4%

Job No.	97785	Calc No.	

Computation

Project	Tomoka Farms Road Landfill - North Cell	Computed	A. Evans
System	South Slope Runoff Berm	Date	
Component	Attachment G	Reviewed	
Task		Date	

Attachment G Hydraflow Hydragraph Model Output

Hydraflow Table of Contents

Volusia Runoff Berm_South Slope.gpw

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Wednesday, Mar 23, 2011

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-----	-----	-----	-----	-----	-----	3.768	-----	-----	Runoff from South Slope Bermed Are
2	Reservoir	1	-----	-----	-----	-----	-----	3.758	-----	-----	Berm with Toe Drain
3	Reservoir	1	-----	-----	-----	-----	-----	0.011	-----	-----	Berm w/o toe drain

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052

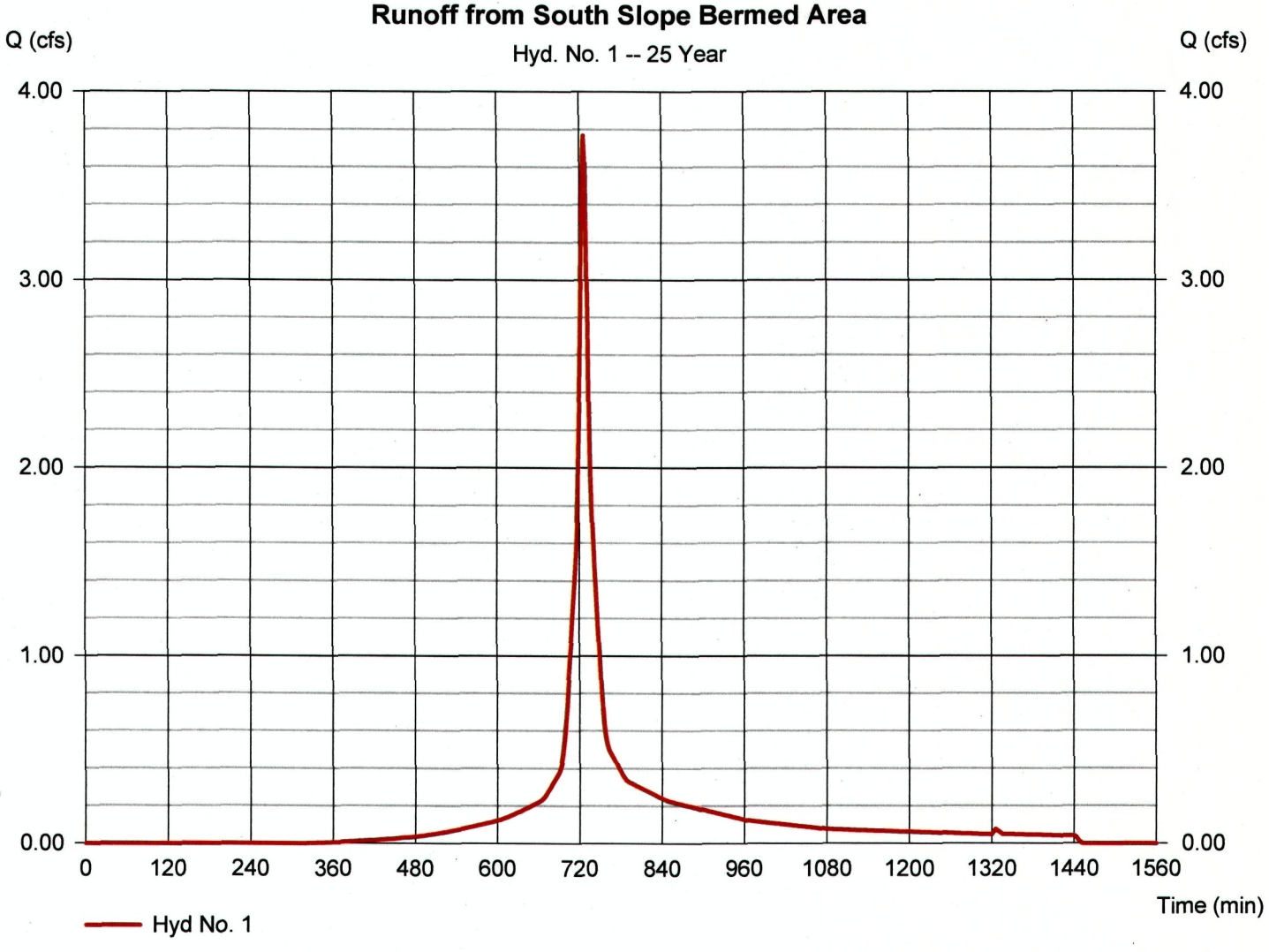
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	3.768	2	726	13,102	-----	------	------	Runoff from South Slope Bermed Are
2	Reservoir	3.758	2	726	13,102	1	34.05	64.6	Berm with Toe Drain
3	Reservoir	0.011	2	1448	3,183	1	37.82	12,618	Berm w/o toe drain

Hydrograph Report

Hyd. No. 1

Runoff from South Slope Bermed Area

Hydrograph type	= SCS Runoff	Peak discharge	= 3.768 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 13,102 cuft
Drainage area	= 0.560 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.60 min
Total precip.	= 9.00 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052

Hyd. No. 1

Runoff from South Slope Bermed Area

Description	A	B	C	Totals
Sheet Flow				
Manning's n-value	= 0.240	0.011	0.011	
Flow length (ft)	= 122.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 2.20	0.00	0.00	
Land slope (%)	= 33.00	0.00	0.00	
Travel Time (min)	**= 6.57**	**+ 0.00**	**+ 0.00**	**= 6.57**
Shallow Concentrated Flow				
Flow length (ft)	= 0.00	0.00	0.00	
Watercourse slope (%)	= 0.00	0.00	0.00	
Surface description	= Paved	Paved	Paved	
Average velocity (ft/s)	= 0.00	0.00	0.00	
Travel Time (min)	**= 0.00**	**+ 0.00**	**+ 0.00**	**= 0.00**
Channel Flow				
X sectional flow area (sqft)	= 0.00	0.00	0.00	
Wetted perimeter (ft)	= 0.00	0.00	0.00	
Channel slope (%)	= 0.00	0.00	0.00	
Manning's n-value	= 0.015	0.015	0.015	
Velocity (ft/s)	= 0.00	0.00	0.00	
Flow length (ft)	= 0.0	0.0	0.0	
Travel Time (min)	**= 0.00**	**+ 0.00**	**+ 0.00**	**= 0.00**

Total Travel Time, Tc ..... 6.60 min

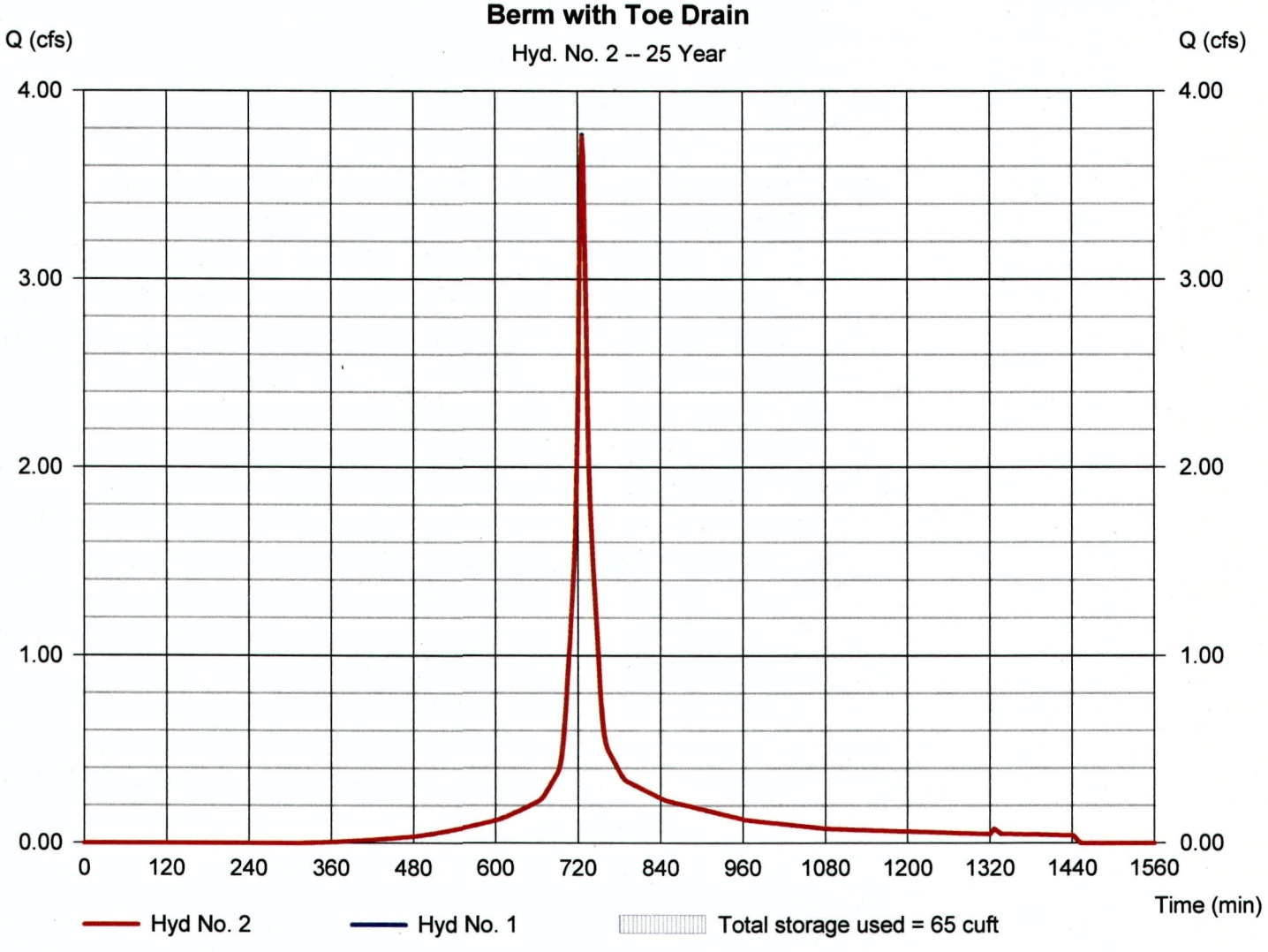
Hydrograph Report

Hyd. No. 2

Berm with Toe Drain

Hydrograph type	= Reservoir	Peak discharge	= 3.758 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 13,102 cuft
Inflow hyd. No.	= 1 - Runoff from South Slope Bermed Area	Max. Elevation	= 34.05 ft
Reservoir name	= Runoff Berm with Toe Drain	Max. Storage	= 65 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

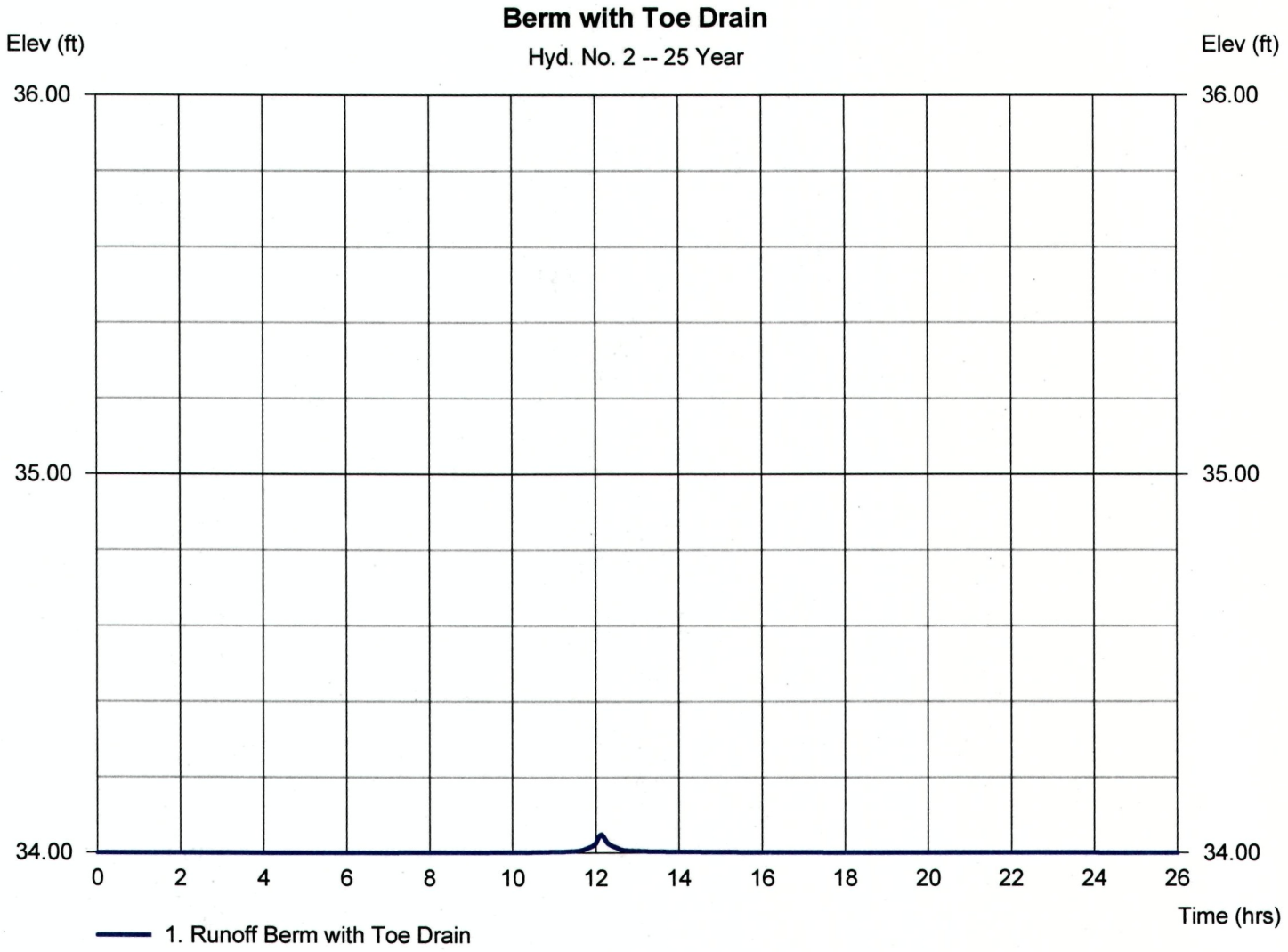
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Wednesday, Mar 23, 2011

Hyd. No. 2

Berm with Toe Drain

Hydrograph type	= Reservoir	Peak discharge	= 3.758 cfs
Storm frequency	= 25 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 13,102 cuft
Inflow hyd. No.	= 1 - Runoff from South Slope Bermed Area	Max. Elevation	= 34.05 ft
Reservoir name	= Runoff Berm with Toe Drain	Max. Storage	= 65 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 — Wednesday, Mar 23, 2011

Pond No. 1 - Runoff Berm with Toe Drain

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 34.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	34.00	746	0	0
1.00	35.00	2,037	1,338	1,338
2.00	36.00	3,387	2,683	4,022
3.00	37.00	4,797	4,071	8,093
4.00	38.00	6,267	5,515	13,608

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 200.00	0.00	0.00	0.00
Crest El. (ft)	= 38.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 1650.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	34.00	---	---	---	---	0.00	---	---	---	0.000	---	0.000
0.10	134	34.10	---	---	---	---	0.00	---	---	---	7.780	---	7.780
0.20	268	34.20	---	---	---	---	0.00	---	---	---	15.560	---	15.56
0.30	402	34.30	---	---	---	---	0.00	---	---	---	23.340	---	23.34
0.40	535	34.40	---	---	---	---	0.00	---	---	---	31.121	---	31.12
0.50	669	34.50	---	---	---	---	0.00	---	---	---	38.901	---	38.90
0.60	803	34.60	---	---	---	---	0.00	---	---	---	46.681	---	46.68
0.70	937	34.70	---	---	---	---	0.00	---	---	---	54.461	---	54.46
0.80	1,071	34.80	---	---	---	---	0.00	---	---	---	62.241	---	62.24
0.90	1,205	34.90	---	---	---	---	0.00	---	---	---	70.021	---	70.02
1.00	1,338	35.00	---	---	---	---	0.00	---	---	---	77.802	---	77.80
1.10	1,607	35.10	---	---	---	---	0.00	---	---	---	82.958	---	82.96
1.20	1,875	35.20	---	---	---	---	0.00	---	---	---	88.114	---	88.11
1.30	2,143	35.30	---	---	---	---	0.00	---	---	---	93.270	---	93.27
1.40	2,412	35.40	---	---	---	---	0.00	---	---	---	98.426	---	98.43
1.50	2,680	35.50	---	---	---	---	0.00	---	---	---	103.583	---	103.58
1.60	2,948	35.60	---	---	---	---	0.00	---	---	---	108.739	---	108.74
1.70	3,217	35.70	---	---	---	---	0.00	---	---	---	113.895	---	113.90
1.80	3,485	35.80	---	---	---	---	0.00	---	---	---	119.051	---	119.05
1.90	3,753	35.90	---	---	---	---	0.00	---	---	---	124.208	---	124.21
2.00	4,022	36.00	---	---	---	---	0.00	---	---	---	129.364	---	129.36
2.10	4,429	36.10	---	---	---	---	0.00	---	---	---	134.749	---	134.75
2.20	4,836	36.20	---	---	---	---	0.00	---	---	---	140.135	---	140.13
2.30	5,243	36.30	---	---	---	---	0.00	---	---	---	145.520	---	145.52
2.40	5,650	36.40	---	---	---	---	0.00	---	---	---	150.905	---	150.91
2.50	6,057	36.50	---	---	---	---	0.00	---	---	---	156.291	---	156.29
2.60	6,464	36.60	---	---	---	---	0.00	---	---	---	161.676	---	161.68
2.70	6,872	36.70	---	---	---	---	0.00	---	---	---	167.061	---	167.06
2.80	7,279	36.80	---	---	---	---	0.00	---	---	---	172.447	---	172.45
2.90	7,686	36.90	---	---	---	---	0.00	---	---	---	177.832	---	177.83
3.00	8,093	37.00	---	---	---	---	0.00	---	---	---	183.218	---	183.22
3.10	8,644	37.10	---	---	---	---	0.00	---	---	---	188.832	---	188.83
3.20	9,196	37.20	---	---	---	---	0.00	---	---	---	194.447	---	194.45
3.30	9,747	37.30	---	---	---	---	0.00	---	---	---	200.061	---	200.06
3.40	10,299	37.40	---	---	---	---	0.00	---	---	---	205.676	---	205.68
3.50	10,850	37.50	---	---	---	---	0.00	---	---	---	211.290	---	211.29
3.60	11,402	37.60	---	---	---	---	0.00	---	---	---	216.905	---	216.90
3.70	11,953	37.70	---	---	---	---	0.00	---	---	---	222.519	---	222.52
3.80	12,505	37.80	---	---	---	---	0.00	---	---	---	228.134	---	228.13
3.90	13,057	37.90	---	---	---	---	0.00	---	---	---	233.749	---	233.75

Continues on next page...

Runoff Berm with Toe Drain

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
4.00	13,608	38.00	---	---	---	---	0.00	---	---	---	239.363	---	239.36

...End

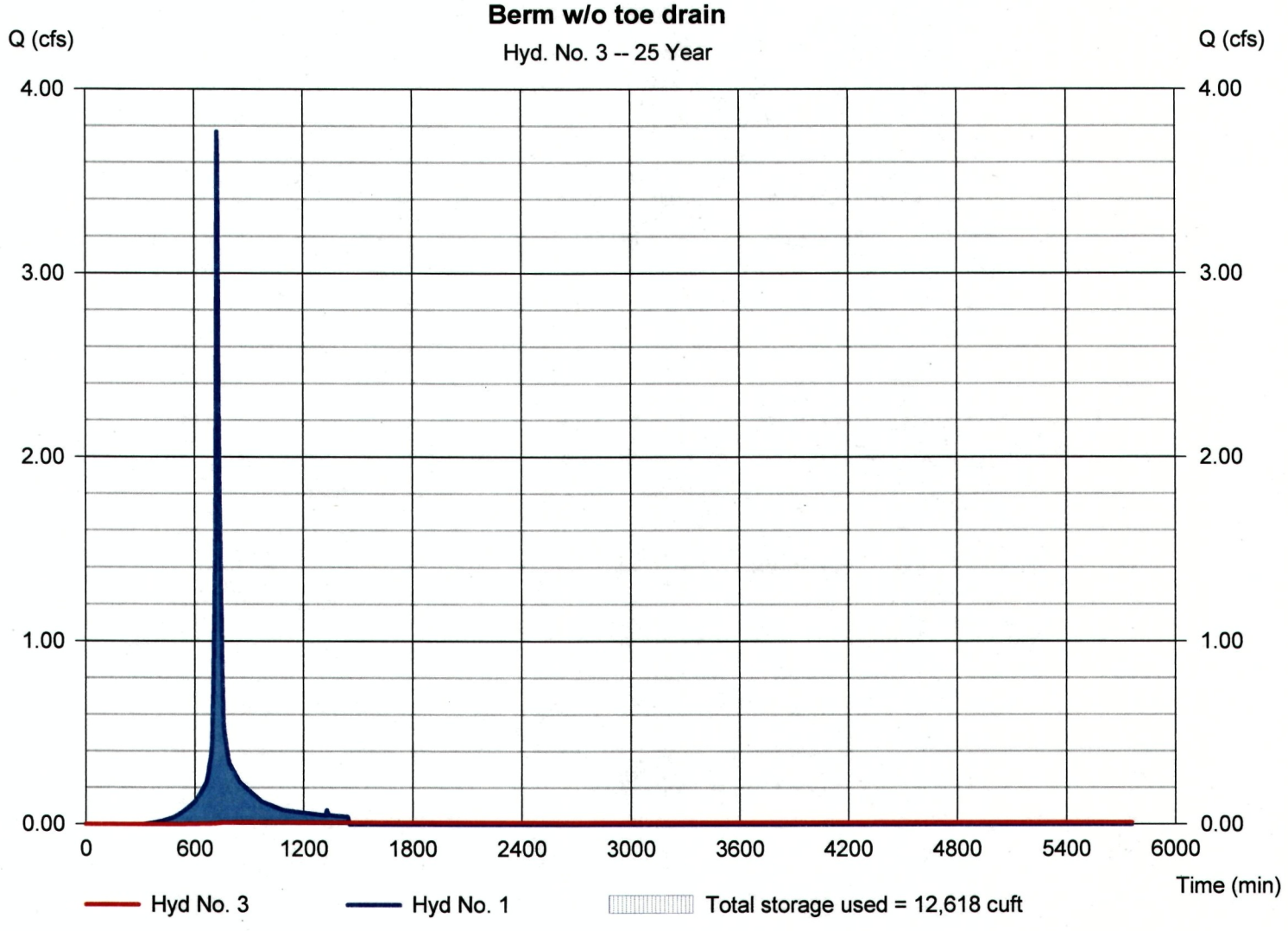
Hydrograph Report

Hyd. No. 3

Berm w/o toe drain

Hydrograph type	= Reservoir	Peak discharge	= 0.011 cfs
Storm frequency	= 25 yrs	Time to peak	= 1448 min
Time interval	= 2 min	Hyd. volume	= 3,183 cuft
Inflow hyd. No.	= 1 - Runoff from South Slope Bermed Area	Max. Elevation	= 37.82 ft
Reservoir name	= Runoff Berm w/o toedrain	Max. Storage	= 12,618 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

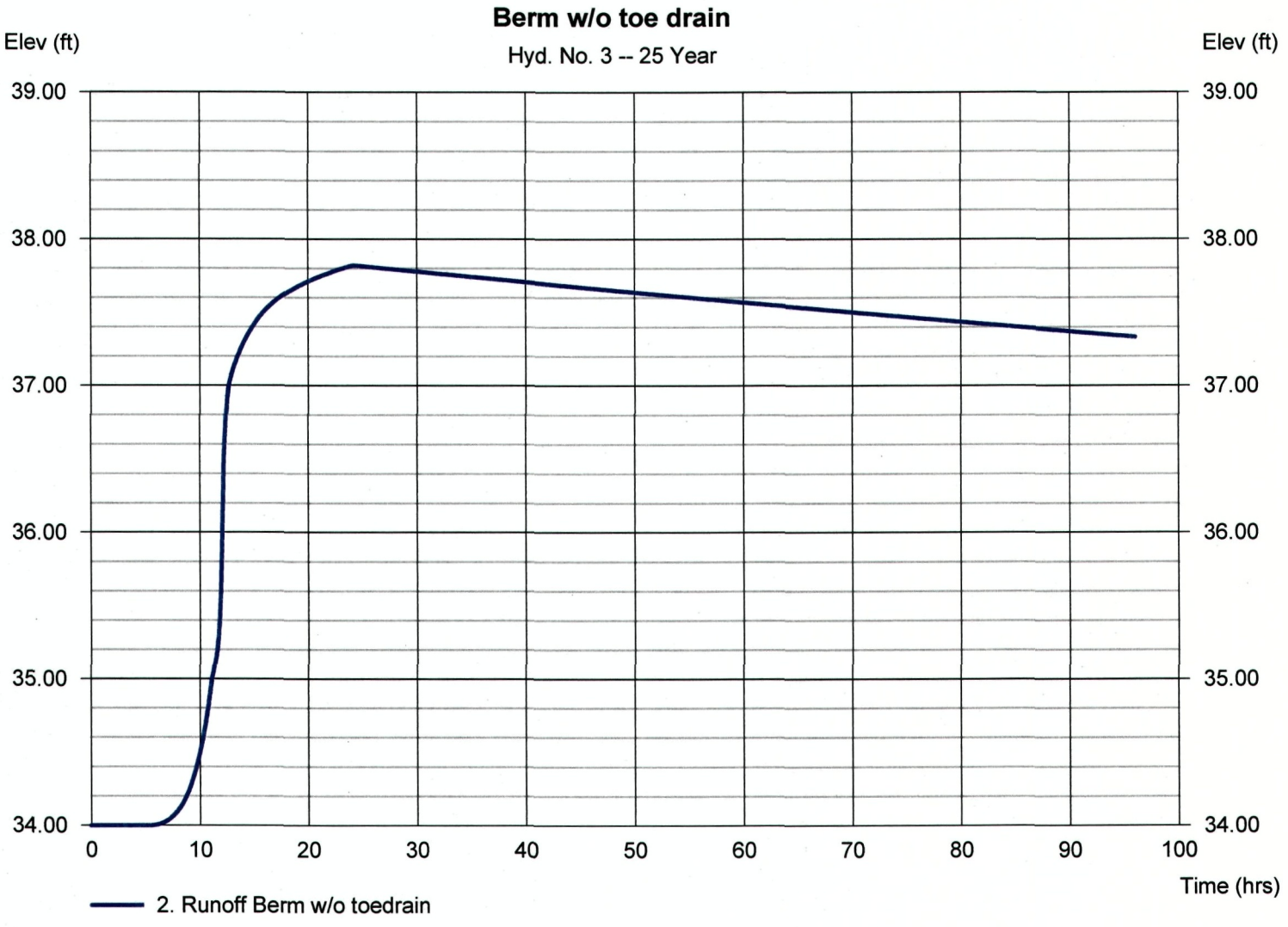
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2008 by Autodesk, Inc. v6.052 Wednesday, Mar 23, 2011

Hyd. No. 3

Berm w/o toe drain

Hydrograph type	= Reservoir	Peak discharge	= 0.011 cfs
Storm frequency	= 25 yrs	Time to peak	= 1448 min
Time interval	= 2 min	Hyd. volume	= 3,183 cuft
Inflow hyd. No.	= 1 - Runoff from South Slope Bermed Area	Max. Elevation	= 37.82 ft
Reservoir name	= Runoff Berm w/o toedrain	Max. Storage	= 12,618 cuft

Storage Indication method used. Outflow includes exfiltration.



Pond No. 2 - Runoff Berm w/o toedrain

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 34.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	34.00	746	0	0
1.00	35.00	2,037	1,338	1,338
2.00	36.00	3,387	2,683	4,022
3.00	37.00	4,797	4,071	8,093
4.00	38.00	6,267	5,515	13,608

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 200.00	0.00	0.00	0.00
Crest El. (ft)	= 37.99	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.080 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	34.00	---	---	---	---	0.00	---	---	---	0.000	---	0.000
0.10	134	34.10	---	---	---	---	0.00	---	---	---	0.000	---	0.000
0.20	268	34.20	---	---	---	---	0.00	---	---	---	0.001	---	0.001
0.30	402	34.30	---	---	---	---	0.00	---	---	---	0.001	---	0.001
0.40	535	34.40	---	---	---	---	0.00	---	---	---	0.002	---	0.002
0.50	669	34.50	---	---	---	---	0.00	---	---	---	0.002	---	0.002
0.60	803	34.60	---	---	---	---	0.00	---	---	---	0.002	---	0.002
0.70	937	34.70	---	---	---	---	0.00	---	---	---	0.003	---	0.003
0.80	1,071	34.80	---	---	---	---	0.00	---	---	---	0.003	---	0.003
0.90	1,205	34.90	---	---	---	---	0.00	---	---	---	0.003	---	0.003
1.00	1,338	35.00	---	---	---	---	0.00	---	---	---	0.004	---	0.004
1.10	1,607	35.10	---	---	---	---	0.00	---	---	---	0.004	---	0.004
1.20	1,875	35.20	---	---	---	---	0.00	---	---	---	0.004	---	0.004
1.30	2,143	35.30	---	---	---	---	0.00	---	---	---	0.005	---	0.005
1.40	2,412	35.40	---	---	---	---	0.00	---	---	---	0.005	---	0.005
1.50	2,680	35.50	---	---	---	---	0.00	---	---	---	0.005	---	0.005
1.60	2,948	35.60	---	---	---	---	0.00	---	---	---	0.005	---	0.005
1.70	3,217	35.70	---	---	---	---	0.00	---	---	---	0.006	---	0.006
1.80	3,485	35.80	---	---	---	---	0.00	---	---	---	0.006	---	0.006
1.90	3,753	35.90	---	---	---	---	0.00	---	---	---	0.006	---	0.006
2.00	4,022	36.00	---	---	---	---	0.00	---	---	---	0.006	---	0.006
2.10	4,429	36.10	---	---	---	---	0.00	---	---	---	0.007	---	0.007
2.20	4,836	36.20	---	---	---	---	0.00	---	---	---	0.007	---	0.007
2.30	5,243	36.30	---	---	---	---	0.00	---	---	---	0.007	---	0.007
2.40	5,650	36.40	---	---	---	---	0.00	---	---	---	0.007	---	0.007
2.50	6,057	36.50	---	---	---	---	0.00	---	---	---	0.008	---	0.008
2.60	6,464	36.60	---	---	---	---	0.00	---	---	---	0.008	---	0.008
2.70	6,872	36.70	---	---	---	---	0.00	---	---	---	0.008	---	0.008
2.80	7,279	36.80	---	---	---	---	0.00	---	---	---	0.008	---	0.008
2.90	7,686	36.90	---	---	---	---	0.00	---	---	---	0.009	---	0.009
3.00	8,093	37.00	---	---	---	---	0.00	---	---	---	0.009	---	0.009
3.10	8,644	37.10	---	---	---	---	0.00	---	---	---	0.009	---	0.009
3.20	9,196	37.20	---	---	---	---	0.00	---	---	---	0.009	---	0.009
3.30	9,747	37.30	---	---	---	---	0.00	---	---	---	0.010	---	0.010
3.40	10,299	37.40	---	---	---	---	0.00	---	---	---	0.010	---	0.010
3.50	10,850	37.50	---	---	---	---	0.00	---	---	---	0.010	---	0.010
3.60	11,402	37.60	---	---	---	---	0.00	---	---	---	0.011	---	0.011
3.70	11,953	37.70	---	---	---	---	0.00	---	---	---	0.011	---	0.011
3.80	12,505	37.80	---	---	---	---	0.00	---	---	---	0.011	---	0.011
3.90	13,057	37.90	---	---	---	---	0.00	---	---	---	0.011	---	0.011

Continues on next page...

Runoff Berm w/o toedrain

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
4.00	13,608	38.00	---	---	---	---	0.67	---	---	---	0.012	---	0.677

...End

Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	-------
2	108.3200	15.2000	0.9020	-------
3	0.0000	0.0000	0.0000	-------
5	126.7843	18.7000	0.8789	-------
10	148.9680	21.2000	0.8798	-------
25	192.0961	24.6001	0.8927	-------
50	236.5566	27.3001	0.9085	-------
100	291.0470	30.0001	0.9266	-------

File name: FloridaZone7.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	7.20	5.90	5.01	4.36	3.87	3.48	3.17	2.91	2.69	2.50	2.34	2.20
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	7.85	6.63	5.76	5.10	4.58	4.17	3.83	3.54	3.29	3.08	2.90	2.73
10	8.42	7.22	6.33	5.65	5.11	4.67	4.30	3.99	3.72	3.49	3.29	3.11
25	9.33	8.12	7.20	6.47	5.89	5.40	5.00	4.65	4.35	4.09	3.86	3.66
50	10.07	8.83	7.88	7.12	6.50	5.98	5.54	5.17	4.84	4.56	4.30	4.08
100	10.80	9.54	8.55	7.76	7.10	6.55	6.08	5.68	5.33	5.02	4.74	4.50

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	2.20	0.00	3.30	4.25	9.00	6.80	7.95
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	0.00	6.50	8.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	1.75	0.00	2.80	3.90	0.00	6.00	7.10

TOMOKA FARMS ROAD LANDFILL

NORTH CELL CLASS I
RUN-OFF CONTAINMENT BERM

Volusia County
FLORIDA

PREPARED FOR:

Volusia County
Solid Waste Division
3151 East New York Avenue
Deland, Florida 32724

PREPARED BY:

HDR Engineering Inc.
200 W. Forsyth Street Suite 800
Jacksonville, FL 32202

March 2011

TABLE OF CONTENTS

DIVISION 2
SITE WORK

SECTION 02500
AGGREGATE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. CONTRACTOR shall be prepared to place riprap, gravel and drainage aggregate in conjunction with other components of the Work.

B. The Work shall include procurement, placement, and testing of all gravel and drainage aggregate.

1.03 SUBMITTALS

A. CONTRACTOR shall submit the following information and samples to ENGINEER prior to starting construction of components that require gravel and drainage aggregates.

1. The proposed riprap, gravel/aggregate source(s).

2. The results of a grain-size analysis on the proposed material, conducted in accordance with ASTM C 136.

3. The results of tests conducted in accordance with ASTM D 3042 to determine insoluble residue of the proposed material.

4. The results of tests conducted in accordance with ASTM C 88 to determine the soundness of the proposed material.

B. The testing in Paragraph 1.03A above shall be carried out by the CONTRACTOR's independent geotechnical testing laboratory.

PART 2 PRODUCTS

2.01 MATERIAL

A. Aggregate shall consist of hard, strong, durable, non-carbonate material free of any metal, roots, concrete, debris, organics, and other deleterious materials and coatings. Gravel and drainage aggregates shall be used for the following components:

- Pavement and resurfacing (may contain carbonate aggregate);

- Toe drain and seep trenches (as needed);
- Riprap (may contain carbonate aggregate); and
- Erosion and sediment control, as needed.

B. The aggregate shall have less than 5 percent loss of weight when tested in accordance with ASTM D3042.

PART 3 EXECUTION

3.01 FAMILIARIZATION

A. Prior to implementing any of the work described in this section, CONTRACTOR shall become thoroughly familiar with the site, the site conditions, and all portions of the work falling within this section.

B. Inspection:

1. Prior to implementing any of the work in this section, CONTRACTOR shall carefully inspect the installed work of all other sections and verify that all work is complete to the point where the work of this section may properly commence without adverse impact.

2. If CONTRACTOR has any concerns regarding the installed work of other sections, it should immediately notify ENGINEER prior to the initiation of gravel placement. Failure to notify ENGINEER in writing will be construed as CONTRACTOR's acceptance of the related work of all other sections.

3.02 FIELD QUALITY ASSURANCE

A. The CQA Officer will visually observe the placement of aggregate.

3.03 INSTALLATION

A. The aggregate shall be placed as shown on the Drawings.

B. Placement of the aggregate shall be performed manually or using a piece of equipment approved by ENGINEER. The maximum drop height shall be 18 inches.

C. CONTRACTOR shall not operate equipment directly on geosynthetics.

3.04 SURVEYING AND CONSTRUCTION TOLERANCES

A. The Surveyor shall prepare as-built documentation in accordance with the requirements with the drawings.

3.05 PRODUCT PROTECTION

A. CONTRACTOR shall use all means necessary to protect all prior work and materials and completed work of other sections.

B. In the event of damage, CONTRACTOR shall immediately make all repairs and replacements necessary, to the approval of the CQA Officer and at no additional cost to OWNER.

[END OF SECTION]

DIVISION 15
MECHANICAL

SECTION 15060
HDPE PIPE AND PIPE FITTINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Scope of Work: The CONTRACTOR shall supply all materials, equipment, and labor needed to install complete and make ready for use all pipe, pipe fittings, and valves as specified herein and as indicated on the Plans.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

B. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only. Use of the most recent version is required.

1. American Association of State Highway and Transportation Officials (AASHTO):
   a. B16.5, Pipe Flanges and Flanged Fittings.
2. ASTM International (ASTM):
   a. D1248 Specification for Polyethylene Plastics Molding and Extrusion Materials.
   b. D2513, Thermoplastic Gas Pressure Pipe, Tubing, and Fittings.
   c. D2683, Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter- Controlled Polyethylene Pipe and Tubing.
   d. D3261, Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
   e. D3350, Specification for Polyethylene Plastics Pipe and Fittings Materials.
   f. D4101, Standard Specification for Propylene Plastic Injection and Extrusion Materials.
3. American National Standard Institute (ANSI):
   a. B31.8, Code for Pressure Piping, Appendix N.
4. Plastics Piping Institute (PPI):
   a. PPI TR-31/9-79, Technical Report.

C. Coordinate flange dimensions and drillings between piping, valves, and equipment.

1.3 DEFINITIONS

A. SDR – Standard Dimension Ratio.

B. ESCR – Environmental Stress Crack Resistance.

C. HDPE – High Density Polyethylene Pipe.

D. LFG – Landfill gas.

1.4 SUBMITTALS

A. The CONTRACTOR shall prepare and submit to the ENGINEER, for review and approval prior to commencement of construction, certificates of compliance on materials furnished and manufacturer's brochures containing complete information and instructions pertaining to the storage, handling, installation, inspection, maintenance and repair of each type of pipe, pipe fitting, and valve furnished.

B. Provide manufacturing test specification data listing resin type, cell classification, stock density, melt flow, flexural modulus, tensile strength, and coloration. Include results of tests with shipment of materials, with two (2) additional copies of test results furnished to ENGINEER.

C. The CONTRACTOR shall prepare and submit Shop Drawings to the ENGINEER for review and approval. The Shop Drawings shall show the following:
   1. All dimensions, slopes, and invert elevations at connections.
   2. All tie-ins to the existing leachate collection system shall be field-verified and shown on the Shop Drawings. This shall include pipe size and burial depth at a minimum.
   3. Pipe Dimensions for each pipe size used:
      a. Average outside diameter.
      b. Average inside diameter.
      c. Minimum average wall thickness.
   4. Each pipe and fitting size to be used.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect pipe coating during handling using methods recommended by manufacturer. Use of bare cables, chains, hooks, metal bars or narrow skids in contact with coated pipe is not permitted.

B. Prevent damage to pipe during transit. Repair abrasions, scars, and blemishes. If repair of satisfactory quality cannot be achieved, replace damaged material immediately.

C. Protect materials from direct exposure to rain or sunlight until installation.

D. Cap ends of pipe with minimum 5 mil plastic bags for pipe runs greater than 100 FT in length.

E. Pipe Storage:
   1. Store or stack pipe to prevent damage from marring, crushing or puncture. Limit maximum stacking height to 6 feet or manufacturer's maximum recommended height, whichever is less.
   2. Store in accordance with manufacturer's recommendations.

F. Pipe handling:
   1. Protect pipe from excessive heat or harmful chemicals.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the Contract Documents, the following manufacturers of PE pipe are acceptable for landfill gas applications:
   1. Chevron Phillips Chemical Company LLC.
   2. ISCO.
   3. American Plastic Pipe and Supply LLC.
   4. Lee Supply.
   5. Ferguson Industrial Plastics.
   6. Or approved alternative.

B. Submit requests for substitution in accordance with Specification Section 01640.

2.2 HIGH DENSITY POLYETHYLENE (HDPE/PE 3608) PIPING AND FITTINGS

A. General:
   1. All HDPE pipe used must be in conformance with the documentation set forth in the construction drawings. The SDR of each specific pipe can be found on the drawings themselves or on the general notes page.
   2. Pipe shall be extruded from a Type III, Class C, Category 5, Grade P34 compound as described in ASTM D 1248. It shall be classified as cell 345464 according to ASTM D 3350 and have the material designation of PE 3608. The pipe shall be manufactured to meet the requirements of ASTM D 2513. Manufacturer's literature shall be adhered to when "manufacturer's recommendations" are specified. All pipe and fittings shall be provided by one of the manufacturers specified in Section 2.2 of this specification.

B. HDPE Fittings
   1. Fittings shall be manufactured from polyethylene compound having cell classification equal to or exceeding the compound used in the pipe.
   2. All fittings 12 inches and smaller shall be molded, unless approved by the ENGINEER. Extrusion welds on fittings will not be allowed with the only exception as gussets as specified on the drawings. The ends of the fabricated fittings shall not be trimmed to match the pipe section to which they are going to be joined. All polyethylene fittings shall have the same or higher pressure rating as the pipe with an included 2.0 safety factor.
   3. Flanges for HDPE Pipe
      1) Flanges for HDPE pipe shall be convoluted ductile iron back-up rings.
      2) The bolts, nuts and wasters for the flanges shall be stainless steel. Below grade flanges shall be wrapped in 5-mil polyethylene sheeting just after installation and prior to backfilling to help prevent corrosion.
      3) Flange gaskets shall be full-face neoprene.
      4) Flanges and bolt patterns consistent with ANSI B16.5/AWWA C207/ASTM A536, as recommended by manufacturer.
   4. Valves

a. See Section 15052 for landfill gas system valve specifications

5. Reducers:
   a. Furnish appropriate size reducers and reducing fittings to mate pipe to equipment connections. Connection size requirements may change from those shown on Drawings depending on equipment furnished.

C. All pipe and fittings must be supplied by the same manufacturer.

D. Identify each length of pipe clearly at intervals of 5 FT or less with the following markings:
   1. Manufacturer's name and trademark.
   2. Nominal size of pipe.
   3. Type of plastic (e.g. PE 3608).
   4. Standard dimension ratio (SDR).
   5. ASTM designations (i.e., ASTM D 2513).

PART 3 - EXECUTION

3.1 PIPE PACKAGING, HANDLING, AND STORAGE

A. The manufacturer shall package the pipe in a manner designed to deliver the pipe to the project neatly, intact, and without physical damage. The transportation carrier shall use appropriate methods and intermittent checks to ensure the pipe is properly supported, stacked, and restrained during transport such that the pipe is not nicked, gouged, or physically damaged.

B. Pipe shall be stored on clean, level ground to prevent undue scratching or gouging. If the pipe must be stacked for storage, such stacking shall be done in accordance with the pipe manufacturer's recommendations. The pipe shall be handled in such a manner that it is not pulled over sharp objects or cut by chokers or lifting equipment.

C. Sections of pipe having been discovered with cuts or gouges in excess of 10% of the pipe wall thickness shall be cut out and removed. The undamaged portions of the pipe shall be rejoined using the heat fusion joining method.

D. Fused segments of pipe shall be handled so as to avoid damage to the pipe. Chains or cable type chokers must be avoided when lifting fused sections of pipe. Nylon slings are preferred. Spreader bars are recommended when lifting long fused sections.

E. Any pipes that are stored for more than 24 hours must have the ends of the pipe temporarily capped to prevent entry of debris and animals.

3.2 FIELD QUALITY CONTROL

A. Pipe may be rejected for failure to conform to Specifications, or for:

1. Fractures or cracks passing through pipe wall, except single crack not exceeding two (2) inches in length at either end of pipe which could be cut off and discarded. Pipes within one shipment will be rejected if defects exist in more than 5% of shipment or delivery.
2. Cracks sufficient to impair strength, durability, or serviceability of pipe.
3. Defects indicating improper proportioning, mixing, and molding.
4. Damaged ends, where such damage would prevent making satisfactory joints.

B. Acceptance of fittings, stubs, or other specifically fabricated pipe sections shall be based on visual observation by the OWNER or ENGINEER at the Project site and documentation that they conform to these Specifications.

3.3 CLEANING

A. General Cleaning:

1. Clean interior of piping systems thoroughly of foreign matter before installing. Maintain pipe in clean condition during installation.

2. Before joining pipe, thoroughly clean and wipe joint contact surfaces and then properly dress and make joint.

3. Immediately prior to pressure testing of piping systems, clean and remove grease, dirt or other foreign materials which may have entered the system.

4. Upon completion of work and prior to final acceptance, thoroughly clean work installed under these specifications. Clean pipe, valves and fittings of debris which may have accumulated by operation of system, from testing or from other causes.

5. All pipe shavings from the heat fusion process must be removed completely from the interrior of the pipe prior to pipe being used in the collection system construction.

3.4 HPDE PIPE INSTALLATION

A. Install pipe as indicated on Drawings. Pipe installation shall comply with the requirements of ASTM D 2321, PPI TR31/9-79, and the manufacturer's recommendations.

B. Remove standing water in trench before installation.

C. Lengths of fused pipe to be handled as one segment shall not exceed 400 feet.

D. The OWNER and ENGINEER shall be notified prior to any pipe being installed in the trench in order to have an opportunity to inspect the following items:
1. All butt and saddle fusions.
2. Pipe integrity.

3. Trench excavation and bedding material for rocks and foreign material.
4. Proper trench slope.
5. Trench contour to ensure the pipe will have uniform and continuous support.
6. Proposed backfill sand and soil.

E. Any irregularities found by the ENGINEER during this inspection must be corrected before lowering the pipe into the trench. Pipe shall be allowed sufficient time to adjust to trench temperature prior to any testing, segment tie-ins, and/or backfilling.

F. Pipes and fittings shall be carefully lowered into trench to limit stress to pipes, fittings, and joints.

G. Pipe and fittings shall be installed so that there will be no deviation at the joints and so that inverts present a smooth surface. Pipe and fittings that do not fit together to form a tight fitting joint are not permitted.

H. Tie-ins shall be made out of the trench whenever possible. When tie-ins are to be made only in the trench, a bell hole shall be excavated large enough to ensure an adequate and safe work area.

I. The CONTRACTOR shall ensure that kinking or excessive bend diameters of the pipe do not occur during the installation process.

J. The CONTRACTOR shall insure that the pipe installed in the trench is firmly supported. The CONTRACTOR shall follow the minimum length and type of backfill specified in the Plans.

K. Cap pipe sections longer than single joint (usually 40 feet) on both ends during placement, except during fusing operations.

L. All installed valves shall be tested in the presence of the ENGINEER. All repairs deemed necessary by the Engineer shall be made by the CONTRACTOR at the CONTRACTOR'S expense.

M. HDPE pipe and fittings shall be by the same manufacturer. The minimum strength of the fittings shall not be less than that of the pipe.

N. Service taps shall be installed as shown on the Drawings.

O. Changes in direction of HDPE Pipe:
1. Do not bend pipe to greater degree than minimum radius recommended by manufacturer for type and grade.

P. The CONTRACTOR shall remove cuttings from the interior and exterior. Shavings shall not be left on the ground and must be disposed of properly.

Q. HDPE shall not be field threaded and such threaded joints shall not be used in gas distribution systems.

R. Except as indicted on construction drawings, fittings shall be butt fusion type, meeting the requirements of ASTM D-3261 and this specification. All fittings shall be pressure rated to match the system piping to which they are fused.

S. All perforated pipes shall be perforated by the Manufacturer as shown on the Drawings.

T. Workmanship: Exterior and interior surfaces shall be smooth with no sharp projections. The surfaces shall be free of foreign inclusions and major surface defects. Polyethylene pipe shall be as uniform as commercially practical in color, opacity, density, and other physical properties. The product function shall be considered when judging external defects.

U. All installed HDPE pipe shall be marked in 50-foot intervals corresponding to the stationing required for slope confirmation and conformance surveying. Each joint shall be marked at header and lateral joints. For main pipeline, station numbering shall be continuous and sequential. Station numbering shall be referenced in daily logs to document pipe installation progress.

3.5 HEAT FUSION OF HDPE PIPING:

A. HDPE pipe shall be joined by butt-fusion methods, having a uniform and monolithic pipe interior according to the fusion joining procedures as instructed by the manufacturer as shown in the Construction Drawing

B. Each individual performing fusion joining shall have at least one (1) year of experience in the use of the fusion procedure.

C. Join pipe sections at ground level to a maximum length of 400 feet, or a length recommended by the manufacturer such that maximum allowable stress, when pulling the pipe into position alongside the trench, is not exceeded. Use appropriate materials and equipment, as recommended by the HDPE pipe manufacturer, when pulling butt-fused pipe sections alongside the trench to prevent pipe damage.

D. For summertime installations it may be necessary to provide a slightly longer length of HDPE pipe when connections are to be made between two fixed points or structures to compensate for contraction of the pipe in a cooler trench bottom. The additional pipe length requirements shall be in accordance with the HDPE pipe manufacturer's instructions.

E. For cleaning pipe ends, solutions such as detergents and solvents, when required, shall be used in accordance with manufacturer's recommendations.

F. Do not bend pipe to greater degree than minimum radius recommended by manufacturer for type and grade.

G. Do not subject pipe to strains that will overstress or buckle pipe or impose excessive stress on joints.

H. Branch saddle fusions shall be joined in accordance with manufacturer's recommendations and procedures. Branch saddle fusion equipment will be of the size to facilitate saddle fusion within the trench.

I. Before butt fusing pipe, each length shall be observed for presence of dirt, sand, mud, shavings, and other debris or animals. Remove all materials from the inside of the pipe.

J. At end of each working day, cover open ends of fused pipe. Cap to prevent entry by animals or debris.

K. Use compatible fusion techniques when polyethylene pipes of different melt indexes are fused together. Refer to manufacturer's specifications for compatible fusion.

END OF SECTION

PROPERTY OWNER

VOLUSIA COUNTY - SOLID WASTE DIVISION
3151 EAST NEW YORK AVENUE
DELAND, FLORIDA 32724

PROPERTY ADDRESS

TOMOKA FARMS ROAD LANDFILL
1990 TOMOKA FARMS ROAD
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HDR

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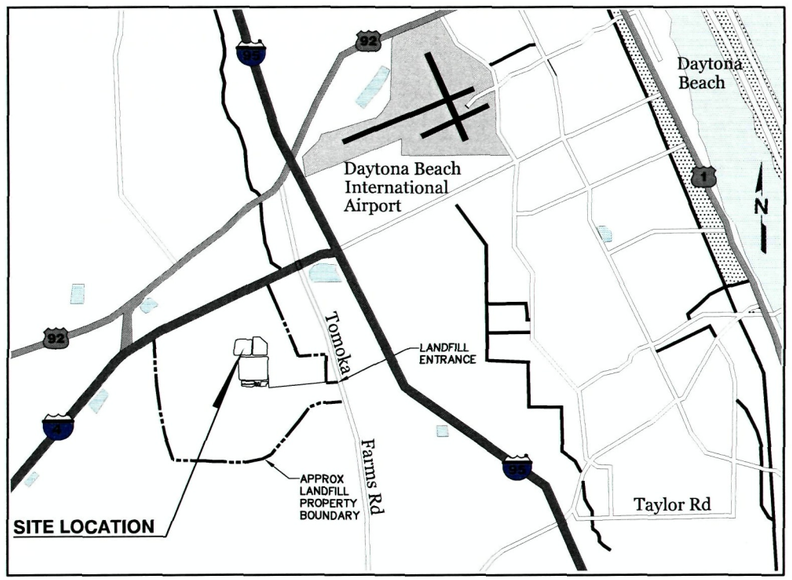


LOCATION MAP

Construction Drawings For

Volusia County Tomoka Farms Road Landfill

Run-Off Containment Construction Drawings

Project No. 97785

ISSUED FOR CONSTRUCTION

MARCH, 2011

INDEX OF DRAWINGS

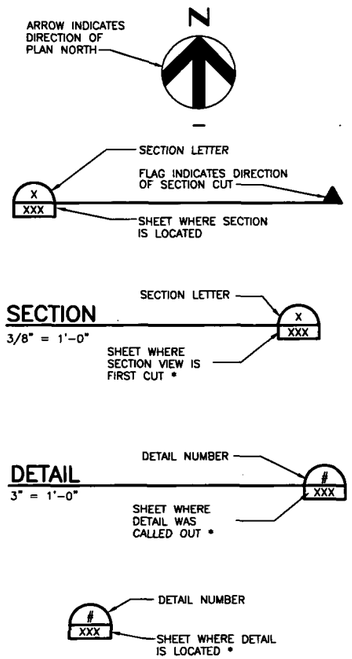
SURVEY AND MAP REPORT:

1. EXISTING AERIAL TOPOGRAPHY AND IMAGERY SUPPLIED BY AERIAL CARTOGRAPHICS OF AMERICA FROM AERIAL PHOTOGRAPHY DATED APRIL 7, 2010.
2. HORIZONTAL DATUM IS BASED ON THE FLORIDA STATE PLANE COORDINATE SYSTEM (EAST ZONE) NAD 1983/90. VERTICAL DATUM IS BASED ON THE NATIONAL GEODETIC *VERTICAL DATUM (NGVD) 1929.*

GENERAL NOTES:

1. ALL ELEVATIONS ARE ABOVE MEAN SEA LEVEL.
2. THIS IS A STANDARD SHEET SHOWING COMMON SYMBOLOGY. ALL SYMBOLS ARE NOT NECESSARILY USED ON THIS PROJECT.
3. CONTRACTOR SHALL TAKE WHATEVER MEANS NECESSARY TO PROTECT EXISTING PIPING, AND WELLS FROM DAMAGE DURING CONSTRUCTION. CONTRACTOR SHALL REPAIR OR REPLACE PIPING, AND GAS WELLS DAMAGED DURING CONSTRUCTION WITH EQUIVALENT MATERIALS AT NO EXPENSE TO THE COUNTY.
4. IT IS RESPONSIBILITY OF THE CONTRACTOR TO BECOME FAMILIAR WITH THE OSHA EXCAVATION SAFETY STANDARDS AND ABIDE BY THEM.
5. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL NECESSARY LICENSES AND PERMITS ASSOCIATED WITH THE CONSTRUCTION OF THIS PROJECT UNLESS NOTIFIED OTHERWISE IN WRITING BY THE OWNER.
6. THERE MAY BE UTILITIES NOT SHOWN ON THESE PLANS. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITY LOCATIONS SHOWN OR NOT SHOWN AND IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE LOCATIONS OF ALL UTILITIES WITHIN THE LIMIT OF THE WORK. ALL DAMAGE MADE TO THE EXISTING UTILITIES SHALL BE SOLE RESPONSIBILITY OF THE CONTRACTOR.
7. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH EXISTING VOLUSIA COUNTY DESIGN AND CONSTRUCTION STANDARDS.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ROADS USED BY CONTRACTOR AND SUBCONTRACTORS DURING PROJECT. CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING MUD AND TRASH, SUPPRESSING DUST, AND REPAIRING ROADS AND OTHER FACILITIES DAMAGED BY THE CONTRACTORS AND SUBCONTRACTORS VEHICLES.
9. CONTRACTOR SHALL COMPLY WITH ALL TERMS, CONDITIONS, AND REQUIREMENTS OF ALL APPLICABLE PERMITS FOR THE SITE.
10. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ENVIRONMENTAL PROTECTION DURING THE LIFE OF THE CONTRACT. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH PREVAILING FEDERAL, STATE, LOCAL AND OTHER APPLICABLE REGULATIONS.
11. THE CONTRACTOR SHALL PROVIDE ALL WARNING SIGNALS, SIGNS, LIGHTS, AND FLAG PERSONNEL AS REQUIRED BY FDOT.
12. WHERE IT IS NECESSARY TO DEFLECT PIPE EITHER HORIZONTALLY OR VERTICALLY, PIPE DEFLECTION SHALL NOT EXCEED 75% OF THE MANUFACTURER'S RECOMMENDED DEFLECTION ANGLE. MINIMUM PIPE RADIUS SHALL BE A MINIMUM OF 25% GREATER THAN THE MANUFACTURER'S RECOMMENDED MINIMUM RADIUS.
13. CONTRACTOR SHALL VERIFY ALL CLEARANCES PRIOR TO CONSTRUCTION.
14. CONTRACTOR SHALL MAINTAIN A CLEAR PATH FOR ALL SURFACE WATER DRAINAGE STRUCTURES AND DITCHES DURING ALL PHASES OF CONSTRUCTION AND SHALL UTILIZE WHATEVER MEANS NECESSARY TO MANAGE STORMWATER SUCH THAT THE IMPACT TO CONSTRUCTION AND TO ESTABLISHED LANDFILL COVER IS MINIMIZED. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OF DAMAGE DUE TO STORM WATER.
15. THE CONTRACTOR SHALL REPLACE ALL EXISTING PAVING, LANDFILL COVER MATERIAL, ACCESS ROADS, PIPES, STABILIZED EARTH, FENCES, SIGNS AND OTHER IMPROVEMENTS WITH THE SAME TYPE OF MATERIAL THAT WAS REMOVED OR DAMAGED DURING CONSTRUCTION, AS A RESULT OF CONSTRUCTION, OR AS DIRECTED BY THE ENGINEER WITHOUT INCREASE IN THE CONTRACT PRICE OR TIME.
16. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY WHEN CONFLICTS BETWEEN DRAWINGS AND ACTUAL CONDITIONS ARE DISCOVERED.
17. ANY AND ALL FINES IMPOSED ON THE OWNER BY ANY REGULATORY AGENCY DUE TO ACTIONS OF THE CONTRACTOR SHALL BE PAID BY THE CONTRACTOR.
18. NO DISTURBANCE SHALL BE ALLOWED OUTSIDE OF THE LIMITS OF CONSTRUCTION UNLESS APPROVED BY THE ENGINEER, OR SPECIFICALLY NOTED ON THE PLANS.
19. INSPECTION: EXAMINE AREAS FOR CONDITIONS UNDER WHICH WORK IS TO BE PERFORMED. REPORT TO ENGINEER ALL CONDITIONS CONTRARY TO THOSE SHOWN ON THE DRAWINGS OR SPECIFIED HEREIN AND ALL OTHER CONDITIONS THAT WILL AFFECT SATISFACTORY EXECUTION OF WORK. DO NOT PROCEED WITH WORK UNTIL UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED. STARTING WORK CONSTITUTES ACCEPTANCE OF THE CONDITIONS UNDER WHICH WORK IS TO BE PERFORMED. AFTER SUCH ACCEPTANCE, THE CONTRACTOR SHALL, AT THEIR EXPENSE, BE RESPONSIBLE FOR CORRECTING ALL UNSATISFACTORY AND DEFECTIVE WORK RESULTING FROM SUCH UNSATISFACTORY CONDITIONS.
20. DEVIATIONS FROM THESE PLANS AND SPECIFICATIONS WITHOUT PRIOR WRITTEN CONSENT OF THE ENGINEER MAY CAUSE THE WORK TO BE UNACCEPTABLE AND WILL BE ADJUSTED OR REPEATED AT CONTRACTOR'S EXPENSE.
21. ALL WORK SHALL HAVE ONE YEAR WARRANTY, UNLESS OTHERWISE NOTED IN DRAWINGS OR SPECIFICATIONS. ONE YEAR WARRANTY WILL BECOME EFFECTIVE WHEN THE PROJECT IS SUBSTANTIALLY COMPLETE.
22. REQUEST FOR INSPECTIONS SHALL BE MADE AT LEAST 48 HOURS IN ADVANCE.
23. PROTECTIONS: INSTALL TEMPORARY BARRIERS, FENCES, BARRICADES, LIGHTS, WARNING SIGNS AND OTHER DEVICES NECESSARY TO PROTECT STRUCTURES, UTILITIES, LANDSCAPING, EXCAVATIONS, AND OTHER ITEMS AS NECESSARY. PROTECT SURVEY BENCHMARKS AND MONUMENTS FROM DISPLACEMENT.
24. ALL WORK SHALL BE PERFORMED IN A QUALITY WORKMANLIKE MANNER.
25. ALL EXCAVATED MATERIALS SHALL REMAIN THE PROPERTY OF THE OWNER.
26. AS-BUILT SURVEY SHALL INCLUDE TOE DRAIN, TOPO OF BERM AND EXISTING GRADE TIE IN, AND EDGE OF LINER. AS-BUILT DRAWINGS SHALL BE SEALED AND SIGNED BY A FLORIDA REGISTERED LAND SURVEYOR.
27. THE CONTRACTOR SHALL NOTIFY ALL UTILITY COMPANIES IN THE AREA AT LEAST 72 HOURS PRIOR TO BEGINNING CONSTRUCTION. CALL FLORIDA SUNSHINE STATE ONE CALL CENTER AT 811
28. CONTRACTOR IS RESPONSIBLE FOR DEWATERING (IF REQUIRED) ALL EXCAVATIONS, FILL AREAS, ETC. IN ORDER TO WORK IN DRY CONDITIONS AND OBTAINING ANY NECESSARY PERMITS.
29. ATTENTION IS DIRECTED TO THE FACT THAT AN ACTIVE LANDFILL AND OTHER FACILITIES WILL BE IN OPERATION DURING THE CONSTRUCTION PERIOD. WASTE HAULING TRUCKS WILL BE ACTIVE DURING NORMAL BUSINESS HOURS. IF NECESSARY, CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL TO MAINTAIN LANDFILL ACTIVITIES. CONTRACTOR'S ACTIVITIES SHALL NOT INTERFERE WITH LANDFILL OPERATIONS.
30. CONTRACTOR SHALL PROVIDE PROPER WARNING SIGNS, BARRICADES, TEMPORARY FENCING AND OTHER APPROPRIATE SAFETY DEVICES DURING THE EXECUTION OF THE WORK TO *PROVIDE PUBLIC PROTECTION AND SAFETY.*
31. SURVEY BENCHMARKS, MONUMENTS AND OTHER REFERENCE POINTS SHALL BE PROTECTED FROM DAMAGE AND DISPLACEMENT. IF DISTURBED OR DESTROYED, THEY SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.
32. PROJECT SITE IS A SOLID WASTE LANDFILL, AS SUCH, CONDITIONS ARE SUBJECT TO CHANGE WITH TIME. CONTROLS, IN PARTICULAR VERTICAL CONTROL, SHOULD BE EXPECTED (AND ANTICIPATED) TO VARY FROM THOSE SHOWN ON THESE DRAWINGS DUE TO ONGOING SUBSIDENCE RESULTING FROM REFUSE DECOMPOSITION. RELATIVE ELEVATION DIFFERENCES IN EXISTING AND PROPOSED ELEVATIONS SHOWN ON THE DRAWINGS SHALL BE ADJUSTED ACCORDINGLY. LOCATION OF STRUCTURES SHALL BE PLACED IN ACCORDANCE WITH HORIZONTAL CONTROLS. VERTICAL PLACEMENT OF STRUCTURES SHALL BE IN ACCORDANCE WITH CONSTRUCTION DOCUMENTS, OR AS APPROVED BY THE ENGINEER.
33. EXCAVATION IS UNCLASSIFIED AND INCLUDES REMOVAL OF EARTH FILLS, RUBBLE, TRASH, AND OTHER MATERIALS ENCOUNTERED IN WASTE EXCAVATION AND GRADING OPERATIONS TO DEPTH AND EXTENT SHOWN ON DRAWINGS OR SPECIFICATIONS. THE OWNER'S REPRESENTATIVE SHALL BE THE FINAL AUTHORITY AND SHALL MAKE THE FINAL DECISION DURING CONSTRUCTION AS TO THE DEPTH AND EXTENT TO WHICH MATERIALS MUST BE REMOVED AND REPLACED.
34. WORK SHALL BE SCHEDULED BETWEEN 7:30 AM AND 5:30 PM, MONDAY THROUGH FRIDAY. WORK PLANNED OUTSIDE OF NORMAL OPERATING HOURS SHALL BE REQUESTED IN WRITING TO THE ENGINEER A MINIMUM OF 48 HOURS IN ADVANCE.
35. PRIOR TO TRENCHING AND TOE DRAIN INSTALLATION, CONTRACTOR SHALL STAKEOUT THE ENTIRE PROPOSED TRENCH ALIGNMENT. THE PROPOSED ALIGNMENT MUST BE APPROVED BY THE ENGINEER PRIOR TO COMMENCEMENT OF EXCAVATION ACTIVITIES. SURVEY NOTES WITH THE PROPOSED TOE DRAIN SLOPE SHALL BE INCLUDED WITH THE ALIGNMENT.
36. EXCAVATIONS SHALL NOT BE LEFT OPEN OVERNIGHT.
37. CONTRACTOR SHALL DISPOSE OF CUTTINGS AT THE WORKING FACE OF THE LANDFILL BY THE END OF EACH WORKING DAY. EXCAVATED REFUSE MUST BE REMOVED DURING ANY *RAIN EVENT TO PREVENT STORM WATER FROM CONTACTING REFUSE.*
38. FINISHED GRADE TO BE SMOOTH AND UNIFORMLY SLOPING SURFACES TO EXISTING ELEVATIONS.

SHEET REFERENCES



DETAIL MARKER

* FOR REFERENCING DETAILS INCLUDED IN DRAWING SET.

ABBREVIATIONS

ADS	–	ADVANCED DRAINAGE SYSTEMS SMOOTH INTERIOR WALL CORRUGATED POLYETHYLENE *DRAINAGE PIPE (N-12 PIPE)* OR EQUAL
APPROX	–	APPROXIMATE, APPROXIMATELY
BLDG	–	BUILDING
BOP	–	BEGINNING OF PAVEMENT
BTM	–	BOTTOM
CB	–	CATCH BASIN
CM	–	CONCRETE MONUMENT
CONC	–	CONCRETE
CONT	–	CONTINUOUS
CORR	–	CORRUGATED
CPP	–	CORRUGATED PLASTIC PIPE
DET	–	DETAIL
DIA	–	DIAMETER
DIM	–	DIMENSION
DWG	–	DRAWING
EA	–	EACH
EOL	–	EDGE OF LINER
EOP	–	ENDING OF PAVEMENT
EOR	–	EDGE OF ROAD
ETC	–	ET CETERA
ENCL	–	ENCLOSE, ENCLOSURE
EL	–	ELEVATION
EQUIP	–	EQUIPMENT
ERCP	–	ELLIPTICAL REINFORCED CONCRETE PIPE
EXIST	–	EXISTING
FDEP	–	FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
FDOT	–	FLORIDA DEPARTMENT OF TRANSPORTATION
FES	–	FLARED END SECTION
FIN	–	*FINISHED*
FM	–	FORCE MAIN
GALV	–	GALVANIZED
GCL	–	GEOSYNTHETIC CLAY LINER
GFFR	–	GROUT FILLED FIBER REVETMENT
GR	–	GRADE
GDL	–	GEOSYNTHETIC DRAINAGE LINER
GM	–	GAS MONITORING LOCATION
GP	–	GAS PROBE
HDPE	–	HIGH DENSITY POLYETHYLENE
HP	–	HIGH POINT
ID	–	INSIDE DIAMETER
IE	–	INVERT ELEVATION
LF	–	LINEAL FEET
LFG	–	LANDFILL GAS
LLDPE	–	LINEAR LOW DENSITY POLYETHYLENE
LP	–	LOW POINT
MAX	–	MAXIMUM
MFR	–	MANUFACTURER
MH	–	MANHOLE
MIN	–	MINIMUM
MISC	–	MISCELLANEOUS
MSL	–	(ABOVE) MEAN SEA LEVEL
MT	–	MOUNT
MW	–	GROUNDWATER MONITORING WELL
N/A	–	NOT APPLICABLE
N/AVAIL	–	NOT AVAILABLE
NGVD	–	NATIONAL GEODETIC VERTICAL DATUM
NIC	–	NOT IN CONTRACT
No	–	NUMBER
NP	–	NON-PERFORATED PIEZOMETER
NTS	–	NOT TO SCALE
OC	–	ON CENTER
OD	–	OUTSIDE DIAMETER
OSHA	–	OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION
P	–	PIEZOMETER
PLS	–	PROFESSIONAL LAND SURVEYOR
PS	–	PUMP STATION
R	–	RADIUS
RCP	–	REINFORCED CONCRETE PIPE
REF	–	REFERENCE
REQD	–	REQUIRED
SL	–	SLOPE
SCH	–	SCHEDULE
SDR	–	STANDARD DIMENSION RATIO
SHT	–	SHEET
SIM	–	SIMILAR
SS	–	STAINLESS STEEL
STD	–	STANDARD
STL	–	*STEEL*
STW	–	STORMWATER MONITORING STATION
TRM	–	TURF REINFORCEMENT MATTING
TYP	–	TYPICAL
USC&GS	–	UNITED STATES COASTAL AND GEODETIC SURVEY
USGS	–	UNITED STATES GEOLOGICAL SURVEY
WGT	–	WEIGHT
W.E.	–	WATER ELEVATION

HDR
HDR Engineering, Inc.
200 W Forsyth St
Jacksonville, FL 32202
FLORIDA CA #00004213

ISSUE	DATE	DESCRIPTION
1	3/11	SUBMITTED TO COUNTY FOR CONSTRUCTION

PROJECT MANAGER	A. EVANS, P.E.
DESIGNED BY	A. EVANS, P.E.
DESIGNED BY	M. AUSTIN
DESIGNED BY	
DRAWN BY	C. BREWER
CHECKED BY	M. ROBERTS, P.E.
PROJECT NUMBER	0000000000097785

Volusia County FLORIDA

RUN OFF CONTAINMENT BERM

CLASS I ACTIVE AREA
TOMOKA FARMS ROAD LANDFILL
VOLUSIA COUNTY, FLORIDA

GENERAL NOTES

0 1" 2"

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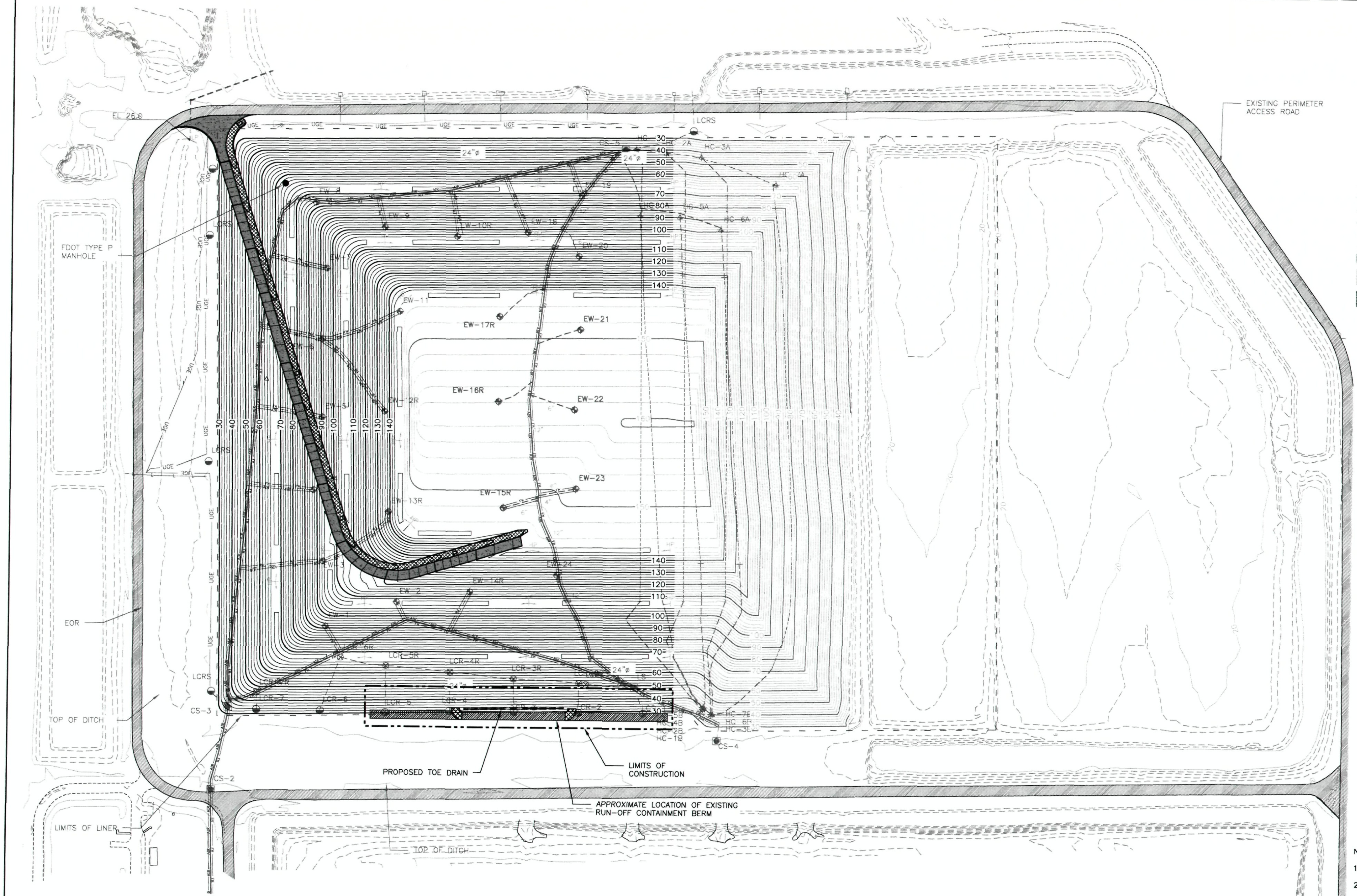
SCALE	NOT TO SCALE

SHEET 00G-01



N

SCALE IN FEET

125 0 125 250

LEGEND

- LIMITS OF LINER
- LIMITS OF CONSTRUCTION
- 1080 EXISTING CONTOURS (MAJOR)
- EXISTING CONTOURS (MINOR)
- 1080 FINAL CONTOURS (MAJOR)
- FINAL CONTOURS (MINOR)
- EXISTING PERIMETER ROAD
- EXISTING RUN OFF CONTAINMENT BERM
- RUN OFF CONTAINMENT BERM TIE IN
- HIGH POINT

NOTES:

1. FINAL CONTOURS SHOWN REPRESENT MAXIMUM ALLOWABLE ELEVATIONS AND TOP OF FINAL COVER.
2. FINAL GRADES SHALL NOT BE GREATER THAN 3:1.

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Volusia County
FLORIDA

RUN OFF CONTAINMENT BERM

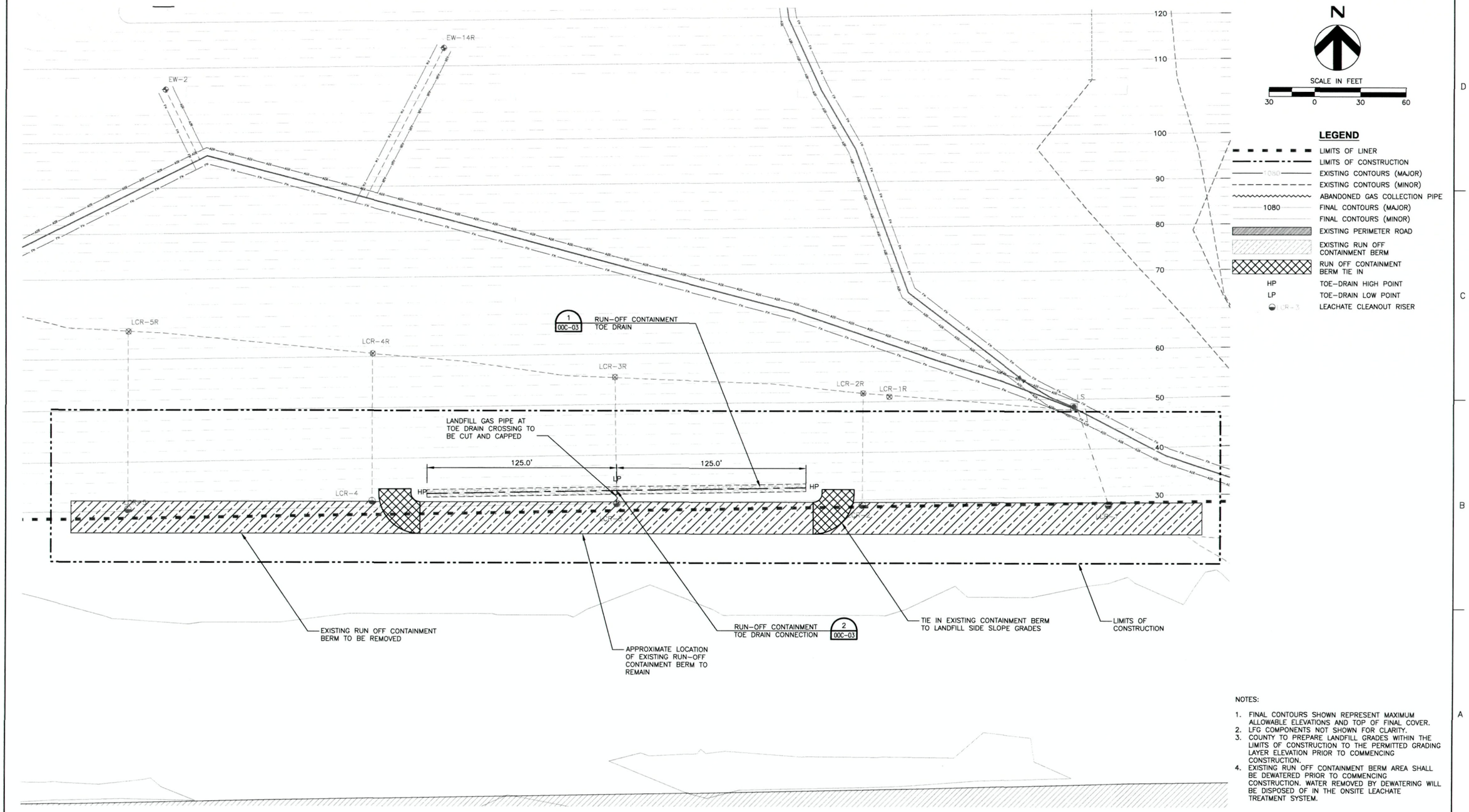
CLASS I ACTIVE AREA
TOMOKA FARMS ROAD LANDFILL
VOLUSIA COUNTY, FLORIDA

RUN-OFF CONTAINMENT OVERALL SITE PLAN

0 1" 2"

FILENAME	00C-01.dwg
SCALE	AS SHOWN

SHEET
00C-01



NOTES:

1. FINAL CONTOURS SHOWN REPRESENT MAXIMUM ALLOWABLE ELEVATIONS AND TOP OF FINAL COVER.
2. LFG COMPONENTS NOT SHOWN FOR CLARITY.
3. COUNTY TO PREPARE LANDFILL GRADES WITHIN THE LIMITS OF CONSTRUCTION TO THE PERMITTED GRADING LAYER ELEVATION PRIOR TO COMMENCING CONSTRUCTION.
4. EXISTING RUN OFF CONTAINMENT BERM AREA SHALL BE DEWATERED PRIOR TO COMMENCING CONSTRUCTION. WATER REMOVED BY DEWATERING WILL BE DISPOSED OF IN THE ONSITE LEACHATE TREATMENT SYSTEM.

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Volusia County FLORIDA

RUN OFF CONTAINMENT BERM

CLASS I ACTIVE AREA
TOMOKA FARMS ROAD LANDFILL
VOLUSIA COUNTY, FLORIDA

RUN-OFF CONTAINMENT PLAN

0 1" 2"

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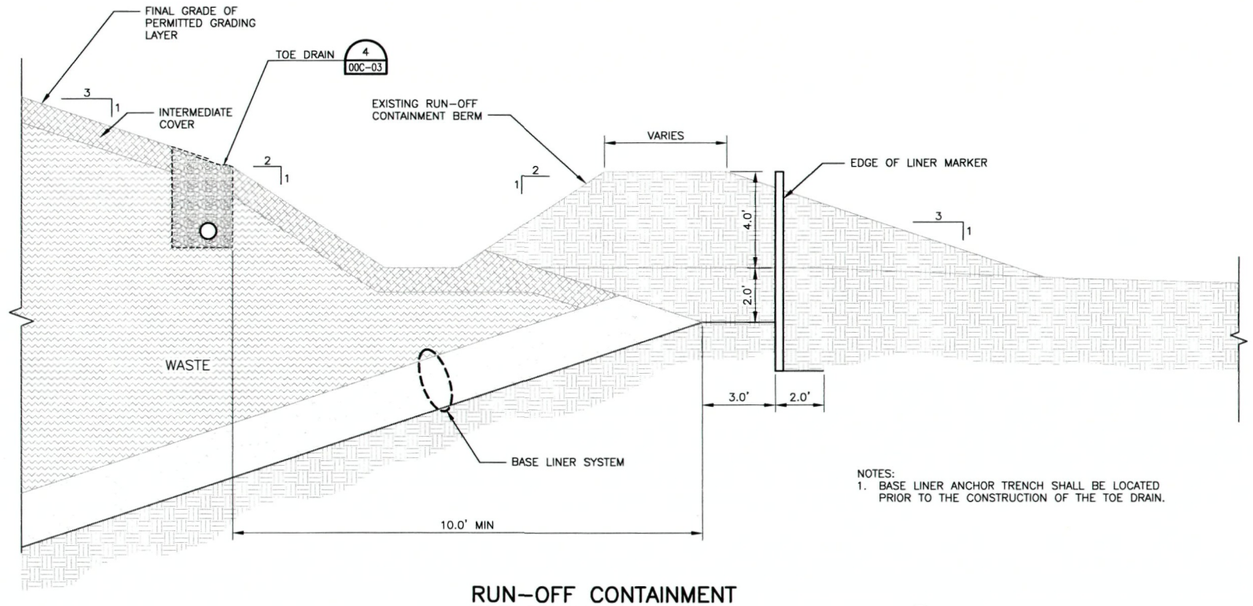
SCALE	AS SHOWN

SHEET 00C-02

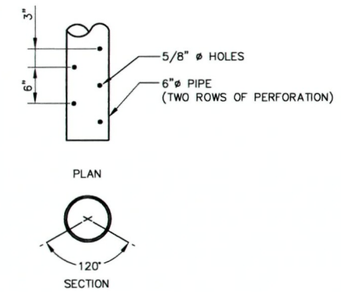


NOTES:
1. BASE LINER ANCHOR TRENCH SHALL BE LOCATED PRIOR TO THE CONSTRUCTION OF THE TOE DRAIN.

RUN-OFF CONTAINMENT TOE DRAIN

NOT TO SCALE

1
00C-02



PIPE PERFORATIONS

NOT TO SCALE

3
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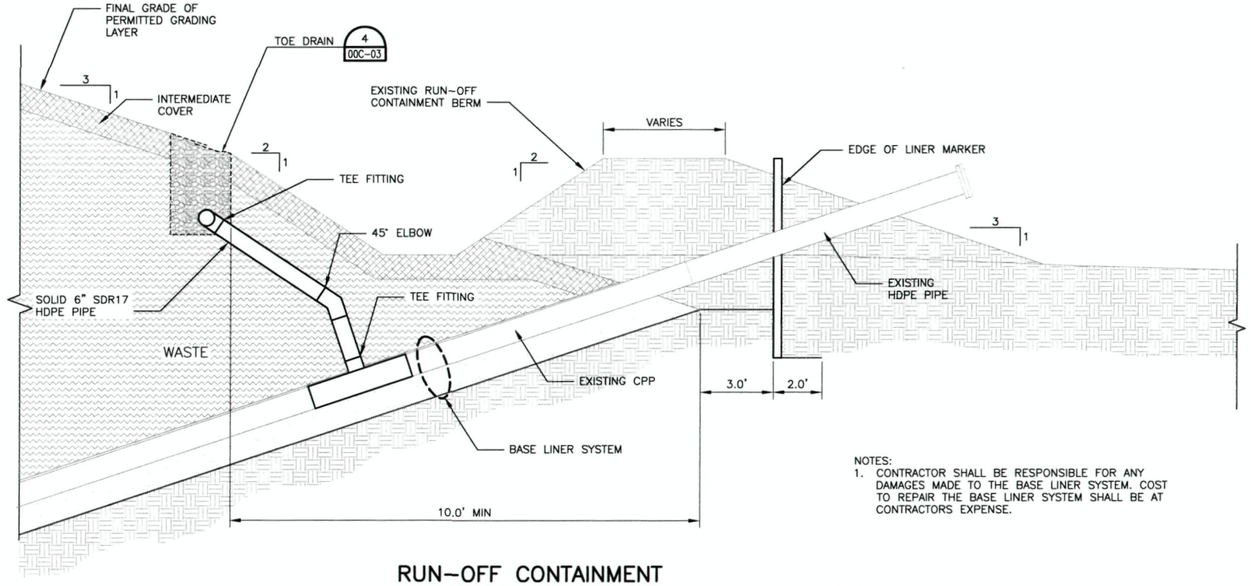
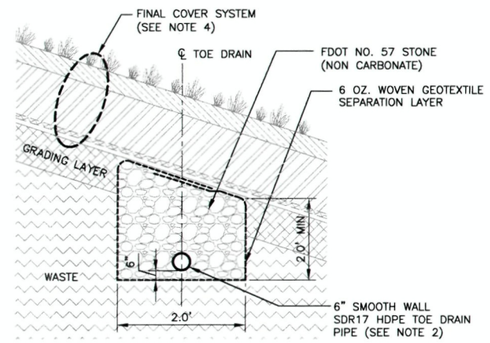


NOTES:
1. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGES MADE TO THE BASE LINER SYSTEM. COST TO REPAIR THE BASE LINER SYSTEM SHALL BE AT CONTRACTORS EXPENSE.

RUN-OFF CONTAINMENT TOE DRAIN CONNECTION

NOT TO SCALE

2
00C-02



NOTES:
1. TOE DRAIN PIPE TO BE GRADED AT 0.5% MIN AND TIED INTO EXISTING LEACHATE CLEANOUT.
2. SEE DETAIL 3 FOR TOE DRAIN PIPE PERFORATIONS.
3. FINAL COVER SYSTEM NOT TO BE CONSTRUCTED.

TOE DRAIN

NOT TO SCALE

4
00C-03

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Volusia County FLORIDA

CLASS I ACTIVE AREA
TOMOKA FARMS ROAD LANDFILL
VOLUSIA COUNTY, FLORIDA

RUN-OFF CONTAINMENT DETAILS

0 1" 2"

FILENAME	00C-03.dwg
SCALE	AS SHOWN

SHEET
00C-03

Appendix H

Modifications to Operations Plan

RECORDING LEACHATE QUANTITES (RULE 62-701.500(8)(F), F.A.C.)

Quantities of leachate collected and removed for off-site treatment and/or disposal are recorded and those records are maintained at the landfill. These quantities will be recorded in gallons per day.

RECORDING PRECIPITATION (RULE 62-701.500(8)(g), F.A.C.)

A rain gauge has been installed and is operated and maintained by Volusia County personnel to record precipitation at the disposal facility. Precipitation records will be maintained in the facility's operating record and will be compared with leachate generation rates.

INSPECTION AND CLEANING (RULE 62-101.500(8)(h), F.A.C)

The leachate collection system for future cells will either be pressure cleaned or inspected by video recording after construction but prior to the initial placement of waste. Thereafter, existing leachate collection systems at the Tomoka Farms Road Landfill will pressure cleaned or inspected by video at the time of permit renewal. Results of the cleanings and inspections are kept on file in the landfill office.

CONTROLLING LEACHATE SEEPS

In the event a leachate seep occurs at the landfill, Volusia County personnel will take immediate action. The following guidelines will be followed:

- Assess the area impacted by the seep. Determine the extent of the impacted area, the origin of the seep and its potential to travel outside of waste limits.
- If the seep is slowly percolating and does not have potential to travel outside the limits of waste then the following corrective actions will be taken:
  - Excavate the seep origin and at least five feet downgradient to a minimum of 3 feet below the existing surface.
  - Fill the bottom of the excavated area with 2 feet of the excavated area with gravel or similar pervious material and top foot with uncontaminated soil.
  - Leachate shall not cross waste limits or edge of liner at any time nor shall it mix with stormwater runoff.
  - Inform FDEP about the seep location, extent, and corrective actions taken to control the seep.
  - This information will be recorded and kept on-site. Continue to monitor seep location for signs of repeated outbreaks.
- If seep is seeping quickly then following corrective actions will be taken:

- Contain the seep within the waste limits by appropriately implementing one or a combination of the actions below:
  (a) Construct a temporary 4-foot high containment berm downgradient of the seep and within the waste limits. The temporary berm will have a maximum sideslope of 2:1 and provide a swale with a bottom width of 3 feet to allow for percolation into waste.
  (b) Construct a 2-foot deep by 2-foot wide French drain or similar structure downgradient of the seep and within the limits of waste to allow leachate to re-enter waste. The length of the structure shall be determined by the impacted area.
  (c) Excavate a pit in waste limits such that the seep is collected in the excavated pit. Pump the collected leachate on into the landfill through a nearby cleanout.
- Inform FDEP about the seep location, extent, and corrective actions taken to control the seep.
- Develop and implement a long-term solution addressing the control of the seep after discussing potential solutions with FDEP.
- This information will be recorded and kept on-site. Continue to monitor seep location for signs of repeated outbreaks.