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ENVIRONMENTAL CONSULTANTS

March 19, 2014

Mr. James Warren
Tennessee Department of Environment and Conservation
Jackson Environmental Field Office
1625 Hollywood Drive
Jackson, Tennessee 38305-4316

**Re: Closure Plan Modification
Phase II Bivens Industrial Park Monofill
IDL#03-0215**

Dear James,

Attached are the proposed revisions to the Closure/Post-Closure Care Plan for the Bivens Industrial Park Monofill in Camden, Tennessee. The proposed final grading plan and associated details have been modified to depict the final surface elevations for the proposed final cap and those modifications to the site drainage required to achieve final closure. To reduce the potential for future surface water infiltration into the Phase 1 ash disposal area, the geosynthetics will be extended across the existing Phase 1 disposal area as well as the Phase 2 disposal area.

Also included as Attachment 1 are the revised drainage calculations for the rip-rap ditch and proposed letdown structures.

Please call if you have any questions or require additional information.

Sincerely,
TriAD Environmental Consultants, Inc.

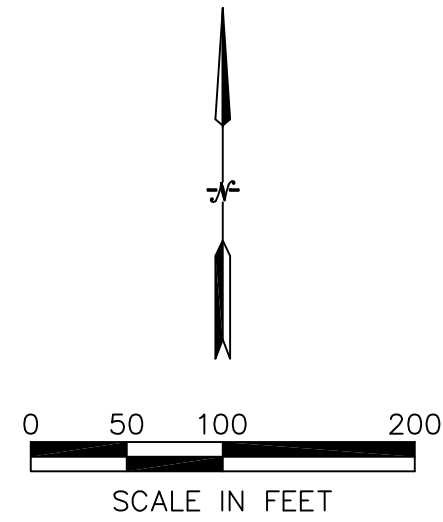
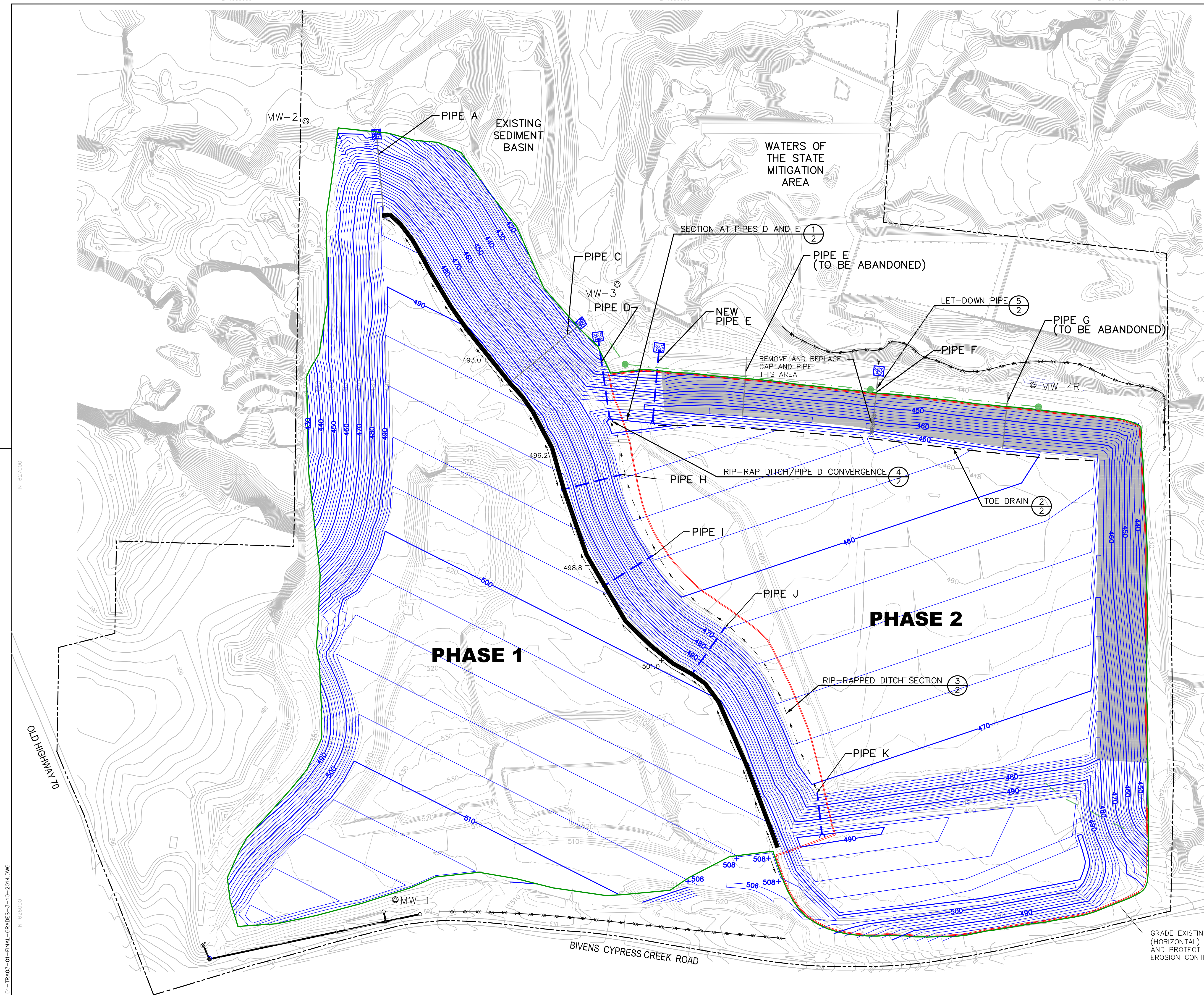
Nancy B. Sullivan

Nancy B. Sullivan, P.E., CPESC
Senior Project Manager/Engineer

attachments

cc: Mr. Joe Kaldmo, Trans-Ash
Mr. Abe Almassi, TDEC
Mr. Glen Pugh, TDEC

Attachment A
Drawings

**LEGEND**

- MW-1 EXISTING GROUNDWATER MONITORING WELL
- EXISTING FENCE
- EXISTING CONTOUR
- PROPERTY BOUNDARY
- CLOSED LANDFILL AREA
- LET-DOWN PIPE
- LEACHATE LINE WITH MANHOLE
- PROPOSED LET-DOWN PIPE
- PROPOSED FINAL GRADES
- PROPOSED DITCH
- PROPOSED BERM
- PROPOSED SILT FENCE
- PHASE II LINER ANCHOR TRENCH
- PROPOSED EDGE OF FINAL COVER
- PROPOSED RIP-RAPPED OUTLET
- PROPOSED TOE DRAIN

NOTES

1. BASE MAP DEVELOPED FROM MARCH 27, 2003, AERIAL SURVEY PROVIDED BY KUCERNA INTERNATIONAL, INC.
2. BASE MAP MODIFIED BASED ON FEBRUARY 11, 2004, SURVEY BY TRANS-ASH, INC.
3. BASE MAP MODIFIED BASED ON NOVEMBER 07, 2013, SURVEY PROVIDED BY TRANS-ASH, INC.
4. PIPES D, NEW E, F, H, I, J, AND K INSTALLED OR TO BE INSTALLED WITH HEADWALLS APPROVED IN MINOR MODIFICATION DATED SEPTEMBER 10, 2012.
5. PIPES A AND C INSTALLED WITH AREA DRAINS PER CONSTRUCTION PLANS DATED AUGUST 28, 2009. INLETS SHALL BE RAISED TO FINAL GRADE ELEVATIONS 487 AND 491.5, RESPECTIVELY.

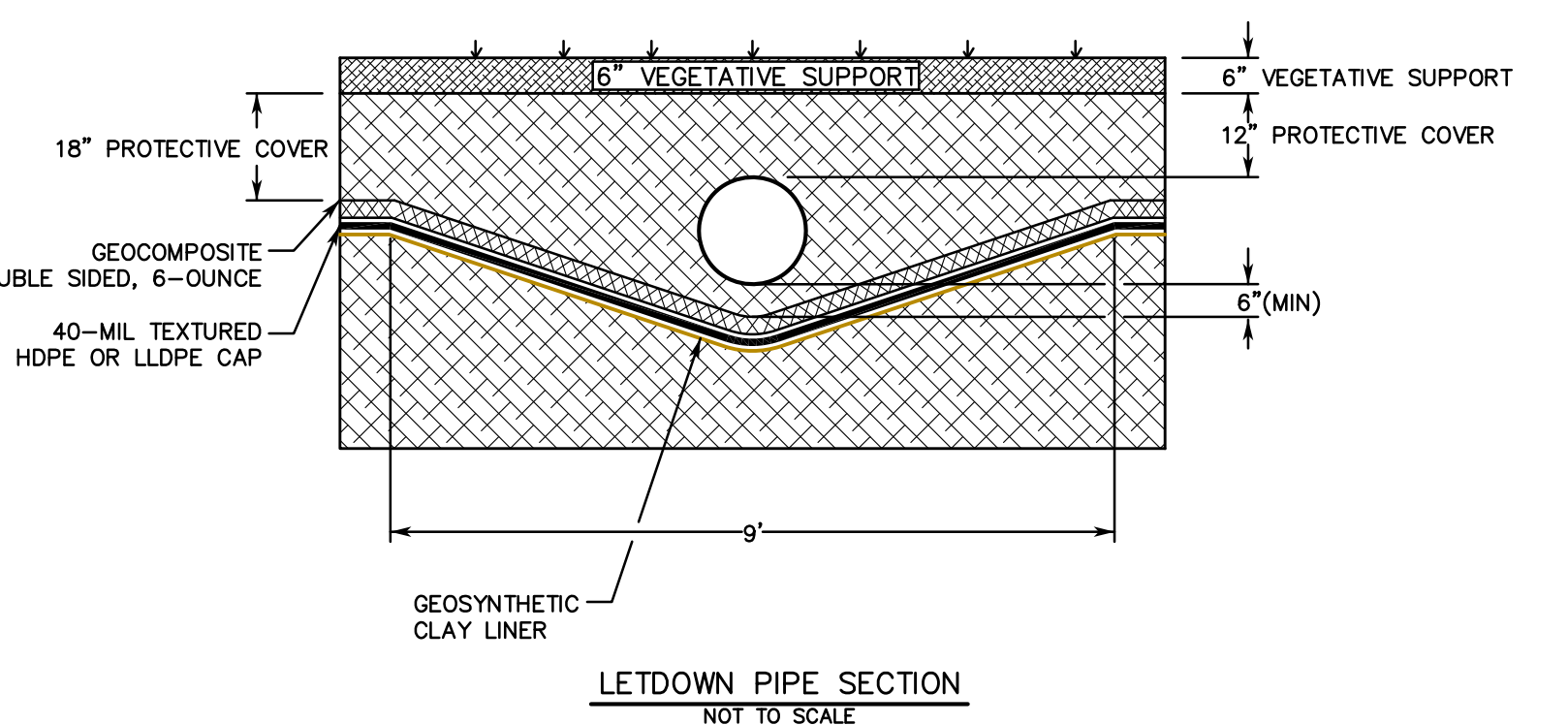
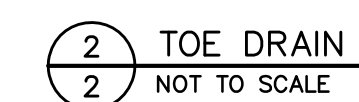
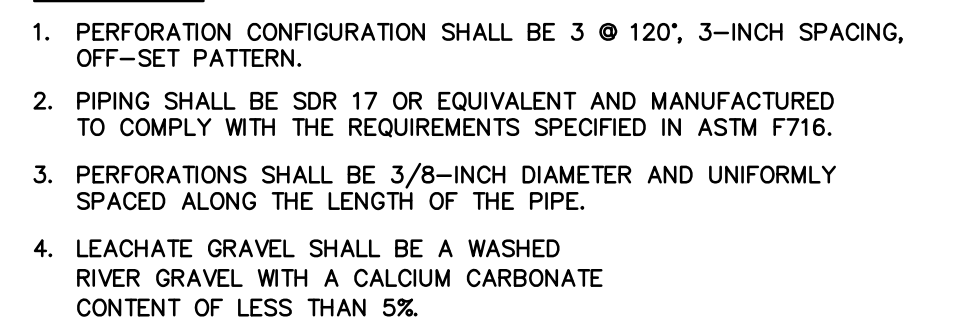
**FINAL GRADES**

PREPARED FOR:
BIVENS INDUSTRIAL PARK MONOFILL
CAMDEN, TENNESSEE

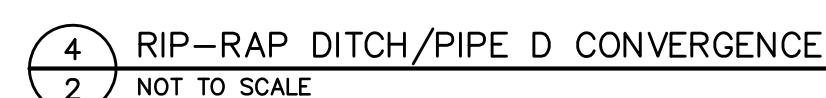
SCALE: 1" = 100' OR DWF CHK NBS REV NBS

PREPARED BY:
 TRIAD ENVIRONMENTAL CONSULTANTS, INC.
Suite 200, 207 Donelson Pike, Nashville, TN 37214
615-889-6888 fax 615-889-4004

PROJ: 01-TRA03-01 DATE: 03/10/14 SHEET 1 OF 2



5 LETDOWN PIPE
2 NOT TO SCALE



PROJ: 01-TRA03-01	DATE: 03/10/14	SHEET 2 OF 2
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Attachment B
Drainage Calculations

List of Drainage Calculations

Sheet 1	Rip-Rap Ditch
Sheet 2	Pipe A
Sheet 3	Pipe C
Sheet 4	Pipe D
Sheet 5	New Pipe E
Sheet 6	Pipe F
Sheet 7	Pipe H
Sheet 8	Pipe I
Sheet 9	Pipe J
Sheet 10	Pipe K



Rip-rap Ditch

Material:

Trapezoidal Channel

Bottom Width (ft)	Left Sideslope Ratio	Right Sideslope Ratio	Slope (%)	Manning's n	Freeboard Depth (ft)	Freeboard % of Depth	Freeboard Mult. x (VxD)
2.00	2.0:1	2.0:1	2.0	0.0300	0.50		

	w/o Freeboard	w/ Freeboard
Design Discharge:	44.97 cfs	
Depth:	1.46 ft	1.96 ft
Top Width:	7.84 ft	9.84 ft
Velocity:	6.26 fps	
X-Section Area:	7.18 sq ft	
Hydraulic Radius:	0.842 ft	
Froude Number:	1.15	

Pipe A

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
180.00	31.00	0.0110	3.50	0.00	0.20

Culvert Results:

Minimum pipe diameter: 1 - 15 inch pipe(s) required

Detailed Performance Curves

Design Discharge = 7.78 cfs

Maximum Headwater = 3.50 ft

(BOLD indicates design pipe size)

Headwater (ft)	Discharge (cfs) (12 in)	Discharge (cfs) (15 in)	Discharge (cfs) (18 in)
0.35	0.46	0.56	0.66
0.70	1.23	1.54	1.84
1.05	2.25	2.82	3.38
1.40	3.22	4.34	5.20
1.75	3.96	5.63	7.25
2.10	4.59	6.69	8.88
2.45	5.14	7.60	10.29
2.80	5.63	8.41	11.53
3.15	6.09	9.16	12.65
3.50	6.51	9.84	13.67
3.85	6.91	10.48	14.63
4.20	7.29	11.09	15.52
4.55	7.65	11.66	16.37
4.90	7.99	12.21	17.18
5.25	8.31	12.73	17.95

Pipe C

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
245.00	32.00	0.0110	3.50	0.00	0.20

Culvert Results:

Minimum pipe diameter: 1 - 18 inch pipe(s) required

Detailed Performance Curves

Design Discharge = 12.55 cfs

Maximum Headwater = 3.50 ft

(BOLD indicates design pipe size)

Headwater (ft)	Discharge (cfs) (15 in)	Discharge (cfs) (18 in)	Discharge (cfs) (21 in)
0.35	0.56	0.66	0.76
0.70	1.54	1.84	2.15
1.05	2.82	3.38	3.95
1.40	4.34	5.20	6.07
1.75	5.63	7.25	8.48
2.10	6.69	8.88	11.01
2.45	7.60	10.29	13.05
2.80	8.41	11.53	14.84
3.15	9.16	12.65	16.45
3.50	9.84	13.67	17.91
3.85	10.48	14.63	19.26
4.20	11.09	15.52	20.51
4.55	11.66	16.37	21.70
4.90	12.21	17.18	22.83
5.25	12.73	17.95	23.90

Pipe D

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
190.00	15.00	0.0110	10.00	0.00	0.20

Culvert Results:

Minimum pipe diameter: 1 - 30 inch pipe(s) required

Detailed Performance Curves

Design Discharge = 47.34 cfs

Maximum Headwater = 10.00 ft

(BOLD indicates design pipe size)

Headwater (ft)	Discharge (cfs) (24 in)	Discharge (cfs) (30 in)	Discharge (cfs) (36 in)
1.00	4.19	5.24	6.29
2.00	11.85	14.81	17.78
3.00	19.50	27.01	32.64
4.00	25.00	36.22	47.70
5.00	29.48	43.68	59.26
6.00	33.36	50.04	68.91
7.00	36.85	55.68	77.33
8.00	40.02	60.81	84.98
9.00	42.97	65.53	91.95
10.00	45.72	69.93	98.45
11.00	48.32	74.07	104.57
12.00	50.79	77.97	110.31
13.00	53.14	81.70	115.77
14.00	55.39	85.29	121.00
15.00	57.55	88.71	126.00

New Pipe E

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
170.00	33.00	0.0110	10.00	0.00	0.20

Culvert Results:

Minimum pipe diameter: 1 - 18 inch pipe(s) required

Detailed Performance Curves

Design Discharge = 22.30 cfs

Maximum Headwater = 10.00 ft

(BOLD indicates design pipe size)

Headwater (ft)	Discharge (cfs) (15 in)	Discharge (cfs) (18 in)	Discharge (cfs) (21 in)
1.00	2.62	3.14	3.67
2.00	6.39	8.42	10.37
3.00	8.84	12.17	15.76
4.00	10.74	15.00	19.79
5.00	12.36	17.38	23.13
6.00	13.78	19.48	26.04
7.00	15.06	21.37	28.67
8.00	16.25	23.11	31.06
9.00	17.35	24.74	33.28
10.00	18.41	26.25	35.37
11.00	19.38	27.67	37.34
12.00	20.33	29.04	39.21
13.00	21.22	30.35	41.00
14.00	22.08	31.59	42.71
15.00	22.92	32.80	44.36

Pipe F

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
145.00	33.00	0.0110	8.00	0.00	0.20

Culvert Results:

Minimum pipe diameter: 1 - 18 inch pipe(s) required

Detailed Performance Curves

Design Discharge = 18.53 cfs

Maximum Headwater = 8.00 ft

(BOLD indicates design pipe size)

Headwater (ft)	Discharge (cfs) (15 in)	Discharge (cfs) (18 in)	Discharge (cfs) (21 in)
0.80	1.88	2.25	2.62
1.60	5.11	6.36	7.42
2.40	7.47	10.09	12.77
3.20	9.25	12.80	16.67
4.00	10.74	15.02	19.79
4.80	12.05	16.95	22.51
5.60	13.23	18.69	24.92
6.40	14.31	20.27	27.12
7.20	15.32	21.73	29.15
8.00	16.26	23.11	31.06
8.80	17.15	24.42	32.85
9.60	18.00	25.64	34.56
10.40	18.81	26.83	36.17
11.20	19.57	27.95	37.72
12.00	20.33	29.04	39.21

Pipe H

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
135.00	29.00	0.0110	3.50	0.00	0.20

Culvert Results:

Minimum pipe diameter: 1 - 18 inch pipe(s) required

Detailed Performance Curves

Design Discharge = 11.52 cfs

Maximum Headwater = 3.50 ft

(BOLD indicates design pipe size)

Headwater (ft)	Discharge (cfs) (15 in)	Discharge (cfs) (18 in)	Discharge (cfs) (21 in)
0.35	0.56	0.66	0.76
0.70	1.54	1.84	2.15
1.05	2.82	3.38	3.95
1.40	4.34	5.20	6.07
1.75	5.63	7.25	8.48
2.10	6.69	8.88	11.01
2.45	7.60	10.29	13.05
2.80	8.41	11.53	14.84
3.15	9.16	12.65	16.45
3.50	9.84	13.67	17.91
3.85	10.48	14.63	19.26
4.20	11.09	15.52	20.51
4.55	11.66	16.37	21.70
4.90	12.21	17.18	22.83
5.25	12.73	17.95	23.90

Pipe I

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
136.00	29.00	0.0110	3.50	0.00	0.20

Culvert Results:

Minimum pipe diameter: 1 - 15 inch pipe(s) required

Detailed Performance Curves

Design Discharge = 9.78 cfs

Maximum Headwater = 3.50 ft

(BOLD indicates design pipe size)

Headwater (ft)	Discharge (cfs) (12 in)	Discharge (cfs) (15 in)	Discharge (cfs) (18 in)
0.35	0.46	0.56	0.66
0.70	1.23	1.54	1.84
1.05	2.25	2.82	3.38
1.40	3.22	4.34	5.20
1.75	3.96	5.63	7.25
2.10	4.59	6.69	8.88
2.45	5.14	7.60	10.29
2.80	5.63	8.41	11.53
3.15	6.09	9.16	12.65
3.50	6.51	9.84	13.67
3.85	6.91	10.48	14.63
4.20	7.29	11.09	15.52
4.55	7.65	11.66	16.37
4.90	7.99	12.21	17.18
5.25	8.31	12.73	17.95

Pipe J

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
136.00	33.00	0.0110	3.50	0.00	0.20

Culvert Results:

Minimum pipe diameter: 1 - 15 inch pipe(s) required

Detailed Performance Curves

Design Discharge = 7.85 cfs

Maximum Headwater = 3.50 ft

(BOLD indicates design pipe size)

Headwater (ft)	Discharge (cfs) (12 in)	Discharge (cfs) (15 in)	Discharge (cfs) (18 in)
0.35	0.46	0.56	0.66
0.70	1.23	1.54	1.84
1.05	2.25	2.82	3.38
1.40	3.22	4.34	5.20
1.75	3.96	5.63	7.25
2.10	4.59	6.69	8.88
2.45	5.14	7.60	10.29
2.80	5.63	8.41	11.53
3.15	6.09	9.16	12.65
3.50	6.51	9.84	13.67
3.85	6.91	10.48	14.63
4.20	7.29	11.09	15.52
4.55	7.65	11.66	16.37
4.90	7.99	12.21	17.18
5.25	8.31	12.73	17.95

Pipe K

Culvert Inputs:

Length (ft)	Slope (%)	Manning's n	Max. Headwater (ft)	Tailwater (ft)	Entrance Loss Coef. (Ke)
113.00	16.10	0.0110	3.50	0.00	0.20

Culvert Results:

Minimum pipe diameter: 1 - 12 inch pipe(s) required

Detailed Performance Curves

Design Discharge = 5.39 cfs

Maximum Headwater = 3.50 ft

(BOLD indicates design pipe size)

Headwater (ft)	Discharge (cfs) (10 in)	Discharge (cfs) (12 in)	Discharge (cfs) (15 in)
0.35	0.39	0.46	0.56
0.70	1.03	1.23	1.54
1.05	1.82	2.25	2.82
1.40	2.41	3.22	4.34
1.75	2.90	3.96	5.63
2.10	3.32	4.59	6.69
2.45	3.69	5.14	7.60
2.80	4.02	5.63	8.41
3.15	4.33	6.09	9.16
3.50	4.62	6.51	9.84
3.85	4.89	6.91	10.48
4.20	5.15	7.29	11.09
4.55	5.39	7.65	11.66
4.90	5.62	7.99	12.21
5.25	5.85	8.31	12.73