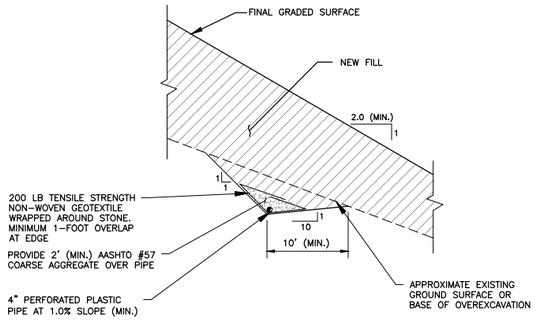
Drawing Set #2

Mockingbird Hill Site Specific Plans

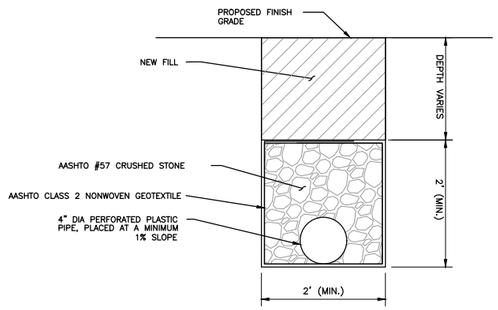
Some Mapping Contains Critical Energy Infrastructure Information - Filed Separately



NOTE:

INTERMEDIATE FILL KEYS SHALL BE INSTALLED INTO PRE-EXISTING GROUND SURFACE OR SPECIFIED OVEREXCAVATION AT LOCATIONS SHOWN ON THE SECTIONS AND AT ANY LOCATION DEEMED NECESSARY BY A CEC REPRESENTATIVE.

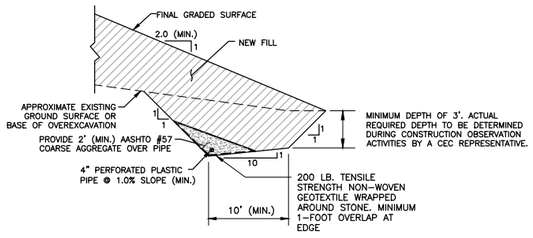
DETAIL 1
INTERMEDIATE FILL KEY
NOT TO SCALE



NOTES:

1. USE SUBSURFACE DRAIN TO EXTEND FILL KEY DRAINS BEYOND AND BELOW LIMITS OF NEW FILL
2. INSTALL SUBSURFACE DRAINS AT SPRING/SEEPAGE AREAS ENCOUNTERED DURING CONSTRUCTION. EXCAVATE INTO EXISTING GROUND SURFACE ONLY AND OUTLET BEYOND LIMITS OF NEW FILL

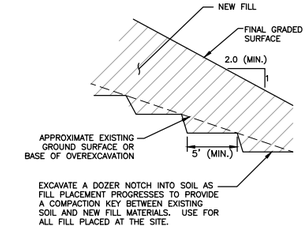
DETAIL 2
SUBSURFACE DRAIN
NOT TO SCALE



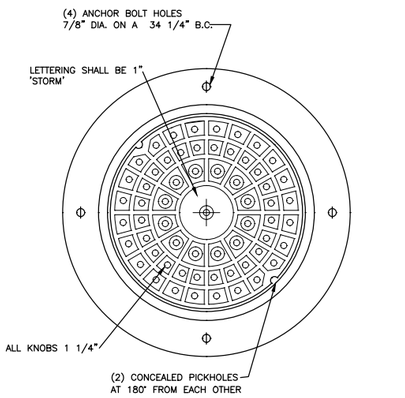
NOTES:

1. OUTLET FILL FOUNDATION KEY DRAIN BEYOND THE LIMITS OF NEW FILL USING SUBSURFACE DRAIN (DETAIL 9).
2. FILL FOUNDATION AREAS SHALL BE INSTALLED AT THE TOE OF ANY FILL SLOPE EXCEEDING 5 FEET IN HEIGHT MEASURED VERTICALLY FROM THE TOE OF SLOPE TO THE NECESSARY BY A CEC REPRESENTATIVE.

DETAIL 3
FILL FOUNDATION KEY
NOT TO SCALE



DETAIL 4
COMPACTION KEY
NOT TO SCALE

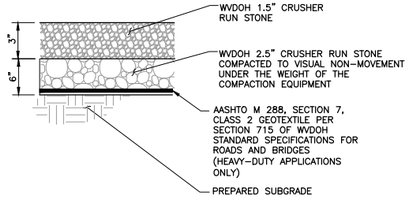


DETAIL 5
CAST IRON MANHOLE COVER DETAIL
NOT TO SCALE

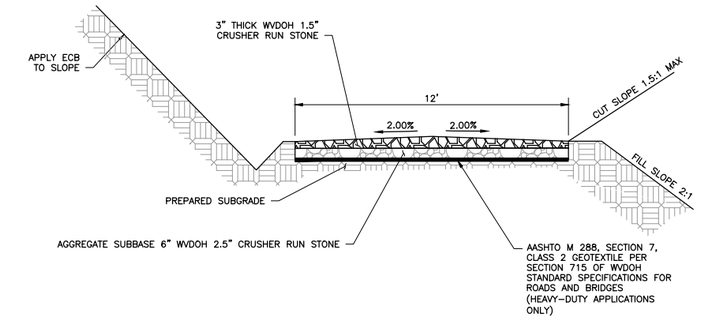
NOTES:

1. PROVIDE TACK COAT ALONG SAWCUT TO BIND EXISTING PAVEMENT TO NEW PAVEMENT. FOR AREAS WITH PATCHING AND OVERLAY, PROVIDE TACK COAT TO BIND EXISTING PAVEMENT WITH NEW ASPHALT.
2. THIS DETAIL APPLIES TO ALL AREAS WHERE PROPOSED PAVEMENT IS INSTALLED ABUTTING EXISTING PAVEMENT, OR AS NOTED ON PLANS.

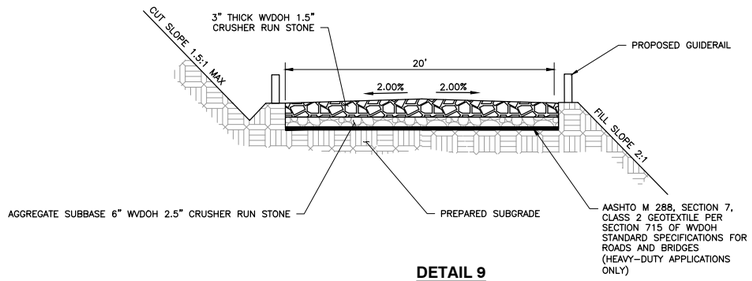
DETAIL 6
TYPICAL SAWCUT AND PAVEMENT JOINT
NOT TO SCALE



DETAIL 7
GRAVEL PAD DETAIL
NOT TO SCALE



DETAIL 8
ACCESS ROAD CROSS SECTION
NOT TO SCALE



DETAIL 9
PERMANENT ACCESS ROAD CROSS SECTION
NOT TO SCALE

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
600 Marketplace Ave · Suite 200 · Bridgeport, WV 26330
Ph: 304.933.3119 · 855.488.9539 · Fax: 304.933.3327
www.cecinc.com

SUPPLY HEADER PROJECT
MOCKINGBIRD HILL
COMPRESSOR STATION
WETZEL COUNTY, WEST VIRGINIA

CONSTRUCTION DETAILS

DATE:	JANUARY 2017
DWG SCALE:	AS SHOWN
PROJECT NO:	
APPROVED BY:	*HAND SIGNATURE ON FILE
DRAWN BY:	PWC/TGJ
CHECKED BY:	ARG
	161-104-CV01
	*QSL

DRAWING NO.:
C800

GREGORY S. LINDER REGISTERED 15229 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
1-31-2017

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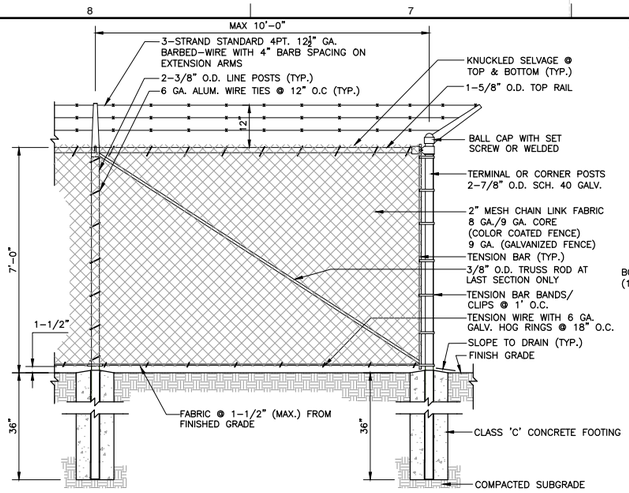
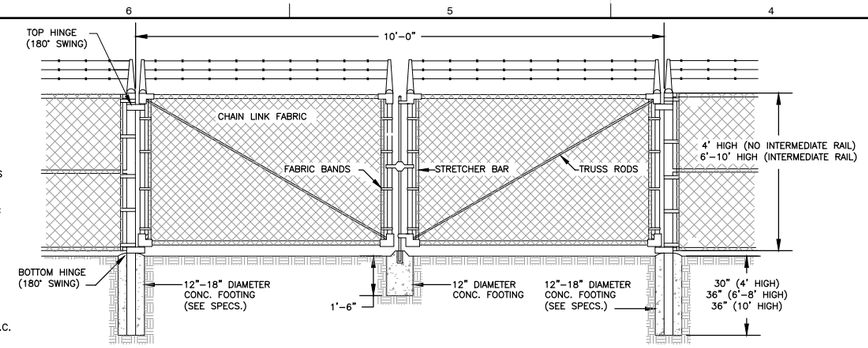


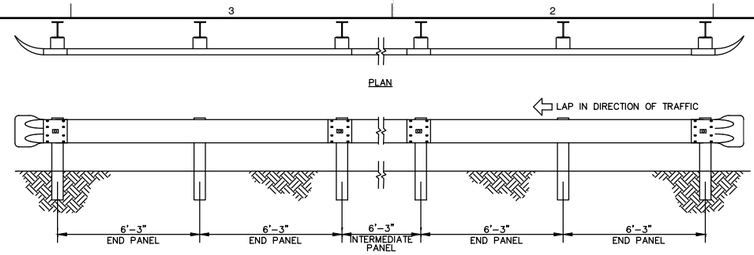
NOTES:

1. FOOTING WIDTH TO BE (4)X POST WIDTH. MINIMUM DEPTH TO BE 36".
2. FENCE BY MASTER HALCO OR APPROVED EQUAL.

DETAIL 10
CHAINLINK FENCE DETAIL
NOT TO SCALE

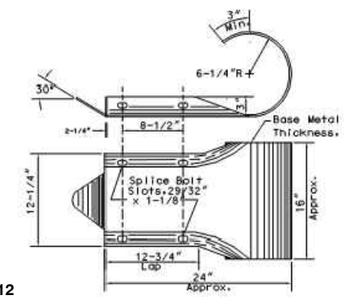


DETAIL 11A
DOUBLE VEHICLE GATE DETAIL
NOT TO SCALE

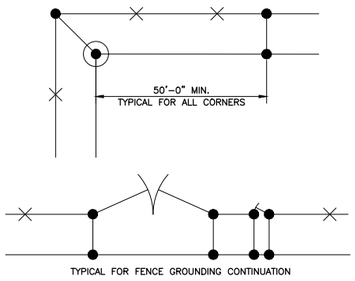


NOTES:

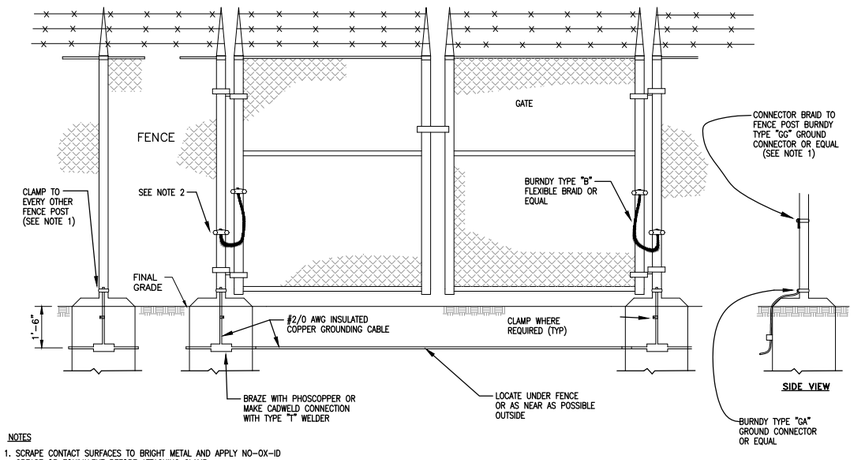
1. PROVIDE MATERIALS AND CONSTRUCTION MEETING THE REQUIREMENTS OF THE WVDOH STANDARDS FOR ROADWAY CONSTRUCTION.
2. ATTACH W-BEAM RAIL ELEMENT TO EACH POST, SPLICE ONLY AT POSTS AND LAP IN THE DIRECTION OF TRAFFIC.
3. DURING ERECTION, USE TEMPORARY SUPPORT BOLTS OR TEMPORARY DRIFT PINS TO SUPPORT THE RAIL ELEMENT UNTIL THE 5/16" POST BOLTS ARE PROPERLY TORQUED.



DETAIL 12
GUIDERAIL
NOT TO SCALE



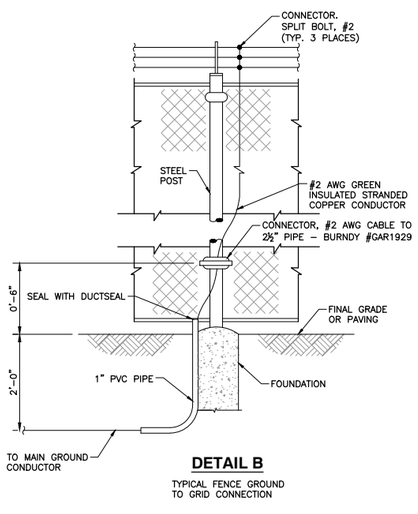
DETAIL A
TYPICAL FENCE GROUNDING



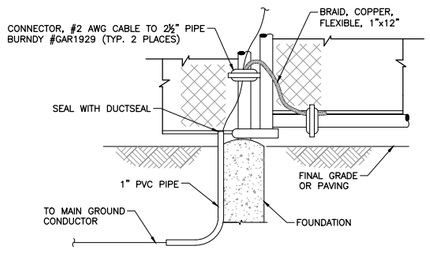
NOTES

1. SCRAPE CONTACT SURFACES TO BRIGHT METAL AND APPLY NO-OX-ID GREASE OR EQUIVALENT BEFORE ATTACHING CLAMP.
2. FOR DOUBLE GATES, INSTALL GROUNDING CONNECTIONS FOR EACH GATE POST.
3. GROUND RODS TO BE PLACE AT 50' MIN. ALONG FENCE

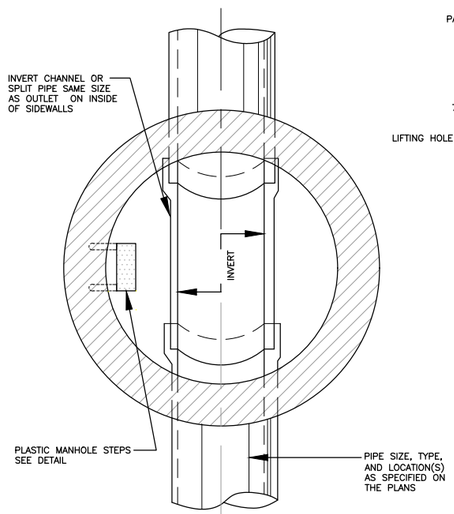
DETAIL 11B
FENCE GROUNDING
NOT TO SCALE



DETAIL B
TYPICAL FENCE GROUND TO GRID CONNECTION



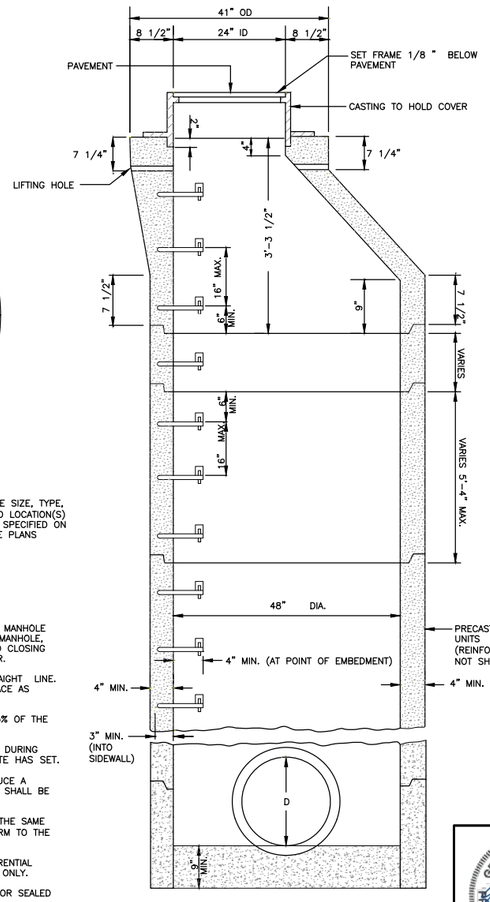
DETAIL C
TYPICAL FENCE GATE GROUND TO GRID CONNECTION



SECTION THROUGH FOOTER

NOTES:

1. PIPE AT ELEVATIONS OTHER THAN SHOWN MAY BE JOINED TO THE MANHOLE BY CUTTING A HOLE THE SIZE OF THE CONNECTING PIPE IN THE MANHOLE, INSERTING THE PIPE THE THICKNESS OF THE MANHOLE SHELL AND CLOSING ALL OPENINGS AROUND THE CONNECTING PIPE WITH JOINT MORTAR.
2. DRAWING SHOWS PIPE ENTERING AND LEAVING MANHOLE IN A STRAIGHT LINE. HOWEVER, THE PIPES MAY ENTER OR LEAVE AT AN ANGLE OR PLACE AS CALLED FOR OR SHOWN ON THE PLANS.
3. MINIMUM HEIGHT OF BENCH WALL ABOVE FLOWLINE OF PIPE IS 25% OF THE DIAMETER OF THE PIPES.
4. MANHOLE STEPS SHALL BE PLACED INTO PLASTIC CONCRETE WALL DURING MANUFACTURE OR MORTARED INTO HOLES AFTER THE CONCRETE HAS SET.
5. SIDEWALL SECTIONS MAY BE USED IN ANY COMBINATION TO PRODUCE A MANHOLE OF DESIRED DEPTH, EXCEPT THE TAPERED TOP SECTION SHALL BE RETAINED AS SHOWN.
6. THE TAPERED TOP SECTION SHALL BE MANUFACTURED AND MEET THE SAME REQUIREMENTS AS THE MANHOLE'S SIDEWALLS, BUT SHALL CONFORM TO THE DIMENSIONS DETAILED HEREIN.
7. LIFTING HOLES IN THE TAPERED TOP SECTION AND THE CIRCUMFERENTIAL NOTCHES IN THE MANHOLE COVER ARE FOR HANDLING PURPOSES ONLY.
8. THE PRE-CAST SIDEWALL UNITS SHALL BE SET IN JOINT MORTAR OR SEALED WITH O-RING GASKETS.



PRE-CAST

DETAIL 13
STORM SEWER MANHOLE DETAIL
NOT TO SCALE

GREGORY S. LINDER REGISTERED 15629 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
1-31-2017

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
600 Marketplace Ave · Suite 200 · Bridgeport, WV 26330
Ph: 304.933.3119 · 855.488.9539 · Fax: 304.933.3327
www.cecinc.com

SUPPLY HEADER PROJECT
MOCKINGBIRD HILL
COMPRESSOR STATION
WETZEL COUNTY, WEST VIRGINIA

CONSTRUCTION DETAILS

DRAWN BY:	PWC/TGJ	DATE:	JANUARY 2017
CHECKED BY:	ARG	DWG SCALE:	AS SHOWN
PROJECT NO:	161-104-CV01	APPROVED BY:	*HAND SIGNATURE ON FILE *GSL

DRAWING NO.:
C801

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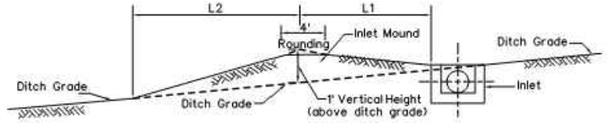
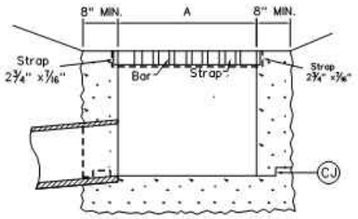
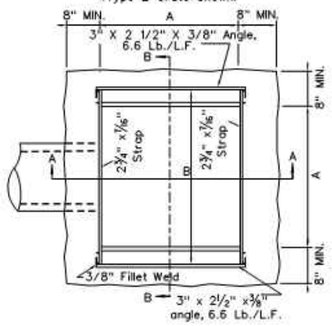
INLET MOUNDING TABLE			
DITCH GRADE (Z)		L1, HORIZONTAL LENGTH (FT.)	L2, HORIZONTAL LENGTH (FT.)
FROM	TO		
0	3	10	15
3	5	9	20
5	7.5	8	40
7.5	UP	SPECIAL DESIGN	SPECIAL DESIGN



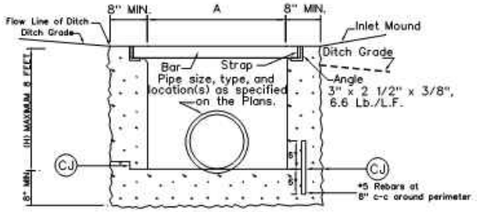
MOUNDING DETAIL
Median and Side Ditches



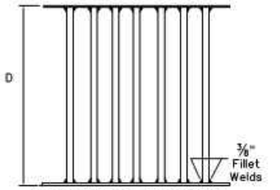
SECTION A-A
(Type 2 Grate Shown)



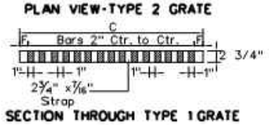
PLAN



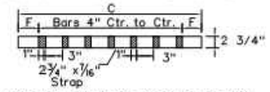
SECTION B-B



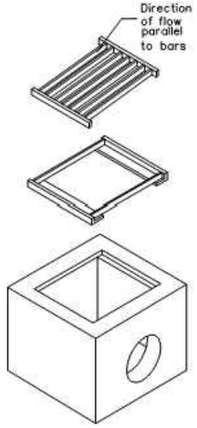
PLAN VIEW-TYPE 2 GRATE



SECTION THROUGH TYPE 1 GRATE



SECTION THROUGH TYPE 2 GRATE



EXPLODED DETAIL

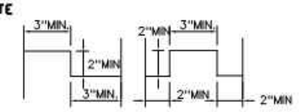
DIMENSIONS						TYPE 2 GRATE			FRAME	TYPE 1 GRATE		
Pipe Size	A	B	C	D	H(Min)	F	Bars	WT.	WT.	F	Bars	WT.
18"	2'-8"	3'-2"	2'-7 3/4"	3'-1 3/4"	2'-0"	3 3/8"	7	223	62	1 3/8"	15	453
21"	2'-8"	3'-2"	2'-7 3/4"	3'-1 3/4"	2'-3"	3 3/8"	7	223	62	1 3/8"	15	453
24"	2'-8"	3'-2"	2'-7 3/4"	3'-1 3/4"	2'-6"	3 3/8"	7	223	62	1 3/8"	15	453
27"	3'-0"	3'-6"	2'-11 3/4"	3'-5 3/4"	2'-9"	3 3/8"	8	279	69	1 3/8"	17	566
30"	3'-6"	4'-0"	3'-5 3/4"	3'-11 3/4"	3'-0"	3 3/8"	9	357	80	1 3/8"	21	797
33"	3'-9"	4'-3"	3'-8 3/4"	4'-2 3/4"	3'-3"	3 7/8"	10	419	85	1 7/8"	21	847
36"	4'-0"	4'-6"	3'-11 3/4"	4'-5 3/4"	3'-6"	3 3/8"	11	486	90	1 3/8"	23	981
42"	4'-6"	5'-0"	4'-5 3/4"	4'-11 3/4"	4'-0"	3 3/8"	12	587	101	1 3/8"	27	1277
48"	5'-0"	5'-6"	4'-11 3/4"	5'-5 3/4"	4'-6"	3 3/8"	14	748	112	1 3/8"	29	1507

Table Note: Grate and frame weights are for information only and will increase if larger straps and bars are used.
The following substitutions in dimensions are acceptable for fabricating the grate and frame:
Strap Thickness: 1/2" Strap Depth: 3" Bar Depth: 3"

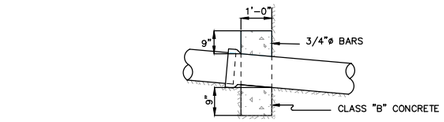
NOTES:

1. FINAL INSTALLED TOP SURFACE OF INLET AND GRATE SHALL BE FLUSH WITH ADJACENT FINISHED SURFACES.
2. CONSTRUCTION MAY BE CAST-IN-PLACE, PRECAST IN ONE OR MULTIPLE SECTIONS, OR ANY COMBINATION OF CAST-IN-PLACE AND PRECAST.
3. TYPE 2 GRATE SHALL BE USED AT ALL LOCATION UNLESS OTHERWISE SPECIFIED ON THE PLANS.
4. THE CONTRACTOR, AT HIS OPTION, MAY OMIT USE OF THE FRAME BY FORMING A LEDGE IN THE CONCRETE.
5. SPECIAL CARE SHALL BE EXECISED IN FORMING THE 2" WIDE CONCRETE LEDGE TO PROVIDE A SMOOTH, EVEN SURFACE FOR SUPPORTING THE GRATES IF THE SHALLOW FRAME IS NOT USED. NO PROJECTION SHALL EXIST ON THE BEARING SURFACES OF THE LEDGE OR THE GRATES, AND THE GRATES SHALL SEAT ON THE LEDGE WITH ROCKING.
6. THE MOUNDING DETAIL AS SHOWN IS NOT REQUIRED WHEN AN INLET IS PLACED IN A SAG.
7. OPTIONAL CONSTRUCTION JOINTS LABELED "CJ" MAY BE ROUGHENED CONCRETE, KEYED OR DOWELED AS PER THE TYPICAL DETAILS SHOWN HEREIN OR AS APPROVED BY THE ENGINEER. NON-SHRINK GROUT MEETING THE REQUIREMENTS OF SUBSECTION 715.5 OF THE SPECIFICATION MAY BE USED TO A DEPTH OF 0.5" FOR LEVELING BETWEEN PRECAST SECTION. THICKER DEPTHS WILL BE ALLOWED AS PER THE MANUFACTURER'S RECOMMENDATIONS.
8. THIS INLET TO BE INSTALLED IN ROADSIDE OR MEDIAN DITCHES ONLY. IT IS NOT TO BE PLACED ADJACENT TO PAVEMENT R IN THE GUTTER PAN OF COMBINATION CURB AND GUTTER.
9. THE MINIMUM DISTANCE FROM THE TOP OF ANY PIPE OPENING TO ANY CONSTRUCTION JOINT ABOVE THE OPENING SHALL BE 4".
10. THE NUMBER AND LOCATION OF PIPE OPENINGS SHALL BE AS SHOWN IN THE PLANS. THE CONTRACTOR AT NO ADDITIONAL COST, SHALL BE RESPONSIBLE FOR ANY TEMPORARY BRACING REQUIRED TO TRANSPORT PRECAST INLET SECTION DUE TO MULTIPLE OPENINGS.

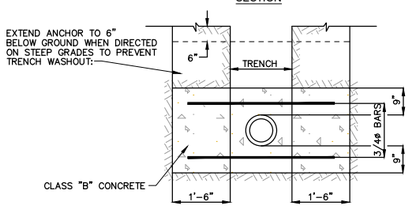
DETAIL 14
INLET DETAIL
NOT TO SCALE



CONSTRUCTION JOINT DETAILS



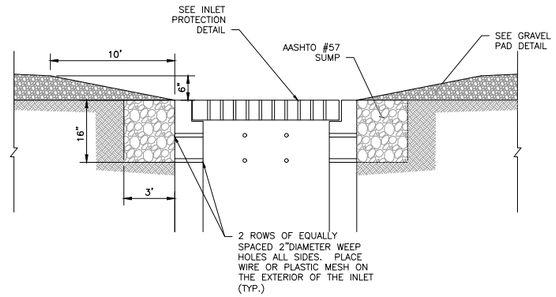
SECTION



ELEVATION

PROVIDE NO ANCHORS ON GRADES LESS THAN 20%
PROVIDE ANCHORS 20' C.C. ON GRADES GREATER THAN 20%.
ANCHORS SHALL BE PLACED AT THE PIPE JOINTS.

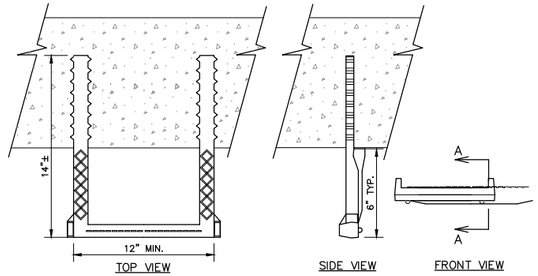
DETAIL 16
CONCRETE ANCHOR
NOT TO SCALE



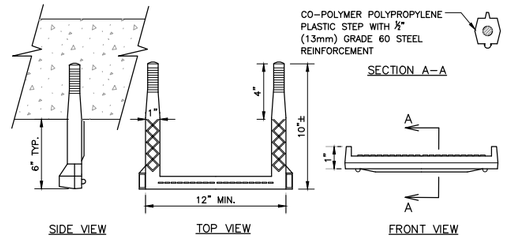
NOTES:

1. SLOPE FINAL GRADES TO INLETS
2. SUMP TO EXTEND AROUND THE ENTIRE INLET.

DETAIL 15
GRADING AT STORM INLETS
NOT TO SCALE



TYPE 1 CAST-IN-PLACE

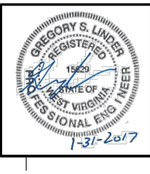


TYPE 2 PRE-DRILLED HOLE

NOTES:

1. TYPICAL STEPS, SPACING AND MATERIAL AS PER ASTM DESIGNATION C-478, AASHTO M-199.
2. PLASTIC SHALL BE A CO-POLYMER POLYPROPYLENE MEETING THE REQUIREMENTS OUTLINED IN ASTM DESIGNATION D-4101 UNDER TYPE II, GRADE 49108.
3. STEEL REINFORCING BAR SHALL BE A ½" (13mm) DEFORMED BAR, GRADE 60 AND CONFORMING TO THE REQUIREMENTS OF ASTM DESIGNATION A-615.
4. USE TYPE 1 FOR CAST-IN-PLACE VAULTS. USE TYPE 2 FOR NEW PRECAST MANHOLES/INLETS OR WHEN ADDING STEPS TO EXISTING STRUCTURES.
5. ALL STEPS SHALL BE SET VERTICALLY AT 12" CENTER TO CENTER.

DETAIL 17
PLASTIC INLET/MANHOLE STEP DETAIL
NOT TO SCALE



REVISION RECORD

NO	DATE	DESCRIPTION

CEC
Civil & Environmental Consultants, Inc.
600 Marketplace Ave · Suite 200 · Bridgeport, WV 26330
Ph: 304.933.3119 · 855.488.9539 · Fax: 304.933.3327
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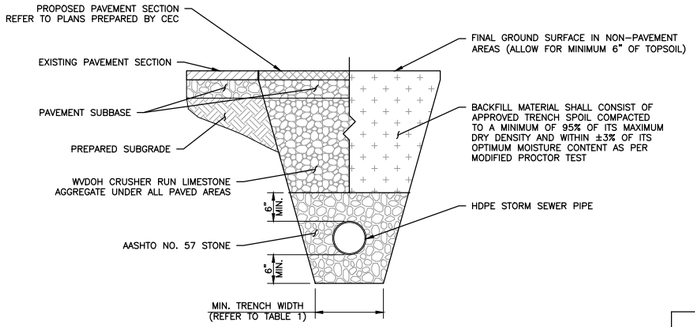
SUPPLY HEADER PROJECT
MOCKINGBIRD HILL
COMPRESSOR STATION
WETZEL COUNTY, WEST VIRGINIA

CONSTRUCTION DETAILS

DATE:	JANUARY 2017
DWG SCALE:	AS SHOWN
PROJECT NO:	161-104-CV01
APPROVED BY:	*HAND SIGNATURE ON FILE
DRAWN BY:	PWC/TGJ
CHECKED BY:	ARG
	*GSL

DRAWING NO.:
C802



NOTES:

1. ALL MATERIALS EXCAVATED DURING TRENCHING SHALL BE STOCKPILED A SUFFICIENT DISTANCE FROM ALL TRENCHES TO PREVENT SLIDES OR CAVE-INS.
2. ALL BACKFILL MATERIALS SHALL BE APPROVED BY THE OWNER'S ENGINEER OR THEIR REPRESENTATIVE BEFORE BEING PLACED. BACKFILL MATERIAL SHALL BE PLACED IN MAXIMUM 10" THICK LIFTS FOR FULL-SIZE COMPACTION EQUIPMENT OR 4"-6" THICK LIFTS IF USING WALK-BEHIND OR REMOTELY OPERATED COMPACTION EQUIPMENT.
3. AASHTO NO. 57 CRUSHED LIMESTONE AGGREGATE SHALL SATISFY THE REQUIREMENTS OF AASHTO M43-05, STANDARD SPECIFICATION OF AGGREGATE FOR ROAD AND BRIDGE CONSTRUCTION. WVDOH CRUSHER RUN LIMESTONE AGGREGATE SHALL SATISFY THE REQUIREMENTS OF WVDOH DIVISION 400, STANDARD SPECIFICATIONS ROADS AND BRIDGES.
4. REFER TO TABLE 2 FOR TRENCH BACKFILL COMPACTION REQUIREMENTS.
5. THE CONTRACTOR SHALL CONSTRUCT TRENCHES AND PROVIDE ADEQUATE SHORING (WHERE NECESSARY) IN CONFORMANCE WITH THE LATEST OSHA REQUIREMENTS FOR CONSTRUCTION STANDARD FOR EXCAVATIONS (29 CFR PART 1926.650-.652 SUBPART P).
6. THE CONTRACTOR SHALL VERIFY THAT THE MINIMUM SPECIFIED PIPE COVER IS PROVIDED BETWEEN THE FINAL GROUND SURFACE AND TOP OF PIPE BEFORE LAYING PIPE. PROVIDE A MINIMUM OF 2 FEET OF COVER ABOVE ALL PIPES DURING CONSTRUCTION.
7. INCREASE TRENCH WIDTH AS NECESSARY TO ALLOW FOR PROPER COMPACTION OF BEDDING/BACKFILL.
8. RECOMMENDED MANUFACTURER: ADVANCED DRAINAGE SYSTEMS, INC. (ADS), OR APPROVED EQUAL.

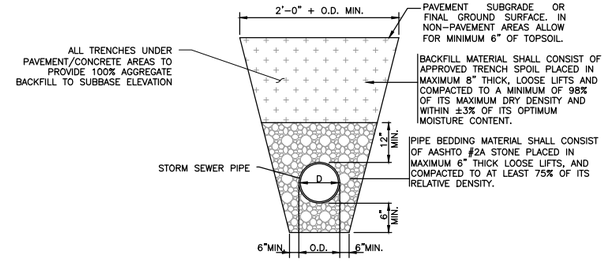
TABLE 1: MINIMUM TRENCH WIDTHS

PIPE DIAMETER (in.)	TRENCH WIDTH (in.)
4-10	28
12	30
15	34
18	39
24	48
30	56
36	64
42	72
48	80
54	88
60	96

TABLE 2: BACKFILL MATERIAL AND COMPACTION REQUIREMENTS

DESCRIPTION	SOIL CLASSIFICATIONS			MIN. MODIFIED PROCTOR DENSITY %
	ASTM D2321	ASTM D487	AASHTO M43	
GRADED OR CRUSHED STONE, GRAVEL	CLASS I	–	5 56	N/A SEE NOTES FOR VISUAL CRITERIA
WELL-GRADED SAND, GRAVELS AND GRAVEL/SAND MIXTURES; POORLY GRADED SAND, GRAVELS AND GRAVEL/SAND MIXTURES; LITTLE TO NO FINES	CLASS II	GW GP SW SP	57 6	N/A SEE NOTES FOR VISUAL CRITERIA
SILTY OR CLAYEY GRAVELS, GRAVEL/SAND/SILT OR GRAVEL AND CLAY MIXTURES; SILTY OR CLAYEY SANDS, SAND/CLAY OR SAND/SILT MIXTURES	CLASS III	GM, GC, SM, SC, ML, CL	N/A	95%

DETAIL 18
TYPICAL HDPE STORM SEWER TRENCH
NOT TO SCALE



STORM SEWER PIPE

D = INSIDE DIAMETER
O.D. = OUTSIDE DIAMETER

COVER REQUIREMENTS	
UTILITY	MINIMUM COVER REQUIRED* *
STORM SEWER	2.0 FT.

AS MEASURED FROM TOP OF PIPE TO FINAL GROUND SURFACE

NOTES:

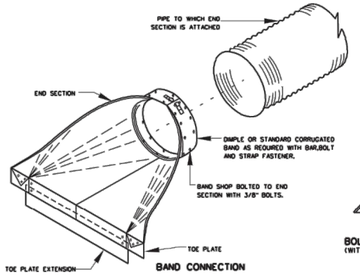
1. ALL MATERIALS EXCAVATED FROM THE UTILITY TRENCH SHALL BE STOCKPILED A MINIMUM SUFFICIENT DISTANCE FROM ALL TRENCHES TO PREVENT SLIDES OR CAVE-INS.
2. ALL BACKFILL MATERIALS SHALL BE APPROVED BY THE OWNER OR HIS REPRESENTATIVE BEFORE BEING PLACED.
3. THE AASHTO NO. 2A STONE SHALL SATISFY THE REQUIREMENTS OF WVDOH STANDARD SPECIFICATIONS.
4. THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT FOR THE BACKFILL MATERIALS SHALL BE DETERMINED BY ASTM D698.
5. THE GENERAL CONTRACTOR SHALL CONSTRUCT THE UTILITY TRENCHES AND PROVIDE ADEQUATE SHORING (WHERE NECESSARY) IN CONFORMANCE WITH THE LATEST REQUIREMENTS FOR CONSTRUCTION STANDARD FOR EXCAVATIONS (29 CFR PART 1926.650-.652 SUBPART P) PROMULGATED BY OSHA.
6. THE GENERAL CONTRACTOR SHALL VERIFY THAT THE MINIMUM SPECIFIED PIPE COVER IS PROVIDED BETWEEN THE FINAL GROUND SURFACE AND TOP OF PIPE BEFORE LAYING PIPE. PROVIDE A MINIMUM OF 2 FT. OF COVER ABOVE ALL PIPES DURING CONSTRUCTION.

DETAIL 19
TYPICAL REINFORCED CONCRETE STORM SEWER
NOT TO SCALE

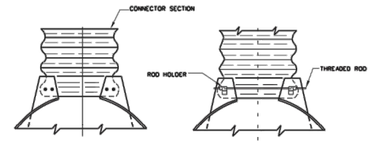
DIMENSIONS OF GALVANIZED STEEL END SECTION FOR ROUND PIPE								
PIPE DIAM. (INCHES)	METAL THK. (INCHES)	DIMENSIONS (INCHES) A ±1"	B MAX	H ±1"	L ±1½"	W ±2"	APPROX. SLOPE	BODY
12	.064	6	6	6	21	24	2½	1 PC.
15	.064	7	8	6	26	30	2½	1 PC.
18	.064	8	10	6	31	36	2½	1 PC.
21	.064	9	12	6	36	42	2½	1 PC.
24	.064	10	13	6	41	48	2½	1 PC.
30	.079	12	16	8	51	60	2½	1 PC.
36	.079	14	19	9	60	72	2½	2 PC.
42	.109	16	22	11	69	84	2½	2 PC.
48	.109	18	27	12	78	90	2¼	2 PC.
54	.109	18	30	12	84	102	2	2 PC.
60	.109	18	33	12	87	114	1¾	3 PC.
66	.109	18	36	12	87	120	1½	3 PC.
72	.109	18	39	12	87	126	1⅓	3 PC.
78	.109	18	42	12	87	132	1¼	3 PC.
84	.109	18	45	12	87	138	1⅛	3 PC.

DIMENSIONS OF GALVANIZED STEEL END SECTION FOR PIPE ARCH									
PIPE ARCH SPAN X RISE (INCHES)	EQUIV. DIAM. (INCHES)	METAL THK. (INCHES)	DIMENSIONS (INCHES) A ±1"	B MAX	H ±1"	L ±1½"	W ±2"	APPROX. SLOPE	BODY
17X13	15	.064	7	9	6	19	30	2½	1 PC.
21X15	18	.064	7	10	6	23	36	2½	1 PC.
24X18	21	.064	8	12	6	28	42	2½	1 PC.
28X20	24	.064	9	14	6	32	48	2½	1 PC.
35X24	30	.079	10	16	6	39	60	2½	1 PC.
42X29 (40X31)	36	.079	12	18	8	46	75	2½	1 PC.
49X33 (46X36)	42	.109	13	21	9	53	85	2½	2 PC.
57X38 (53X41)	48	.109	18	26	12	63	90	2½	2 PC.
64X43 (60X46)	54	.109	18	30	12	70	102	2¼	2 PC.
71X47 (66X51)	60	.109	18	33	12	77	114	2¼	3 PC.
77X52 (73X55)	66	.109	18	36	12	77	126	2	3 PC.
83X57 (81X59)	72	.109	18	39	12	77	138	2	3 PC.

NOTE: SPAN AND RISE DIMENSIONS IN PARENTHESES ARE FOR 3"X1" CORRUGATED PIPE ARCHES. ALL OTHER SPAN AND RISE VALUES ARE FOR 2 1/2"X1/2" CORRUGATED PIPE ARCHES.



BAND CONNECTION



BOLTED OR RIVETED CONNECTION
(WITH OR WITHOUT CONNECTOR SECTION)

THREADED ROD CONNECTION

NOTES

TYPICAL END SECTIONS FOR PIPES AND PIPE ARCHES ARE DETAILED HEREIN. OTHER SIMILAR DESIGNS MAY BE USED IF ACCEPTABLE TO THE ENGINEER.

GALVANIZED STEEL END SECTIONS SHALL BE USED ON THE ENDS OF CORRUGATED STEEL PIPES AND/OR PIPE ARCHES AT THOSE LOCATIONS SPECIFIED ON THE PLANS. END SECTIONS SHALL BE MEASURED AS THE NUMBER OF UNITS INSTALLED OF EACH SIZE AND TYPE AND SHALL BE PAID FOR IN ACCORDANCE WITH 604 OF THE SPECIFICATIONS.

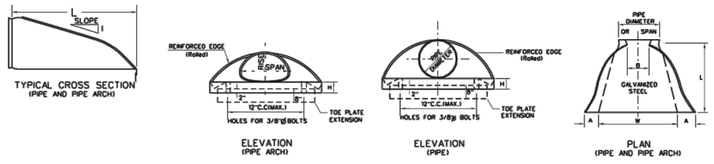
TWO-PIECE AND THREE-PIECE END SECTIONS SHALL BE OF LAP SEAM CONSTRUCTION. TIGHTLY JOINED WITH 3/8" DIAMETER GALVANIZED RIVETS OR BOLTS.

FOR 60" THRU 84" PIPES, THE REINFORCED EDGES OF THE END SECTIONS SHALL BE SUPPLEMENTED WITH GALVANIZED STIFFENER ANGLES FASTENED BY 3/8" DIAMETER GALVANIZED BOLTS AND NUTS. THIS REQUIREMENT SHALL ALSO BE APPLICABLE TO THE END SECTIONS FOR 77"X52", 73"X 55", 83"X 57", AND 81"X 59" PIPE ARCH SIZES. IN ADDITION, FOR THOSE PIPE ARCH SIZES, ANGLE REINFORCEMENT SHALL BE USED UNDER THE CENTER PANEL SEAMS.

THE END SECTION CONNECTION DETAILS SHALL BE AS SHOWN ON THIS PLAN SHEET OR OF A SIMILAR DESIGN AS RECOMMENDED BY THE MANUFACTURER. ALL SIMILAR DESIGNS SHALL PROVIDE A SECURE ATTACHMENT OF THE END SECTION TO THE PIPE OR PIPE ARCH.

ALTHOUGH A PIPE OR PIPE ARCH MAY HAVE A BITUMINOUS COATING AND/OR PAVED INVERT, IT WILL NOT BE NECESSARY TO BITUMINOUS COAT OR PAVE THE END SECTION, CONNECTORS, OR CONNECTOR SECTION.

TOE PLATE EXTENSIONS SHALL BE THE SAME THICKNESS AS THE END SECTIONS AND SHALL BE FASTENED TO TOE PLATES WITH 3/8" DIAMETER GALVANIZED BOLTS. LENGTH OF TOE PLATE EXTENSION SHALL BE W+10"(approx.) FOR 12" THRU 30" DIAMETER PIPES AND FOR PIPE ARCHES WITH RISE VALUES UP TO AND INCLUDING 29". THE LENGTH SHALL BE W+22"(approx.) FOR LARGER PIPE SIZES AND W+18" (approx.) FOR LARGER PIPE ARCHES.



WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

PREPARED 7-1-99
REVISION DATE

END SECTIONS FOR CORRUGATED STEEL PIPES AND PIPE ARCHES

STANDARD SHEET DR3

DETAIL 20
END SECTIONS
NOT TO SCALE

REVISION RECORD

NO.	DATE	DESCRIPTION

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www.cecinc.com

SUPPLY HEADER PROJECT
MOCKINGBIRD HILL
COMPRESSOR STATION
WETZEL COUNTY, WEST VIRGINIA

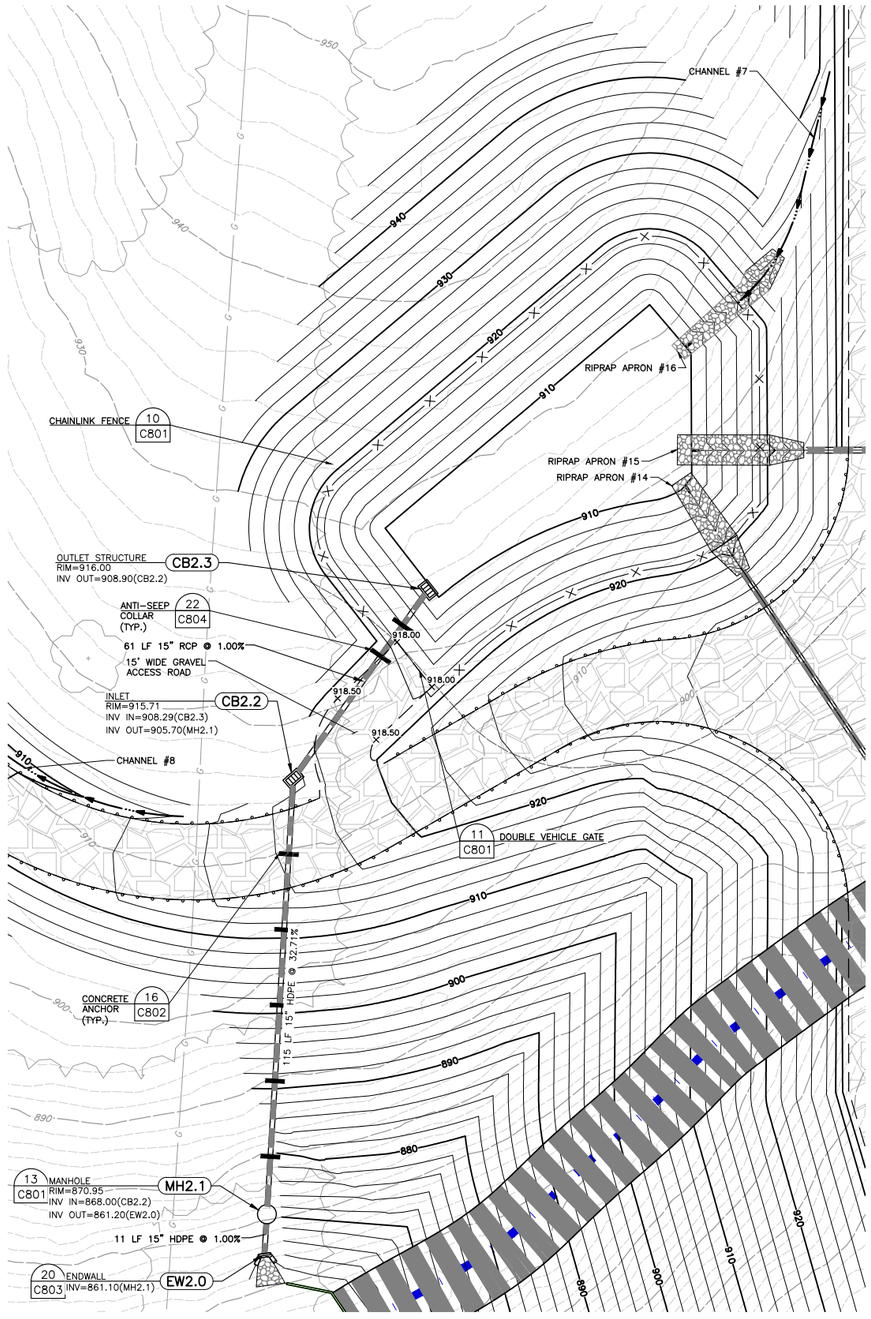
CONSTRUCTION DETAILS

DATE:	JANUARY 2017
DWG SCALE:	AS SHOWN
PROJECT NO:	161-104-CV01
APPROVED BY:	*HAND SIGNATURE ON FILE
DRAWN BY:	PWC/TGJ
CHECKED BY:	ARG
	*GSL

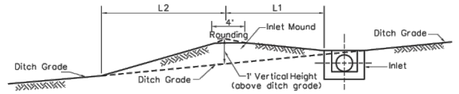
DRAWING NO.:
C803

GREGORY S. LINDER
REGISTERED
15209
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER
1-31-2017

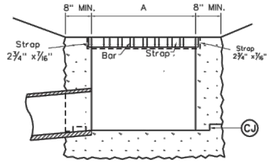
P:\2016\161-104\-CAD\Dwg\CV01\161104-CV01-C803.dwg[C803] LS(1/31/2017 - adamw) - LS 1/31/2017 4:55 PM



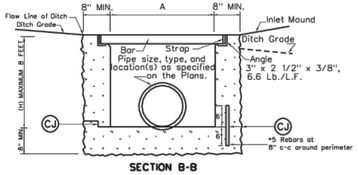
INLET MOUNDING TABLE			
DITCH GRADE (%)		L1, HORIZONTAL LENGTH (FT.)	L2, HORIZONTAL LENGTH (FT.)
FROM	TO		
0	3	10	15
3	5	9	20
5	7.5	8	40
7.5	UP	SPECIAL DESIGN	SPECIAL DESIGN



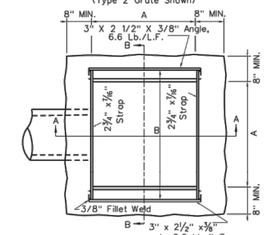
MOUNDING DETAIL
Median and Side Ditches



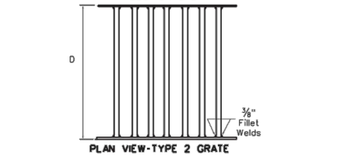
SECTION A-A
(Type 2 Grate Shown)



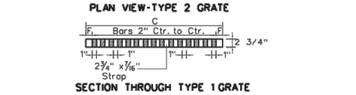
SECTION B-B



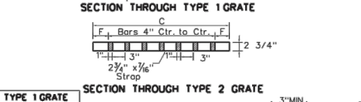
PLAN



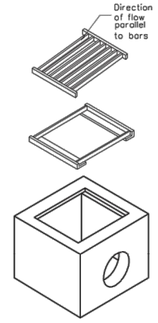
PLAN VIEW-TYPE 2 GRATE



SECTION THROUGH TYPE 1 GRATE



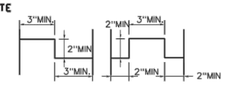
SECTION THROUGH TYPE 2 GRATE



EXPLODED DETAIL

DIMENSIONS						TYPE 2 GRATE			FRAME	TYPE 1 GRATE		
Pipe Size	A	B	C	D	H(Min)	F	Bars	WT.	WT.	F	Bars	WT.
18"	2'-8"	3'-2"	2'-7 3/4"	3'-1 3/4"	2'-0"	3 3/8"	7	223	62	1 3/8"	15	453
21"	2'-8"	3'-2"	2'-7 3/4"	3'-1 3/4"	2'-3"	3 3/8"	7	223	62	1 3/8"	15	453
24"	2'-8"	3'-2"	2'-7 3/4"	3'-1 3/4"	2'-6"	3 3/8"	7	223	62	1 3/8"	15	453
27"	3'-0"	3'-6"	2'-11 3/4"	3'-5 3/4"	2'-9"	3 3/8"	8	279	69	1 3/8"	17	566
30"	3'-6"	4'-0"	3'-5 3/4"	3'-11 3/4"	3'-0"	3 3/8"	9	357	80	1 3/8"	21	797
33"	3'-9"	4'-3"	3'-8 3/4"	4'-2 3/4"	3'-3"	3 7/8"	10	419	85	1 7/8"	21	847
36"	4'-0"	4'-6"	3'-11 3/4"	4'-5 3/4"	3'-6"	3 3/8"	11	486	90	1 3/8"	23	981
42"	4'-6"	5'-0"	4'-5 3/4"	4'-11 3/4"	4'-0"	3 3/8"	12	587	101	1 3/8"	27	1277
48"	5'-0"	5'-6"	4'-11 3/4"	5'-5 3/4"	4'-6"	3 3/8"	14	748	112	1 3/8"	29	1507

Table Note: Grate and frame weights are for information only and will increase if larger straps and bars are used.
The following substitutions in dimensions are acceptable for fabricating the grate and frame:
Strap Thickness: 1/2" Strap Depth: 3" Bar Depth: 3"



CONSTRUCTION JOINT DETAILS

NOTES

The final installed top surface of inlet and grate shall be flush with adjacent finished surfaces such as pavement, gutters, curbs, and sidewalks. Top of grate elevation, if shown on the plans, is for information only.

Construction may be cast-in place, precast in one or multiple sections, or any combination of cast-in-place and precast.

Type 2 Grate shall be used at all locations unless otherwise specified on the Plans. Type 1 Urban Grates shall be used only at specially designated locations as shown on the plans.

The Contractor, at his option, may omit use of the frame by forming a ledge in the concrete.

Special care shall be execised in forming the 2" wide concrete ledge to provide a smooth, even surface for supporting the grates if the shallow frame is not used. no projections shall exist on the bearing surfaces of the ledge or the grates, and the grates shall seat on the ledge without rocking.

The Mounding Detail as shown is not required when an inlet is placed in a sag.

Optional construction joints labeled "CJ" may be roughened concrete, keyed or doweled as per the typical details shown herein or as approved by the Engineer. Non shrink grout meeting the requirements of subsection 715.5 of the specifications may be used to a depth of ½" for leveling between precast sections. Thicker depths will be allowed as per the manufacturer's recommendations.

This inlet is to be installed in roadside or median ditches only. It is not to be placed adjacent to pavement or in the gutter pan of combination curb and gutter.

The minimum distance from the top of any pipe opening to any construction joint above the opening shall be four (4) inches.

The number and location of pipe openings shall be as shown in the plans. The contractor at no additional cost, shall be responsible for any temporary bracing required to transport precast inlet sections due to multiple openings.

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
STANDARD DETAIL

PREPARED 7-1-99
REVISION DATE

TYPE G INLET

STANDARD SHEET DR6-G

DRY DETENTION POND NOTES:

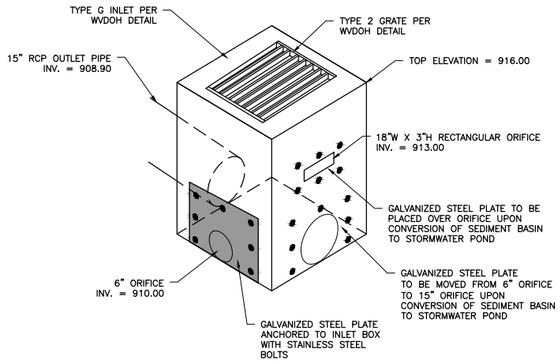
1. PROTECT BASIN BOTTOM FROM COMPACTION PRIOR TO AND DURING INSTALLATION.
2. BASIN BOTTOM SHOULD BE VEGETATED WITH A DIVERSE NATIVE PLANTING MIX.
3. WOODY VEGETATION SHOULD NOT BE PLANTED ON THE EMBANKMENTS.
4. MEADOW GRASSES OR OTHER DEEPLY ROOTED HERBACEOUS VEGETATION IS RECOMMENDED ON THE INTERIOR SLOPES OF THE EMBANKMENTS.
5. FERTILIZER AND PESTICIDES SHOULD NOT BE USED.

LONG TERM MAINTENANCE:

1. ALL BASIN STRUCTURES EXPECTED TO RECEIVE AND/OR TRAP DEBRIS AND SEDIMENT SHOULD BE INSPECTED FOR CLOGGING AND EXCESSIVE DEBRIS AND SEDIMENT ACCUMULATION AT LEAST FOUR TIMES PER YEAR, AS WELL AS AFTER EVERY STORM GREATER THAN 1 INCH.
2. SEDIMENT REMOVAL SHOULD BE CONDUCTED WHEN THE BASIN IS COMPLETELY DRY. SEDIMENT SHOULD BE DISPOSED OF PROPERLY AND ONCE SEDIMENT IS REMOVE, DISTURBED AREAS NEED TO BE IMMEDIATELY STABILIZED AND RE-VEGETATED.
3. MOWING AND/OR TRIMMING OF VEGETATION SHOULD BE PERFORMED AS NECESSARY TO SUSTAIN THE SYSTEM, BUT ALL DETRITUS SHOULD BE REMOVED FROM THE BASIN.
   - A. VEGETATED AREAS SHOULD BE INSPECTED ANNUALLY FOR EROSION.
   - B. VEGETATED AREAS SHOULD BE INSPECTED ANNUALLY FOR UNWANTED GROWTH OF EXOTIC/INVASIVE SPECIES.
   - C. VEGETATIVE COVER SHOULD BE MAINTAINED AT A MINIMUM OF 95%. IF VEGETATIVE COVER HAS BEEN REDUCED BY 10%, VEGETATION SHOULD BE RE-ESTABLISHED.

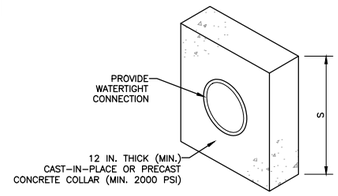
DETAIL 21
DRY DETENTION BASIN 1
NOT TO SCALE

CONTRIBUTING DRAINAGE AREA = 4.6 ACRES			
	CLEAN-OUT VOLUME (cf)	WET VOLUME (cf)	DRY VOLLUME (cf)
REQUIRED STORAGE	4,122	8,244	8,244



TYPE G INLET/RISER DETAIL
NOT TO SCALE

Elevation (FT)	Area (SF)	Volume (CF)	Volume (ACRE-FT)
910	2738	0	0.000
911	3279	3009	0.069
912	3796	6546	0.150
913	4346	10616	0.244
914	4920	15249	0.350
915	5521	20469	0.470
916	6149	26304	0.604
917	6806	32781	0.753
918	7491	39930	0.917
919	8205	47778	1.097
920	8950	56355	1.294

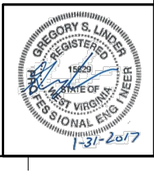


BASIN OR TRAP NO.	PIPE SIZE (IN)	S (IN)	NO. OF COLLARS	RISER TO FIRST COLLAR (FT)	COLLAR SPACING (FT)
1	15	72	2	10	10

NOTES:

1. ALL COLLARS SHALL BE INSTALLED SO AS TO BE WATERTIGHT.
2. COLLAR SIZE AND SPACING SHALL BE AS INDICATED WITHIN TABLE.

DETAIL 22
CONCRETE ANTI-SEEP COLLAR
NOT TO SCALE



REVISION RECORD

NO	DATE	DESCRIPTION

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SUPPLY HEADER PROJECT
MOCKINGBIRD HILL
COMPRESSOR STATION
WETZEL COUNTY, WEST VIRGINIA

CONSTRUCTION DETAILS

DATE:	JANUARY 2017	DRAWN BY:	PWC/TGJ
DWG SCALE:	AS SHOWN	CHECKED BY:	ARG
PROJECT NO:			161-104-CV01
APPROVED BY:	*HAND SIGNATURE ON FILE		*GSL

DRAWING NO.:
C804

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LEGEND

- EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- EXISTING TREE LINE
- EXISTING FENCE
- EXISTING ROADS (PAVED)
- EXISTING ROADS (UNPAVED)
- EXISTING TREE
- EXISTING GAS LINE
- EXISTING OVERHEAD TELECOM.
- EXISTING OVERHEAD ELECTRIC/TELECOM.
- EXISTING UTILITY POLE
- EXISTING STREAM
- EXISTING TAX PARCEL LINE
- EXISTING SOIL BOUNDARY
- EXISTING SOIL TYPE
- PROPOSED INDEX CONTOUR
- PROPOSED INTERMEDIATE CONTOUR
- PROPOSED LIMIT OF DISTURBANCE
- PROPOSED BELTED SILT RETENTION FENCE
- PROPOSED SUPER SILT FENCE
- PROPOSED 32" COMPOST FILTER SOCK/ SLOPE INTERRUPTION DEVICE
- PROPOSED COMPOST FILTER SOCK/ SEDIMENT TRAP
- PROPOSED TEMPORARY 32" COMPOST FILTER SOCK
- PROPOSED CONCRETE WASHOUT
- PROPOSED TEMPORARY/PERMANENT CHANNEL
- PROPOSED RIPRAP APRON
- SEDIMENT BARRIER ID
- PROPOSED ROCK CONSTRUCTION ENTRANCE
- PROPOSED EMERGENCY SPILLWAY
- WV STORMWATER PERMIT SIGN
- PROPOSED ROCK CHECK DAM
- PROPOSED ROCK FILL UNDERDRAIN
- PROPOSED SAND BAG COFFER DAM
- PROPOSED EROSION CONTROL BLANKET
- PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED INLET
- PROPOSED ENDWALL/HEADWALL
- PROPOSED INLET PROTECTION
- PROPOSED FILL FOUNDATION KEY
- PROPOSED INTERMEDIATE FILL KEY
- PROPOSED SUBSURFACE DRAIN

NORTH

COFFER DAM AND PUMP BYPASS 6A C904
PROPOSED TEMPORARY CHANNEL #18 17 C906
CULVERT #8 14 C905
CULVERT #6 14 C905
RIPRAP APRON #9 14 C905
PROPOSED PERMANENT CHANNEL #19 17 C906
PROPOSED TEMPORARY CHANNEL #17 16 C906
RIPRAP APRON #10 14 C905
PROPOSED TEMPORARY CHANNEL #16 17 C906
ROCK CONSTRUCTION ENTRANCE/EXIT #1 1 C903
CULVERT #3 14 C905
RIPRAP APRON #3 14 C905
PROPOSED PERMANENT CHANNEL #10 16 C906
PROPOSED PERMANENT CHANNEL #11 16 C906
CULVERT #4 14 C905
ROCK CONSTRUCTION ENTRANCE/EXIT #2 1 C903
RIPRAP APRON #2 14 C905
WV STORMWATER PERMIT SIGN 2 C903
UTILITY POLE TO BE REMOVED
PROPOSED PERMANENT CHANNEL #12-A 16 C906
RIPRAP APRON #4 14 C905
MOCKINGBIRD HILL ROAD
UTILITY POLE TO BE REMOVED
STAGING AREA #2
STAGING AREA #3
CHANNEL #10 ENDS AND #9 BEGINS
TO BE REMOVED
PROPOSED PERMANENT CHANNEL #13 17 C906
RIPRAP APRON #5 14 C905
RIPRAP APRON #6 14 C905
PROPOSED PERMANENT CHANNEL #9 17 C906
TO BE REMOVED
RIPRAP APRON #7 14 C905
RIPRAP APRON #8 14 C905
PROPOSED PERMANENT CHANNEL #8 17 C906
PROPOSED PERMANENT CHANNEL #14 17 C906
STAGING AREA #1
PROPOSED FILL WITH ROCK FILL UNDERDRAIN 20 C906
PROPOSED ROCK FILL UNDERDRAIN 19 C906
PROPOSED PERMANENT CHANNEL #20 17 C906
RIPRAP APRON #11 14 C905
TEMPORARY ACCESS ROAD
SWZG007
PERMANENT ACCESS ROAD
CB2.3
CB2.2
MH2.1
RIPRAP APRON #23 14 C905
PROPOSED PERMANENT CHANNEL #15 17 C906
COMPOST FILTER SOCK SEDIMENT TRAP 18 C906
16 C906 PROPOSED PERMANENT CHANNEL #12-B
8 C904 EROSION CONTROL BLANKET (TYP.)
6 C904 SLOPE INTERRUPTION DEVICE (TYP.)
4 C903 SUPER SILT FENCE (TYP.)
3 C903 BELTED SILT RETENTION FENCE (TYP.)
SWZG006
PROPOSED PERMANENT CHANNEL #1 16 C906
RIPRAP APRON #22 14 C905
32" COMPOSITE FILTER SOCK TO BE REMOVED AFTER CULVERT INSTALLATION
PERIMETER BERM #1 12 C905
PROPOSED PERMANENT CHANNEL #7 17 C906
LANDFILL
FIREWOOD
LOGS
DEBRIS
CULVERT #7 14 C905
CONTRACTOR SHALL USE THIS ACCESS ROAD UNTIL PERMANENT ACCESS ROAD IS CONSTRUCTED.
PROPOSED TEMPORARY CHANNEL #21 16 C906
RIPRAP APRON #21 14 C905
PROPOSED PERMANENT CHANNEL #5 16 C906
CB1.1
INLET PROTECTION 11 C905
PROPOSED PERMANENT CHANNEL #2 17 C906
RIPRAP APRON #18 14 C905
COMPOST FILTER SOCK (TYP.) 5 C903
RIPRAP APRON #19 14 C905
32" COMPOSITE FILTER SOCK TO BE REMOVED AFTER CULVERT INSTALLATION
RIPRAP APRON #16 14 C905
CULVERT #2 14 C905
RIPRAP APRON #15 14 C905
RIPRAP APRON #14 14 C905
CULVERT #1 14 C905
ROCK CHECK DAM (TYP.) 15 C906
TEMPORARY CONCRETE WASHOUT 7 C904
PROPOSED PERMANENT CHANNEL #3 17 C906
PERIMETER BERM #2 12 C905
EXISTING GASLINE TO BE RELOCATED (BY OTHERS)
RIPRAP APRON #13 14 C905
PROPOSED PERMANENT CHANNEL #6 16 C906
PROPOSED PERMANENT CHANNEL #4 16 C906
PERIMETER BERM #3 12 C905
RIPRAP APRON #20 14 C905
TL-492 PIPELINE
TL-342
TL-377 PIPELINE
EQT PIPELINE
H & G PIPELINE
G-134
GARAGE
HOUSE
OUT BUILDING
GpD
GpF
Sk

SCALE IN FEET
0 50 100

REFERENCES

1. EXISTING TOPOGRAPHIC INFORMATION BASED ON MAPPING PROVIDED BY DOMINION TRANSMISSION, INC.
2. SOILS DATA EXPORTED FROM SOIL DATA MART, SOIL SURVEY GEOGRAPHIC (SSURGO) DATABASE FOR WETZEL COUNTY, WEST VIRGINIA.

GREGORY S. LINDER — 15829 — STATE OF WEST VIRGINIA — PROFESSIONAL ENGINEER — 1-31-2017

REVISION RECORD

NO	DATE	DESCRIPTION

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SUPPLY HEADER PROJECT
MOCKINGBIRD HILL COMPRESSOR STATION
WETZEL COUNTY, WEST VIRGINIA

EROSION AND SEDIMENT CONTROL PLAN

DATE: JANUARY 2017 | DRAWN BY: PWC/TGJ
DWG SCALE: AS SHOWN | CHECKED BY: ARG
PROJECT NO: 161-104-CV01
APPROVED BY: *HAND SIGNATURE ON FILE | *GSL

DRAWING NO.: **C900**

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GENERAL EROSION AND SEDIMENTATION CONTROL PLAN NOTES

1. THE LOCATION OF EXISTING UTILITIES AND UNDERGROUND STRUCTURES SHOWN ARE APPROXIMATE AND THOSE SHOWN ARE NOT NECESSARILY ALL THE EXISTING UTILITIES AND STRUCTURES. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE EXACT LOCATION OF ALL ABOVE AND BELOW GROUND UTILITIES AND STRUCTURES PRIOR TO INITIATING CONSTRUCTION ACTIVITIES.

2. A COPY OF THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) SHALL BE KEPT ON SITE AT ALL TIMES DURING WORKING HOURS AND SHALL BE STRICTLY ADHERED TO.

3. ANY CHANGES TO THE SEDIMENT CONTROL PLAN SHALL BE APPROVED BY THE ENGINEER AND THE PROJECT OWNER. THE REVISED PLANS MUST MEET ALL CURRENT STATE SOIL EROSION AND SEDIMENTATION CONTROL STANDARDS.

4. ALL WORK SHALL BE DONE IN ACCORDANCE OF THE CURRENT ADDITION OF THE WVDEP EROSION AND SEDIMENT POLLUTION CONTROL STANDARDS BMP MANUAL.

5. ADDITIONAL EROSION AND SEDIMENTATION CONTROL MEASURES MAY BE REQUIRED AS DEEMED NECESSARY BY THE WVDEP, OR THE OWNER, IN THE EVENT THAT ANY UNFORESEEN PROBLEMS ARISE DURING CONSTRUCTION.

6. THE CONTRACTOR SHALL INSTALL SOIL EROSION AND SEDIMENTATION CONTROL MEASURES PRIOR TO ANY SOIL DISTURBANCE, OR IN THEIR PROPER SEQUENCE, AND MAINTAIN THEM UNTIL PERMANENT STABILIZATION IS ESTABLISHED.

7. THE CONTRACTOR SHALL VERIFY ALL EXISTING UTILITIES TO BE REMOVED, RELOCATED, AND/OR RAZED ARE DISCONNECTED PRIOR TO INITIATING EARTHMOVING ACTIVITIES.

8. UPON TEMPORARY CESSATION OF AN EARTH DISTURBANCE ACTIVITY OR ANY STAGE OR PHASE OF AN ACTIVITY WHERE A CESSATION OF EARTH DISTURBANCE ACTIVITIES WILL EXCEED 7 DAYS, THE SITE SHALL BE IMMEDIATELY SEEDED, MULCHED, OR OTHERWISE PROTECTED FROM ACCELERATED EROSION AND SEDIMENTATION PENDING FUTURE EARTH DISTURBANCE ACTIVITIES. IF THE SEASON PREVENTS THE ESTABLISHMENT OF A TEMPORARY COVER, STRAW SHALL BE APPLIED AT A RATE OF THREE (3) TONS PER ACRE OVER TOP EXPOSED AREAS.

9. AT THE TIME WHEN THE SITE PREPARATION FOR PERMANENT VEGETATIVE STABILIZATION IS GOING TO BE ACCOMPLISHED, ANY SOIL THAT WILL NOT PROVIDE A SUITABLE ENVIRONMENT TO SUPPORT ADEQUATE VEGETATIVE GROUND COVER SHALL BE REMOVED OR TREATED BY THE CONTRACTOR TO MAKE IT SUITABLE TO SUPPORT VEGETATIVE GROUND COVER.

10. THE CONTRACTOR SHALL CONTROL DUST WITH WATER OR OTHER METHODS APPROVED BY THE WVDEP AND THE OWNER.

11. ALL BMPs SHALL BE INSPECTED AT LEAST ONCE EVERY SEVEN (7) CALENDAR DAYS AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN 0.5 INCHES PER 24-HOUR PERIOD. ANY REQUIRED REPAIRS OR MAINTENANCE SHOULD BE MADE IMMEDIATELY. INSPECTION REPORTS MUST BE READILY AVAILABLE FOR REVIEW BY WVDEP, AT THEIR REQUEST.

12. THE CONTRACTOR SHALL PROVIDE THE LOCATION AND ANY APPLICABLE PERMIT NUMBERS OF ALL THE OFF SITE DISPOSAL AND BORROW SITES THAT WILL BE UTILIZED DURING CONSTRUCTION TO THE WVDEP PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL ALSO IDENTIFY THE EROSION AND SEDIMENTATION CONTROL MEASURES, WHICH WILL BE IMPLEMENTED AT THE DISPOSAL AND/OR BORROW SITES. IF THE DISPOSAL AND/OR BORROW SITES ARE NOT PERMITTED, A SEDIMENT CONTROL PLAN MUST BE APPROVED BY THE OWNER PRIOR TO THEIR USE.

13. THE CONTRACTOR SHALL SUBMIT A PREPAREDNESS, PREVENTION AND CONTINGENCY (PPC) PLAN TO THE OWNER PRIOR TO CONSTRUCTION IF CHEMICALS, SOLVENTS OR OTHER HAZARDOUS WASTES OR MATERIALS WITH THE POTENTIAL TO CAUSE ACCIDENTAL POLLUTION DURING EARTHMOVING OR OTHER CONSTRUCTION ACTIVITIES ARE STORED OR USED ON SITE.

14. THE CONTRACTOR SHALL CONSTRUCT A BERM AROUND AREAS WHERE HYDRAULIC FLUID AND DIESEL FUEL WILL BE STORED DURING CONSTRUCTION TO SERVE AS A CONTAINMENT AREA FOR THE CONTROL OF POSSIBLE SPILLS. ANY SPILL WITHIN THE CONTAINMENT AREA SHALL BE IMMEDIATELY CLEANED. TELEPHONE NUMBERS OF EMERGENCY RESPONSE TEAMS ARE TO BE KEPT ON SITE, AND THEY ARE TO BE NOTIFIED IN THE CASE OF A SPILL.

15. DIESEL FUEL STORAGE CONTAINERS SHALL BE LOCATED WITHIN AN IMPERVIOUS SECONDARY CONTAINMENT.

16. PETROLEUM PRODUCT STORAGE SHALL MAINTAIN A MINIMUM 100' SETBACK FROM STREAMS/WETLAND BOUNDARIES.

17. PROPERTIES AND WATERWAY DOWNSTREAM FROM DEVELOPMENT SITES SHALL BE PROTECTED FROM SEDIMENT DEPOSITION, EROSION AND DAMAGE DUE TO INCREASES IN VOLUM, VELOICTY AND PEAK FLOW RATE OF STORMWATER RUNOFF.

18. ALL MEASURES USED TO PROTECT PROPERTIES AND WATERWAYS SHALL BE EMPLOYED IN A MANNER WHICH MINIMIZES IMPACTS ON THE PHYSICAL, CHEMICAL, AND BIOLOGICAL INTEGRITY OF RIVERS, STREAMS AND OTHER WATERS OF THE STATE.

TEMPORARY CONTROL MEASURES

A. ROCK CONSTRUCTION ENTRANCE/EXIT

ROCK CONSTRUCTION ENTRANCES WILL BE PROVIDED AT THE LOCATIONS SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE STANDARD DETAIL TO REMOVE SEDIMENT/MUD FROM VEHICLES BEFORE ENTERING ONTO STATE AND COUNTY ROADS.

INSTALLATION:
1. THE ROCK CONSTRUCTION ENTRANCE IS TO BE A MINIMUM OF SEVENTY FEET (70') IN LENGTH AND TWELVE FEET (12') IN WIDTH, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. EXCAVATE THE AREA OF THE ROCK CONSTRUCTION ENTRANCE A MINIMUM OF SIX INCHES (6").
2. PLACE A LAYER OF SEPARATION GEOTEXTILE ALONG THE FULL LENGTH AND WIDTH OF THE ROCK CONSTRUCTION ENTRANCE.
3. PLACE SIX INCHES (6") OF AASHTO #1 STONE ACROSS THE FULL LENGTH AND WIDTH OF THE ROCK CONSTRUCTION ENTRANCE. STONE DEPTH IS TO BE A MINIMUM OF SIX INCHES (6") THICK.

B. TOPSOIL STOCKPILE AREA

TOPSOIL REQUIRED FOR THE ESTABLISHMENT OF VEGETATION SHALL BE STOCKPILED IN THE AMOUNT NECESSARY TO COMPLETE THE FINISH GRADING OF ALL EXPOSED AREAS THAT ARE TO BE STABILIZED BY VEGETATION. THERE WILL BE A DESIGNATED TOPSOIL STOCKPILE LOCATION(S) ON THE PROPERTY. THE LOCATION(S) SHALL BE AS APPROXIMATELY SHOWN ON THE E&S SITE PLANS. ALL TOPSOIL FROM THE SITE SHALL BE STOCKPILED IN THE LOCATION(S) UNTIL IT IS PLACED ON PERMANENT SLOPES OR REMOVED FROM THE SITE. STOCKPILE HEIGHTS SHALL NOT EXCEED 35 FEET. STOCKPILE SLOPES SHALL BE 3H:1V OR FLATTER. SURROUND THE STOCKPILE WITH COMPOST FILTER SOCK TO PREVENT SEDIMENT-LADEN RUNOFF FROM ENTERING NATURAL DRAINAGE PATHWAYS.

INSTALLATION:
TOPSOIL STOCKPILES SHALL NOT EXCEED 35 FEET IN HEIGHT. SOIL STOCKPILE SLOPES SHALL NOT EXCEED 3H:1V. INSTALL COMPOST FILTER SOCK AS SHOWN ON THE PLANS.

C. BELTED SILT RETENTION FENCE

BELTED SILT RETENTION FENCE IS USED TO CONTROL RUNOFF FROM DISTURBED AREAS WHEN IT IS IN THE FORM OF SHEET FLOW, AND THE DISCHARGE IS TO A STABLE AREA.

INSTALLATION:
1. EXCAVATE A 8-INCH TRENCH, MINIMIZING THE DISTURBANCE ON THE DOWNSLOPE SIDE. THE BOTTOM OF THE TRENCH SHOULD BE AT LEVEL GRADE. MAXIMUM DEVIATION FROM LEVEL GRADE SHOULD BE 5%, AND NOT EXTEND FOR MORE THAN 20 FEET.
2. INSTALL POSTS AT 6-FOOT MAXIMUM SPACING. POLES SHOULD BE DRIVEN A MINIMUM OF 22 INCHES BELOW THE GROUND SURFACE AND EXTEND A MINIMUM OF 26 INCHES ABOVE THE GROUND SURFACE.
3. THE FABRIC TOW SHOULD BE PLACED IN THE BOTTOM OF THE TRENCH, BACKFILLED, AND COMPACTED.
4. BOTH ENDS OF EACH FENCE SECTION SHOULD BE EXTENDED AT LEAST 8 FEET UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT TO ALLOW FOR POOLING OF WATER.

D. SUPER SILT FENCE

SUPER SILT FENCE IS USED TO CONTROL RUNOFF FROM DISTURBED AREAS WHEN IT IS IN THE FORM OF SHEET FLOW, AND THE DISCHARGE IS TO A STABLE AREA.

INSTALLATION:
1. EXCAVATE A 12-INCH TRENCH, MINIMIZING THE DISTURBANCE ON THE DOWNSLOPE SIDE. THE BOTTOM OF THE TRENCH SHOULD BE AT LEVEL GRADE. MAXIMUM DEVIATION FROM LEVEL GRADE SHOULD BE 5%, AND NOT EXTEND FOR MORE THAN 20 FEET.
2. INSTALL A CHAIN LINK FENCE ON THE DOWNSLOPE SIDE OF THE TRENCH WITH THE FENCE ON THE UPSLOPE SIDE OF THE POLES. POLES SHOULD BE 2.5-INCH DIAMETER GALVANIZED OR ALUMINUM POSTS, OR 4-INCH BY 4-INCH PRESSURE TREATED POSTS, SET AT 10-FOOT MAXIMUM SPACING. POLES SHOULD BE DRIVEN A MINIMUM OF 36 INCHES BELOW THE GROUND SURFACE AND EXTEND A MINIMUM OF 36 INCHES ABOVE THE GROUND SURFACE.
3. STRETCH THE FILTER FABRIC AND SECURELY FASTEN IT TO THE FENCE WITH WIRE FASTENERS, STAPLES, OR PREFORMED SLIPS. THE FABRIC SHOULD BE EXTENDED A MINIMUM OF 36 INCHES ABOVE THE GROUND SURFACE, AND BE FASTENED SECURELY TO THE CHAIN LINK FENCE WITH TIES SPACED EVERY 2 FEET AT THE TOP AND MID-SECTION.
4. AT FABRIC ENDS, BOTH ENDS SHOULD BE OVERLAPPED A MINIMUM OF 6 INCHES, FOLDED, AND SECURE TO THE FENCE. THE FABRIC TOW SHOULD BE PLACED IN THE BOTTOM OF THE TRENCH, BACKFILLED, AND COMPACTED.
5. BOTH ENDS OF EACH FENCE SECTION SHOULD BE EXTENDED AT LEAST 8 FEET UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT TO ALLOW FOR POOLING OF WATER.

E. COMPOST FILTER SOCK

COMPOST FILTER SOCK SHALL BE INSTALLED IN THE LOCATIONS SHOWN ON PLANS AND IN ACCORDANCE WITH THE STANDARD DETAIL PROVIDED.

INSTALLATION:
1. COMPOST FILTER SOCK SHALL BE INSTALLED PARALLEL TO THE BASE OF THE SLOPE OR OTHER DISTURBED AREA AND PARALLEL TO THE CONTOUR.
2. STAKES SHALL BE INSTALLED THROUGH THE MIDDLE OF THE COMPOST FILTER SOCK ON 10 FOOT CENTERS, USING 2-INCH BY 2-INCH WOODEN STAKES.
3. STAKING DEPTH FOR SAND AND SILT LOAMS SHALL BE 12-INCH, AND 8-INCH FOR CLAY SOILS. REFER TO THE SOILS MAP PROVIDED IN APPENDIX G OF THE SEDIMENT CONTROL PLAN.
4. BACKFILL WITH LOOSE COMPOST ALONG THE UPSLOPE SIDE OF THE COMPOST FILTER SOCK, FILLING THE SEAM BETWEEN THE SOIL SURFACE AND THE DEVICE, IMPROVING FILTRATION AND SEDIMENT RETENTION.

F. TEMPORARY CONCRETE WASHOUT FACILITY

CONCRETE WASHOUTS ARE USED TO CONTAIN ALL WASHOUT WATER FROM CONCRETE CONSTRUCTION ACTIVITIES.

INSTALLATION:
INSTALL CONCRETE WASHOUTS IN ACCORDANCE WITH THE STANDARD DETAIL NEAR CONCRETE CONSTRUCTION ACTIVITIES AS DETERMINED IN THE FIELD. CLEARLY MARK THE CONCRETE WASHOUT BY INSTALLING A SIGN LOCATED WITHIN 30' OF THE WASHOUT.

G. SLOPE EROSION CONTROL BLANKET

NORTH AMERICAN GREEN S150BN, OR EQUIVALENT, EROSION CONTROL BLANKET WILL BE USED TO PREVENT EROSION FROM THE GRADING OPERATIONS AND INSTALLED ON PERMANENT SLOPES. THE EROSION CONTROL BLANKETS WILL PROVIDE EROSION PROTECTION AND ASSIST WITH VEGETATION ESTABLISHMENT FOR UP TO 12 MONTHS. AFTER A 12 MONTH PERIOD THE BLANKETS WILL BIODEGRADE LEAVING A STABLE VEGETATED ROOT STRUCTURE.

INSTALLATION:
1. PREPARE SOIL ON ALL ESTABLISHED TEMPORARY AND PERMANENT SLOPES AND ANY NECESSARY APPLICATION OF FERTILIZER AND SEED. SEED SLOPES IN ACCORDANCE WITH THE "SEEDING CRITERIA" TABLE LOCATED ON THE EROSION AND SEDIMENTATION CONTROL NOTES DRAWING BEFORE INSTALLING EROSION CONTROL BLANKET.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE EROSION CONTROL BLANKET IN A 6-INCH BY 6-INCH WIDE TRENCH WITH APPROXIMATELY 12 INCHES OF BLANKET EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES APPROXIMATELY 12 INCHES APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12 INCH PORTION OF THE EROSION CONTROL BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES SPACED APPROXIMATELY 12 INCHES APART ACROSS THE WIDTH OF THE BLANKET.
3. ROLL THE EROSION CONTROL BLANKET DOWN THE SLOPE. BLANKET WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES IN APPROPRIATE LOCATIONS AS RECOMMENDED BY THE MANUFACTURER.
4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 2 TO 5 INCH OVERLAP OR AS RECOMMENDED BY MANUFACTURER.

H. GEOTEXTILE FILTER BAG

GEOTEXTILE FILTER BAGS MAY BE USED TO FILTER SEDIMENT LADEN WATER PUMPED FROM DISTURBED AREAS, TRENCHES, ETC. PRIOR TO DISCHARGING.

INSTALLATION:
FILTER BAGS SHALL BE MADE FROM NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH-STRENGTH, DOUBLE-STITCHED "J"-TYPE SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS.

A SUITABLE MEANS OF ACCESSING THE BAG WITH MACHINERY REQUIRED FOR DISPOSAL PURPOSES MUST BE PROVIDED. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME HALF FULL. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE FILLED.

BAGS SHALL BE LOCATED IN WELL VEGETATED (GRASSY) AREAS AND DISCHARGE ONTO STABLE EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE FLOW PATH SHALL BE PROVIDED. BAGS SHALL NOT BE PLACED ON SLOPES GREATER THAN 5%. THE PUMP DISCHARGE HOSE SHALL BE INSERTED INTO THE BAGS IN THE MANNER SPECIFIED BY THE MANUFACTURER AND SECURELY CLAMPED. THE PUMPING RATE SHALL BE NO GREATER THAN 750 GPM OR ONE-HALF THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHALL BE FLOATING AND SCREENED.

I. PERIMETER BERM

PERIMETER BERMS WERE DESIGNED IN ACCORDANCE WITH THE GENERAL DESIGN CRITERIA OF THE WVDEP MANUAL. PERIMETER BERMS ARE SHOWN ON THE E&S DRAWINGS AS GENERAL GUIDANCE AS TO THE APPROXIMATE LOCATION OF INSTALLATION.

INSTALLATION:
THE PERIMETER BERMS SHALL BE INSTALLED AROUND THE TOP OF FILL SLOPES AFTER EACH DAYS CONSTRUCTION OR DURING CONSTRUCTION IF A RUNOFF EVENT OF ONE-HALF INCH (1/2") OR GREATER IS EXPECTED. PERIMETER BERMS SHALL BE DIRECTED TO PERMANENT SLOPE PIPES.

J. COMPOST FILTER SOCK SEDIMENT TRAP: COMPOST FILTER SOCK SEDIMENT TRAPS SHALL BE INSTALLED IN THE LOCATIONS SHOW ON THE PLANS AND IN ACCORDANCE WITH THE STANDARD DETAIL PROVIDED.

INSTALLATION:
1. COMPOST FILTER SOCK SEDIMENT TRAP SHALL BE INSTALLED PARALLEL TO THE BASE OF THE SLOPE OR OTHER DISTURBED AREA AND PARALLEL TO THE CONTOUR.
2. STAKES SHALL BE INSTALLED ON 10 FOOT CENTER, USING 2-INCH BY 2-INCH BY 3-FOOT WOODEN STAKES.

TEMPORARY CONTROL MEASURES (CONTINUED)

3. STAKES IN THE TWO BOTTOM FILTER SOCKS SHALL BE INSTALLED PERPENDICULAR TO THE GROUND AND AT A MINIMUM DEPTH OF 18 INCH INTO THE GROUND.
4. TWO STAKES SHALL BE INSTALLED THROUGH TOP FILTER SOCKS AT AN ANGLE THAT ALLOWS EACH STAKE TO GO THROUGH ONE OF THE BOTTOM SOCKS AND INTO THE GROUND A MINIMUM DEPTH OF 18 INCHES.
5. LOOSE COMPOST MAY BE BACKFILLED ALONG THE UPSLOPE SIDE OF THE SILT SOCK, FILLING THE SEAM BETWEEN THE SOIL SURFACE AND THE DEVICE, IMPROVING FILTRATION AND SEDIMENT RETENTION.

K. TEMPORARY VEGETATIVE STABILIZATION

FERTILIZING, SEEDING, AND MULCHING WILL BE USED AS A TEMPORARY E&S CONTROL MEASURE ON ALL DISTURBED AREAS AS NEEDED. EXPOSED SOILS NOT SUBJECT TO CONSTRUCTION TRAFFIC SHALL NOT REMAIN UNSEEDED OR COVERED BY MULCH FOR MORE THAN 14 DAYS, INCLUDING STOCKPILE SOIL MATERIALS. REFER TO THE SEEDING MIXTURES PROVIDED ON THE DRAWINGS FOR TEMPORARY MIXTURES.

INSTALLATION:
THE CONTRACTOR SHALL VEGETATE ALL DISTURBED AREAS AT THE EARLIEST APPROPRIATE TIMES FOR ESTABLISHMENT OF TEMPORARY OR PERMANENT SEED MIXTURES, RESPECTIVELY. WHEN SITE DEVELOPMENT STAGING OR SEASON WILL NOT PERMIT TIMELY SOWING OF THE PERMANENT SEED MIXTURE(S), PREPARE SOILS (FERTILIZERS AND LIME) AS FOR PERMANENT SEEDING, SEED WITH TEMPORARY SEED MIXTURE AND MULCH, AND THEN OVERSOW THE PERENNIAL SEED MIXTURE INTO THE STUBBLE OF TEMPORARY VEGETATION AT THE NEXT APPROPRIATE SEEDING SEASON PER ITEM 6 BELOW. UNLESS DIRECTED OTHERWISE, VEGETATION SHALL BE ESTABLISHED AS FOLLOWS:

1. SOIL PLACEMENT: SOIL TO RECEIVE SEED SHALL BE PLACED TO THE DESIGN THICKNESS AND GRADE AND TRACKED AND ROLLED INTO PLACE IN A MANNER THAT WILL NOT CAUSE EXCESSIVE COMPACTION. IF SOIL DENSITY IS VERIFIED IN THE FIELD, SOIL SHALL BE COMPACTED TO A DRY DENSITY BETWEEN 75 AND 100 POUNDS PER CUBIC FOOT, AFTER CORRECTION TO ZERO PERCENT COARSE FRAGMENT (PARTICLES LARGER THAN 2 MILLIMETERS) CONTENT.
2. TEMPORARY SEEDING THAT WILL NOT BE FOLLOWED BY PERMANENT SEEDING, SUCH AS TOPSOIL STOCKPILES OR INTERIM GRADING PATTERNS DO NOT REQUIRE THE APPLICATION OF LIME OR FERTILIZER.
3. SEEDBED PREPARATION: JUST BEFORE SEEDING, PREPARE SEEDBED BY TRACKING, RAKING, OR OTHER APPROPRIATE METHOD AS NECESSARY TO BREAK UP SOIL CRUSTS. IF TRACKING THE SITE WITH A DOZER, TRACK IN A MANNER THAT LEAVES CLEAT MARKS PARALLEL TO SITE CONTOURS.
4. SEEDING: EVENLY APPLY THE TEMPORARY SEED MIXTURE USING A BROADCAST SEEDER, DRILL, CULTI-PACKER SEEDER, OR HYDROSEEDER. SMALL GRAINS SHALL BE PLANTED NO MORE THAN 1.5" DEEP. SMALL SEEDS, SUCH AS ANNUAL RYE, SHALL BE PLANTED NO MORE THAN 0.25" DEEP. OTHER GRASSES AND LEGUMES SHALL BE PLANTED NO MORE THAN 0.50" DEEP.
5. MULCHING AND TACKING: AFTER SEEDING, PROMPTLY MULCH USING STRAW APPLIED AT A RATE OF 6,000 LBS/ACRE OR 90LBS/1,000 SQUARE FEET OR AS NECESSARY TO OBTAIN 70% MULCH GROUND COVER. DO NOT USE HAY AS A STRAW SUBSTITUTE. STRAW SHALL BE ADDED WHEN TEMPORARY SEEDING IS CONDUCTED IN FALL FOR WINTER COVER AND DURING HOT AND DRY SUMMER MONTHS.

   IN SOME LOCATIONS SHOWN ON THE DRAWINGS, SUCH AS SLOPES STEEPER THAN 3:1 (H:V), EROSION CONTROL BLANKET OR TURF REINFORCEMENT MAT (TRM) MAY BE THE ONLY PERMISSIBLE MULCHING OPTION. INSTALL EROSION CONTROL BLANKETS/TRM PER MANUFACTURER'S INSTRUCTIONS. STAPLE BLANKET/TRM IN PLACE USING 6-INCH (MINIMUM) SOD STAPLES IN ROWS AT THE EDGES AND CENTERLINE OF THE BLANKET AND ON 24-INCH OR CLOSER CENTERS.
6. OVER-SEEDING AND RE-SEEDING: WHEN THE SITE DEVELOPMENT STAGING OR SEASON WILL NOT PERMIT TIMELY SOWING OF THE PERMANENT SEED MIXTURE(S), PREPARE SOILS (FERTILIZERS AND LIME) AS FOR PERMANENT SEEDING, THEN SEED WITH TEMPORARY SEED MIXTURE AND MULCH. OVERSOW THE PERENNIAL SEED MIXTURE INTO THE STUBBLE OF TEMPORARY VEGETATION AT THE NEXT APPROPRIATE SEEDING SEASON.

   IF PERENNIAL SEED IS BEING SOWN INTO THE STUBBLE OF ACTIVELY GROWING TEMPORARY VEGETATION, MOW THE TEMPORARY VEGETATION TO REDUCE COMPETITION EITHER BEFORE OR IMMEDIATELY AFTER SOWING THE PERMANENT SEED.
7. STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN SEVEN DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS PERMANENTLY CEASED.
8. WHERE THE INITIATION OF STABILIZATION MEASURES BY THE SEVENTH DAY AFTER CONSTRUCTION ACTIVITY TEMPORARILY OR PERMANENTLY CEASES IS PRECLUDED BY SNOW COVER, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS CONDITIONS ALLOW.
9. WHERE CONSTRUCTION ACTIVITY WILL RESUME ON A PORTION OF THE SITE WITHIN 14 DAYS FROM WHEN ACTIVITIES CEASED, (E.G., THE TOTAL TIME PERIOD THAT CONSTRUCTION ACTIVITY IS TEMPORARILY HALTED IS LESS THAN 14 DAYS) THEN STABILIZATION MEASURES DO NOT HAVE TO BE INITIATED ON THAT PORTION OF THE SITE BY THE SEVENTH DAY AFTER CONSTRUCTION ACTIVITIES HAVE TEMPORARILY CEASED. APPLY TEMPORARY SEEDING TO EXPOSED SOIL SURFACES WITHIN 7 DAYS IF SOILS ARE NOT TO BE FINE-GRADED FOR A PERIOD OF 14 DAYS. SUCH AREAS INCLUDE DENUDED AREAS, SOIL STOCKPILES, TEMPORARY ROAD BANKS, ETC. REFER TO THE SEEDING MIXTURES PROVIDED ON THE DRAWINGS FOR TEMPORARY MIXTURES.

L. CONSTRUCTION WASTE RECYCLE/DISPOSAL

CONSTRUCTION WASTES ARE REFUSE MATERIALS THAT ARE EXISTING ON-SITE OR GENERATED DURING THE COURSE OF CONSTRUCTION AND INCLUDE, BUT ARE NOT LIMITED TO PAPER, PLASTIC, RUBBER, WOOD, TEXTILE, AND METAL PRODUCTS.

INSTALLATION:
THE CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING WASTE RECYCLING/DISPOSAL AREAS ON THE PLANS, ONCE THEY HAVE BEEN DETERMINED. WASTE DISPOSAL STOCKPILES SHALL BE PLACED UPSTREAM OF TEMPORARY E&S CONTROL MEASURES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL WASTE RECYCLING/DISPOSAL PERMITS PRIOR TO THE COMMENCEMENT OF CONSTRUCTION ACTIVITIES.

M. CHECK DAMS

ROCK CHECK DAMS ARE TO BE INSTALLED ACROSS A CHANNEL TO REDUCE VELOCITY OF STORMWATER FLOWS, THEREBY REDUCING EROSION OF THE CHANNEL AND TRAPPING SEDIMENT.

INSTALLATION:
ROCK CHECK DAMS SHALL BE INSTALLED ACROSS THE CHANNELS IN THE LOCATIONS SHOWN ON THE PLANS AND PER THE STANDARD DETAIL.

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
600 Marketplace Ave · Suite 200 · Bridgeport, WV 26330
Ph: 304.933.3119 · 855.488.9539 · Fax: 304.933.3327
www.cecinc.com

SUPPLY HEADER PROJECT
MOCKINGBIRD HILL
COMPRESSOR STATION
WETZEL COUNTY, WEST VIRGINIA

EROSION AND SEDIMENT CONTROL DETAILS

DATE:	JANUARY 2017
DWG SCALE:	AS SHOWN
PROJECT NO:	161-104-CV01
APPROVED BY:	*HAND SIGNATURE ON FILE
DRAWN BY:	PWC/TGJ
CHECKED BY:	ARG
	*GSL

DRAWING NO.:
C901

GREGORY S. LINDER — REGISTERED — 15229 — STATE OF WEST VIRGINIA — PROFESSIONAL ENGINEER
1-31-2017

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PERMANENT CONTROL MEASURES

A. RIPRAP APRON

ROCK APRONS WILL BE USED AT STORM SEWER OUTFALLS TO DISSIPATE THE VELOCITY AND HELP PREVENT EROSION/SCOUR OF EXISTING DRAINAGE WAYS AND FEATURES

INSTALLATION:
1. EXCAVATE A TRENCH THE FULL LENGTH, WIDTH, AND THICKNESS OF THE APRON DIMENSIONS AS SHOWN ON THE DETAIL.
2. PLACE A LAYER OF SEPARATION GEOTEXTILE WITHIN THE EXCAVATED AREA, TRENCHING IN ALL SIDES.
3. PLACE RIPRAP THE APPROPRIATE THICKNESS AS SHOWN ON THE DETAIL.

B. PERMANENT CHANNELS:

CHANNELS WILL BE USED TO CONVEY STORMWATER RUNOFF IN A STABLE MANNER. THE CHANNEL WILL BE LINED WITH THE SPECIFIED RIPRAP OR NORTH AMERICAN GREEN (NAG) EROSION CONTROL BLANKET, OR EQUIVALENT, AS SHOWN ON THE PLANS.

C. PERMANENT VEGETATIVE STABILIZATION

FERTILIZING, SEEDING AND MULCHING, WILL BE USED AS A PERMANENT E&S CONTROL MEASURE ON ALL DISTURBED AREAS. REFER TO THE PERMANENT SEED MIXTURES PROVIDED ON THE DRAWINGS.

INSTALLATION:
FERTILIZING, SEEDING, AND MULCHING WILL BE USED AS A TEMPORARY/PERMANENT E&S CONTROL MEASURE ON ALL NON-PAVED DISTURBED AREAS. EXPOSED SOILS, NOT SUBJECT TO CONSTRUCTION TRAFFIC, SHALL NOT REMAIN UNSEEDED OR UNCOVERED BY MULCH FOR MORE THAN 14 DAYS. SEED AND MULCH TOPSOIL STOCKPILES WITHIN 7 DAYS IF THE STOCKPILE IS TO REMAIN IN PLACE FOR LONGER THAN 14 DAYS. REFER TO THE SEEDING MIXTURE TABLES PROVIDED. FOR TEMPORARY/PERMANENT SEED MIXES, UNLESS THE OWNER'S REPRESENTATIVE DIRECTS OTHERWISE, VEGETATION SHALL BE ESTABLISHED AS FOLLOWS:

1. SOIL PLACEMENT: SOIL TO RECEIVE SEED SHALL BE PLACED TO THE DESIGN THICKNESS AND GRADE AND TRACKED AND ROLLED INTO PLACE IN A MANNER THAT WILL NOT CAUSE EXCESSIVE COMPACTION. IF SOIL DENSITY IS VERIFIED IN THE FIELD, SOIL SHALL BE COMPACTED TO A DRY DENSITY BETWEEN 75 AND 100 POUNDS PER CUBIC FOOT, AFTER CORRECTION TO ZERO PERCENT COARSE FRAGMENT (PARTICLES LARGER THAN 2 MILLIMETERS) CONTENT.

2. FOR PERMANENT SEEDING, SOIL TESTING AND SOIL AMENDMENT (LIME AND FERTILIZER) RATES ARE AS FOLLOWS: UNLESS SOIL TEST RESULTS AND RECOMMENDATIONS FROM WVU EXTENSION SERVICE SOIL TESTING LABORATORY (OR EQUIVALENT SOIL TESTING LABORATORY) INDICATE OTHERWISE, EVENLY APPLY: 1) AGRICULTURAL GRADE GROUND LIMESTONE AT A RATE OF: 2 TONS PER ACRE (CALCIUM CARBONATE EQUIVALENT BASIS); AND 2) 1,000 LBS./ACRE OF FERTILIZER AT A RATE OF: 10-20-20 (N-P2O5-K2O) FOR MIXED GRASSES AND LEGUMES; 5-10-10 (N-P2O5-K2O) FOR LEGUME STANDS ONLY; AND 10-20-10 (N-P2O5-K2O) FOR GRASSES ONLY. LIME AND FERTILIZER SHALL BE INCORPORATED INTO THE TOP 4"-6" BY DISKING OR OTHER MEANS. IF LIME REQUIREMENTS ARE LESS THAN 4 TONS PER ACRE OR SLOPES ARE TOO STEEP TO PERMIT SAFE TILLAGE, THE SOIL AMENDMENTS CAN BE MIXED INTO A HYDROMULCH SLURRY OR CAN BE TRACKED IN WITH A DOZER IN LIEU OF INCORPORATION. IF TRACKING THE SITE WITH A DOZER, TRACK IN A MANNER THAT LEAVES CLEAT MARKS PARALLEL TO SITE CONTOURS.

3. SEEDBED PREPARATION: JUST BEFORE SEEDING, PREPARE SEEDBED BY TRACKING, RAKING, OR OTHER APPROPRIATE METHOD AS NECESSARY TO BREAK UP SOIL CRUSTS. IF TRACKING THE SITE WITH A DOZER, TRACK IN A MANNER THAT LEAVES CLEAT MARKS PARALLEL TO SITE CONTOURS.

4. SEEDING: EVENLY APPLY THE SEED MIXTURE USING A BROADCAST SEEDER, DRILL, CULTI-PACKER SEEDER, OR HYDROSEEDER. SMALL GRAINS SHALL BE PLANTED NO MORE THAN 1.5" DEEP. SMALL SEEDS, SUCH AS ANNUAL RYE, SHALL BE PLANTED NO MORE THAN 0.25" DEEP. OTHER GRASSES AND LEGUMES SHALL BE PLANTED NO MORE THAN 0.50" DEEP. FOR PERMANENT SEEDING, SEED DEPTH SHOULD BE 0.25" TO 0.50" DEEP.

5. MULCHING AND TACKING: AFTER SEEDING, PROMPTLY MULCH USING STRAW APPLIED AT A RATE OF 6,000 LBS/ACRE OR 90LBS/1,000 SQUARE FEET OR AS NECESSARY TO OBTAIN 70% MULCH GROUND COVER. DO NOT USE HAY AS A STRAW SUBSTITUTE. STRAW SHALL BE ADDED WHEN TEMPORARY SEEDING IS CONDUCTED IN FALL FOR WINTER COVER AND DURING HOT AND DRY SUMMER MONTHS.

   IN SOME LOCATIONS SHOWN ON THE DRAWINGS, SUCH AS SLOPES STEEPER THAN 3:1 (H:V), EROSION CONTROL BLANKET OR TURF REINFORCEMENT MAT (TRM) MAY BE THE ONLY PERMISSIBLE MULCHING OPTION. INSTALL EROSION CONTROL BLANKETS/TRM PER MANUFACTURER'S INSTRUCTIONS. STAPLE BLANKET/TRM IN PLACE USING 6-INCH (MINIMUM) SOD STAPLES IN ROWS AT THE EDGES AND CENTERLINE OF THE BLANKET AND ON 24-INCH OR CLOSER CENTERS.

6. OVER-SEEDING AND RE-SEEDING: WHEN THE SITE DEVELOPMENT STAGING OR SEASON WILL NOT PERMIT TIMELY SOWING OF THE PERMANENT SEED MIXTURE(S), PREPARE SOILS (FERTILIZERS AND LIME) AS FOR PERMANENT SEEDING, THEN SEED WITH TEMPORARY SEED MIXTURE AND MULCH. OVERSOW THE PERENNIAL SEED MIXTURE INTO THE STUBBLE OF TEMPORARY VEGETATION AT THE NEXT APPROPRIATE SEEDING SEASON.

   IF PERENNIAL SEED IS BEING SOWN INTO THE STUBBLE OF ACTIVELY GROWING TEMPORARY VEGETATION, MOW THE TEMPORARY VEGETATION TO REDUCE COMPETITION EITHER BEFORE OR IMMEDIATELY AFTER SOWING THE PERMANENT SEED.

7. STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS PRACTICABLE IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT IN NO CASE MORE THAN SEVEN DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS PERMANENTLY CEASED.

8. WHERE THE INITIATION OF STABILIZATION MEASURES BY THE SEVENTH DAY AFTER CONSTRUCTION ACTIVITY TEMPORARILY OR PERMANENTLY CEASES IS PRECLUDED BY SNOW COVER, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS CONDITIONS ALLOW.

CONSTRUCTION SEQUENCE

1. THE CONTRACTOR SHALL CONFIRM WITH ATLANTIC COAST PIPELINE, LLC (ACP) THAT THE EXISTING GAS AND OVERHEAD ELECTRICAL LINES HAVE BEEN ABANDONED AND/OR RELOCATED AS NECESSARY PRIOR TO THE START OF CONSTRUCTION.
2. PRIOR TO COMMENCEMENT OF ANY EARTH DISTURBANCE ACTIVITY INCLUDING CLEARING AND GRUBBING, THE CONTRACTOR SHALL CLEARLY DELINEATE SENSITIVE AREAS, AND STREAMS THAT ARE TO BE CONSERVED WITHIN THE PROJECT SITE WITH TEMPORARY ORANGE CONSTRUCTION FENCE. CONFIRM THE WV STORMWATER PERMIT SIGN HAS BEEN INSTALLED.
3. STAKE OUT THE LIMITS TO BE DISTURBED.
4. INSTALL ROCK CONSTRUCTION ENTRANCE #1 IN THE LOCATION SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE STANDARD DETAIL. CLEAR AND GRUB AS NECESSARY AND INSTALL SEDIMENT BARRIERS ALONG THE TEMPORARY ACCESS ROAD AND STAGING AREA #1. INSTALL THE SEDIMENT BARRIERS IN ACCORDANCE WITH THE STANDARD DETAILS. INSTALL TEMPORARY COFFER DAM AND PUMP BYPASS FOR STREAM SWZG007 IMMEDIATELY UPSTREAM OF THE PROPOSED TEMPORARY CULVERT 8. INSTALL CULVERT 8 AT THE LOCATION SHOWN ON THE PLANS. CONSTRUCT THE TEMPORARY ACCESS ROAD IN THE LOCATION SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE STANDARD DETAIL. CONSTRUCT STAGING AREA #1. INSTALL THE ROCK FILL UNDERDRAINS IN THE LOCATIONS SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE STANDARD DETAIL. INSTALL CHANNELS #16-18 AND #21, CULVERTS #3, #6 AND #7 AND RIPRAP APRONS #3, #9, AND #21 IN THE LOCATIONS SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE STANDARD DETAILS. INSTALL ROCK CHECK DAMS IN THE LOCATIONS SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE STANDARD DETAIL. SEE STEP #14 FOR SLOPE STABILIZATION MEASURES.
5. CLEAR AND GRUB AS NECESSARY AND INSTALL SEDIMENT BARRIERS ALONG THE EAST AND SOUTH SIDES OF THE COMPRESSOR PAD AND ALONG THE EAST SIDE OF STREAM SWZG006. INSTALL THE SEDIMENT BARRIERS IN ACCORDANCE WITH THE STANDARD DETAILS.
6. CLEAR AND GRUB THE COMPRESSOR PAD AREA WITHIN THE INSTALLED SEDIMENT BARRIERS.
7. BEGIN EXCAVATING THE COMPRESSOR PAD. CONSTRUCT STAGING AREA #1 WITH MATERIAL FROM THE COMPRESSOR PAD USING THE TEMPORARY ACCESS ROAD. MAINTAIN ACCESS AT THE NORTH SIDE OF THE COMPRESSOR PAD DURING EXCAVATION OPERATIONS. INSTALL CHANNELS #19 AND #20, AND RIPRAP APRONS #10 AND #11 IN THE LOCATIONS SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE STANDARD DETAILS. INSTALL ROCK CHECK DAMS IN THE LOCATIONS SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE STANDARD DETAIL. SEE STEP #14 FOR SLOPE STABILIZATION MEASURES.
8. INSTALL ROCK CONSTRUCTION ENTRANCE #2 IN THE LOCATION SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE STANDARD DETAIL. CLEAR AND GRUB AS NECESSARY AND INSTALL SEDIMENT BARRIERS ALONG STAGING AREAS #2 AND #3, AND SWZG007.
9. DEMOLISH THE EXISTING HOUSE, GARAGE, KENNEL, AND OUT BUILDING. CONSTRUCT STAGING AREAS #2 AND #3, CHANNELS #10-12B, CULVERT #4, AND RIPRAP APRON #2 AND #4 IN THE LOCATIONS SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE STANDARD DETAILS. INSTALL ROCK CHECK DAMS IN THE LOCATIONS SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE STANDARD DETAIL.
10. INSTALL THE ARCH BOTTOMLESS CULVERT IN STREAM SWZG007 AND CONSTRUCT THE PERMANENT ACCESS ROAD TO STATION 5+00. NO DISTURBANCE SHALL OCCUR TO THE STREAM. INSTALL CHANNELS #8-9, AND #13-14, AND RIPRAP APRONS #5-8 IN THE LOCATIONS SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE STANDARD DETAILS. INSTALL ROCK CHECK DAMS IN THE LOCATIONS SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE STANDARD DETAIL. SEE STEP #14 FOR SLOPE STABILIZATION MEASURES.
11. CLEAR AND GRUB AS NECESSARY AND INSTALL SEDIMENT BARRIERS ALONG THE WEST SIDE OF STREAM SWZG006. INSTALL THE SEDIMENT BARRIERS IN ACCORDANCE WITH THE STANDARD DETAILS.
12. INSTALL THE ARCH BOTTOMLESS CULVERT IN STREAM SWZG006. NO DISTURBANCE SHALL OCCUR TO THE STREAM.
13. FINISH CONSTRUCTING THE COMPRESSOR PAD, STORMWATER POND, AND PERMANENT ACCESS ROAD. ACCESS FROM THE TEMPORARY ACCESS ROAD TO THE COMPRESSOR PAD SHALL BE REMOVED ONCE THE PERMANENT ACCESS ROAD IS CONSTRUCTED. INSTALL CHANNELS #1-7, #15, CULVERTS #1-2, AND RIPRAP APRONS #13-16, #18-20, AND #22 IN THE LOCATIONS SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE STANDARD DETAILS. INSTALL ROCK CHECK DAMS IN THE LOCATIONS SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE STANDARD DETAIL. ONCE 10' OF FILL IS PLACED, INSTALL PERIMETER BERMS #1, #2, AND #3 IN THE LOCATIONS SHOWN ON THE PLANS AND IN ACCORDANCE WITH THE STANDARD DETAIL. THE PERIMETER BERMS SHALL BE INSTALLED AT THE TOP OF THE FILLS SLOPES AFTER EACH DAY OF CONSTRUCTION OR DURING CONSTRUCTION IF A RUNOFF EVENT OF ONE-HALF INCH OR GREATER IS EXPECTED. INSTALL THE STORMWATER POND OUTLET STRUCTURE, OUTLET PIPE, ASSOCIATED STORM SEWER, AND RIPRAP APRON #23.
14. THE CONTRACTOR SHALL INSTALL 12" COMPOST FILTER SOCK SLOPE INTERRUPTIONS HORIZONTALLY, ALONG THE CONTOURS OF SLOPES, AND PERPENDICULAR TO THE SHEET RUNOFF FLOW, EVERY 20 VERTICAL FEET AS THE SLOPE IS CONSTRUCTED. SEED, MULCH AND INSTALL EROSION CONTROL BLANKET OVER THE FACE OF THE SLOPE EVERY 20 VERTICAL FEET AS THE SLOPE IS CONSTRUCTED. AREAS SHALL NOT BE DISTURBED AFTER APPLICATION. THE SOIL WHERE THE SEED AND MULCH SHALL BE APPLIED MUST BE GRADED TO REMOVE AY PRE-EXISTING RILL AND SHALL BE COMPACTED TO MEET PROJECT SPECIFICATION. TRACK-WALKING OR SOME OTHER SOIL IMPRINTING DEVICE IS RECOMMENDED TO ROUGHEN THE SLOP TO SLOW RUNOFF DURING A STORM EVENT.
15. PLACE GRAVEL TO STABILIZE THE COMPRESSOR PAD AND PERMANENT ACCESS ONCE THE FINAL GRADES ARE REACHED.
16. ALL DISTURBED AREAS SHALL BE SEEDED AND MULCHED AS SOON AS POSSIBLE TO OBTAIN OPTIMUM SEED GERMINATION AND SEEDLING GROWTH BUT AT A MINIMUM WITHIN 7 DAYS OF REACHING FINAL GRADE OR WITHIN 7 DAYS IF NO ADDITIONAL ACTIVITY IS ANTICIPATED FOR 14 DAYS OR MORE.
17. ONCE A UNIFORM 70% VEGETATIVE COVER IS ACHIEVED ON ALL DISTURBED AREAS, REMOVE ALL REMAINING EROSION AND SEDIMENTATION CONTROLS AND SEE AND MULCH ANY REMAINING DISTURBED AREAS. NOTE: SLOPE INTERRUPTIONS TO REMAIN, ONLY REMOVE PERIMETER SEDIMENT BARRIERS.

MAINTENANCE SCHEDULE

ALL EROSION AND SEDIMENTATION CONTROLS WILL BE MAINTAINED IN GOOD WORKING ORDER (CLEANED, REPAIRED, ETC.) UNTIL ALL DISTURBED AREAS ARE STABILIZED AND A UNIFORM 70% PERENNIAL VEGETATIVE COVER HAS BEEN ESTABLISHED. IF ANY REPAIRS TO THE E&S CONTROL MEASURES ARE NECESSARY, THE CONTRACTOR SHALL MAKE THE NECESSARY REPAIRS AS OUTLINED BELOW FOLLOWING AN INSPECTION TO ENSURE EFFECTIVE AND EFFICIENT OPERATION OF THE E&S CONTROL MEASURES.

1. INSPECTIONS ARE TO BE PERFORMED AT LEAST ONCE EVERY SEVEN CALENDAR DAYS AND WITHIN 24 HOURS AFTER ANY STORM EVENT GREATER THAN 0.5 INCHES PER 24 HOUR PERIOD. ANY REQUIRED REPAIRS OR MAINTENANCE SHOULD BE MADE IMMEDIATELY. A COPY OF THE BMP INSPECTION CHECKLIST IS INCLUDED IN THE SWPPP FOR THE CONTRACTOR TO USE AS A GUIDELINE FOR INSPECTION REQUIREMENTS.

2. ROCK CONSTRUCTION ENTRANCE/EXIT: THE ROCK CONSTRUCTION ENTRANCES THICKNESS SHALL BE CONSTANTLY MAINTAINED TO THE SPECIFIED DIMENSIONS SHOWN ON THE DETAIL. A STOCKPILE SHALL BE MAINTAINED ONSITE FOR THIS PURPOSE. AT THE END OF EACH CONSTRUCTION DAY, ALL SEDIMENT DEPOSITED ON PAVED ROADWAYS SHALL BE REMOVED AND RETURNED TO THE CONSTRUCTION SITE. IF THE CRUSHED STONE DOES NOT ADEQUATELY REMOVE THE MUD FROM THE VEHICLE TIRES, THE TIRES SHOULD BE HOSED OFF BEFORE THE VEHICLE ENTERS A PUBLIC STREET. THE WASHING SHOULD BE DONE ON AN AREA COVERED WITH CRUSHED STONE, AND THE WASH WATER SHOULD DRAIN TO A SEDIMENT CONTROL DEVICE.

3. TOPSOIL STOCKPILE AREA: REPAIR THE COMPOST FILTER SOCK AS NECESSARY TO ENSURE THAT THE INTEGRITY OF THE SOCK CAN WITHSTAND AND HOLD THE SOIL IN ITS STOCKPILE LOCATION. SEED AND MULCH STOCKPILES WITHIN 7 DAYS OF FORMATION IF THE STOCKPILE IS TO REMAIN IN PLACE FOR LONGER THAN 14 DAYS.

4. BELTED SILT RETENTION FENCE:ACCUMULATED SEDIMENTS SHALL BE REMOVED IN ALL CASES WHERE ACCUMULATIONS HAVE REACHED HALF THE ABOVE-GROUND HEIGHT OF THE FENCE. IF THE FENCE HAS BEEN DAMAGED, IT SHALL BE REPAIRED, OR REPLACED IF BEYOND REPAIR.

5. SUPER SILT FENCE: ACCUMULATED SEDIMENTS SHALL BE REMOVED IN ALL CASES WHERE ACCUMULATIONS HAVE REACHED HALF THE ABOVE-GROUND HEIGHT OF THE FENCE. IF THE FENCE HAS BEEN DAMAGED, IT SHALL BE REPAIRED, OR REPLACED IF BEYOND REPAIR.

6. COMPOST FILTER SOCK: ACCUMULATED SEDIMENTS SHALL BE REMOVED IN ALL CASES WHERE ACCUMULATIONS HAVE REACHED HALF THE ABOVE-GROUND HEIGHT OF THE SOCK. IF THE SOCK HAS BEEN DAMAGED, IT SHALL BE REPAIRED, OR REPLACED IF BEYOND REPAIR. THE FILTER MEDIA WILL BE DISPERSED ON SITE ONCE THE DISTURBED AREA HAS BEEN PERMANENTLY STABILIZED. ADHERE TO ANY MANUFACTURER'S RECOMMENDATIONS. THE SOCK SHALL BE MAINTAINED UNTIL A DISTURBED AREA ABOVE THE DEVICE HAS BEEN PERMANENTLY STABILIZED AND A UNIFORM 70% PERENNIAL VEGETATION HAS BEEN ESTABLISHED.

7. TEMPORARY CONCRETE WASHOUT FACILITY: REMOVE SEDIMENT AND CONCRETE MATERIALS COLLECTED IN THE TEMPORARY CONCRETE WASHOUT FACILITY AND MAKE ANY REPAIRS TO THE CONTAINMENT FACILITY AS NEEDED.

8. SLOPE EROSION CONTROL BLANKET: ANY SCOURED AREAS SHALL BE REPAIRED IMMEDIATELY BY COMPACTING SOIL IN THE WASHOUT AREA AND PLACING SEED. ANY DAMAGED EROSION CONTROL BLANKETS SHALL BE REPLACED IMMEDIATELY. BLANKETS SHALL BE MAINTAINED UNTIL A UNIFORM 70% PERENNIAL VEGETATION HAS BEEN ESTABLISHED.

9. GEOTEXTILE FILTER BAGS: PUMP AND FILTER BAGS SHALL BE INSPECTED DAILY. IF ANY PROBLEM IS DETECTED, PUMPING SHALL CEASE IMMEDIATELY, AND SHALL NOT RESUME UNTIL THE PROBLEM IS CORRECTED. SEDIMENT REMOVED FROM THE FILTER BAG SHALL BE SPREAD ONSITE UPSTREAM FROM ESTABLISHED SEDIMENT CONTROLS AND ALLOWED TO DRY. ONCE DRY, THE SEDIMENT MAY BE INCORPORATED ONSITE AS PART OF THE FILL.

10. PERIMETER BERM: INSPECT THE DIKE, FLOW CHANNEL AND OUTLET FOR DEFICIENCIES OR SIGNS OF EROSION. RESEED OR OTHERWISE STABILIZE THE DIKE AS NEEDED TO MAINTAIN ITS STABILITY. INSPECT FOR SEDIMENT DEPOSITS, CONSTRICTIONS AND BLOCKAGES. REMOVE ANY BLOCKAGE IMMEDIATELY.

11. CONSTRUCTION/WASTE DISPOSAL: ALL CONSTRUCTION WASTE SHALL BE REMOVED BY THE CONTRACTOR AND DISPOSED OF AT A STATE-APROVED WASTE SITE AND IN ACCORDANCE WITH ALL LOCAL AND STATE CODES AND PERMIT REQUIREMENTS. THE BURNING OF WASTE MATERIALS SHALL NOT BE PERMITTED.

12. RIPRAP APRON: ANY VISIBLE DAMAGE INCLUDING SCOUR SHALL BE FIXED BY THE END OF THE WORKING DAY BY PLACING ADDITIONAL RIPRAP IN THE SCOUR AREA WITH A LAYER OF GEOTEXTILE. PLACE ADDITIONAL STONE AS NECESSARY TO PREVENT EROSION AND SCOUR.

13. PERMANENT CHANNELS: ANY DAMAGE TO THE CHANNEL OR EROSION CONTROL BLANKET SHALL BE FIXED IMMEDIATELY. THE CONTRACTOR IS TO PLACE SEED ON ALL BARE SPOTS AND MULCH. FOR RIPRAP CHANNELS, ANY VISIBLE DAMAGE INCLUDING SCOUR SHALL BE FIXED BY PLACING ADDITIONAL RIPRAP IN THE DAMAGED AREA.

14. COMPOST FILTER SOCK SEDIMENT TRAP: THE COMPOST FILTER SOCK SEDIMENT TRAP SHALL BE INSPECTED AT A MINIMUM OF ONCE EVERY SEVEN (7) CALENDAR DAYS AND WITHIN 24 HOURS AFTER ANY RUNOFF EVENT TO CHECK THE INTEGRITY OF THE TRAP. ACCUMULATED SEDIMENTS SHALL BE REMOVED IN ALL CASES WHERE ACCUMULATIONS HAVE REACHED HALF THE ABOVE-GROUND HEIGHT OF THE SOCK. DISTRIBUTE THE DRIED SEDIMENT EVENLY AMONG THE FILL AREAS ON THE SITE. THE ACCUMULATED SEDIMENT SHALL BE PLACED UPSTREAM OF THE SOIL SOCK TRAP AND ALLOWED TO DRY. IF THE SOCK HAS BEEN DAMAGED, IT SHALL BE REPAIRED, OR REPLACED IF BEYOND REPAIR. THE FILTER MEDIA WILL BE DISPERSED ON SITE ONCE THE DISTURBED AREA HAS BEEN PERMANENTLY STABILIZED. ADHERE TO ANY MANUFACTURER'S RECOMMENDATIONS. THE COMPOST FILTER SOCK SEDIMENT TRAP SHALL BE MAINTAINED UNTIL A DISTURBED AREA ABOVE THE DEVICE HAS BEEN PERMANENTLY STABILIZED AND A UNIFORM 70 PERCENT PERENNIAL VEGETATION HAS BEEN ESTABLISHED.

15. ALL SLOPES SHALL BE CHECKED WEEKLY FOR SIGNS OF EROSION AND/OR SEDIMENTATION. IF EROSION AND/OR SEDIMENTATION EXISTS REPAIR ERODED AREAS AND SEED AND MULCH IMMEDIATELY.

16. DURING CONSTRUCTION, SEDIMENT REMOVED FROM THE EROSION CONTROL DEVICES SHALL BE DISPOSED OF BY SPREADING IT ONSITE. ONCE A UNIFORM 70 PERCENT PERENNIAL VEGETATIVE COVER IS ESTABLISHED AND THE TEMPORARY E&S CONTROLS ARE REMOVED, ALL ACCUMULATED SEDIMENT SHALL BE DISPOSED OF OFFSITE AT A WVDEP APPROVED FACILITY.

17. THE CONTRACTOR IS RESPONSIBLE FOR ALL MAINTENANCE AND INSPECTIONS AND SHALL MAINTAIN RECORDS OF ALL SUCH ACTIVITIES AT THE SITE.

18. DISTURBED AREAS SHALL BE SEEDED AND MULCHED AS SOON AS POSSIBLE TO OBTAIN OPTIMUM SEED GERMINATION AND SEEDLING GROWTH BUT AT A MINIMUM WITHIN 7 DAYS OF REACHING FINAL GRADE OR WITHIN 7 DAYS IF NO ADDITIONAL ACTIVITY IS ANTICIPATED FOR 14 DAYS OR MORE. IF, AT THE END OF A 30-DAY MONITORING AND MAINTENANCE PERIOD, A SATISFACTORY STAND OF VEGETATION HAS NOT BEEN PRODUCED, THE CONTRACTOR SHALL PROMPTLY RENOVATE AND RESEED THE UNSATISFACTORY AREAS. RENOVATION AND RESEEDING SHALL CONTINUE UNTIL A SATISFACTORY STAND OF VEGETATION HAS BEEN PRODUCED.

19. ALL TEMPORARY EROSION AND SEDIMENTATION CONTROLS WILL REMAIN IN PLACE UNTIL A UNIFORM 70 PERCENT PERENNIAL UPLAND VEGETATIVE COVER IS ESTABLISHED.

PERMANENT SEEDING		
SPECIES	PLANTING DATES	APPLICATION RATE LBS/ACRE
SWITCHGRASS	3/1-6/5 8/15-9/15	15
PERENNIAL RYEGRASS	3/1-6/5 8/15-9/15	20
REDTOP	3/1-6/15	5
BIRDSFOOT TREFOIL	3/1-6/5 8/15-9/15	15
JAPANESE MILLET	06/16-08/14	15
WINTER RYE	09/16-08/28	85

TEMPORARY SEEDING		
KIND OF SEED	PLANTING DATES	APPLICATION RATE LBS/ACRE
ANNUAL RYEGRASS	2/16-5/15 8/1-11/1	40
FIELD BROMEGRASS	3/1-6/15 8/1-9/5	40
SPRING OATS	3/1-6/15	100
WINTER RYE	8/15-2/28	170
WINTER WHEAT	8/15-2/28	180
JAPANESE MILLET	5/15-8/15	30
REDTOP	3/1-6/15	10
ANNUAL RYEGRASS AND SPRING OATS	3/1-6/15	30 70
GERMAN/FOXTAIL MILLET	5/1-8/1	40
HAIRY VETCH	8/15-4/1	60

GREGORY S. LINDER
REGISTERED
15629
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER
1-31-2017

REVISION RECORD

NO	DATE	DESCRIPTION

CEC
Civil & Environmental Consultants, Inc.
600 Marketplace Ave · Suite 200 · Bridgeport, WV 26330
Ph: 304.933.3119 · 855.488.9539 · Fax: 304.933.3327
www.cecinc.com

SUPPLY HEADER PROJECT
MOCKINGBIRD HILL
COMPRESSOR STATION
WETZEL COUNTY, WEST VIRGINIA

EROSION AND SEDIMENT CONTROL DETAILS

DATE:	JANUARY 2017
DRAWN BY:	PWC/TGJ
DWG SCALE:	AS SHOWN
CHECKED BY:	ARG
PROJECT NO:	161-104-CV01
APPROVED BY:	*HAND SIGNATURE ON FILE
	*GSL

DRAWING NO.:
C902

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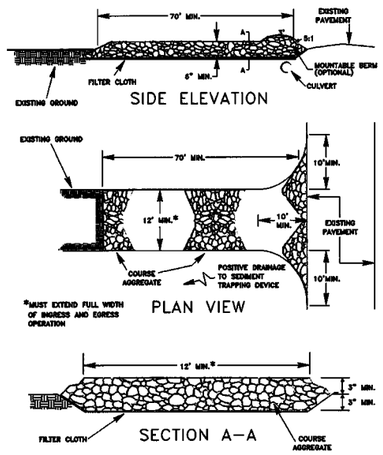
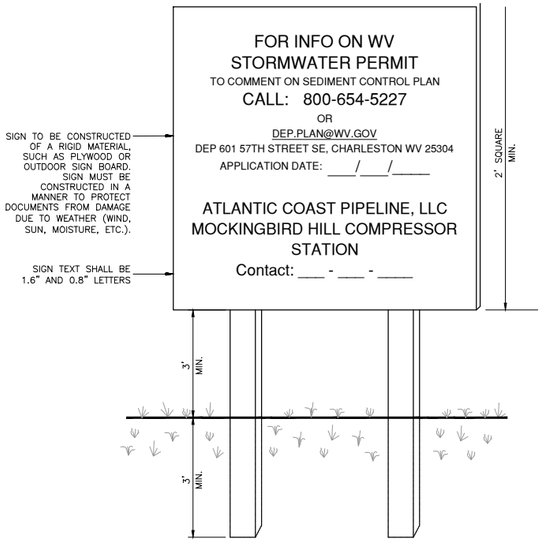
STONE CONSTRUCTION ENTRANCE



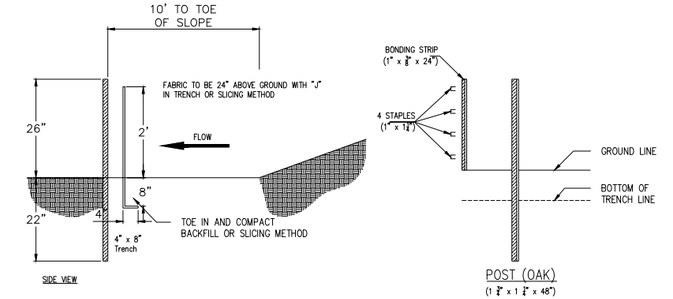
DETAIL 1
ROCK CONSTRUCTION ENTRANCE/EXIT
NOT TO SCALE

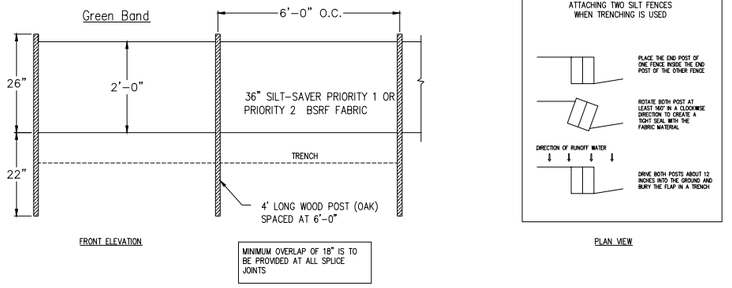


NOTES:

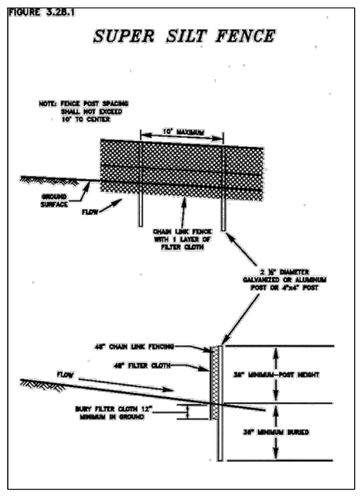
1. THE WV STORMWATER PERMIT SIGN MUST BE LOCATED NEAR THE CONSTRUCTION ENTRANCE OF THE SITE, SUCH THAT IT IS ACCESSIBLE AND VIEWABLE BY THE GENERAL PUBLIC, BUT NOT OBSTRUCTING VIEWS AS TO CAUSE A SAFETY HAZARD.
2. ALL POSTED DOCUMENTS MUST BE MAINTAINED IN A CLEARLY READABLE CONDITION AT ALL TIMES THROUGHOUT CONSTRUCTION AND UNTIL THE NOTICE-OF-TERMINATION (N.O.T.) IS FILED FOR THE PERMIT.
3. CONTRACTOR SHALL POST OTHER STORMWATER AND/OR EROSION AND SEDIMENTATION CONTROL RELATED PERMITS ON THE SIGN AS REQUIRED BY THE GOVERNING AGENCY.
4. SIGN SHALL BE LOCATED OUTSIDE OF PUBLIC RIGHT-OF-WAY AND EASEMENTS UNLESS APPROVED BY THE GOVERNING AGENCY.
5. CONTRACTOR IS RESPONSIBLE FOR ENSURING STABILITY OF THE WV STORMWATER PERMIT SIGN.

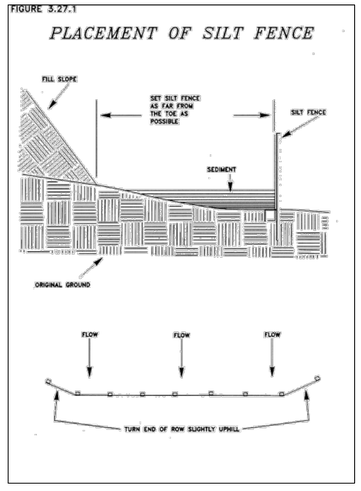
DETAIL 2
WV STORMWATER PERMIT SIGN
NOT TO SCALE



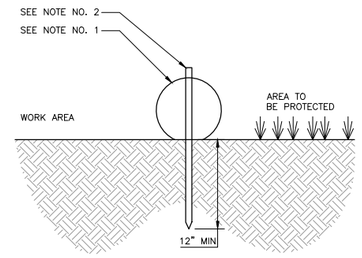


DETAIL 3
BELTED SILT RETENTION FENCE
NOT TO SCALE

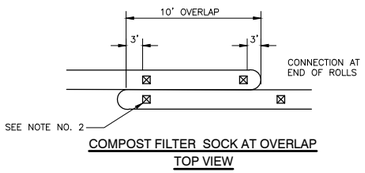




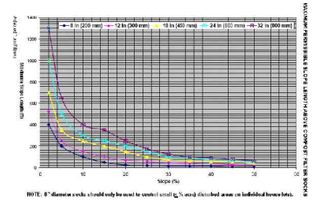
DETAIL 4
SUPER SILT FENCE
NOT TO SCALE



CROSS SECTION VIEW



COMPOST FILTER SOCK AT OVERLAP
TOP VIEW



NOTE: 8" diameter socks should only be used to control small (< ¼ acre) disturbed areas on individual house lots.

COMPOST FILTER SOCK SIZING TABLE

SOCK NAME	SIZE
A	32

NOTES:

1. ALL MATERIAL TO MEET WVDEP SPECIFICATIONS.
2. STAKES SHALL BE INSTALLED THROUGH THE MIDDLE OF THE COMPOST FILTER SOCK ON 10 FOOT CENTERS, USING 2-INCH BY 2-INCH WOODEN STAKES.
3. COMPOST MATERIAL TO BE DISPERSED ON SITE AS DETERMINED BY ENGINEER.

DETAIL 5
COMPOST FILTER SOCK
NOT TO SCALE

GREGORY S. LINDER
REGISTERED
15629
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER
1-31-2017

REVISION RECORD

NO	DATE	DESCRIPTION

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SUPPLY HEADER PROJECT
MOCKINGBIRD HILL
COMPRESSOR STATION
WETZEL COUNTY, WEST VIRGINIA

EROSION AND SEDIMENT CONTROL DETAILS

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DWG SCALE:	AS SHOWN
CHECKED BY:	ARG
PROJECT NO:	161-104-CV01
APPROVED BY:	*HAND SIGNATURE ON FILE
	*GSL

DRAWING NO.:
C903

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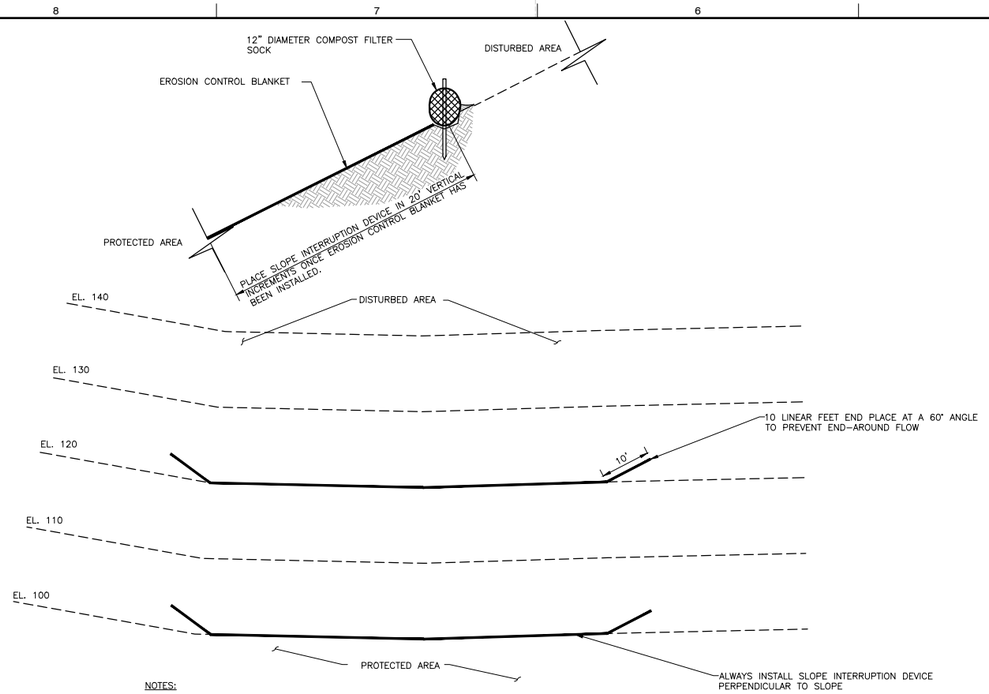
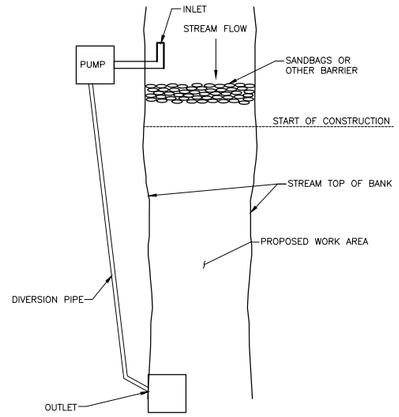


NOTES:

1. SEE COMPOST FILTER SOCK DETAIL FOR SPECIFICATIONS AND INSTALLATION REQUIREMENTS.
2. MAINTENANCE SHALL BE IN ACCORDANCE WITH THE COMPOST FILTER SOCK REQUIREMENTS.

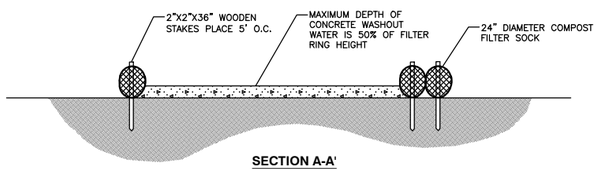
DETAIL 6
SLOPE INTERRUPTION DEVICE
NOT TO SCALE



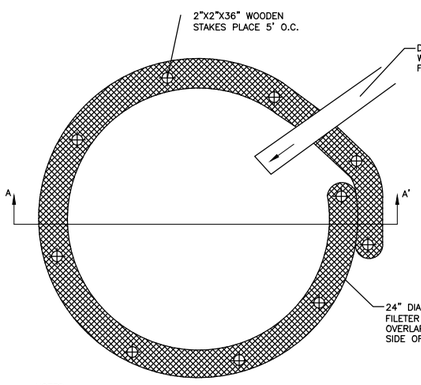
NOTES:

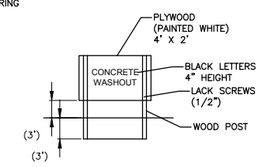
1. CONSTRUCTION ACTIVITIES WITHIN THE STREAM CHANNEL SHOULD BE CONDUCTED DURING LOW FLOW CONDITIONS.
2. PROPERLY ALIGN DIVERSION PIPE TO PREVENT BANK EROSION OR STREAM BED SCOUR.
3. PUMP TO BE PROPERLY SIZED TO CONVEY STREAM FLOWS THROUGHOUT CONSTRUCTION.

DETAIL 6A
COFFER DAM AND PUMP BYPASS
NOT TO SCALE



SECTION A-A'



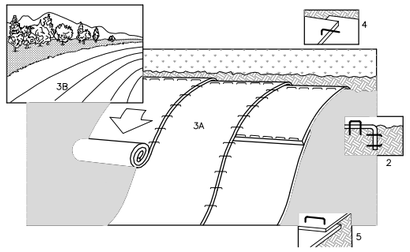


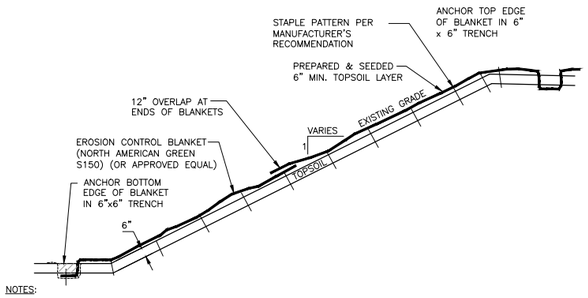
CONCRETE WASHOUT SIGN DETAIL (OR EQUIVALENT)

NOTES:

1. ACTUAL LAYOUT DETERMINED IN THE FIELD.
2. THE CONCRETE WASHOUT SIGN SHALL BE INSTALLED WITHIN 30' OF THE TEMPORARY CONCRETE WASHOUT FACILITY.
3. INSTALL ON FLAT GRADE FOR OPTIMUM PERFORMANCE
4. 18" DIAMETER FILTER SOCK MAY BE STACKED ONTO DOUBLE 24" DIAMETER SOCKS IN PYRAMIDAL CONFIGURATION FOR ADDED HEIGHT.

DETAIL 7
TEMPORARY CONCRETE WASHOUT FACILITY
NOT TO SCALE





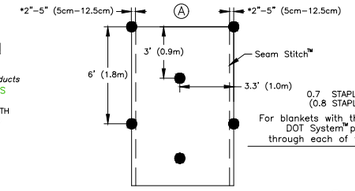
NOTES:

1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING APPLICATION OF LIME, FERTILIZER, AND SEED.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE BLANKET IN 6" DEEP X 6" WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
3. ROLL THE BLANKETS (A.) DOWN OR (B.) HORIZONTALLY ACROSS THE SLOPE.
4. THE EDGES OF PARALLEL BLANKETS MUST BE STAPLED WITH APPROXIMATELY 2" OVERLAP.
5. WHEN BLANKETS MUST BE SPLICED DOWN THE SLOPE, PLACE BLANKETS END OVER END (SHINGLE STYLE) WITH APPROXIMATELY 12" OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" APART.
6. EROSION CONTROL BLANKETS SHALL BE INSTALLED ON ALL 3:1 OR STEEPER SLOPES.
7. REFER TO DETAIL, THIS SHEET FOR STAPLE PATTERN.

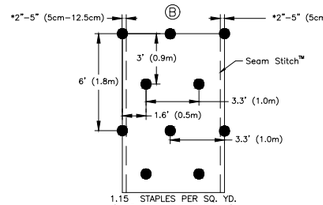
DETAIL 8
EROSION CONTROL BLANKET
NOT TO SCALE

NORTH AMERICAN GREEN
EROSION CONTROL *Products Guaranteed* SOLUTIONS
14649 HIGHWAY 41 NORTH
EVANSVILLE, IN 47725
800-772-2040
www.nagreen.com

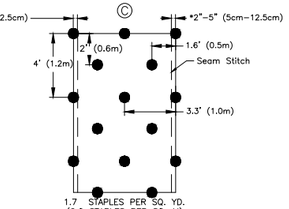
DOT SYSTEM STAPLE PATTERN GUIDE



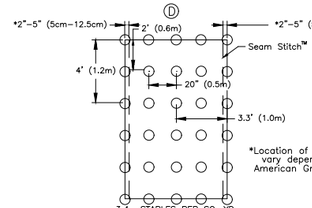
0.7 STAPLES PER SQ. YD. (0.8 STAPLES PER SQ. M)
For blankets with the North American Green DOT System™ place staples/stakes through each of the BLUE colored dots.



1.15 STAPLES PER SQ. YD. (1.35 STAPLES PER SQ. M)
For blankets with the North American Green DOT System™ place staples/stakes through each of the RED colored dots.

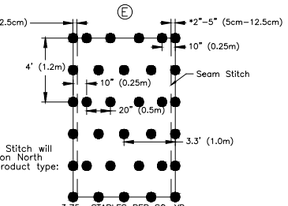


1.7 STAPLES PER SQ. YD. (2.0 STAPLES PER SQ. M)
For blankets with the North American Green DOT System™ place staples/stakes through each of the GREEN colored dots.



3.4 STAPLES PER SQ. YD. (4.1 STAPLES PER SQ. M)
For blankets with the North American Green DOT System™ place staples/stakes through each of the WHITE colored dots.

*Location of Seam Stitch will vary depending on North American Green product type:



3.75 STAPLES PER SQ. YD. (4.5 STAPLES PER SQ. M)
For blankets with the North American Green DOT System™ place staples/stakes through each of the YELLOW colored dots.

DETAIL 9
EROSION CONTROL BLANKET STAPLE PATTERN
NOT TO SCALE

GREGORY S. LINDER REGISTERED 15629 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
1-31-2017

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DWG SCALE:	AS SHOWN
PROJECT NO:	161-104-CV01
APPROVED BY:	*HAND SIGNATURE ON FILE *GSL

DRAWING NO.:
C904

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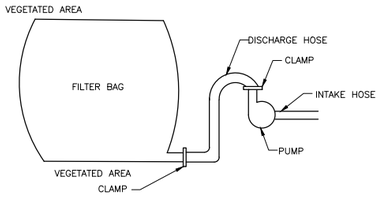
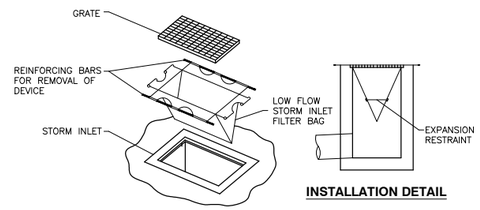


PLAN VIEW

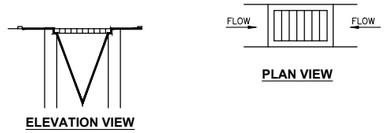
NOTES:

1. FILTER BAGS MAY BE USED TO FILTER WATER PUMPED FROM DISTURBED AREAS SUCH AS UTILITY TRENCHES AND FOOTERS.
2. FILTER BAGS SHALL BE MADE FROM NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH DOUBLE STITCHED "J" TYPE SEEMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS.
3. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME 1/2 FULL. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE FILLED OR FAILED. FILTER BAGS WILL BE DISPOSED OF AT A WVDEP APPROVED FACILITY.
4. BAGS SHALL BE LOCATED IN WELL VEGETATED (GRASSY) AREAS, AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE LINED FLOW PATH SHALL BE PROVIDED. BAGS SHALL NOT BE PLACED ON SLOPES GREATER THAN 5 PERCENT.
5. THE PUMP RATE SHALL BE NO GREATER THAN 750 GPM OR 1/2 THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHOULD BE FLOATING AND SCREENED.
6. FILTER BAGS SHALL BE INSPECTED DURING PUMPING OPERATIONS AND ANY CORRECTIVE ACTION REQUIRED SHALL BE DONE IMMEDIATELY.

DETAIL 10
GEOTEXTILE FILTER BAG
NOT TO SCALE



INSTALLATION DETAIL



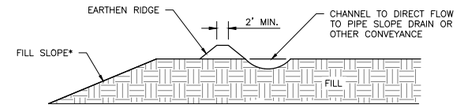
PLAN VIEW

ELEVATION VIEW

NOTES:

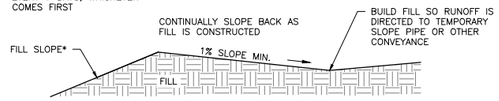
1. AS AN ALTERNATIVE, THE CONTRACTOR MAY SUBSTITUTE A COMMERCIAL GEOTEXTILE FILTER SUCH AS THE SILTSACK OR THE BEAVER DAM OR DANDY BAG MANUFACTURED BY DANDY PRODUCTS OR AN APPROVED EQUAL.
2. INLET PROTECTION TO BE LOW FLOW BAGS.

DETAIL 11
INLET PROTECTION
NOT TO SCALE



TEMPORARY BERM

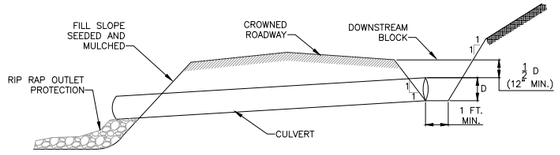
*SEED AND MULCH FILL SLOPE EVERY 10 FEET OF FILL OR EVERY 7 DAYS, WHICHEVER COMES FIRST



GRADING

BERM NUMBER	WIDTH (FT)	HEIGHT (FT)	SIDE SLOPE (_H:1V)
1	2	2.00	1.50
2	2	2.00	1.50
3	2	2.00	1.50

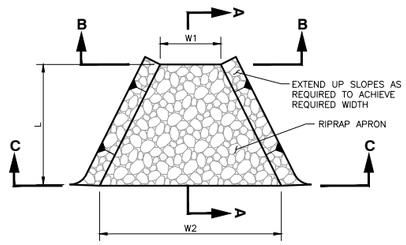
DETAIL 12
PERIMETER BERM
NOT TO SCALE



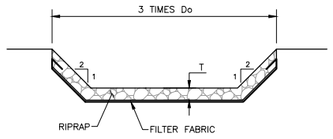
SECTION VIEW

NOTES:

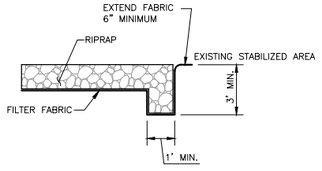
1. CUT AND FILL SLOPES SHALL BE STABILIZED IMMEDIATELY UPON COMPLETION OF ROADWAY GRADING. THESE AREAS SHALL BE BLANKETED WHEREVER THEY ARE LOCATED WITHIN 50 FEET OF A SURFACE WATER OR WITHIN 100 FEET OF AN HQ OR EV SURFACE WATER OR WHERE A SUITABLE VEGETATIVE FILTER STRIP DOES NOT EXIST.
2. A TOP DRESSING COMPOSED OF HARD, DURABLE STONE SHALL BE PROVIDED FOR SOILS HAVING LOW STRENGTH.
3. ROADSIDE DITCHES SHALL BE PROVIDED WITH ADEQUATE PROTECTIVE LINING WHEREVER RUNOFF CANNOT SHEET FLOW AWAY FROM THE ROADWAY.
4. ADEQUATELY SIZED CULVERTS OR OTHER SUITABLE CROSS DRAINS SHALL BE PROVIDED AT ALL SEEPS, SPRINGS, AND DRAINAGE COURSES. DITCH RELIEF CULVERTS OR TURNOUTS SHALL BE PROVIDED AT THE INTERVALS INDICATED ON TABLE 3.3 OR TABLE 3.4 OF THE PA DEP EROSION CONTROL MANUAL FOR ROADSIDE DITCHES. RIPRAP OUTLET PROTECTION TO BE SIZED ACCORDING TO ANTICIPATED DISCHARGE VELOCITY.
5. ROADWAY SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED ROADWAYS, DITCHES, OR CROSS DRAINS SHALL BE REPAIRED IMMEDIATELY.



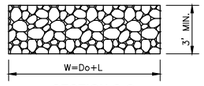
PLAN VIEW



SECTION B-B



SECTION A-A



SECTION C-C

RIPRAP APRON						
NUMBER	W1 (FT)	W2 (FT)	L (FT)	D50 (IN)	D_{MAX} (IN)	T (IN)
2	3.75	10.25	9	3	6	8
3	3.75	10.25	9	3	6	8
4	3.00	9.00	8	3	6	8
5	3.00	7.00	6	3	6	8
6	3.00	7.00	6	3	6	8
7	3.00	7.00	6	3	6	8
8	3.00	7.00	6	3	6	8
9	3.75	9.25	8	9	18	27
10	3.00	7.00	6	6	12	18
11	3.00	7.00	6	6	12	18
13	3.00	7.00	6	3	6	8
14	4.50	10.50	9	9	18	27
15	4.50	10.50	9	6	12	18
16	3.00	7.00	6	6	12	18
18	3.00	7.00	6	3	6	8
19	3.75	10.25	9	3	6	8
20	3.00	11.00	10	3	6	8
21	3.00	7.00	6	3	6	8
22	3.00	7.00	6	3	6	8
23	3.75	9.25	8	6	12	18
24	3.00	7.00	6	6	12	18

CULVERTS						
NUMBER	DIAMETER (IN)	LENGTH (LF)	SLOPE (%)	INVERT UP (FT)	INVERT DOWN (FT)	MATERIAL
1	18	109	2.05	924.63	922.40	HDPE
2	18	43	1.92	924.63	923.80	HDPE
3	15	19	14.11	933.05	930.40	HDPE
4	15	46	2.10	914.48	913.50	RCP
6	15	21	8.99	943.46	941.60	HDPE
7	15	26	10.71	960.00	957.21	HDPE
8*	24	215	18.12	944.93	905.60	HDPE

*CULVERT SHALL BE EMBEDDED IN CHANNEL 4.8"

* RIPRAP APRON LENGTHS REPRINTED IN THIS TABLE ARE MINIMUM REQUIRED BY DEP. REFER TO PLAN DRAWING FOR ACTUAL LENGTHS TO BE CONSTRUCTED WITH THIS PROJECT.

DETAIL 14
RIPRAP APRON AND CULVERT
NOT TO SCALE

REVISION RECORD

NO	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
600 Marketplace Ave · Suite 200 · Bridgeport, WV 26330
Ph: 304.933.3119 · 855.488.9539 · Fax: 304.933.3327
www.cecinc.com

SUPPLY HEADER PROJECT
MOCKINGBIRD HILL
COMPRESSOR STATION
WETZEL COUNTY, WEST VIRGINIA

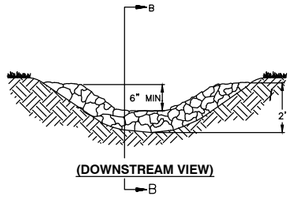
EROSION AND SEDIMENT CONTROL DETAILS

DATE:	JANUARY 2017	DRAWN BY:	PWC/TGJ
DWG SCALE:	AS SHOWN	CHECKED BY:	ARG
PROJECT NO:		161-104-CV01	
APPROVED BY:	*HAND SIGNATURE ON FILE		*GSL

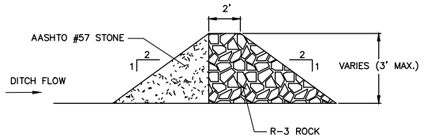
DRAWING NO.:
C905

GREGORY S. LINDER REGISTERED 15620 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
1-31-2017

P:\2016\161-104\-CADD\Dwg\CV01\161104-CV01-DET.dwg[D905] LS(12/20/2016 - Johnston) - LP: 1/31/2017 4:57 PM



(DOWNSTREAM VIEW)

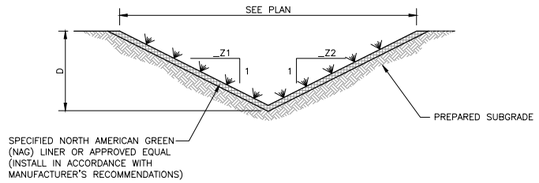


ELEVATION B

NOTES:

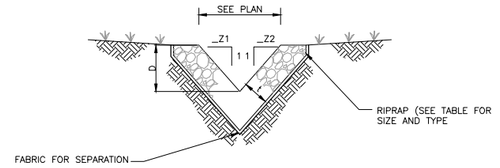
1. SEDIMENT MUST BE REMOVED WHEN ACCUMULATIONS REACH 1/2 THE HEIGHT OF THE FILTERS.
2. IMMEDIATELY UPON STABILIZATION OF EACH CHANNEL, REMOVE ACCUMULATED SEDIMENT, REMOVAL ROCK FILTER, AND STABILIZE DISTURBED AREAS.
3. THE MAXIMUM SPACING BETWEEN THE DAMS SHOULD BE SUCH THAT THE TOE OF THE UPSTREAM DAM IS AT THE SAME ELEVATION AS THE TOP OF THE DOWNSTREAM DAM. THE MAXIMUM DISTANCE BETWEEN ROCK CHECK DAMS IS 300 FEET.

DETAIL 15
ROCK CHECK DAM
NOT TO SCALE



CHANNEL NO.	DEPTH D (FT)	_Z1	_Z2	LINING TYPE
1	1.5	4	4	P300
4	1	10	10	P300
5	1.5	2	2	P300
6	1.5	8	8	P300
10	1	4	4	P300
11	1.5	4	4	P300
12-A	2	2	2	P300
12-B	2	2	2	P300
17	1	1.5	1.5	P300
21	2	1.5	2	P300

DETAIL 16
TEMPORARY/PERMANENT CHANNELS
NOT TO SCALE



(LOOKING DOWNSTREAM)

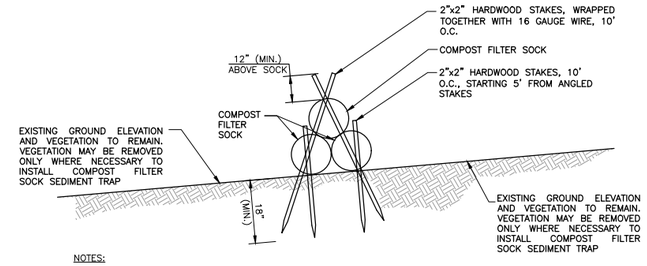
CHANNEL CROSS-SECTION

CHANNEL NO.	DEPTH D (FT)	_Z1	_Z2	TYPE
2	1.5	4	4	R-4
3	1.5	2	2	R-4
7	2	2	2	R-5
8	2	2	2	R-4
9	2	2	2	R-4
13	2	1	1	R-6
14	2	2	2	R-5
15	1	2	2	R-5
16	1	2	2	R-5
18	1	2	2	R-5
19	2	2	2	R-6
20	2	2	2	R-5

NOTES:

1. FILTER STONE UNDERLAYMENT FOR BED SLOPES ≥ 0.10 FT/FT (10 %) SHALL BE USED.
2. CHANNEL DIMENSIONS ARE FOR THE COMPLETED CHANNEL AFTER ROCK PLACEMENT. CHANNEL MUST BE OVER-EXCAVATED A SUFFICIENT AMOUNT TO ALLOW FOR THE VOLUME OF ROCK PLACED WITHIN THE CHANNEL WHILE PROVIDING THE SPECIFIED FINISHED DIMENSIONS.
3. CHANNEL DIMENSIONS SHALL BE CONSTANTLY MAINTAINED. CHANNEL SHALL BE CLEANED WHENEVER TOTAL CHANNEL DEPTH IS REDUCED BY 25% AT ANY LOCATION. SEDIMENT DEPOSITS SHALL BE REMOVED WITHIN 24 HOURS OF DISCOVERY OR AS SOON AS SOIL CONDITIONS PERMIT ACCESS TO CHANNEL WITHOUT FURTHER DAMAGE.
4. DAMAGED LINING SHALL BE REPAIRED OR REPLACED WITHIN 48 HOURS OF DISCOVERY.
5. THE MINIMUM ROCK THICKNESS (t) SHALL BE 1.5 TIMES THE MAX ROCK SIZE.

DETAIL 17
RIPRAP CHANNEL
NOT TO SCALE

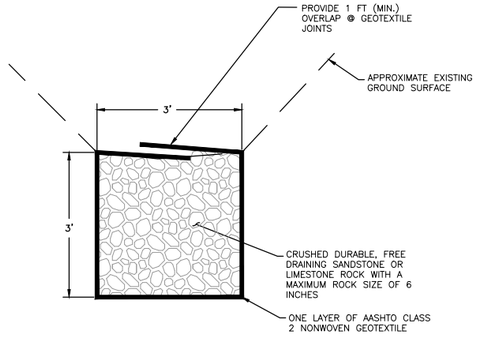


NOTES:

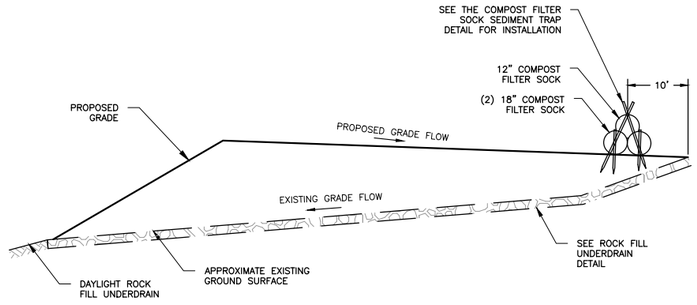
1. CONTRACTOR TO CLEAR ONLY THE VEGETATION REQUIRED TO PLACE THE FILTER SOCKS. ALL OTHER VEGETATION TO REMAIN.
2. SEE COMPOST FILTER SOCK DETAIL FOR SPECIFICATIONS.
3. SEDIMENT TRAP SHALL BE CONSTRUCTED SO THAT THE MINIMUM BASE WIDTH IS EQUIVALENT TO THE HEIGHT (1H:1V).
4. SOCKS SHALL BE A LARGER DIAMETER AT THE BASE OF THE SEDIMENT TRAP AND DECREASE IN DIAMETER FOR SUCCESSIVE LAYERS.
5. ENDS OF THE SEDIMENT TRAP SHALL BE A MINIMUM 1 FT. HIGHER IN ELEVATION THAN THE MID-SECTION, WHICH SHALL BE AT THE LOWEST ELEVATION.
6. COMPOST SHALL MEET THE COMPOST STANDARDS TABLE PROVIDED IN THE COMPOST FILTER SOCK DETAIL.
7. COMPOST SOCK SEDIMENT TRAPS SHALL NOT EXCEED THREE SOCKS IN HEIGHT AND SHALL BE STACKED IN PYRAMIDAL FORM AS SHOWN ABOVE. MINIMUM TRAP HEIGHT IS ONE 24" DIAMETER SOCK. ADDITIONAL STORAGE MAY BE PROVIDED BY MEANS OF AN EXCAVATED SUMP 12" DEEP EXTENDING 1 TO 3 FEET UPSLOPE OF THE SOCKS ALONG THE LOWER SIDE OF THE TRAP.
8. COMPOST SOCK SEDIMENT TRAPS SHALL PROVIDE 2,000 CUBIC FEET STORAGE CAPACITY WITH 12" FREEBOARD FOR EACH TRIBUTARY DRAINAGE ACRE.
9. THE MAXIMUM TRIBUTARY DRAINAGE AREA IS 5.0 ACRES. SINCE COMPOST SOCKS ARE "FLOW THROUGH", NO SPILLWAY IS REQUIRED.

TRAP	BOTTOM LAYER	TOP LAYER
1	32" (2)	18" (1)

DETAIL 18
COMPOST FILTER SOCK SEDIMENT TRAP
NOT TO SCALE



DETAIL 19
ROCK FILL UNDERDRAIN
NOT TO SCALE



DETAIL 20
FILL WITH ROCK FILL UNDERDRAIN
NOT TO SCALE

GREGORY S. LINDER REGISTERED 15620 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER
1-31-2017

REVISION RECORD

NO.	DATE	DESCRIPTION

Civil & Environmental Consultants, Inc.
600 Marketplace Ave · Suite 200 · Bridgeport, WV 26330
Ph: 304.933.3119 · 855.488.9539 · Fax: 304.933.3327
www.cecinc.com

SUPPLY HEADER PROJECT
MOCKINGBIRD HILL
COMPRESSOR STATION
WETZEL COUNTY, WEST VIRGINIA

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PROJECT NO:			161-104-CV01
APPROVED BY:	*HAND SIGNATURE ON FILE		*GSL

DRAWING NO.:
C906

P:\2016\161-104\-CADD\Dwg\CV01\161104-C001-C901.dwg[C906] 1/12/2017 - Johnston - LP: 1/31/2017 4:57 PM

NOAA Atlas 14, Volume 2, Version 3
Location name: Pine Grove, West Virginia, US*
Latitude: 39.5518°, Longitude: -80.6633°
Elevation: 931 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.335 (0.303–0.374)	0.402 (0.363–0.449)	0.482 (0.435–0.537)	0.544 (0.489–0.605)	0.622 (0.558–0.691)	0.681 (0.608–0.755)	0.738 (0.657–0.817)	0.796 (0.705–0.880)	0.872 (0.768–0.964)	0.929 (0.814–1.03)
10-min	0.521 (0.470–0.582)	0.627 (0.567–0.701)	0.748 (0.676–0.834)	0.839 (0.755–0.934)	0.951 (0.853–1.06)	1.03 (0.922–1.15)	1.11 (0.989–1.23)	1.19 (1.05–1.31)	1.28 (1.13–1.42)	1.35 (1.18–1.50)
15-min	0.639 (0.576–0.713)	0.767 (0.693–0.857)	0.919 (0.830–1.02)	1.03 (0.929–1.15)	1.17 (1.05–1.31)	1.28 (1.14–1.42)	1.38 (1.23–1.53)	1.48 (1.31–1.63)	1.60 (1.41–1.77)	1.69 (1.48–1.87)
30-min	0.845 (0.762–0.943)	1.03 (0.927–1.15)	1.26 (1.14–1.40)	1.43 (1.29–1.60)	1.66 (1.49–1.84)	1.83 (1.63–2.03)	1.99 (1.77–2.21)	2.16 (1.91–2.39)	2.37 (2.09–2.62)	2.53 (2.22–2.80)
60-min	1.03 (0.931–1.15)	1.26 (1.14–1.41)	1.58 (1.43–1.76)	1.82 (1.64–2.03)	2.15 (1.93–2.39)	2.41 (2.15–2.67)	2.66 (2.37–2.95)	2.93 (2.59–3.24)	3.28 (2.89–3.63)	3.56 (3.12–3.94)
2-hr	1.20 (1.07–1.34)	1.45 (1.30–1.63)	1.82 (1.63–2.04)	2.11 (1.88–2.36)	2.50 (2.22–2.79)	2.81 (2.48–3.13)	3.13 (2.76–3.48)	3.45 (3.03–3.84)	3.90 (3.40–4.33)	4.26 (3.69–4.72)
3-hr	1.28 (1.15–1.43)	1.55 (1.40–1.74)	1.95 (1.75–2.17)	2.25 (2.01–2.51)	2.68 (2.38–2.98)	3.01 (2.67–3.35)	3.37 (2.97–3.73)	3.74 (3.28–4.13)	4.25 (3.69–4.68)	4.66 (4.03–5.14)
6-hr	1.54 (1.39–1.72)	1.86 (1.68–2.07)	2.30 (2.08–2.56)	2.67 (2.40–2.96)	3.17 (2.85–3.51)	3.59 (3.20–3.96)	4.02 (3.57–4.42)	4.48 (3.95–4.91)	5.12 (4.47–5.61)	5.65 (4.89–6.18)
12-hr	1.85 (1.68–2.04)	2.21 (2.02–2.45)	2.72 (2.47–3.00)	3.13 (2.84–3.45)	3.73 (3.36–4.09)	4.21 (3.78–4.62)	4.73 (4.22–5.17)	5.29 (4.68–5.76)	6.07 (5.32–6.61)	6.72 (5.83–7.31)
24-hr	2.17 (2.02–2.34)	2.58 (2.40–2.79)	3.13 (2.91–3.37)	3.57 (3.32–3.85)	4.20 (3.89–4.52)	4.71 (4.35–5.05)	5.24 (4.82–5.62)	5.79 (5.31–6.21)	6.56 (5.98–7.02)	7.18 (6.50–7.67)
2-day	2.54 (2.36–2.73)	3.01 (2.80–3.24)	3.61 (3.35–3.88)	4.10 (3.80–4.39)	4.77 (4.41–5.11)	5.30 (4.88–5.67)	5.85 (5.38–6.25)	6.42 (5.88–6.85)	7.20 (6.55–7.67)	7.80 (7.07–8.32)
3-day	2.73 (2.55–2.94)	3.24 (3.02–3.48)	3.86 (3.60–4.15)	4.36 (4.06–4.68)	5.05 (4.68–5.40)	5.58 (5.17–5.97)	6.13 (5.66–6.56)	6.69 (6.16–7.15)	7.45 (6.82–7.95)	8.03 (7.32–8.58)
4-day	2.93 (2.74–3.14)	3.46 (3.24–3.72)	4.12 (3.85–4.42)	4.63 (4.32–4.96)	5.33 (4.96–5.70)	5.87 (5.46–6.28)	6.42 (5.95–6.86)	6.97 (6.44–7.44)	7.70 (7.08–8.23)	8.26 (7.57–8.84)
7-day	3.59 (3.37–3.84)	4.24 (3.98–4.53)	4.97 (4.67–5.31)	5.54 (5.20–5.92)	6.29 (5.88–6.71)	6.86 (6.41–7.32)	7.42 (6.91–7.91)	7.97 (7.41–8.50)	8.69 (8.05–9.27)	9.23 (8.52–9.86)
10-day	4.17 (3.91–4.44)	4.90 (4.60–5.23)	5.70 (5.35–6.07)	6.30 (5.90–6.72)	7.09 (6.63–7.55)	7.68 (7.17–8.17)	8.25 (7.69–8.77)	8.80 (8.19–9.36)	9.51 (8.83–10.1)	10.0 (9.29–10.7)
20-day	5.92 (5.61–6.27)	6.94 (6.57–7.35)	7.94 (7.52–8.42)	8.70 (8.23–9.21)	9.65 (9.12–10.2)	10.4 (9.77–11.0)	11.0 (10.4–11.7)	11.6 (11.0–12.3)	12.4 (11.7–13.1)	13.0 (12.2–13.7)
30-day	7.54 (7.17–7.92)	8.80 (8.38–9.26)	9.97 (9.49–10.5)	10.8 (10.3–11.4)	11.9 (11.3–12.5)	12.7 (12.1–13.3)	13.4 (12.7–14.1)	14.1 (13.3–14.8)	14.9 (14.1–15.7)	15.5 (14.6–16.3)
45-day	9.73 (9.26–10.2)	11.3 (10.8–11.9)	12.7 (12.1–13.3)	13.7 (13.0–14.3)	14.9 (14.2–15.6)	15.8 (15.0–16.6)	16.6 (15.8–17.4)	17.3 (16.4–18.2)	18.2 (17.2–19.1)	18.8 (17.8–19.7)
60-day	11.8 (11.3–12.4)	13.7 (13.1–14.4)	15.3 (14.6–15.9)	16.4 (15.7–17.1)	17.7 (16.9–18.5)	18.7 (17.8–19.5)	19.6 (18.6–20.4)	20.3 (19.4–21.3)	21.2 (20.2–22.2)	21.9 (20.8–22.9)

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

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

Please refer to NOAA Atlas 14 document for more information.

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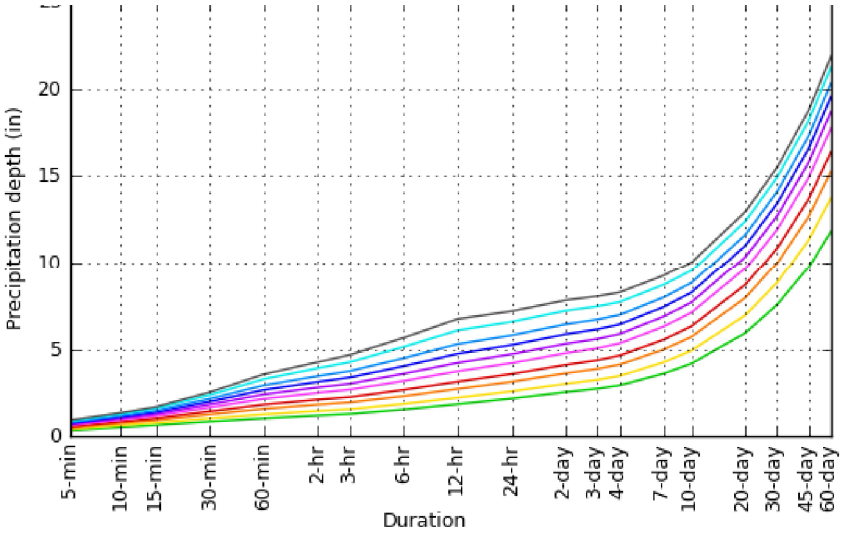
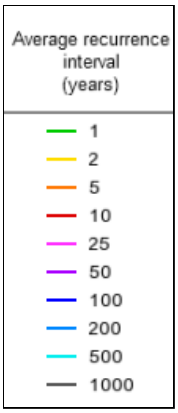
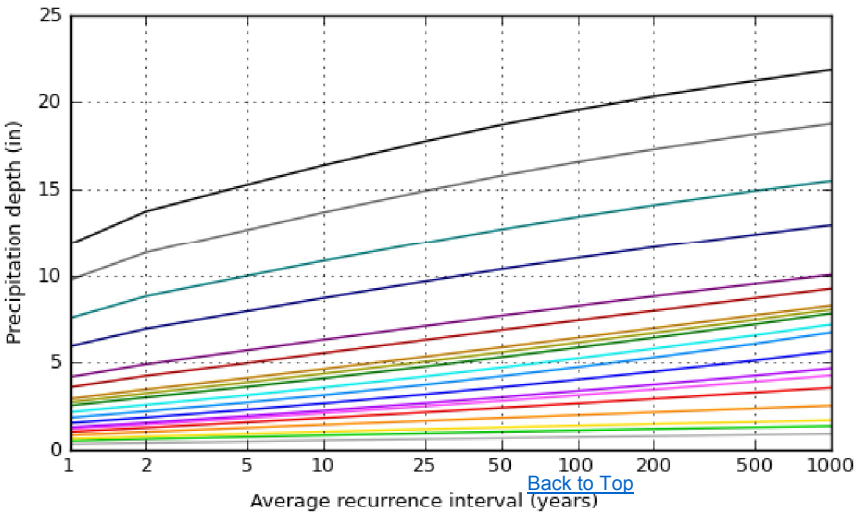
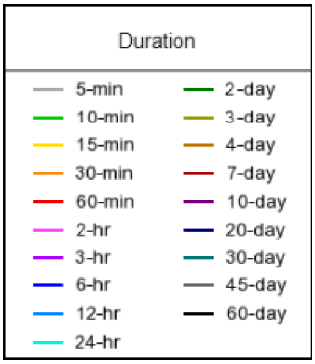
PF graphical









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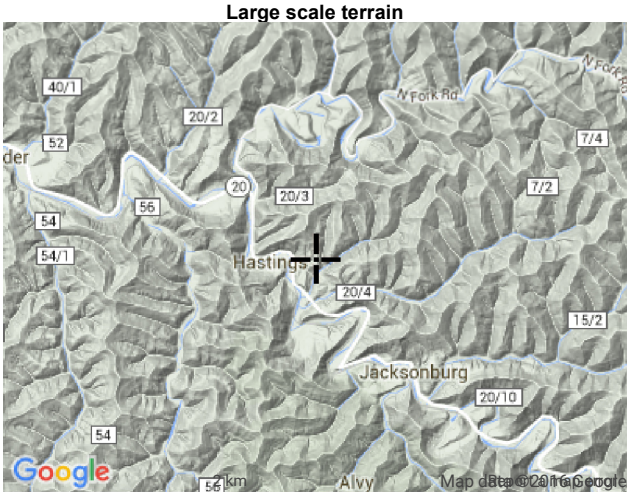
Maps & aerials

NOAA Atlas 14, Volume 2, Version 3

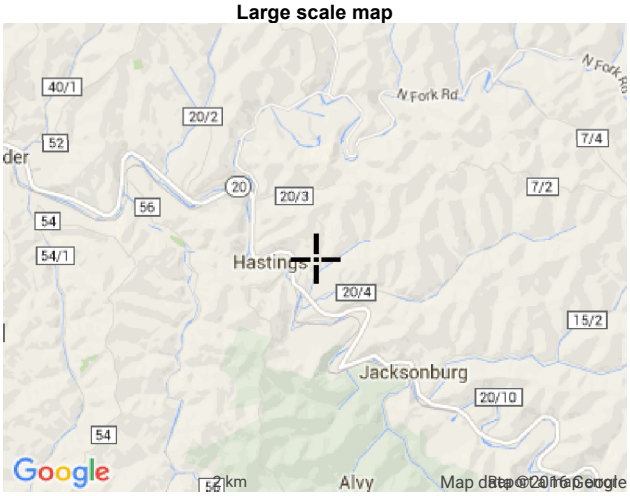
Created (GMT): Mon Jun 6 18:26:37 2016

Small scale terrain

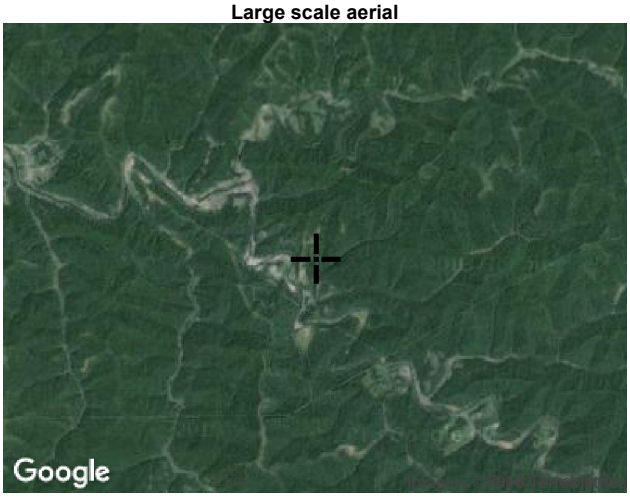
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910

Questions?: HDSC.Questions@noaa.gov

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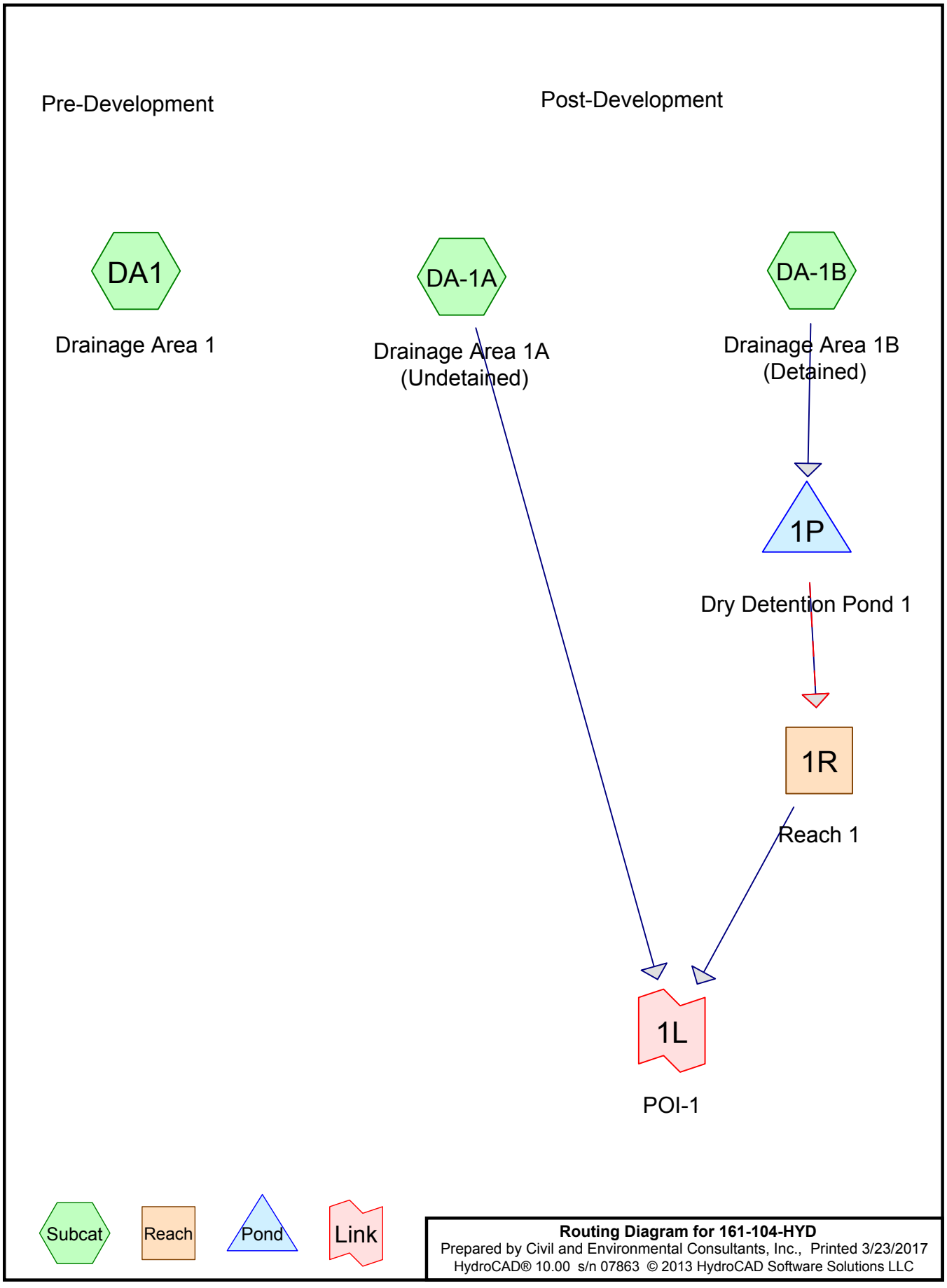

Routing Diagram for 161-104-HYD
Prepared by Civil and Environmental Consultants, Inc., Printed 3/23/2017
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Summary for Subcatchment DA-1A: Drainage Area 1A (Undetained)

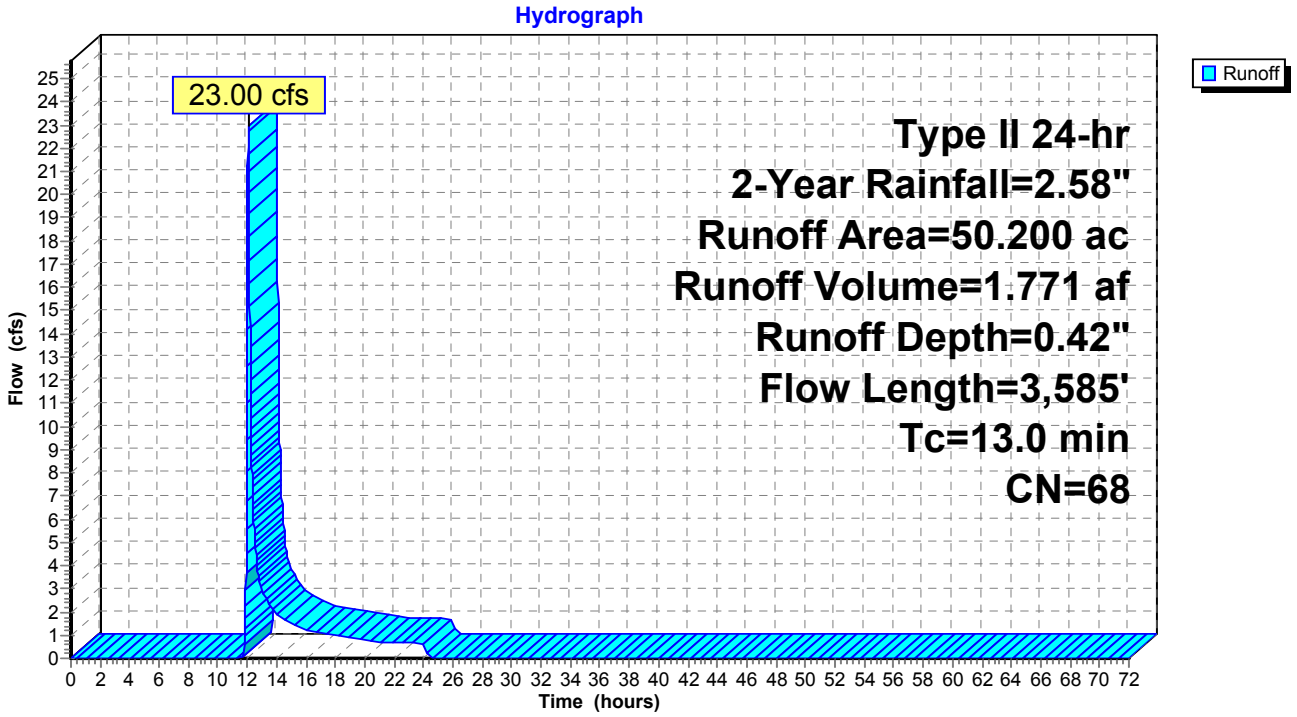
Runoff = 23.00 cfs @ 12.08 hrs, Volume= 1.771 af, Depth= 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-Year Rainfall=2.58"

Area (ac)	CN	Description
0.790	30	Meadow, non-grazed, HSG A
4.780	30	Woods, Good, HSG A
17.480	71	Meadow, non-grazed, HSG C
22.160	70	Woods, Good, HSG C
3.810	89	Gravel roads, HSG C
1.180	98	Paved parking, HSG C
50.200	68	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	100	0.2800	0.44		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.58"
2.8	500	0.3500	2.96		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.5	958	0.2400	10.41	15.62	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035 Earth, dense weeds
2.1	924	0.1000	7.30	18.25	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=4.00' D=0.50' Z= 2.0 '/' Top.W=6.00' n= 0.035 Earth, dense weeds
2.8	1,103	0.0800	6.68	20.03	**Trap/Vee/Rect Channel Flow, E-POI** Bot.W=5.00' D=0.50' Z= 2.0 '/' Top.W=7.00' n= 0.035 Earth, dense weeds
13.0	3,585	Total			

Subcatchment DA-1A: Drainage Area 1A (Undetained)



Summary for Subcatchment DA-1B: Drainage Area 1B (Detained)

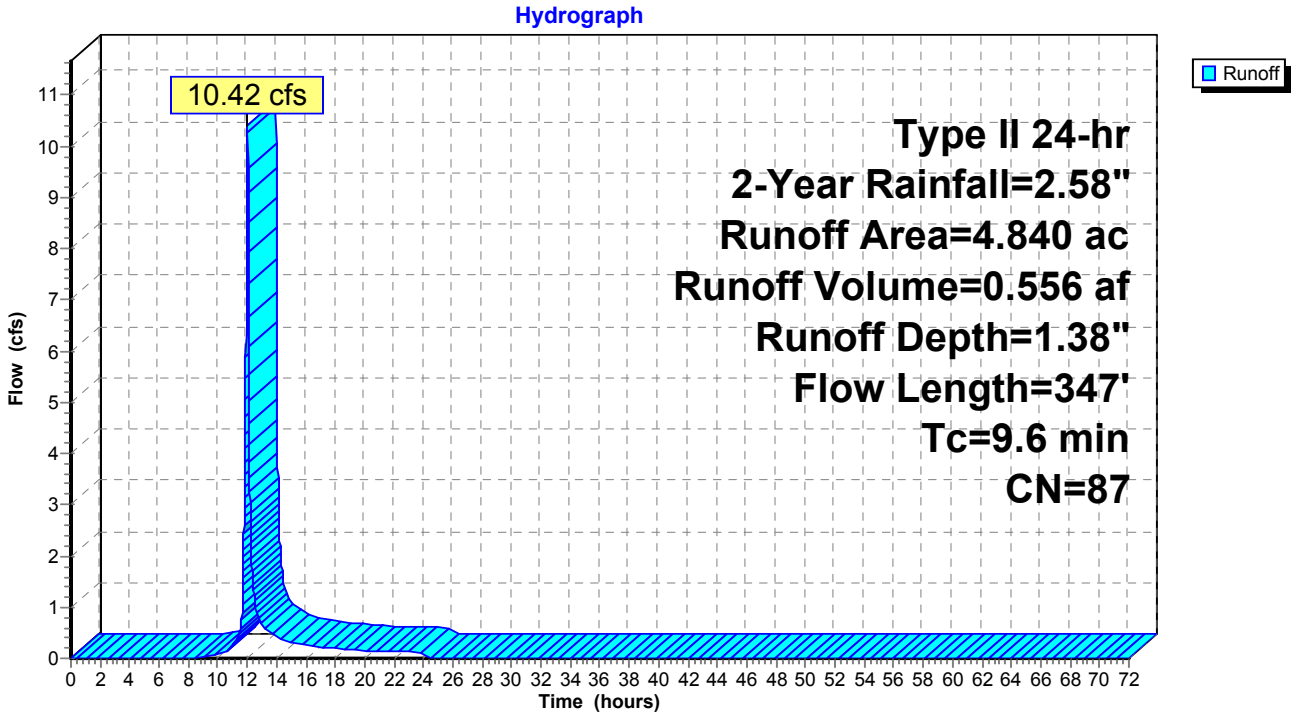
Runoff = 10.42 cfs @ 12.01 hrs, Volume= 0.556 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-Year Rainfall=2.58"

	Area (ac)	CN	Description
	1.070	71	Meadow, non-grazed, HSG C
	0.100	70	Woods, Good, HSG C
	2.490	89	Gravel roads, HSG C
*	1.180	98	Impervious
	4.840	87	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	100	0.0400	0.20		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.58"
0.5	65	0.0800	1.98		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.2	22	0.1300	1.80		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
0.4	80	0.2800	3.70		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
0.1	32	0.0900	4.69	2.35	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=0.00' D=0.50' Z= 2.0 '/' Top.W=2.00' n= 0.035 Earth, dense weeds
0.1	28	0.2100	7.17	3.58	**Trap/Vee/Rect Channel Flow, F-G** Bot.W=0.00' D=0.50' Z= 2.0 '/' Top.W=2.00' n= 0.035 Earth, dense weeds
0.0	20	0.5000	11.06	5.53	**Trap/Vee/Rect Channel Flow, G-H** Bot.W=0.00' D=0.50' Z= 2.0 '/' Top.W=2.00' n= 0.035 Earth, dense weeds
9.6	347	Total			

Subcatchment DA-1B: Drainage Area 1B (Detained)



Summary for Subcatchment DA1: Drainage Area 1

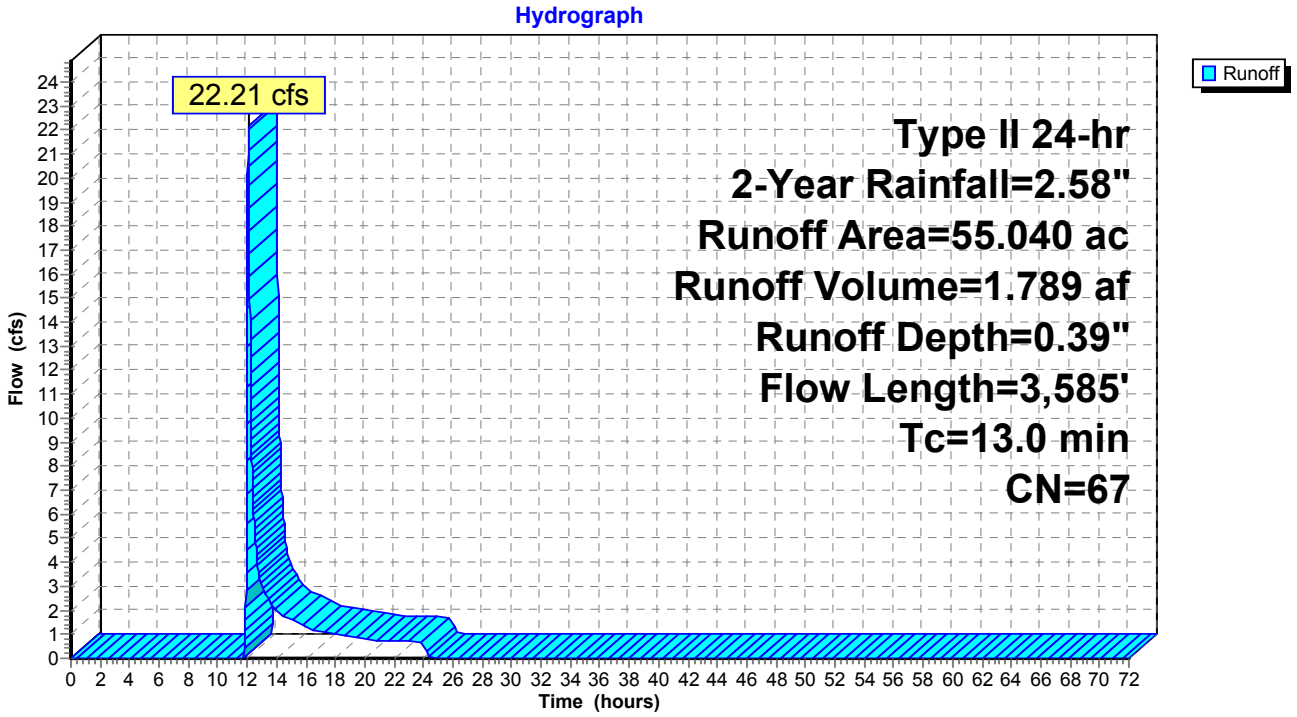
Runoff = 22.21 cfs @ 12.08 hrs, Volume= 1.789 af, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-Year Rainfall=2.58"

	Area (ac)	CN	Description
	0.790	30	Meadow, non-grazed, HSG A
	18.740	71	Meadow, non-grazed, HSG C
	4.780	30	Woods, Good, HSG A
	29.170	70	Woods, Good, HSG C
*	0.260	98	Impervious
	1.300	89	Gravel roads, HSG C
	55.040	67	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	100	0.2800	0.44		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.58"
2.8	500	0.3500	2.96		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.5	958	0.2400	10.41	15.62	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035 Earth, dense weeds
2.1	924	0.1000	7.30	18.25	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=4.00' D=0.50' Z= 2.0 '/' Top.W=6.00' n= 0.035 Earth, dense weeds
2.8	1,103	0.0800	6.68	20.03	**Trap/Vee/Rect Channel Flow, E-POI** Bot.W=5.00' D=0.50' Z= 2.0 '/' Top.W=7.00' n= 0.035 Earth, dense weeds
13.0	3,585	Total			

Subcatchment DA1: Drainage Area 1



Summary for Reach 1R: Reach 1

Inflow Area = 4.840 ac, Inflow Depth = 1.38" for 2-Year event
Inflow = 1.52 cfs @ 12.36 hrs, Volume= 0.556 af
Outflow = 1.51 cfs @ 12.51 hrs, Volume= 0.556 af, Atten= 0%, Lag= 8.6 min

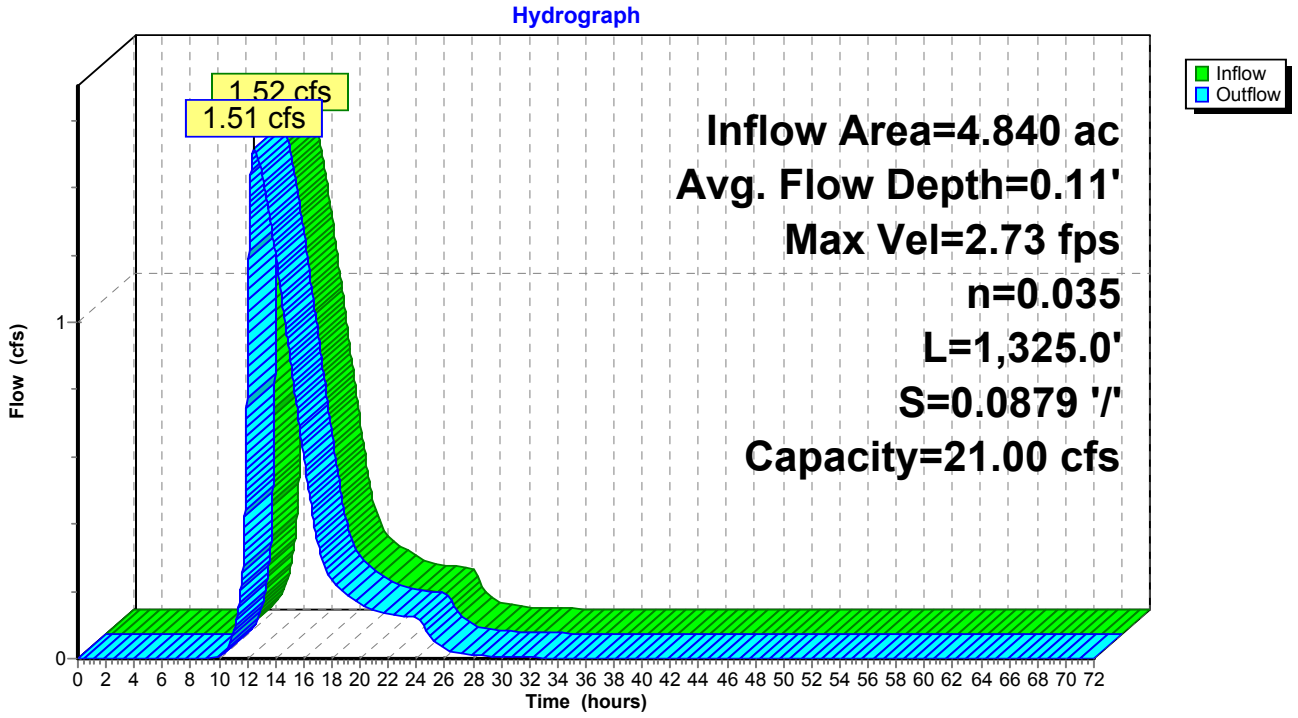
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.73 fps, Min. Travel Time= 8.1 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 34.3 min

Peak Storage= 733 cf @ 12.51 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 0.50' Flow Area= 3.0 sf, Capacity= 21.00 cfs

5.00' x 0.50' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 2.0 '/' Top Width= 7.00'
Length= 1,325.0' Slope= 0.0879 '/'
Inlet Invert= 861.10', Outlet Invert= 744.60'

‡

Reach 1R: Reach 1



Summary for Pond 1P: Dry Detention Pond 1

Inflow Area = 4.840 ac, Inflow Depth = 1.38" for 2-Year event
Inflow = 10.42 cfs @ 12.01 hrs, Volume= 0.556 af
Outflow = 1.52 cfs @ 12.36 hrs, Volume= 0.556 af, Atten= 85%, Lag= 21.0 min
Primary = 1.52 cfs @ 12.36 hrs, Volume= 0.556 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 912.83' @ 12.36 hrs Surf.Area= 4,251 sf Storage= 9,878 cf

Plug-Flow detention time= 83.1 min calculated for 0.556 af (100% of inflow)
Center-of-Mass det. time= 82.7 min (911.2 - 828.5)

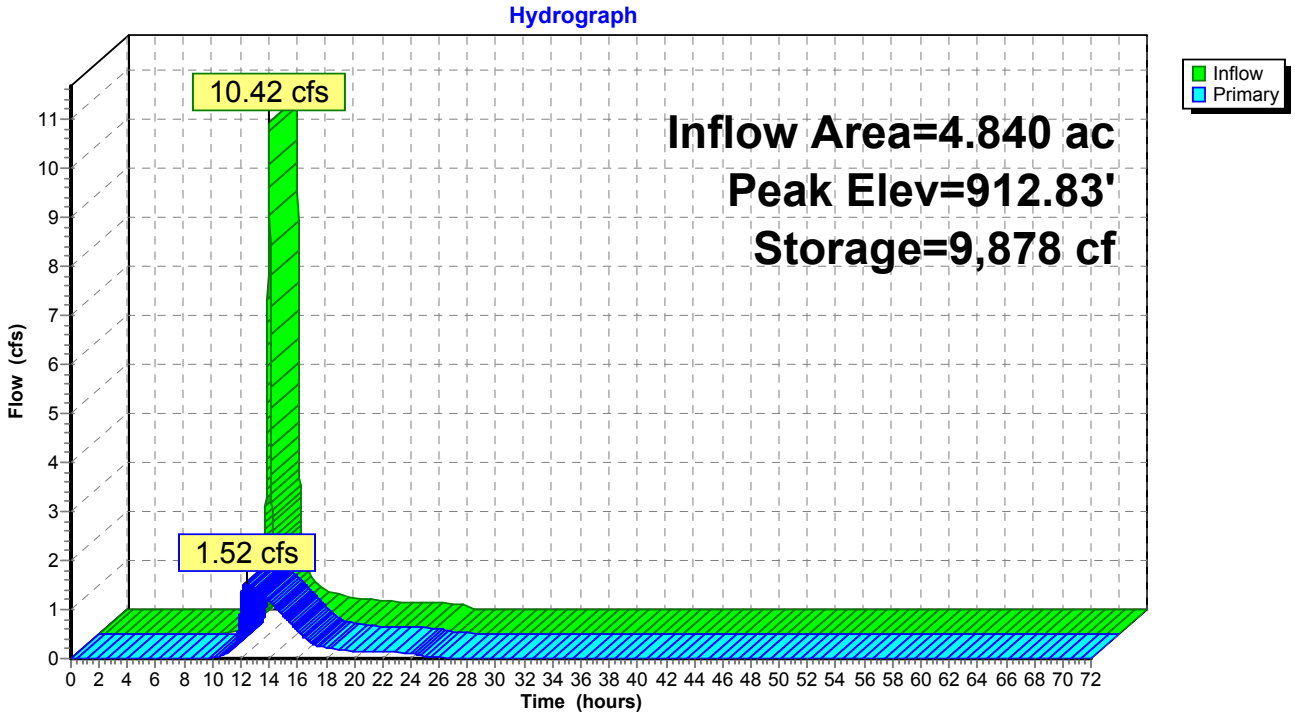
Volume	Invert	Avail.Storage	Storage Description
#1	910.00'	39,932 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
910.00	2,738	0	0
911.00	3,279	3,009	3,009
912.00	3,796	3,538	6,546
913.00	4,346	4,071	10,617
914.00	4,920	4,633	15,250
915.00	5,521	5,221	20,471
916.00	6,149	5,835	26,306
917.00	6,806	6,478	32,783
918.00	7,491	7,149	39,932

Device	Routing	Invert	Outlet Devices
#1	Primary	861.20'	**15.0" Round Culvert** L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 861.20' / 861.10' S= 0.0091 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	905.70'	**15.0" Round Culvert** L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 905.70' / 868.00' S= 0.3278 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#3	Device 2	908.90'	**15.0" Round Culvert** L= 61.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 908.90' / 908.29' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#4	Device 3	910.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#5	Device 3	913.00'	**18.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600
#6	Device 3	916.00'	**24.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.52 cfs @ 12.36 hrs HW=912.83' TW=861.21' (Dynamic Tailwater)
- **1=Culvert** (Passes 1.52 cfs of 42.20 cfs potential flow)
  - **2=Culvert** (Passes 1.52 cfs of 15.07 cfs potential flow)
    - **3=Culvert** (Passes 1.52 cfs of 10.74 cfs potential flow)
      - **4=Orifice/Grate** (Orifice Controls 1.52 cfs @ 7.73 fps)
      - **5=Orifice/Grate** (Controls 0.00 cfs)
      - **6=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Dry Detention Pond 1

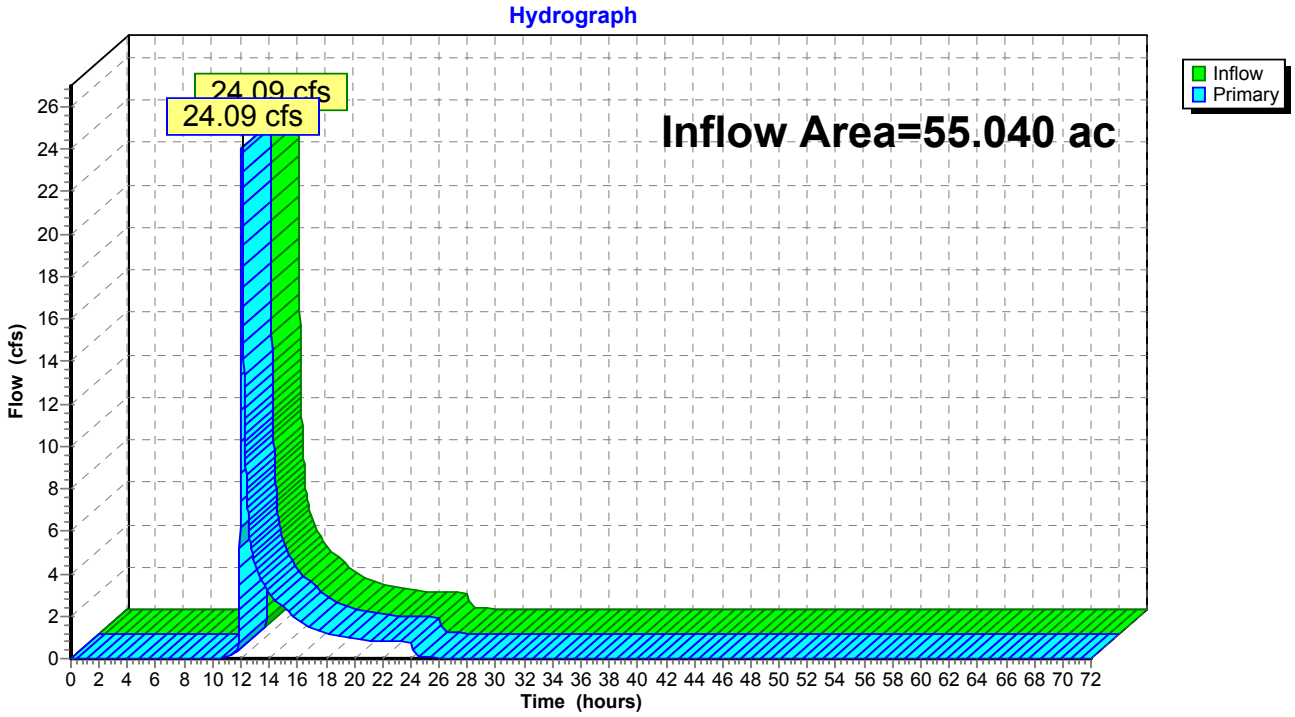


Summary for Link 1L: POI-1

Inflow Area = 55.040 ac, Inflow Depth = 0.51" for 2-Year event
Inflow = 24.09 cfs @ 12.08 hrs, Volume= 2.326 af
Primary = 24.09 cfs @ 12.08 hrs, Volume= 2.326 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: POI-1



Summary for Subcatchment DA-1A: Drainage Area 1A (Undetained)

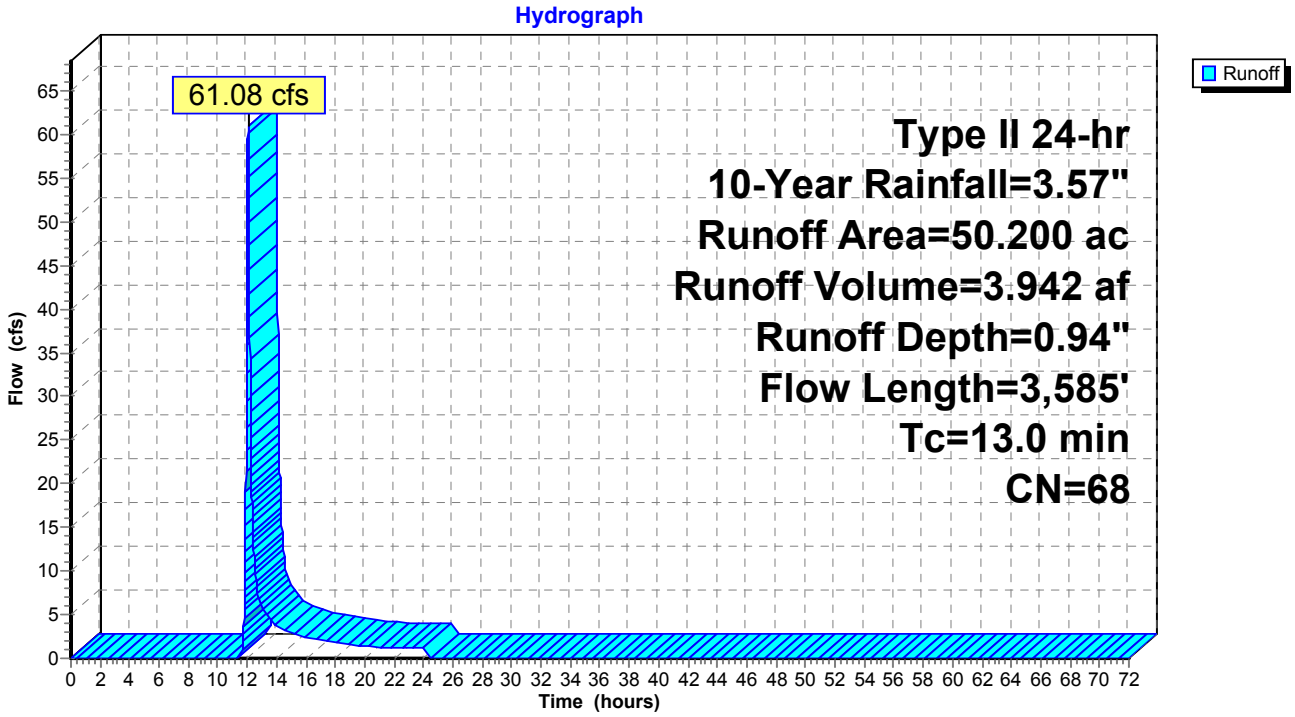
Runoff = 61.08 cfs @ 12.06 hrs, Volume= 3.942 af, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=3.57"

Area (ac)	CN	Description
0.790	30	Meadow, non-grazed, HSG A
4.780	30	Woods, Good, HSG A
17.480	71	Meadow, non-grazed, HSG C
22.160	70	Woods, Good, HSG C
3.810	89	Gravel roads, HSG C
1.180	98	Paved parking, HSG C
50.200	68	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	100	0.2800	0.44		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.58"
2.8	500	0.3500	2.96		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.5	958	0.2400	10.41	15.62	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035 Earth, dense weeds
2.1	924	0.1000	7.30	18.25	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=4.00' D=0.50' Z= 2.0 '/' Top.W=6.00' n= 0.035 Earth, dense weeds
2.8	1,103	0.0800	6.68	20.03	**Trap/Vee/Rect Channel Flow, E-POI** Bot.W=5.00' D=0.50' Z= 2.0 '/' Top.W=7.00' n= 0.035 Earth, dense weeds
13.0	3,585	Total			

Subcatchment DA-1A: Drainage Area 1A (Undetained)



Summary for Subcatchment DA-1B: Drainage Area 1B (Detained)

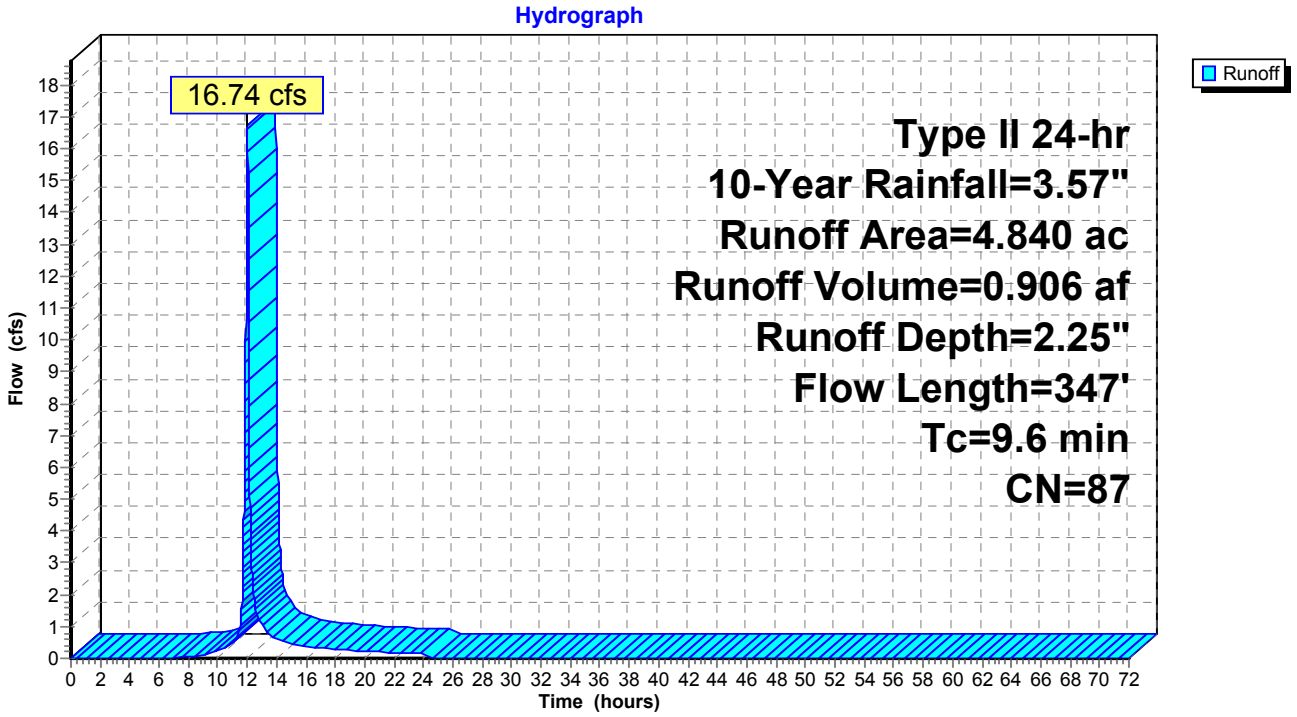
Runoff = 16.74 cfs @ 12.01 hrs, Volume= 0.906 af, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=3.57"

	Area (ac)	CN	Description
	1.070	71	Meadow, non-grazed, HSG C
	0.100	70	Woods, Good, HSG C
	2.490	89	Gravel roads, HSG C
*	1.180	98	Impervious
	4.840	87	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	100	0.0400	0.20		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.58"
0.5	65	0.0800	1.98		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.2	22	0.1300	1.80		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
0.4	80	0.2800	3.70		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
0.1	32	0.0900	4.69	2.35	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=0.00' D=0.50' Z= 2.0 '/' Top.W=2.00' n= 0.035 Earth, dense weeds
0.1	28	0.2100	7.17	3.58	**Trap/Vee/Rect Channel Flow, F-G** Bot.W=0.00' D=0.50' Z= 2.0 '/' Top.W=2.00' n= 0.035 Earth, dense weeds
0.0	20	0.5000	11.06	5.53	**Trap/Vee/Rect Channel Flow, G-H** Bot.W=0.00' D=0.50' Z= 2.0 '/' Top.W=2.00' n= 0.035 Earth, dense weeds
9.6	347	Total			

Subcatchment DA-1B: Drainage Area 1B (Detained)



Summary for Subcatchment DA1: Drainage Area 1

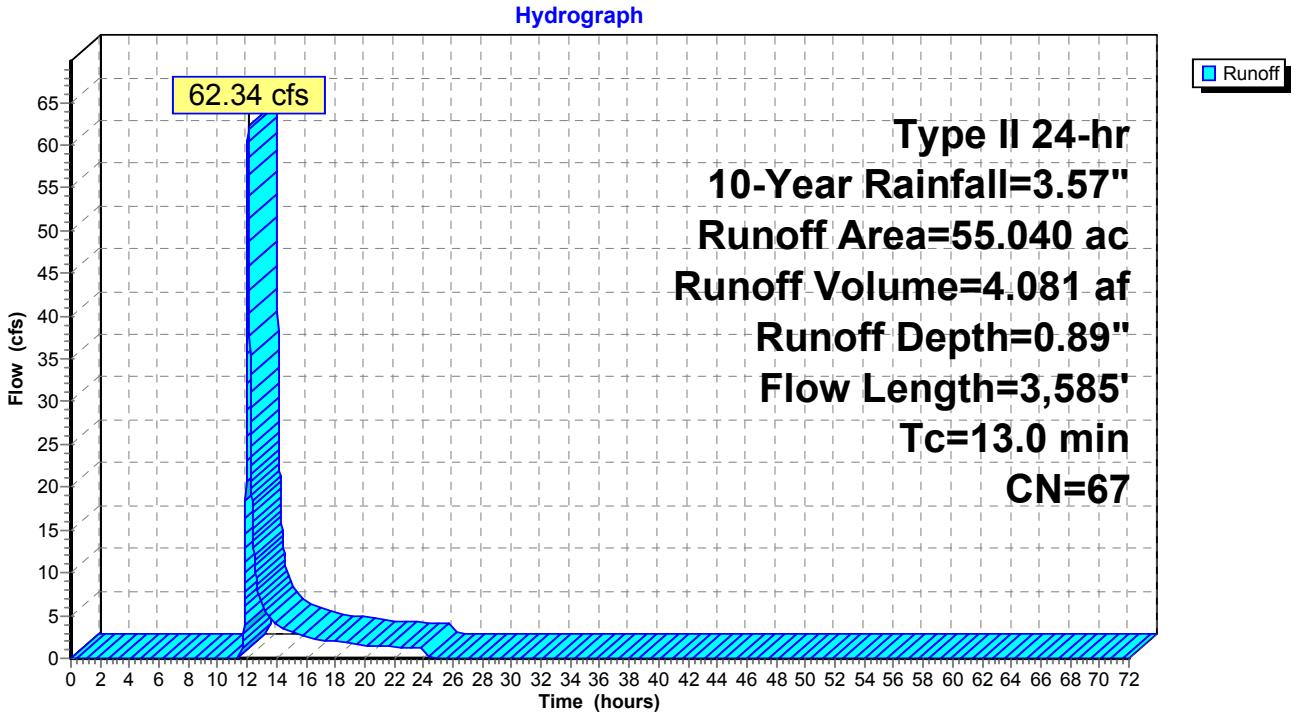
Runoff = 62.34 cfs @ 12.06 hrs, Volume= 4.081 af, Depth= 0.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=3.57"

	Area (ac)	CN	Description
	0.790	30	Meadow, non-grazed, HSG A
	18.740	71	Meadow, non-grazed, HSG C
	4.780	30	Woods, Good, HSG A
	29.170	70	Woods, Good, HSG C
*	0.260	98	Impervious
	1.300	89	Gravel roads, HSG C
	55.040	67	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	100	0.2800	0.44		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.58"
2.8	500	0.3500	2.96		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.5	958	0.2400	10.41	15.62	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035 Earth, dense weeds
2.1	924	0.1000	7.30	18.25	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=4.00' D=0.50' Z= 2.0 '/' Top.W=6.00' n= 0.035 Earth, dense weeds
2.8	1,103	0.0800	6.68	20.03	**Trap/Vee/Rect Channel Flow, E-POI** Bot.W=5.00' D=0.50' Z= 2.0 '/' Top.W=7.00' n= 0.035 Earth, dense weeds
13.0	3,585	Total			

Subcatchment DA1: Drainage Area 1



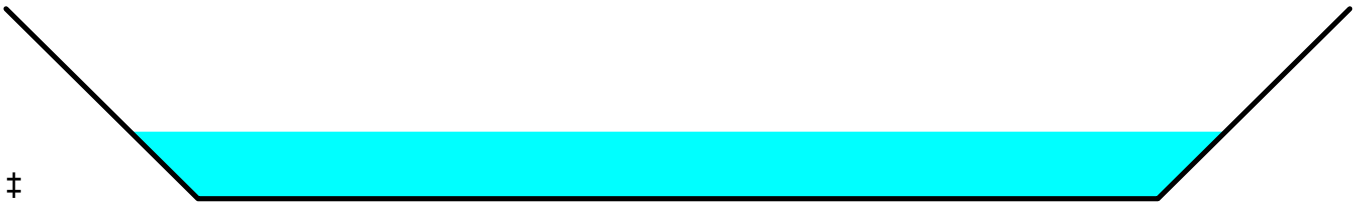
Summary for Reach 1R: Reach 1

Inflow Area = 4.840 ac, Inflow Depth = 2.24" for 10-Year event
Inflow = 3.61 cfs @ 12.24 hrs, Volume= 0.905 af
Outflow = 3.55 cfs @ 12.34 hrs, Volume= 0.905 af, Atten= 2%, Lag= 6.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.76 fps, Min. Travel Time= 5.9 min
Avg. Velocity = 0.72 fps, Avg. Travel Time= 30.6 min

Peak Storage= 1,251 cf @ 12.34 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 0.50' Flow Area= 3.0 sf, Capacity= 21.00 cfs

5.00' x 0.50' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 2.0 '/' Top Width= 7.00'
Length= 1,325.0' Slope= 0.0879 '/'
Inlet Invert= 861.10', Outlet Invert= 744.60'



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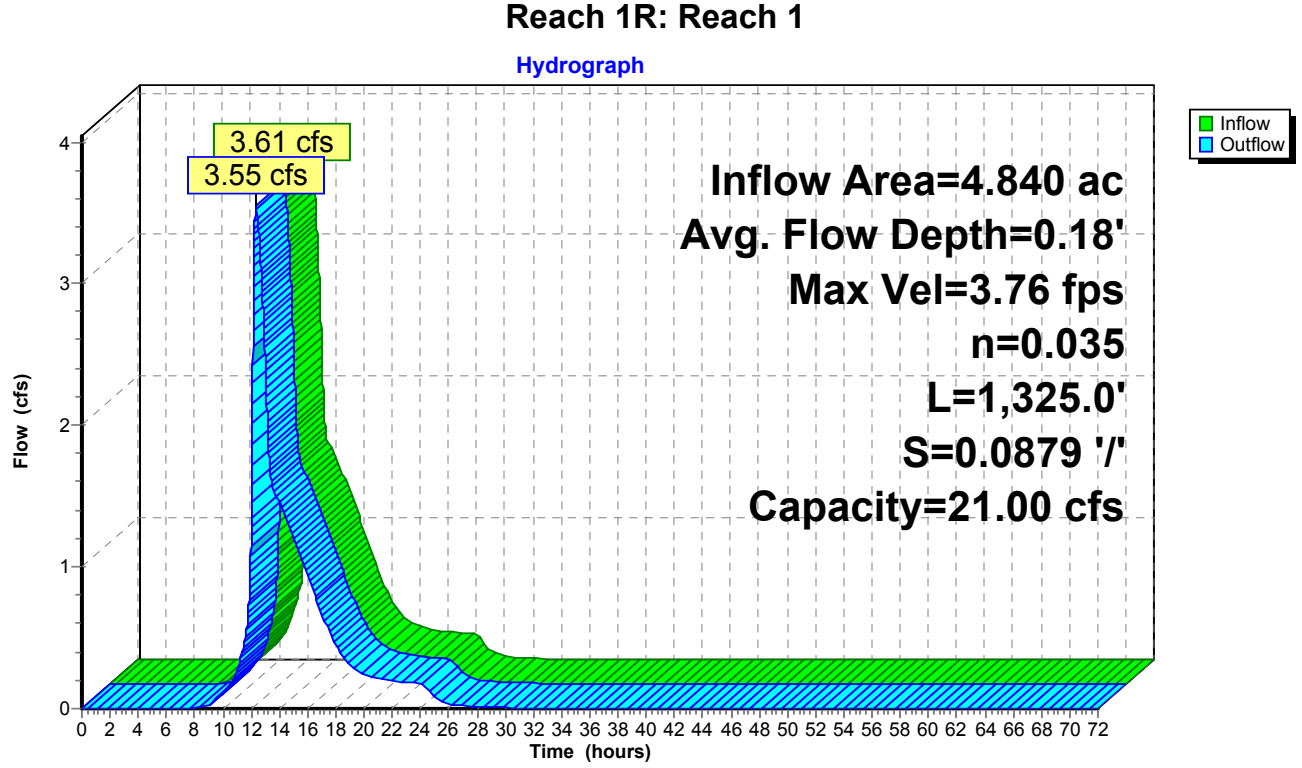


Summary for Pond 1P: Dry Detention Pond 1

Inflow Area = 4.840 ac, Inflow Depth = 2.25" for 10-Year event
Inflow = 16.74 cfs @ 12.01 hrs, Volume= 0.906 af
Outflow = 3.61 cfs @ 12.24 hrs, Volume= 0.905 af, Atten= 78%, Lag= 13.5 min
Primary = 3.61 cfs @ 12.24 hrs, Volume= 0.905 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 914.08' @ 12.24 hrs Surf.Area= 4,967 sf Storage= 15,634 cf

Plug-Flow detention time= 78.6 min calculated for 0.905 af (100% of inflow)
Center-of-Mass det. time= 78.7 min (893.3 - 814.6)

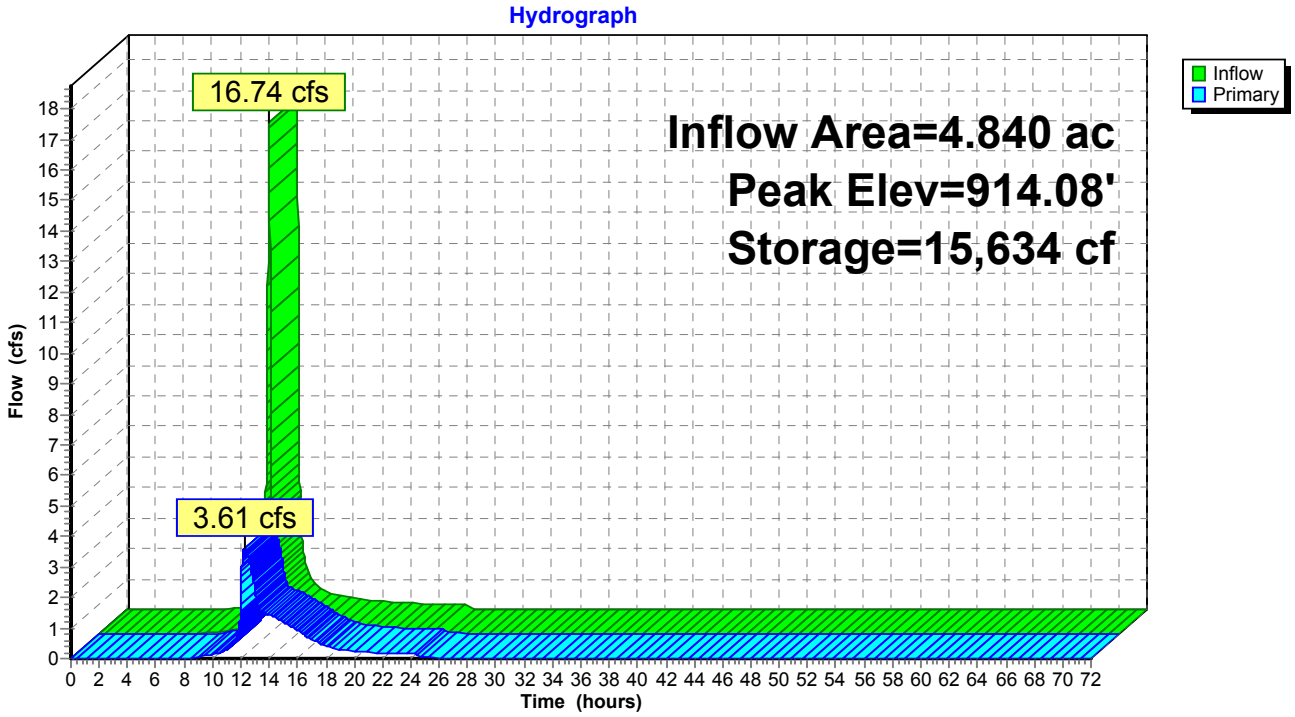
Volume	Invert	Avail.Storage	Storage Description
#1	910.00'	39,932 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
910.00	2,738	0	0
911.00	3,279	3,009	3,009
912.00	3,796	3,538	6,546
913.00	4,346	4,071	10,617
914.00	4,920	4,633	15,250
915.00	5,521	5,221	20,471
916.00	6,149	5,835	26,306
917.00	6,806	6,478	32,783
918.00	7,491	7,149	39,932

Device	Routing	Invert	Outlet Devices
#1	Primary	861.20'	**15.0" Round Culvert** L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 861.20' / 861.10' S= 0.0091 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	905.70'	**15.0" Round Culvert** L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 905.70' / 868.00' S= 0.3278 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#3	Device 2	908.90'	**15.0" Round Culvert** L= 61.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 908.90' / 908.29' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#4	Device 3	910.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#5	Device 3	913.00'	**18.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600
#6	Device 3	916.00'	**24.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.61 cfs @ 12.24 hrs HW=914.08' TW=861.27' (Dynamic Tailwater)
- **1=Culvert** (Passes 3.61 cfs of 42.71 cfs potential flow)
  - **2=Culvert** (Passes 3.61 cfs of 16.45 cfs potential flow)
    - **3=Culvert** (Passes 3.61 cfs of 12.61 cfs potential flow)
      - **4=Orifice/Grate** (Orifice Controls 1.85 cfs @ 9.42 fps)
      - **5=Orifice/Grate** (Orifice Controls 1.76 cfs @ 4.70 fps)
      - **6=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Dry Detention Pond 1

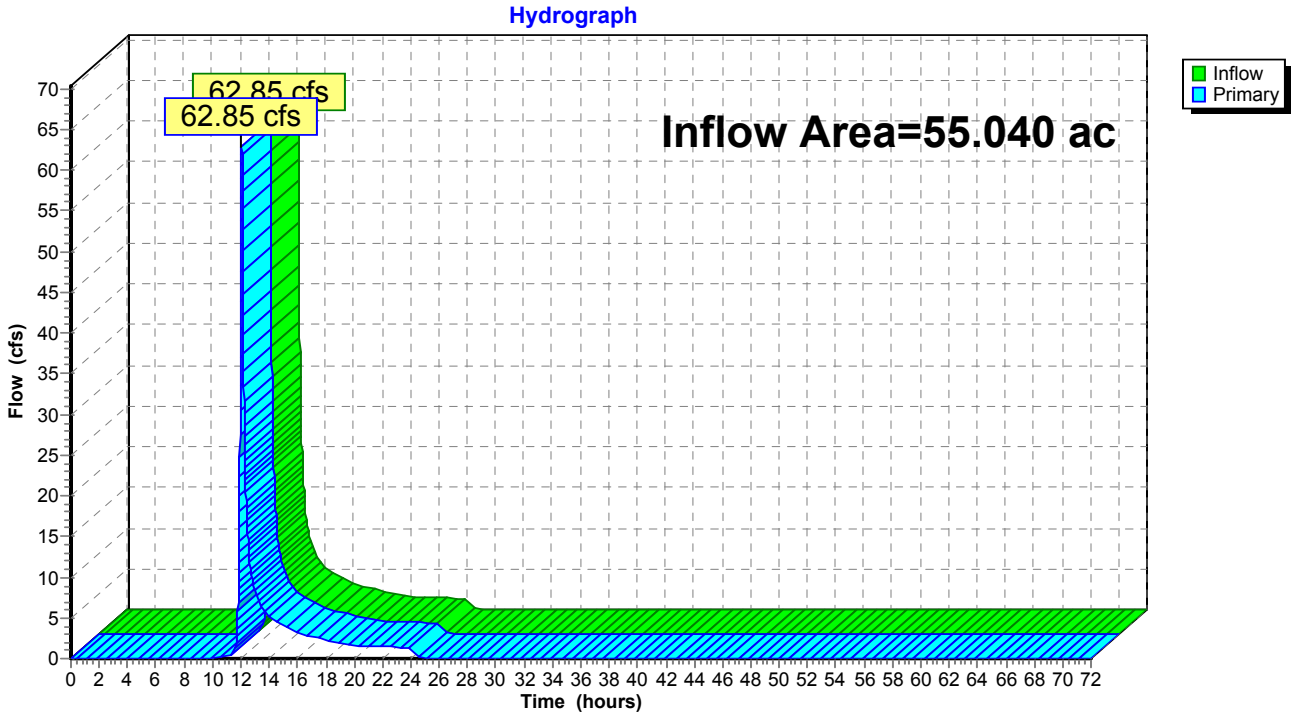


Summary for Link 1L: POI-1

Inflow Area = 55.040 ac, Inflow Depth = 1.06" for 10-Year event
Inflow = 62.85 cfs @ 12.06 hrs, Volume= 4.847 af
Primary = 62.85 cfs @ 12.06 hrs, Volume= 4.847 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: POI-1



Summary for Subcatchment DA-1A: Drainage Area 1A (Undetained)

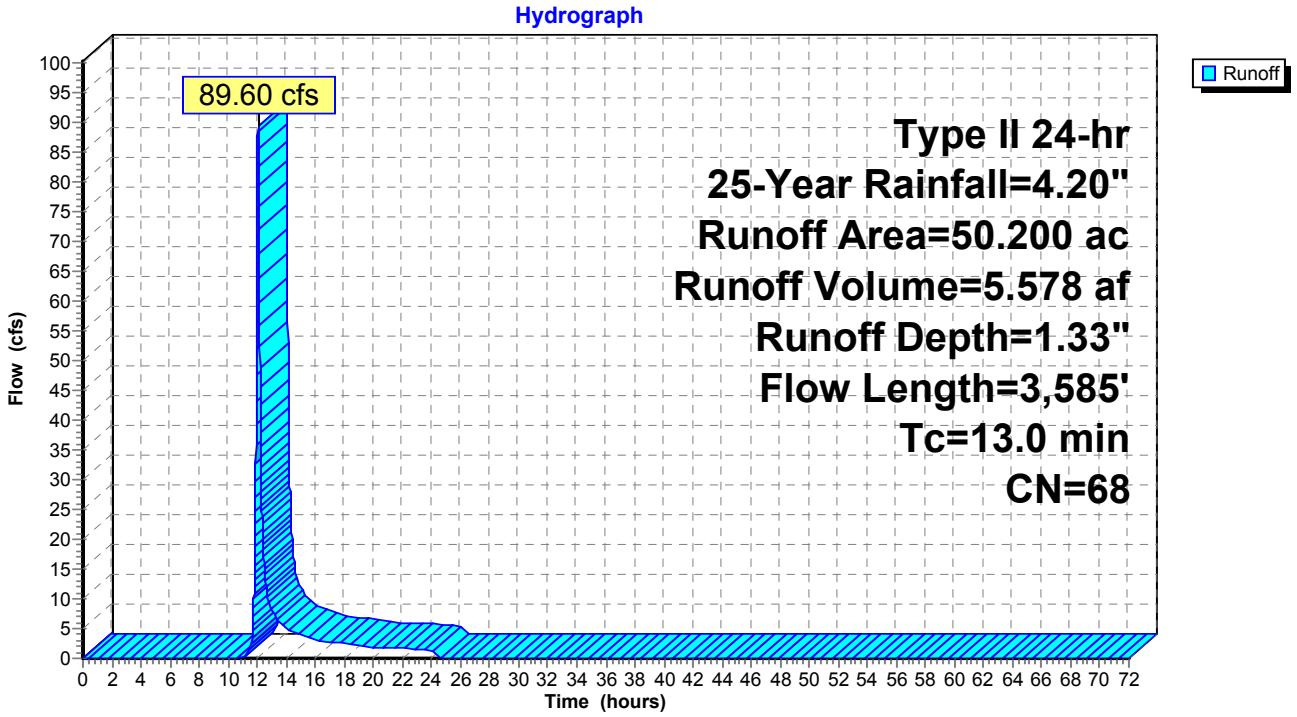
Runoff = 89.60 cfs @ 12.06 hrs, Volume= 5.578 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-Year Rainfall=4.20"

Area (ac)	CN	Description
0.790	30	Meadow, non-grazed, HSG A
4.780	30	Woods, Good, HSG A
17.480	71	Meadow, non-grazed, HSG C
22.160	70	Woods, Good, HSG C
3.810	89	Gravel roads, HSG C
1.180	98	Paved parking, HSG C
50.200	68	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	100	0.2800	0.44		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.58"
2.8	500	0.3500	2.96		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.5	958	0.2400	10.41	15.62	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035 Earth, dense weeds
2.1	924	0.1000	7.30	18.25	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=4.00' D=0.50' Z= 2.0 '/' Top.W=6.00' n= 0.035 Earth, dense weeds
2.8	1,103	0.0800	6.68	20.03	**Trap/Vee/Rect Channel Flow, E-POI** Bot.W=5.00' D=0.50' Z= 2.0 '/' Top.W=7.00' n= 0.035 Earth, dense weeds
13.0	3,585	Total			

Subcatchment DA-1A: Drainage Area 1A (Undetained)



Summary for Subcatchment DA-1B: Drainage Area 1B (Detained)

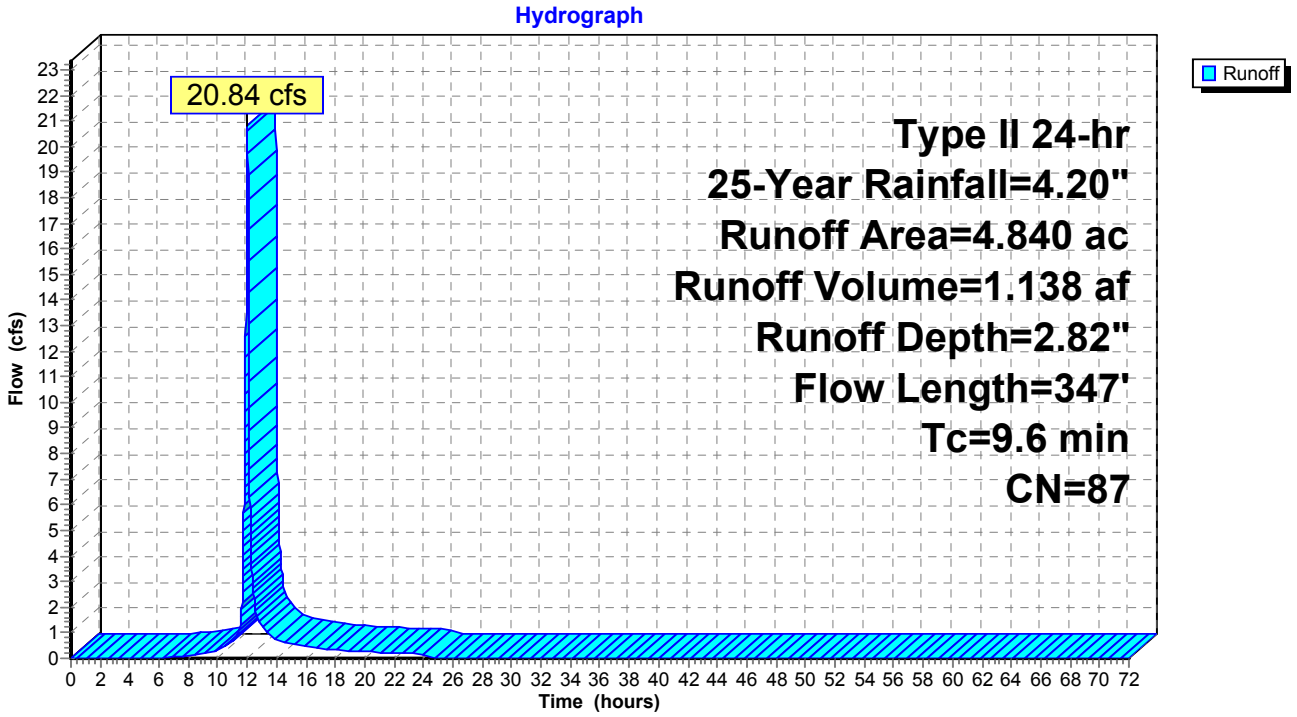
Runoff = 20.84 cfs @ 12.01 hrs, Volume= 1.138 af, Depth= 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-Year Rainfall=4.20"

	Area (ac)	CN	Description
	1.070	71	Meadow, non-grazed, HSG C
	0.100	70	Woods, Good, HSG C
	2.490	89	Gravel roads, HSG C
*	1.180	98	Impervious
	4.840	87	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	100	0.0400	0.20		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.58"
0.5	65	0.0800	1.98		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.2	22	0.1300	1.80		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
0.4	80	0.2800	3.70		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
0.1	32	0.0900	4.69	2.35	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=0.00' D=0.50' Z= 2.0 '/' Top.W=2.00' n= 0.035 Earth, dense weeds
0.1	28	0.2100	7.17	3.58	**Trap/Vee/Rect Channel Flow, F-G** Bot.W=0.00' D=0.50' Z= 2.0 '/' Top.W=2.00' n= 0.035 Earth, dense weeds
0.0	20	0.5000	11.06	5.53	**Trap/Vee/Rect Channel Flow, G-H** Bot.W=0.00' D=0.50' Z= 2.0 '/' Top.W=2.00' n= 0.035 Earth, dense weeds
9.6	347	Total			

Subcatchment DA-1B: Drainage Area 1B (Detained)



Summary for Subcatchment DA1: Drainage Area 1

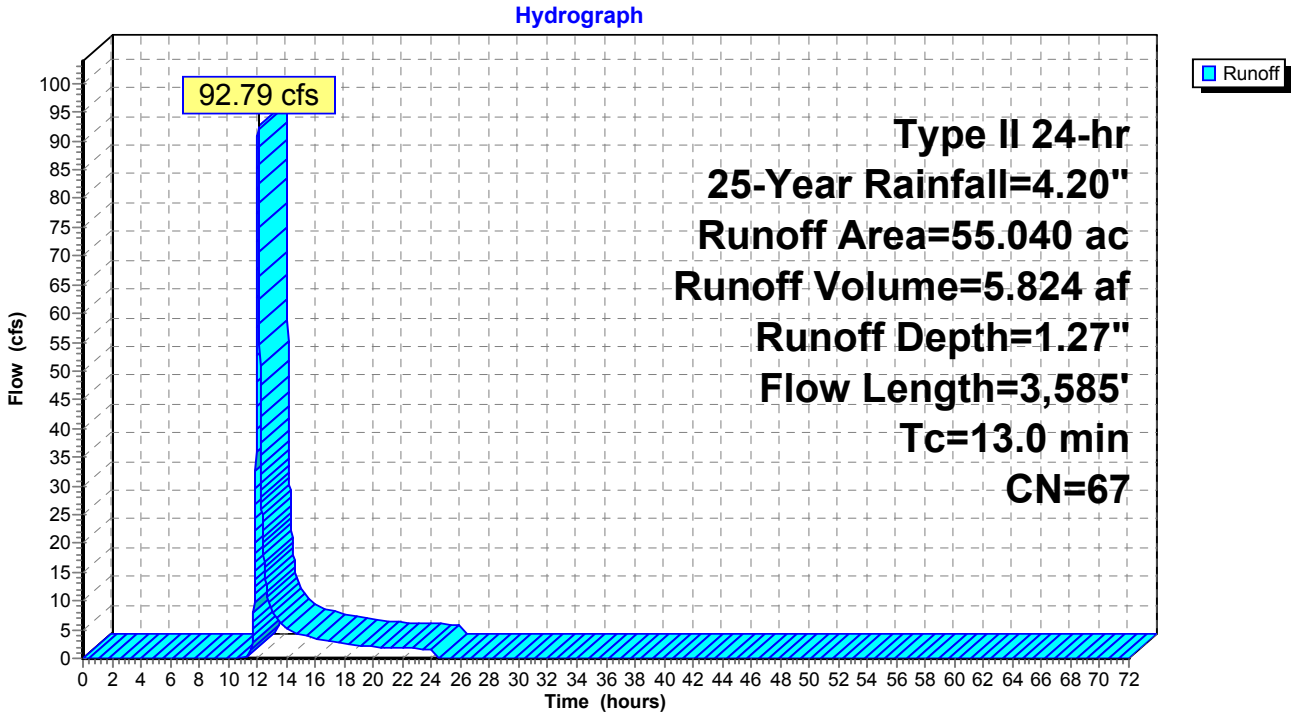
Runoff = 92.79 cfs @ 12.06 hrs, Volume= 5.824 af, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-Year Rainfall=4.20"

	Area (ac)	CN	Description
	0.790	30	Meadow, non-grazed, HSG A
	18.740	71	Meadow, non-grazed, HSG C
	4.780	30	Woods, Good, HSG A
	29.170	70	Woods, Good, HSG C
*	0.260	98	Impervious
	1.300	89	Gravel roads, HSG C
	55.040	67	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	100	0.2800	0.44		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.58"
2.8	500	0.3500	2.96		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.5	958	0.2400	10.41	15.62	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035 Earth, dense weeds
2.1	924	0.1000	7.30	18.25	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=4.00' D=0.50' Z= 2.0 '/' Top.W=6.00' n= 0.035 Earth, dense weeds
2.8	1,103	0.0800	6.68	20.03	**Trap/Vee/Rect Channel Flow, E-POI** Bot.W=5.00' D=0.50' Z= 2.0 '/' Top.W=7.00' n= 0.035 Earth, dense weeds
13.0	3,585	Total			

Subcatchment DA1: Drainage Area 1



Summary for Reach 1R: Reach 1

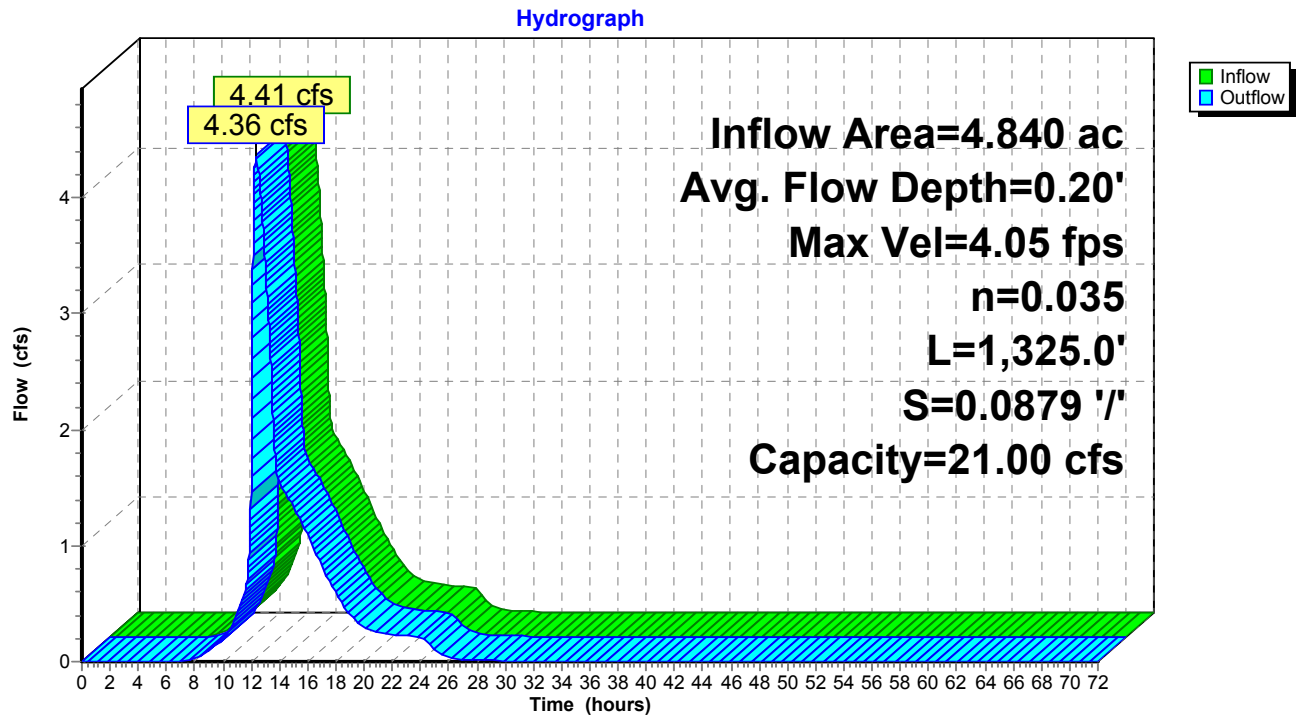
Inflow Area = 4.840 ac, Inflow Depth = 2.82" for 25-Year event
Inflow = 4.41 cfs @ 12.24 hrs, Volume= 1.137 af
Outflow = 4.36 cfs @ 12.34 hrs, Volume= 1.137 af, Atten= 1%, Lag= 6.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.05 fps, Min. Travel Time= 5.4 min
Avg. Velocity = 0.76 fps, Avg. Travel Time= 28.9 min

Peak Storage= 1,426 cf @ 12.34 hrs
Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 0.50' Flow Area= 3.0 sf, Capacity= 21.00 cfs

5.00' x 0.50' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 2.0 '/' Top Width= 7.00'
Length= 1,325.0' Slope= 0.0879 '/'
Inlet Invert= 861.10', Outlet Invert= 744.60'

‡



Summary for Pond 1P: Dry Detention Pond 1

Inflow Area = 4.840 ac, Inflow Depth = 2.82" for 25-Year event
Inflow = 20.84 cfs @ 12.01 hrs, Volume= 1.138 af
Outflow = 4.41 cfs @ 12.24 hrs, Volume= 1.137 af, Atten= 79%, Lag= 13.6 min
Primary = 4.41 cfs @ 12.24 hrs, Volume= 1.137 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 914.86' @ 12.24 hrs Surf.Area= 5,438 sf Storage= 19,710 cf

Plug-Flow detention time= 76.8 min calculated for 1.137 af (100% of inflow)
Center-of-Mass det. time= 76.9 min (885.0 - 808.1)

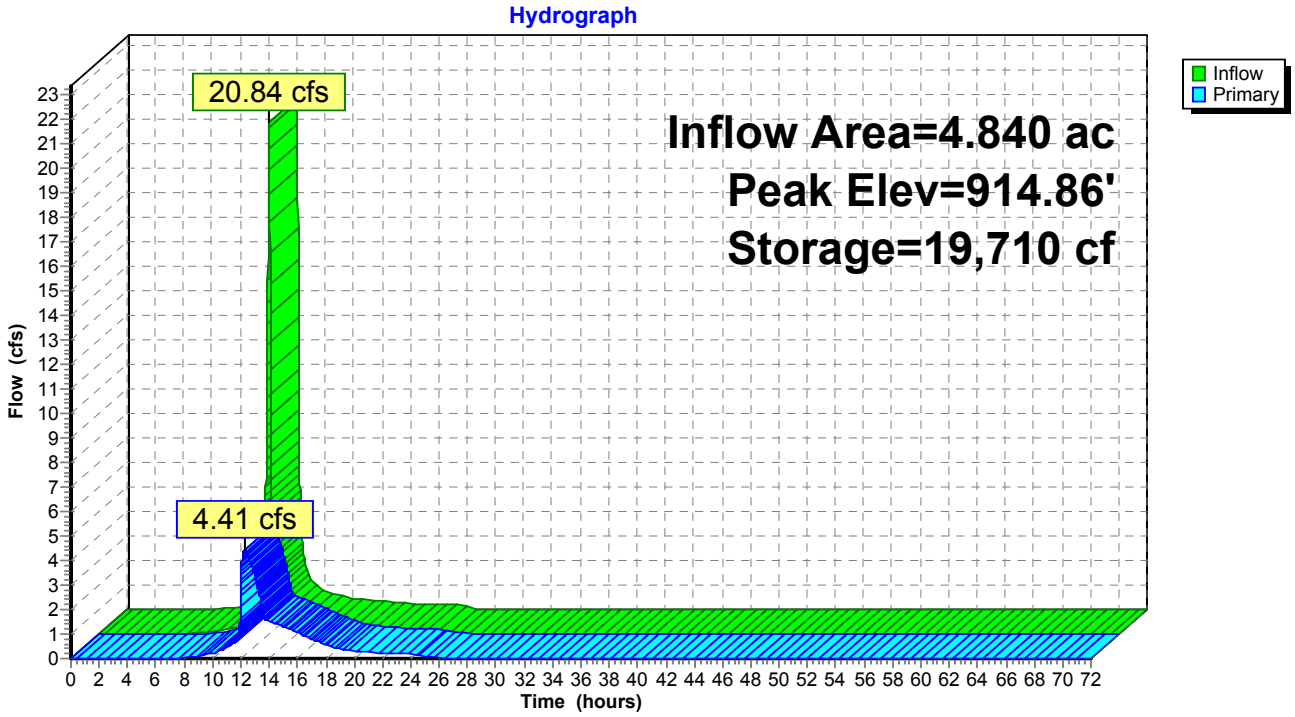
Volume	Invert	Avail.Storage	Storage Description
#1	910.00'	39,932 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
910.00	2,738	0	0
911.00	3,279	3,009	3,009
912.00	3,796	3,538	6,546
913.00	4,346	4,071	10,617
914.00	4,920	4,633	15,250
915.00	5,521	5,221	20,471
916.00	6,149	5,835	26,306
917.00	6,806	6,478	32,783
918.00	7,491	7,149	39,932

Device	Routing	Invert	Outlet Devices
#1	Primary	861.20'	**15.0" Round Culvert** L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 861.20' / 861.10' S= 0.0091 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	905.70'	**15.0" Round Culvert** L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 905.70' / 868.00' S= 0.3278 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#3	Device 2	908.90'	**15.0" Round Culvert** L= 61.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 908.90' / 908.29' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#4	Device 3	910.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#5	Device 3	913.00'	**18.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600
#6	Device 3	916.00'	**24.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.41 cfs @ 12.24 hrs HW=914.86' TW=861.30' (Dynamic Tailwater)
- **1=Culvert** (Passes 4.41 cfs of 43.03 cfs potential flow)
  - **2=Culvert** (Passes 4.41 cfs of 17.26 cfs potential flow)
    - **3=Culvert** (Passes 4.41 cfs of 13.65 cfs potential flow)
      - **4=Orifice/Grate** (Orifice Controls 2.03 cfs @ 10.34 fps)
      - **5=Orifice/Grate** (Orifice Controls 2.38 cfs @ 6.34 fps)
      - **6=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: Dry Detention Pond 1

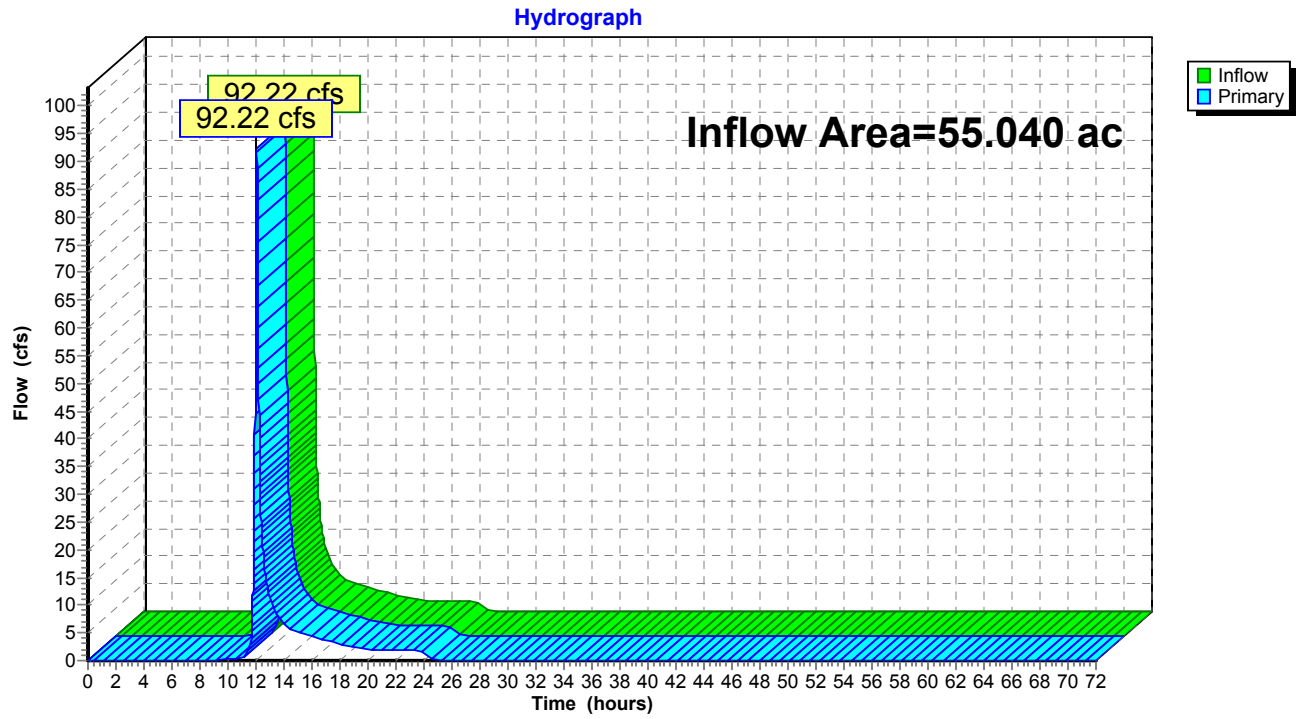


Summary for Link 1L: POI-1

Inflow Area = 55.040 ac, Inflow Depth = 1.46" for 25-Year event
Inflow = 92.22 cfs @ 12.06 hrs, Volume= 6.715 af
Primary = 92.22 cfs @ 12.06 hrs, Volume= 6.715 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: POI-1



Summary for Subcatchment DA-1A: Drainage Area 1A (Undetained)

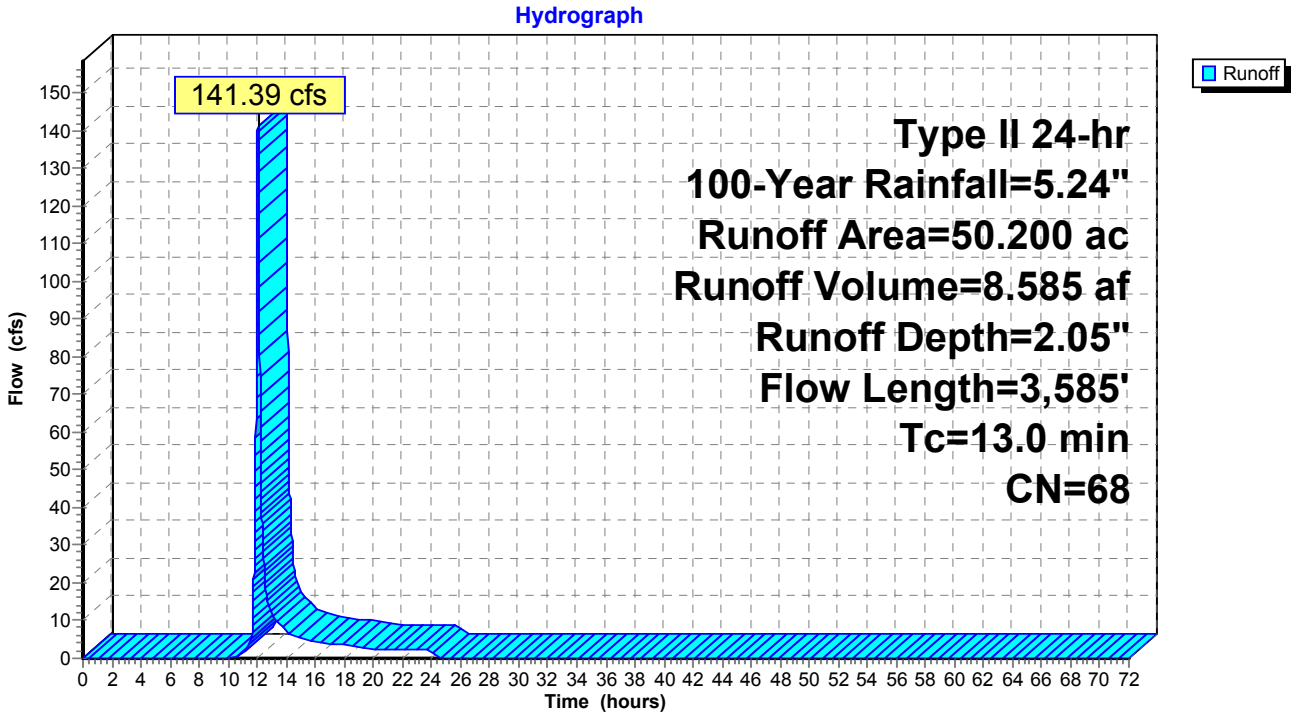
Runoff = 141.39 cfs @ 12.06 hrs, Volume= 8.585 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=5.24"

Area (ac)	CN	Description
0.790	30	Meadow, non-grazed, HSG A
4.780	30	Woods, Good, HSG A
17.480	71	Meadow, non-grazed, HSG C
22.160	70	Woods, Good, HSG C
3.810	89	Gravel roads, HSG C
1.180	98	Paved parking, HSG C
50.200	68	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	100	0.2800	0.44		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.58"
2.8	500	0.3500	2.96		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.5	958	0.2400	10.41	15.62	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035 Earth, dense weeds
2.1	924	0.1000	7.30	18.25	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=4.00' D=0.50' Z= 2.0 '/' Top.W=6.00' n= 0.035 Earth, dense weeds
2.8	1,103	0.0800	6.68	20.03	**Trap/Vee/Rect Channel Flow, E-POI** Bot.W=5.00' D=0.50' Z= 2.0 '/' Top.W=7.00' n= 0.035 Earth, dense weeds
13.0	3,585	Total			

Subcatchment DA-1A: Drainage Area 1A (Undetained)



Summary for Subcatchment DA-1B: Drainage Area 1B (Detained)

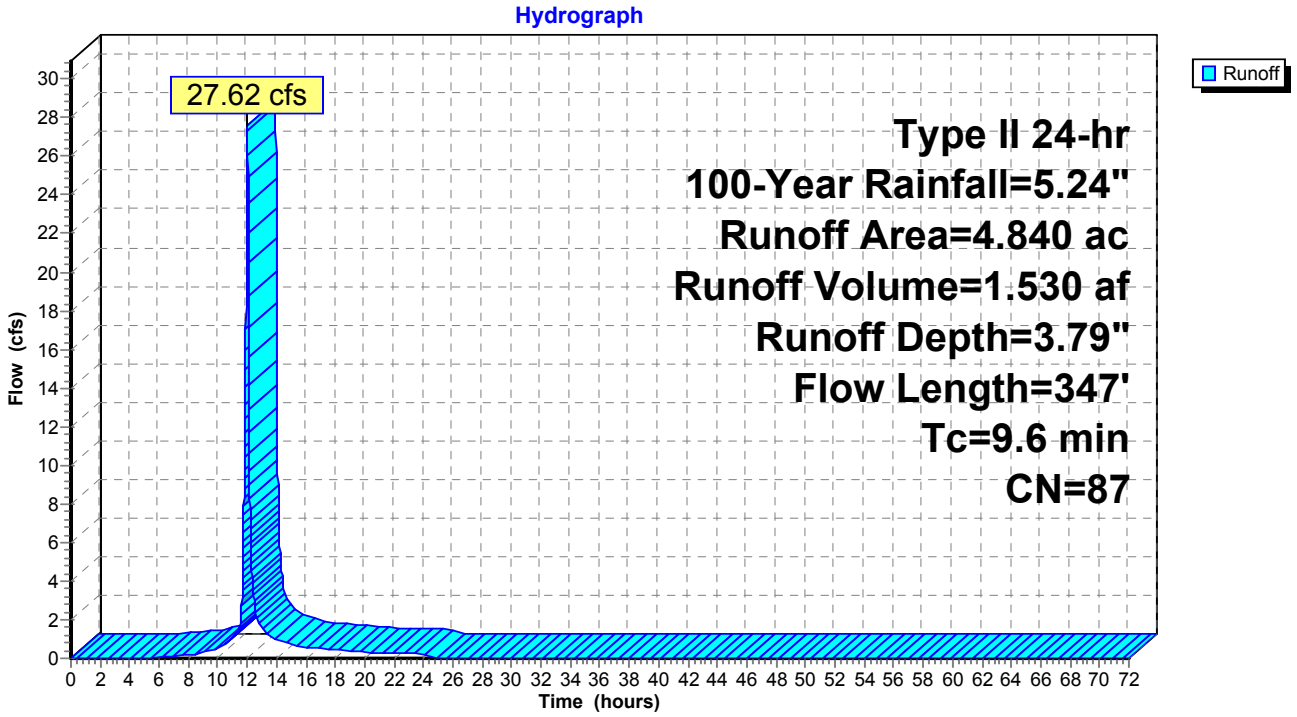
Runoff = 27.62 cfs @ 12.01 hrs, Volume= 1.530 af, Depth= 3.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=5.24"

	Area (ac)	CN	Description
	1.070	71	Meadow, non-grazed, HSG C
	0.100	70	Woods, Good, HSG C
	2.490	89	Gravel roads, HSG C
*	1.180	98	Impervious
	4.840	87	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3	100	0.0400	0.20		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.58"
0.5	65	0.0800	1.98		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.2	22	0.1300	1.80		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
0.4	80	0.2800	3.70		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
0.1	32	0.0900	4.69	2.35	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=0.00' D=0.50' Z= 2.0 '/' Top.W=2.00' n= 0.035 Earth, dense weeds
0.1	28	0.2100	7.17	3.58	**Trap/Vee/Rect Channel Flow, F-G** Bot.W=0.00' D=0.50' Z= 2.0 '/' Top.W=2.00' n= 0.035 Earth, dense weeds
0.0	20	0.5000	11.06	5.53	**Trap/Vee/Rect Channel Flow, G-H** Bot.W=0.00' D=0.50' Z= 2.0 '/' Top.W=2.00' n= 0.035 Earth, dense weeds
9.6	347	Total			

Subcatchment DA-1B: Drainage Area 1B (Detained)



Summary for Subcatchment DA1: Drainage Area 1

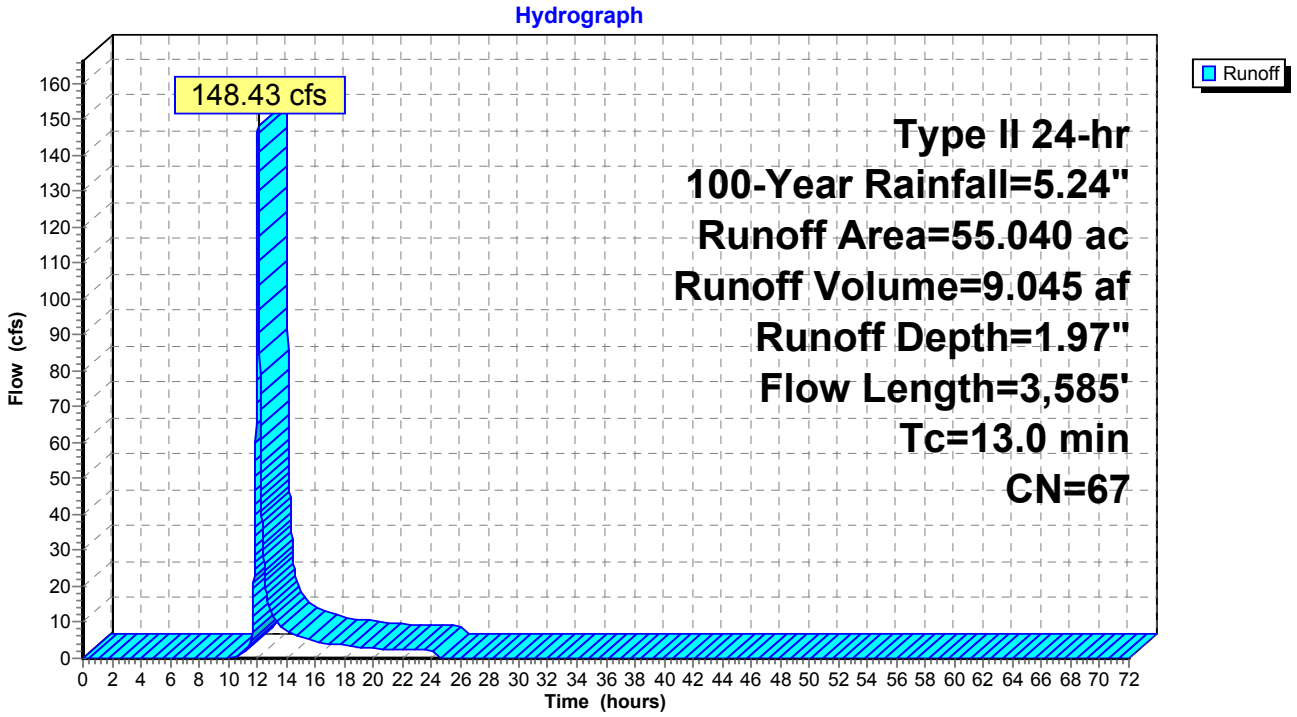
Runoff = 148.43 cfs @ 12.06 hrs, Volume= 9.045 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=5.24"

	Area (ac)	CN	Description
	0.790	30	Meadow, non-grazed, HSG A
	18.740	71	Meadow, non-grazed, HSG C
	4.780	30	Woods, Good, HSG A
	29.170	70	Woods, Good, HSG C
*	0.260	98	Impervious
	1.300	89	Gravel roads, HSG C
	55.040	67	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.8	100	0.2800	0.44		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.58"
2.8	500	0.3500	2.96		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
1.5	958	0.2400	10.41	15.62	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035 Earth, dense weeds
2.1	924	0.1000	7.30	18.25	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=4.00' D=0.50' Z= 2.0 '/' Top.W=6.00' n= 0.035 Earth, dense weeds
2.8	1,103	0.0800	6.68	20.03	**Trap/Vee/Rect Channel Flow, E-POI** Bot.W=5.00' D=0.50' Z= 2.0 '/' Top.W=7.00' n= 0.035 Earth, dense weeds
13.0	3,585	Total			

Subcatchment DA1: Drainage Area 1



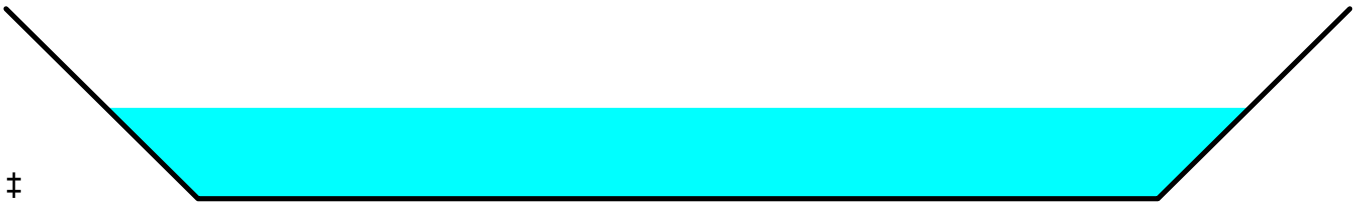
Summary for Reach 1R: Reach 1

Inflow Area = 4.840 ac, Inflow Depth = 3.79" for 100-Year event
Inflow = 6.23 cfs @ 12.22 hrs, Volume= 1.530 af
Outflow = 5.94 cfs @ 12.27 hrs, Volume= 1.530 af, Atten= 5%, Lag= 3.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.53 fps, Min. Travel Time= 4.9 min
Avg. Velocity = 0.83 fps, Avg. Travel Time= 26.6 min

Peak Storage= 1,737 cf @ 12.27 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 0.50' Flow Area= 3.0 sf, Capacity= 21.00 cfs

5.00' x 0.50' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 2.0 '/' Top Width= 7.00'
Length= 1,325.0' Slope= 0.0879 '/'
Inlet Invert= 861.10', Outlet Invert= 744.60'



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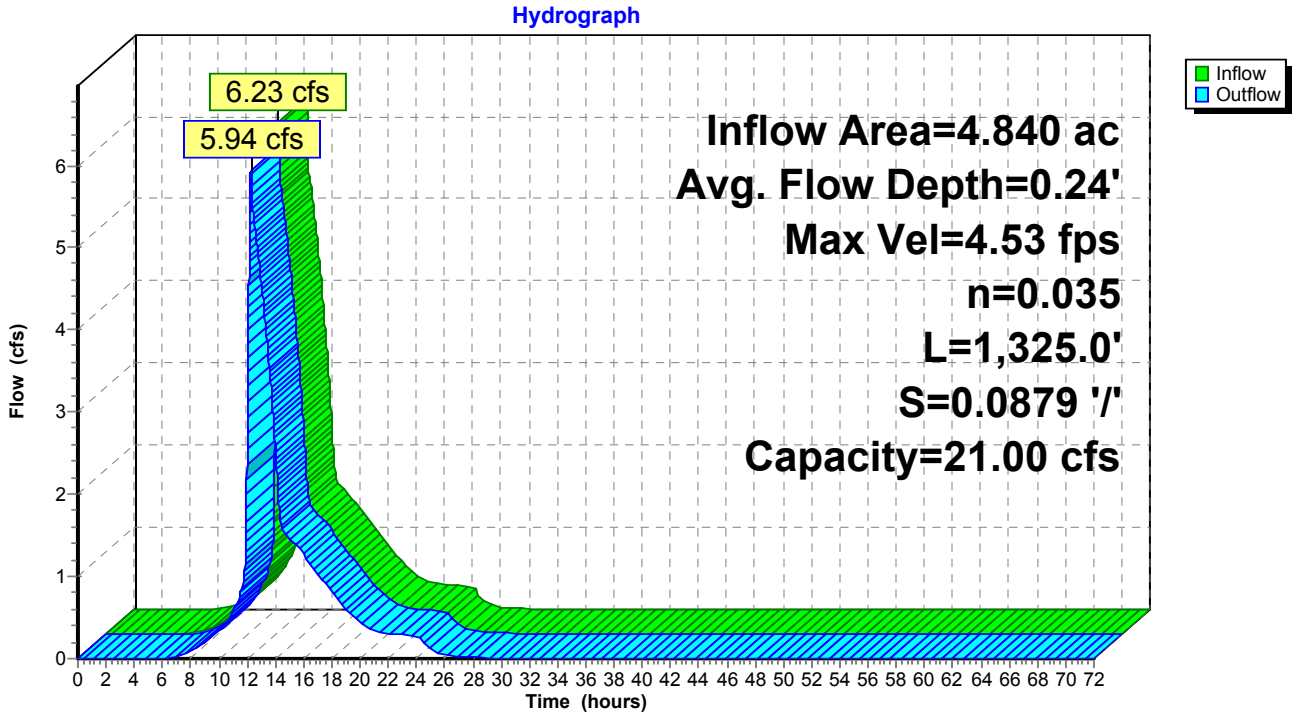
Reach 1R: Reach 1



Summary for Pond 1P: Dry Detention Pond 1

Inflow Area = 4.840 ac, Inflow Depth = 3.79" for 100-Year event
Inflow = 27.62 cfs @ 12.01 hrs, Volume= 1.530 af
Outflow = 6.23 cfs @ 12.22 hrs, Volume= 1.530 af, Atten= 77%, Lag= 12.9 min
Primary = 6.23 cfs @ 12.22 hrs, Volume= 1.530 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 916.08' @ 12.22 hrs Surf.Area= 6,200 sf Storage= 26,782 cf

Plug-Flow detention time= 76.9 min calculated for 1.530 af (100% of inflow)
Center-of-Mass det. time= 76.8 min (876.5 - 799.7)

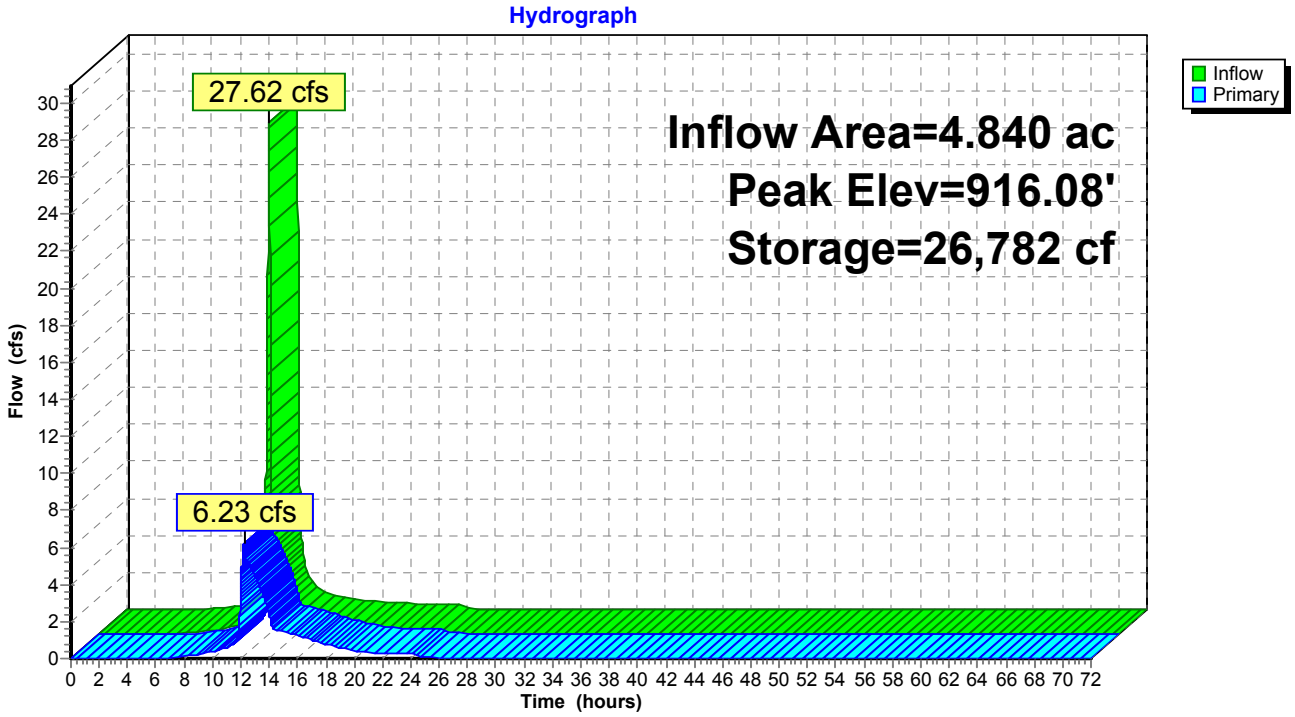
Volume	Invert	Avail.Storage	Storage Description
#1	910.00'	39,932 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
910.00	2,738	0	0
911.00	3,279	3,009	3,009
912.00	3,796	3,538	6,546
913.00	4,346	4,071	10,617
914.00	4,920	4,633	15,250
915.00	5,521	5,221	20,471
916.00	6,149	5,835	26,306
917.00	6,806	6,478	32,783
918.00	7,491	7,149	39,932

Device	Routing	Invert	Outlet Devices
#1	Primary	861.20'	**15.0" Round Culvert** L= 11.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 861.20' / 861.10' S= 0.0091 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	905.70'	**15.0" Round Culvert** L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 905.70' / 868.00' S= 0.3278 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#3	Device 2	908.90'	**15.0" Round Culvert** L= 61.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 908.90' / 908.29' S= 0.0100 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf
#4	Device 3	910.00'	**6.0" Vert. Orifice/Grate** C= 0.600
#5	Device 3	913.00'	**18.0" W x 3.0" H Vert. Orifice/Grate** C= 0.600
#6	Device 3	916.00'	**24.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.22 cfs @ 12.22 hrs HW=916.08' TW=861.33' (Dynamic Tailwater)
- **1=Culvert** (Passes 6.22 cfs of 43.52 cfs potential flow)
  - **2=Culvert** (Passes 6.22 cfs of 18.45 cfs potential flow)
    - **3=Culvert** (Passes 6.22 cfs of 15.12 cfs potential flow)
      - **4=Orifice/Grate** (Orifice Controls 2.28 cfs @ 11.62 fps)
      - **5=Orifice/Grate** (Orifice Controls 3.10 cfs @ 8.27 fps)
      - **6=Orifice/Grate** (Weir Controls 0.84 cfs @ 0.91 fps)

Pond 1P: Dry Detention Pond 1

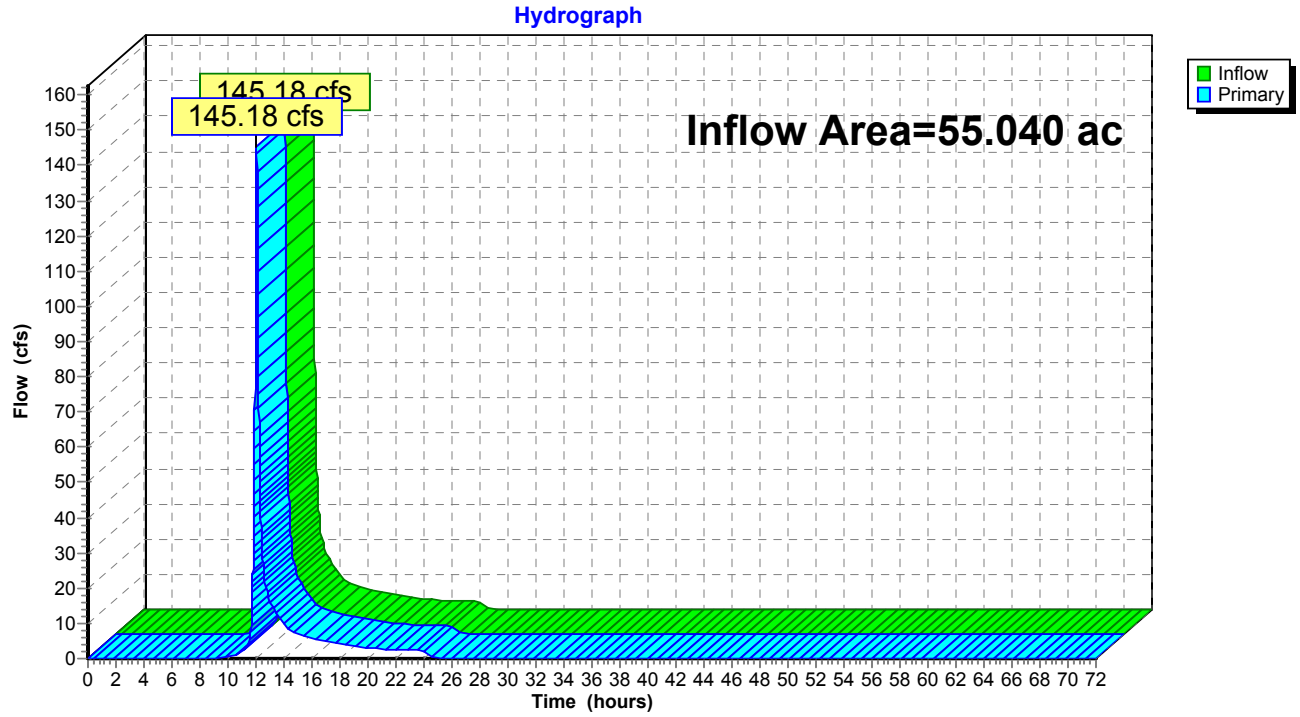


Summary for Link 1L: POI-1

Inflow Area = 55.040 ac, Inflow Depth = 2.21" for 100-Year event
Inflow = 145.18 cfs @ 12.06 hrs, Volume= 10.115 af
Primary = 145.18 cfs @ 12.06 hrs, Volume= 10.115 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Link 1L: POI-1



Drainage Area 1

Subcat Reach Pond Link

Routing Diagram for 161-104-HYD-TempCulvert
Prepared by Civil and Environmental Consultants, Inc., Printed 3/23/2017

Summary for Subcatchment DA1: Drainage Area 1

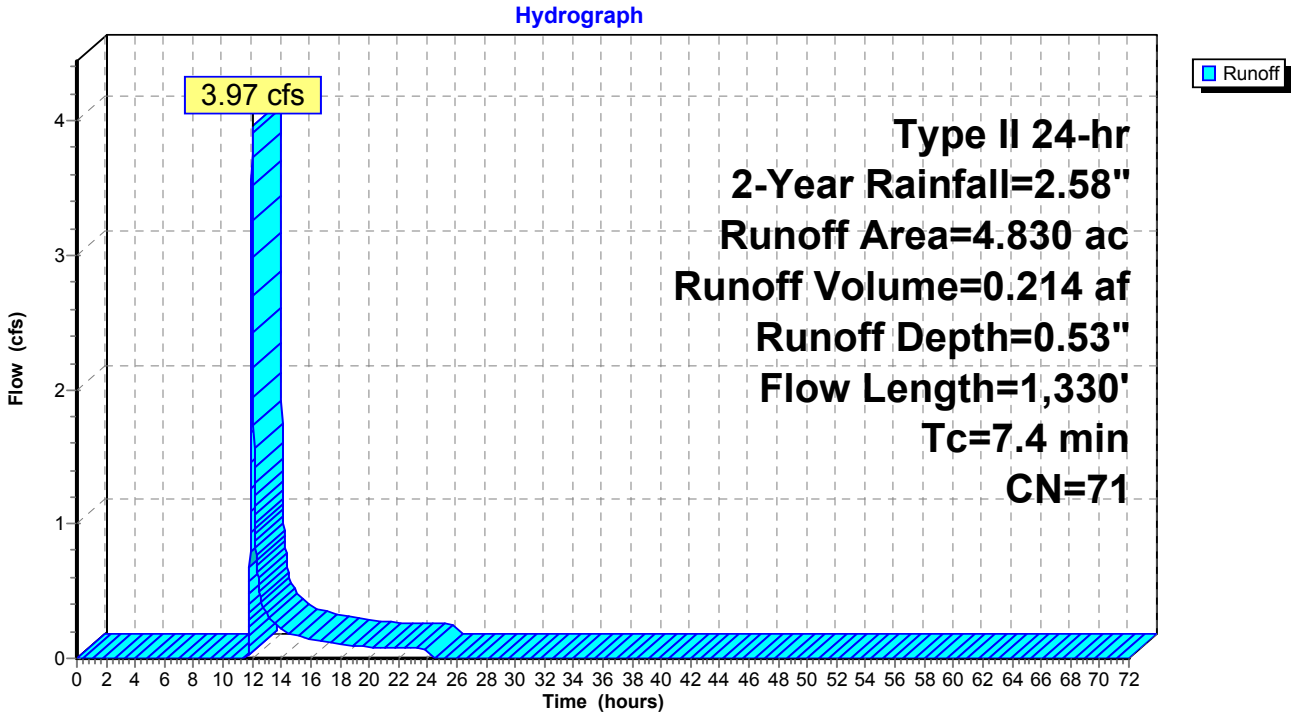
Runoff = 3.97 cfs @ 12.00 hrs, Volume= 0.214 af, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-Year Rainfall=2.58"

Area (ac)	CN	Description
0.050	30	Meadow, non-grazed, HSG A
1.950	71	Meadow, non-grazed, HSG C
2.630	70	Woods, Good, HSG C
0.200	89	Gravel roads, HSG C
4.830	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	100	0.3100	0.46		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.58"
0.6	134	0.3300	4.02		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
2.1	366	0.3300	2.87		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
0.5	324	0.2600	9.90	9.90	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=1.00' D=0.50' Z= 2.0 '/' Top.W=3.00' n= 0.035 Earth, dense weeds
0.6	406	0.3100	11.83	17.75	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035 Earth, dense weeds
7.4	1,330	Total			

Subcatchment DA1: Drainage Area 1



Summary for Subcatchment DA1: Drainage Area 1

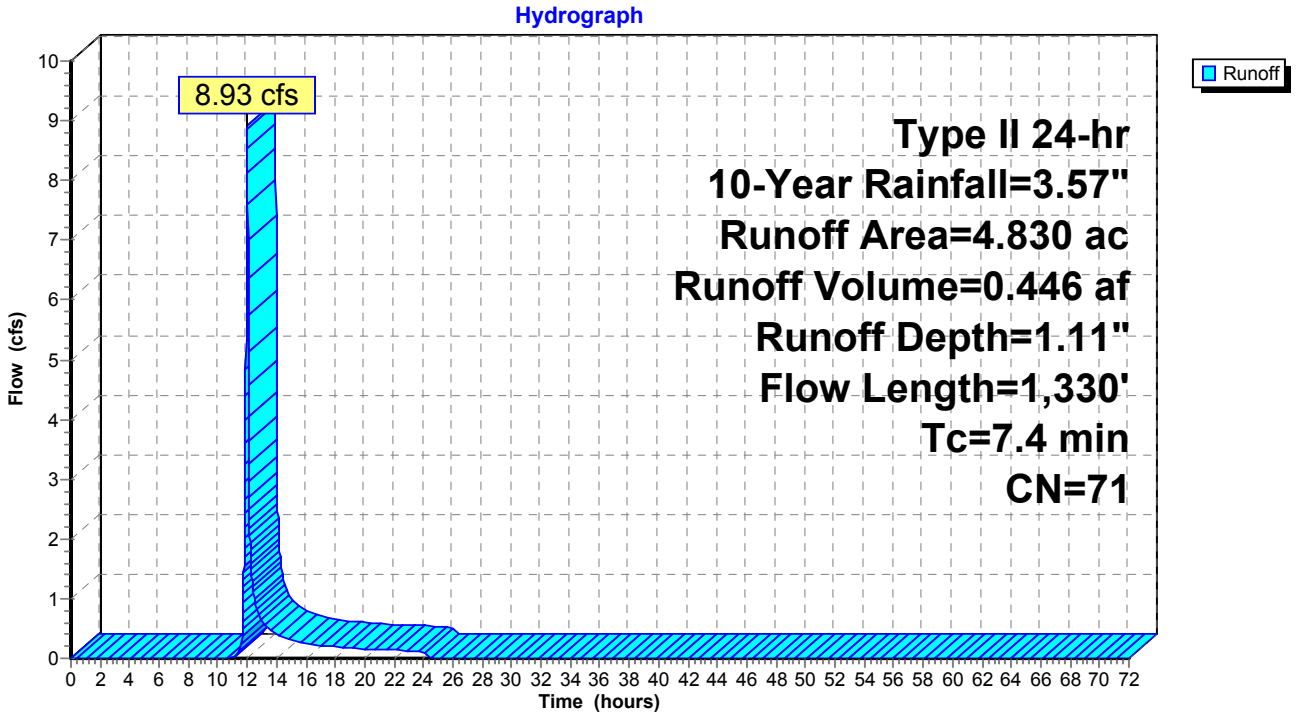
Runoff = 8.93 cfs @ 12.00 hrs, Volume= 0.446 af, Depth= 1.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=3.57"

Area (ac)	CN	Description
0.050	30	Meadow, non-grazed, HSG A
1.950	71	Meadow, non-grazed, HSG C
2.630	70	Woods, Good, HSG C
0.200	89	Gravel roads, HSG C
4.830	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	100	0.3100	0.46		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.58"
0.6	134	0.3300	4.02		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
2.1	366	0.3300	2.87		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
0.5	324	0.2600	9.90	9.90	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=1.00' D=0.50' Z= 2.0 '/' Top.W=3.00' n= 0.035 Earth, dense weeds
0.6	406	0.3100	11.83	17.75	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035 Earth, dense weeds
7.4	1,330	Total			

Subcatchment DA1: Drainage Area 1



Summary for Subcatchment DA1: Drainage Area 1

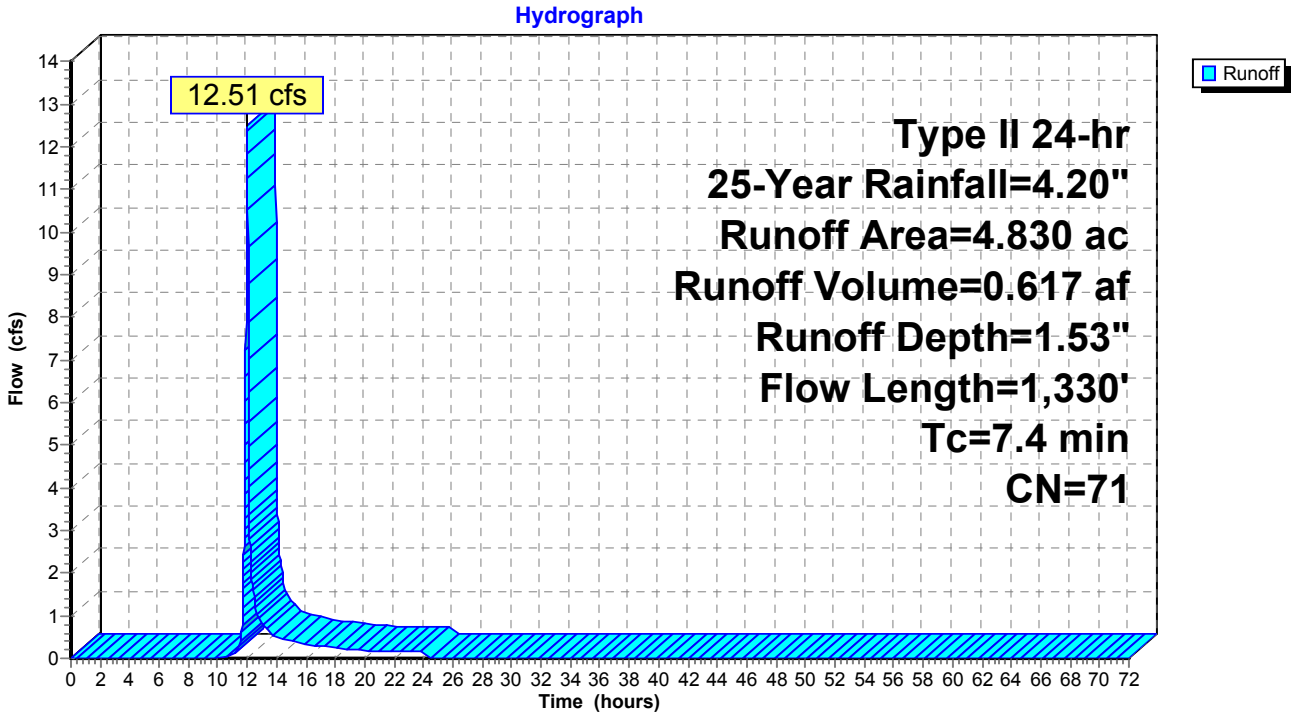
Runoff = 12.51 cfs @ 11.99 hrs, Volume= 0.617 af, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-Year Rainfall=4.20"

Area (ac)	CN	Description
0.050	30	Meadow, non-grazed, HSG A
1.950	71	Meadow, non-grazed, HSG C
2.630	70	Woods, Good, HSG C
0.200	89	Gravel roads, HSG C
4.830	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	100	0.3100	0.46		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.58"
0.6	134	0.3300	4.02		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
2.1	366	0.3300	2.87		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
0.5	324	0.2600	9.90	9.90	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=1.00' D=0.50' Z= 2.0 '/' Top.W=3.00' n= 0.035 Earth, dense weeds
0.6	406	0.3100	11.83	17.75	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035 Earth, dense weeds
7.4	1,330	Total			

Subcatchment DA1: Drainage Area 1



Summary for Subcatchment DA1: Drainage Area 1

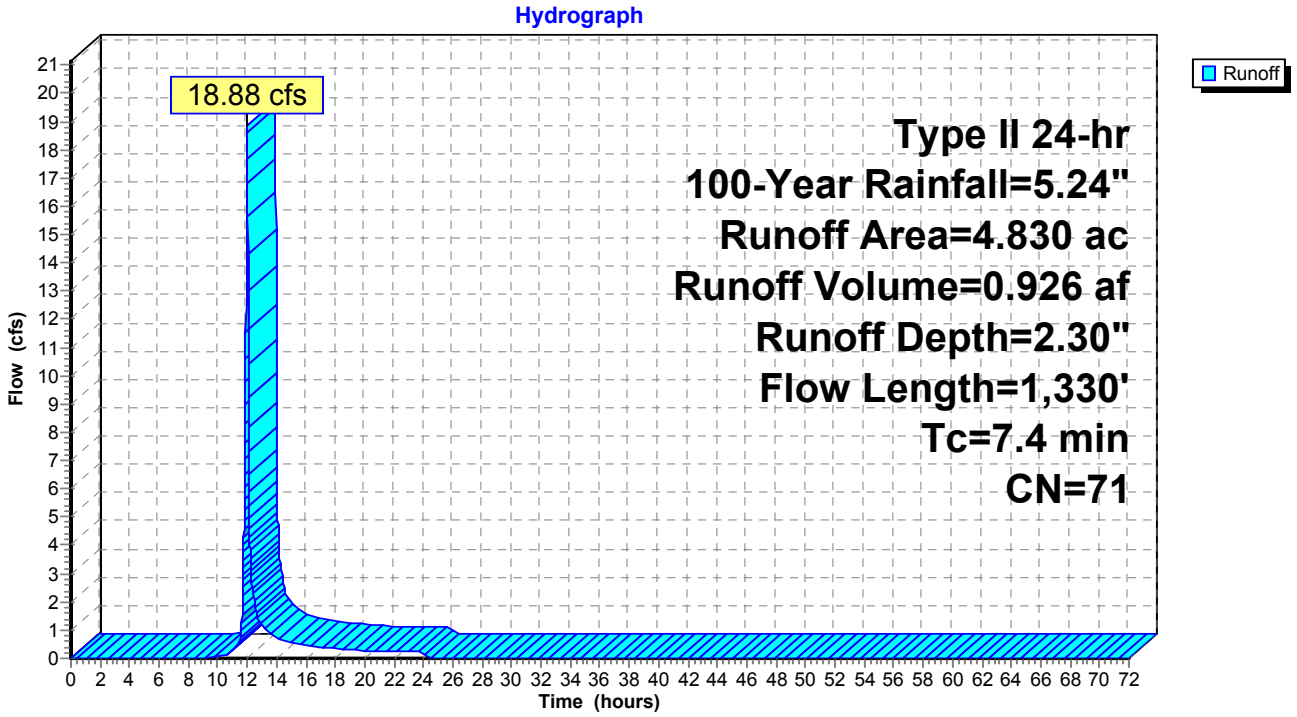
Runoff = 18.88 cfs @ 11.99 hrs, Volume= 0.926 af, Depth= 2.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=5.24"

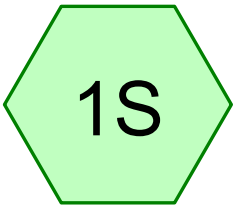
Area (ac)	CN	Description
0.050	30	Meadow, non-grazed, HSG A
1.950	71	Meadow, non-grazed, HSG C
2.630	70	Woods, Good, HSG C
0.200	89	Gravel roads, HSG C
4.830	71	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	100	0.3100	0.46		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.58"
0.6	134	0.3300	4.02		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
2.1	366	0.3300	2.87		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
0.5	324	0.2600	9.90	9.90	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=1.00' D=0.50' Z= 2.0 '/' Top.W=3.00' n= 0.035 Earth, dense weeds
0.6	406	0.3100	11.83	17.75	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=2.00' D=0.50' Z= 2.0 '/' Top.W=4.00' n= 0.035 Earth, dense weeds
7.4	1,330	Total			

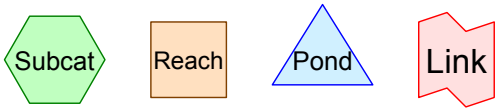
Subcatchment DA1: Drainage Area 1



Sediment Basin 1



Alternative TC



Routing Diagram for 161-104 Mockingbird Compressor SB
Prepared by Civil and Environmental Consultants, Inc., Printed 3/23/2017
HydroCAD® 10.00 s/n 07863 © 2013 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Alternative TC

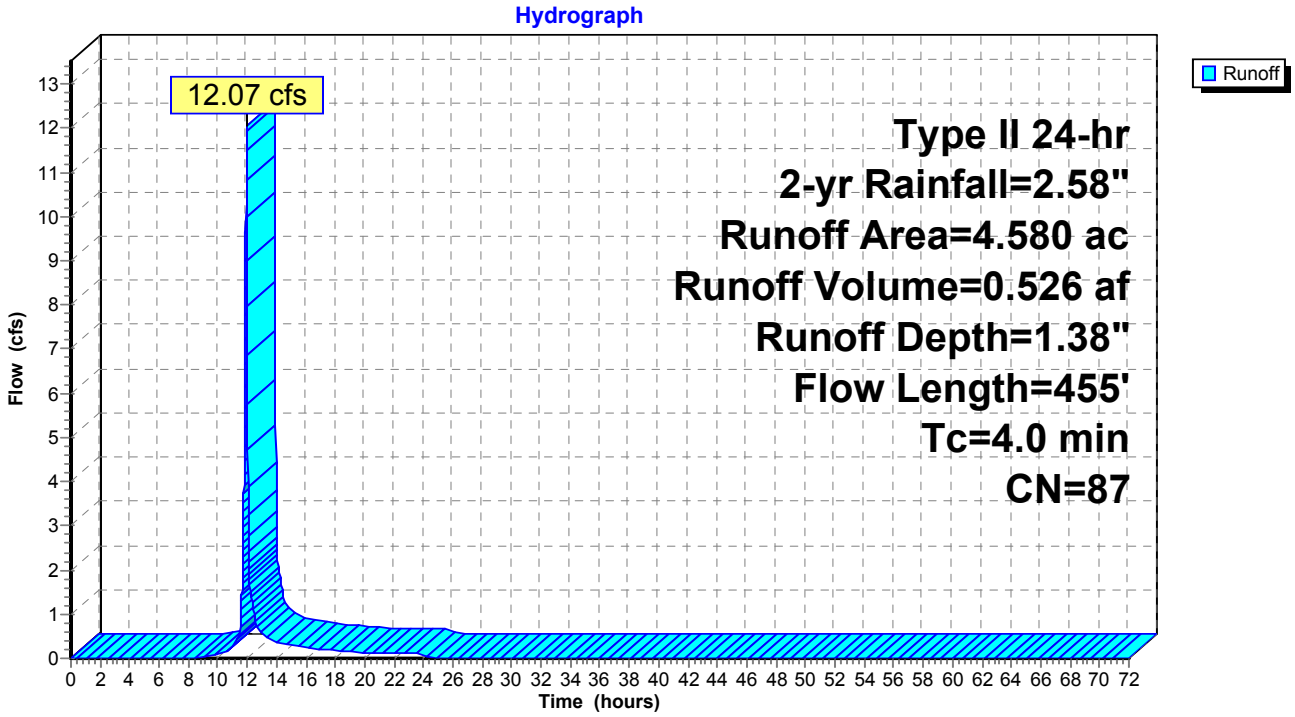
Runoff = 12.07 cfs @ 11.95 hrs, Volume= 0.526 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-yr Rainfall=2.58"

	Area (ac)	CN	Description
	0.090	70	Woods, Good, HSG C
	0.850	71	Meadow, non-grazed, HSG C
	2.650	89	Gravel roads, HSG C
*	0.990	98	Impervious
	4.580	87	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.0100	0.94		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 2.58"
1.7	167	0.0100	1.61		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
0.3	53	0.0500	3.50	1.75	**Trap/Vee/Rect Channel Flow, CD** Bot.W=0.00' D=0.50' Z= 2.0 '/' Top.W=2.00' n= 0.035
0.2	108	0.0200	7.44	9.14	**Pipe Channel, DE** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.0	27	0.4700	10.72	5.36	**Trap/Vee/Rect Channel Flow, EF** Bot.W=0.00' D=0.50' Z= 2.0 '/' Top.W=2.00' n= 0.035
4.0	455	Total			

Subcatchment 1S: Alternative TC



Summary for Subcatchment DA1: Sediment Basin 1

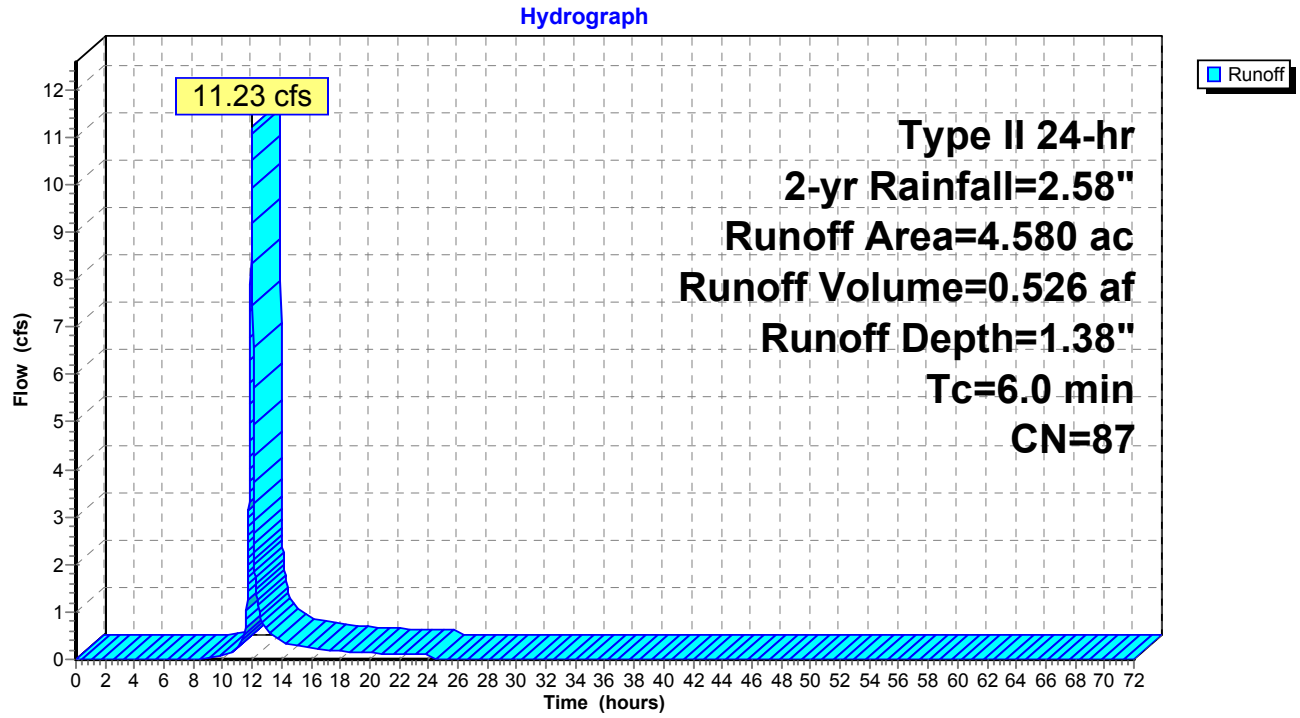
Runoff = 11.23 cfs @ 11.97 hrs, Volume= 0.526 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 2-yr Rainfall=2.58"

	Area (ac)	CN	Description
	0.090	70	Woods, Good, HSG C
	0.850	71	Meadow, non-grazed, HSG C
	2.650	89	Gravel roads, HSG C
*	0.990	98	Impervious
	4.580	87	Weighted Average

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

Subcatchment DA1: Sediment Basin 1



Summary for Subcatchment 1S: Alternative TC

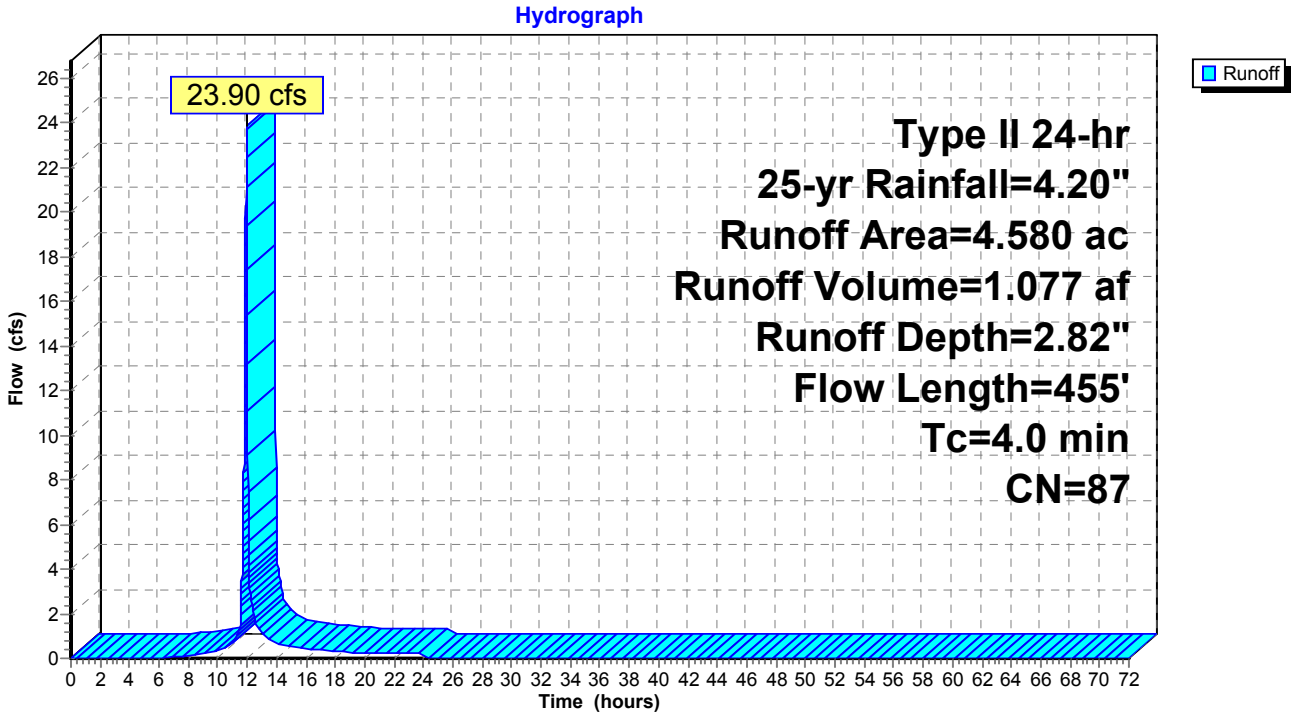
Runoff = 23.90 cfs @ 11.95 hrs, Volume= 1.077 af, Depth= 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=4.20"

	Area (ac)	CN	Description
	0.090	70	Woods, Good, HSG C
	0.850	71	Meadow, non-grazed, HSG C
	2.650	89	Gravel roads, HSG C
*	0.990	98	Impervious
	4.580	87	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	100	0.0100	0.94		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 2.58"
1.7	167	0.0100	1.61		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
0.3	53	0.0500	3.50	1.75	**Trap/Vee/Rect Channel Flow, CD** Bot.W=0.00' D=0.50' Z= 2.0 '/' Top.W=2.00' n= 0.035
0.2	108	0.0200	7.44	9.14	**Pipe Channel, DE** 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.013
0.0	27	0.4700	10.72	5.36	**Trap/Vee/Rect Channel Flow, EF** Bot.W=0.00' D=0.50' Z= 2.0 '/' Top.W=2.00' n= 0.035
4.0	455	Total			

Subcatchment 1S: Alternative TC



Summary for Subcatchment DA1: Sediment Basin 1

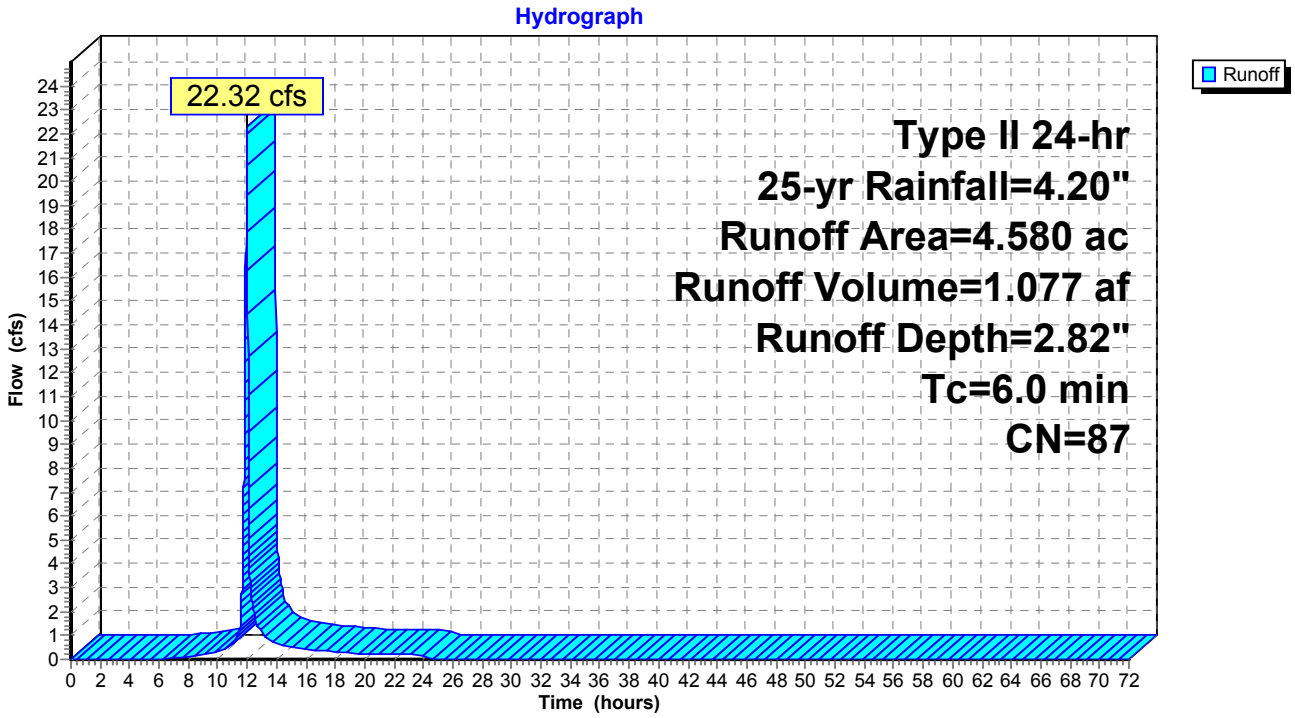
Runoff = 22.32 cfs @ 11.97 hrs, Volume= 1.077 af, Depth= 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-yr Rainfall=4.20"

	Area (ac)	CN	Description
	0.090	70	Woods, Good, HSG C
	0.850	71	Meadow, non-grazed, HSG C
	2.650	89	Gravel roads, HSG C
*	0.990	98	Impervious
	4.580	87	Weighted Average

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

Subcatchment DA1: Sediment Basin 1



COLLECTION/CONVEYANCE DRAINAGE AREA PREPARED BY: GSZ DATE: 10/19/2016
MOCKINGBIRD HILL COMPRESSOR STATION CHECKED BY: BRT/TGJ DATE: 12/20/2016
CEC PROJECT NUMBER 161-104

Structure	Drainage Area (AC)	Impervious Area (AC)	Gravel (AC)	Lawn/Grass (AC)	Woods (AC)	Runoff Coefficient	Design Storm	Flow (cfs)
Channel 1	0.46	0.17	0.09	0.20		0.66	10-year	1.98
Channel 2	1.79	0.67	1.12			0.86	10-year	10.01
Channel 3	1.84	0.29	1.55			0.82	10-year	9.90
Channel 4	0.18			0.18		0.35	10-year	0.41
Channel 5	0.29	0.03	0.09	0.17		0.55	10-year	1.04
Channel 6	1.24	0.17	0.86	0.21		0.74	10-year	6.03
Channel 7	0.38			0.25	0.13	0.30	10-year	0.74
Channel 8	0.54	0.03		0.21	0.30	0.30	10-year	1.06
Channel 9	0.32	0.02		0.30		0.39	10-year	0.81
Channel 10	0.18		0.01	0.17		0.38	10-year	0.44
Channel 11	0.12	0.02	0.01	0.09		0.49	10-year	0.38
Channel 12A	0.33		0.33			0.80	10-year	1.72
Channel 12B	0.57		0.57			0.80	10-year	2.98
Channel 13	0.19	0.03		0.16		0.44	10-year	0.55
Channel 14	0.10	0.02		0.08		0.47	10-year	0.31
Channel 15	0.24			0.24		0.35	10-year	0.55
Channel 16	0.16		0.02	0.08	0.06	0.35	2-year	0.27
Channel 17	0.65		0.05	0.31	0.29	0.32	2-year	1.00
Channel 18	2.60		0.04	0.61	1.95	0.24	2-year	3.06
Channel 19	0.61		0.32	0.24	0.05	0.57	10-year	2.29
Channel 20	0.23		0.08	0.15		0.51	10-year	0.76
Channel 21	0.34		0.02	0.04	0.28	0.25	10-year	0.56
Culvert 7	3.66		0.07	1.75	1.84	0.28	10-year	6.77
CB1.1	0.78	0.37	0.41			0.87	10-year	4.44

Runoff Coefficients*:	
Impervious =	0.95
Gravel =	0.80
Lawn/Meadow =	0.35
Woods =	0.20

* 2-yr and 10-yr, 5-minute rain fall intensites are 4.82in/hr and 6.53in/hr, respectively.
Values obtained per the National Oceanic and Atmospheric Administration's website

Stormwater Analysis - Outlet Protection Sizing Created By: GSZ Checked By: BRT/TGJ
Mockingbird Hill Compressor Station
161-104 Date: 10/17/2016 Date: 12/20/2016

RIPRAP NO.	FACILITY	FLOW (cfs)	PIPE SIZE (in)	Tw (ft)	AREA (sf)	VELOCITY (ft/s)	Do (ft)	d (in)	La (ft)	W (ft)	Tailwater Conditions	RIP RAP	DIAMETER (in)	THICKNESS (ft)
22	Channel 1	1.98	12	0.50	1.11	1.78	1.00	12	6	7.0	Minimum	R-3	6	0.75
15	Channel 2 (Culvert 2)	10.01	18	0.50	1.18	8.49	1.50	18	9	10.5	Minimum	R-4	12	1.50
14	Channel 3 (Culvert 1)	9.90	18	0.50	1.09	9.05	1.50	18	9	10.5	Minimum	R-5	18	2.25
13	Channel 4	0.41	12	0.50	0.43	0.96	1.00	12	6	7.0	Minimum	R-3	6	0.75
18	Channel 5	1.04	12	0.50	0.69	1.50	1.00	12	6	7.0	Minimum	R-3	6	0.75
20	Channel 6	6.03	12	0.50	2.97	2.03	1.00	12	10	11.0	Minimum	R-3	6	0.75
16	Channel 7	0.74	12	0.50	0.11	6.95	1.00	12	6	7.0	Minimum	R-4	12	1.50
8	Channel 8	1.06	12	0.50	0.19	5.55	1.00	12	6	7.0	Minimum	R-3	6	0.75
7	Channel 9	0.81	12	0.50	0.13	6.26	1.00	12	6	7.0	Minimum	R-3	6	0.75
2	Channel 11 (Culvert 4)	0.38	15	0.50	0.10	3.73	1.25	15	9	10.25	Minimum	R-3	6	0.75
4	Channel 12A& 12B	4.70	12	0.50	0.96	4.92	1.00	12	8	9.0	Minimum	R-3	6	0.75
5	Channel 13	0.55	12	0.50	0.09	6.14	1.00	12	6	7.0	Minimum	R-3	6	0.75
6	Channel 14	0.31	12	0.50	0.05	5.76	1.00	12	6	7.0	Minimum	R-3	6	0.75
24	Channel 15	0.55	12	0.50	0.08	6.64	1.00	12	6	7.0	Minimum	R-4	12	1.50
3	Channel 16 (Culvert 3)	0.27	15	0.50	0.04	6.45	1.25	15	9	10.25	Minimum	R-3	6	0.75
10	Channel 19	2.29	12	0.50	0.26	8.73	1.00	12	6	7.0	Minimum	R-4	12	1.50
11	Channel 20	0.76	12	0.50	0.11	6.63	1.00	12	6	7.0	Minimum	R-4	12	1.50
21	Channel 21	0.56	12	0.50	0.37	1.50	1.00	12	6	7.0	Minimum	R-3	6	0.75
9	Channel 17 and 18 (Culvert 6)	4.06	15	0.50	1.23	10.83	1.25	15	8	9.25	Minimum	R-5	18	2.25
19	CB1.1	4.44	15	0.50	1.23	3.61	1.25	15	9	10.25	Minimum	R-3	6	0.75
23	MH2.1	6.23	15	0.50	1.23	7.66	1.25	15	8	9.25	Minimum	R-4	12	1.50

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 1

Discharge	1.98
Peak Flow Period	12
Channel Slope	0.01
Channel Bottom Width	0
Left Side Slope	4
Right Side Slope	4
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

P300 - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
P300 Unvegetated	Straight	1.98 cfs	1.78 ft/s	0.53 ft	0.034	2 lbs/ft2	0.33 lbs/ft2	6.07	STABLE	E
P300 Reinforced Vegetation	Straight	1.98 cfs	0.52 ft/s	0.97 ft	0.173	8 lbs/ft2	0.61 lbs/ft2	13.17	STABLE	E
Underlying Substrate	Straight	1.98 cfs	0.52 ft/s	0.97 ft	--	2 lbs/ft2	0.009 lbs/ft2	224.08	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 2

Discharge	10.01
Peak Flow Period	12
Channel Slope	0.01
Channel Bottom Width	0
Left Side Slope	10
Right Side Slope	10
Existing Bend Radius	71
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

P300 - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
P300 Unvegetated	Straight	10.01 cfs	2.21 ft/s	0.67 ft	0.032	2 lbs/ft2	0.42 lbs/ft2	4.76	STABLE	E
P300 Reinforced Vegetation	Straight	10.01 cfs	0.79 ft/s	1.12 ft	0.127	8 lbs/ft2	0.7 lbs/ft2	11.42	STABLE	E
Underlying Substrate	Straight	10.01 cfs	0.79 ft/s	1.12 ft	--	2 lbs/ft2	0.017 lbs/ft2	115.7	STABLE	--
P300 Unvegetated	Bend	10.01 cfs	2.21 ft/s	0.67 ft	0.03	2 lbs/ft2	0.84 lbs/ft2	2.38	STABLE	E
P300 Reinforced Vegetation	Bend	10.01 cfs	0.79 ft/s	1.12 ft	0.13	8 lbs/ft2	1.4 lbs/ft2	5.71	STABLE	E
Underlying Substrate	Bend	10.01 cfs	0.79 ft/s	1.12 ft	--	2 lbs/ft2	0.017 lbs/ft2	115.7	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 3

Discharge	9.90
Peak Flow Period	12
Channel Slope	0.01
Channel Bottom Width	0
Left Side Slope	2
Right Side Slope	2
Existing Bend Radius	79
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

P300 - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
P300 Unvegetated	Straight	9.9 cfs	3.53 ft/s	1.19 ft	0.028	2 lbs/ft2	0.74 lbs/ft2	2.7	STABLE	E
P300 Reinforced Vegetation	Straight	9.9 cfs	1.64 ft/s	1.74 ft	0.077	8 lbs/ft2	1.09 lbs/ft2	7.37	STABLE	E
Underlying Substrate	Straight	9.9 cfs	1.64 ft/s	1.74 ft	--	2 lbs/ft2	0.046 lbs/ft2	43.29	STABLE	--
P300 Unvegetated	Bend	9.9 cfs	3.53 ft/s	1.19 ft	0.03	2 lbs/ft2	1.48 lbs/ft2	1.35	STABLE	E
P300 Reinforced Vegetation	Bend	9.9 cfs	1.64 ft/s	1.74 ft	0.08	8 lbs/ft2	2.17 lbs/ft2	3.68	STABLE	E
Underlying Substrate	Bend	9.9 cfs	1.64 ft/s	1.74 ft	--	2 lbs/ft2	0.046 lbs/ft2	43.29	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 4 - A

Discharge	.41
Peak Flow Period	12
Channel Slope	0.01
Channel Bottom Width	0
Left Side Slope	10
Right Side Slope	10
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

P300 - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
P300 Unvegetated	Straight	0.41 cfs	0.96 ft/s	0.21 ft	0.034	2 lbs/ft2	0.13 lbs/ft2	15.5	STABLE	E
P300 Reinforced Vegetation	Straight	0.41 cfs	0.21 ft/s	0.44 ft	0.25	8 lbs/ft2	0.27 lbs/ft2	29.34	STABLE	E
Underlying Substrate	Straight	0.41 cfs	0.21 ft/s	0.44 ft	--	2 lbs/ft2	0.003 lbs/ft2	794.35	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 5

Discharge	1.04
Peak Flow Period	12
Channel Slope	0.01
Channel Bottom Width	0
Left Side Slope	4
Right Side Slope	4
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

P300 - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
P300 Unvegetated	Straight	1.04 cfs	1.5 ft/s	0.42 ft	0.034	2 lbs/ft2	0.26 lbs/ft2	7.71	STABLE	E
P300 Reinforced Vegetation	Straight	1.04 cfs	0.35 ft/s	0.86 ft	0.238	8 lbs/ft2	0.54 lbs/ft2	14.87	STABLE	E
Underlying Substrate	Straight	1.04 cfs	0.35 ft/s	0.86 ft	--	2 lbs/ft2	0.004 lbs/ft2	447.66	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 6

Discharge	6.03
Peak Flow Period	12
Channel Slope	0.01
Channel Bottom Width	0
Left Side Slope	8
Right Side Slope	8
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

P300 - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
P300 Unvegetated	Straight	6.03 cfs	2.03 ft/s	0.61 ft	0.033	2 lbs/ft2	0.38 lbs/ft2	5.26	STABLE	E
P300 Reinforced Vegetation	Straight	6.03 cfs	0.68 ft/s	1.05 ft	0.142	8 lbs/ft2	0.66 lbs/ft2	12.18	STABLE	E
Underlying Substrate	Straight	6.03 cfs	0.68 ft/s	1.05 ft	--	2 lbs/ft2	0.014 lbs/ft2	146.89	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 7 - Max

Discharge	0.66
Peak Flow Period	12
Channel Slope	0.5
Channel Bottom Width	0
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

Rock Riprap - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Rock Riprap Unvegetated	Straight	0.66 cfs	6.95 ft/s	0.22 ft	0.032	8 lbs/ft2	6.8 lbs/ft2	1.18	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 7 - Min

Discharge	.74
Peak Flow Period	12
Channel Slope	0.1
Channel Bottom Width	0
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

P300 - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
P300 Unvegetated	Straight	0.74 cfs	3.74 ft/s	0.31 ft	0.034	2 lbs/ft2	1.96 lbs/ft2	1.02	STABLE	E
P300 Reinforced Vegetation	Straight	0.74 cfs	1.22 ft/s	0.55 ft	0.152	8 lbs/ft2	3.44 lbs/ft2	2.32	STABLE	E
Underlying Substrate	Straight	0.74 cfs	1.22 ft/s	0.55 ft	--	2 lbs/ft2	0.084 lbs/ft2	23.87	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 8

Discharge	1.06
Peak Flow Period	12
Channel Slope	0.2
Channel Bottom Width	0
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

Rock Riprap - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Rock Riprap Unvegetated	Straight	1.06 cfs	5.55 ft/s	0.31 ft	0.032	4 lbs/ft2	3.86 lbs/ft2	1.04	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 9

Discharge	0.81
Peak Flow Period	12
Channel Slope	0.33
Channel Bottom Width	0
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

Rock Riprap - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Rock Riprap Unvegetated	Straight	0.81 cfs	6.26 ft/s	0.25 ft	0.032	6 lbs/ft2	5.24 lbs/ft2	1.15	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 10

Discharge	0.44
Peak Flow Period	12
Channel Slope	0.05
Channel Bottom Width	0
Left Side Slope	4
Right Side Slope	4
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

P300 - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
P300 Unvegetated	Straight	0.44 cfs	2.22 ft/s	0.22 ft	0.034	2 lbs/ft2	0.7 lbs/ft2	2.88	STABLE	E
P300 Reinforced Vegetation	Straight	0.44 cfs	0.5 ft/s	0.47 ft	0.25	8 lbs/ft2	1.47 lbs/ft2	5.45	STABLE	E
Underlying Substrate	Straight	0.44 cfs	0.5 ft/s	0.47 ft	--	2 lbs/ft2	0.014 lbs/ft2	147.43	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 11 - Max

Discharge	0.38
Peak Flow Period	12
Channel Slope	0.05
Channel Bottom Width	0
Left Side Slope	4
Right Side Slope	4
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

P300 - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
P300 Unvegetated	Straight	0.38 cfs	2.14 ft/s	0.21 ft	0.034	2 lbs/ft2	0.66 lbs/ft2	3.04	STABLE	E
P300 Reinforced Vegetation	Straight	0.38 cfs	0.48 ft/s	0.45 ft	0.25	8 lbs/ft2	1.39 lbs/ft2	5.75	STABLE	E
Underlying Substrate	Straight	0.38 cfs	0.48 ft/s	0.45 ft	--	2 lbs/ft2	0.013 lbs/ft2	155.77	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 11 - Min

Discharge	0.38
Peak Flow Period	12
Channel Slope	0.01
Channel Bottom Width	0
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

P300 - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
P300 Unvegetated	Straight	0.38 cfs	1.33 ft/s	0.38 ft	0.034	2 lbs/ft2	0.24 lbs/ft2	8.49	STABLE	E
P300 Reinforced Vegetation	Straight	0.38 cfs	0.3 ft/s	0.8 ft	0.25	8 lbs/ft2	0.5 lbs/ft2	16.07	STABLE	E
Underlying Substrate	Straight	0.38 cfs	0.3 ft/s	0.8 ft	--	2 lbs/ft2	0.004 lbs/ft2	516.1	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 12-A

Discharge	1.72
Peak Flow Period	12
Channel Slope	0.02
Channel Bottom Width	0
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

P300 - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
P300 Unvegetated	Straight	1.72 cfs	2.57 ft/s	0.58 ft	0.033	2 lbs/ft2	0.72 lbs/ft2	2.77	STABLE	E
P300 Reinforced Vegetation	Straight	1.72 cfs	0.91 ft/s	0.97 ft	0.133	8 lbs/ft2	1.22 lbs/ft2	6.58	STABLE	E
Underlying Substrate	Straight	1.72 cfs	0.91 ft/s	0.97 ft	--	2 lbs/ft2	0.03 lbs/ft2	66.74	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 12 - B

Discharge	2.98
Peak Flow Period	12
Channel Slope	0.01
Channel Bottom Width	0
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

P300 - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
P300 Unvegetated	Straight	2.98 cfs	2.38 ft/s	0.79 ft	0.031	2 lbs/ft2	0.49 lbs/ft2	4.05	STABLE	E
P300 Reinforced Vegetation	Straight	2.98 cfs	0.87 ft/s	1.31 ft	0.119	8 lbs/ft2	0.81 lbs/ft2	9.82	STABLE	E
Underlying Substrate	Straight	2.98 cfs	0.87 ft/s	1.31 ft	--	2 lbs/ft2	0.02 lbs/ft2	98.86	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 13

Discharge	0.55
Peak Flow Period	12
Channel Slope	0.35
Channel Bottom Width	0
Left Side Slope	1
Right Side Slope	1
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

Rock Riprap - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Rock Riprap Unvegetated	Straight	0.55 cfs	6.14 ft/s	0.3 ft	0.032	8 lbs/ft2	6.53 lbs/ft2	1.22	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 14 - Min

Discharge	0.31
Peak Flow Period	12
Channel Slope	0.35
Channel Bottom Width	0
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

Rock Riprap - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Rock Riprap Unvegetated	Straight	0.31 cfs	5.04 ft/s	0.18 ft	0.032	6 lbs/ft2	3.83 lbs/ft2	1.57	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 14 - Max

Discharge	0.31
Peak Flow Period	12
Channel Slope	0.5
Channel Bottom Width	0
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

Rock Riprap - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Rock Riprap Unvegetated	Straight	0.31 cfs	5.76 ft/s	0.16 ft	0.032	6 lbs/ft2	5.12 lbs/ft2	1.17	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 15

Discharge	0.55
Peak Flow Period	12
Channel Slope	0.5
Channel Bottom Width	0
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

Rock Riprap - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Rock Riprap Unvegetated	Straight	0.55 cfs	6.64 ft/s	0.2 ft	0.032	8 lbs/ft2	6.35 lbs/ft2	1.26	STABLE	--

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5401 St. Wendel-Cynthiana Road
Poseyville, Indiana 47633
Tel. 800.772.2040
Fax 812.867.0247
www.nagreen.com

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Version 5.0

Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 16

Discharge	0.27
Peak Flow Period	12
Channel Slope	0.35
Channel Bottom Width	0
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

Rock Riprap - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Rock Riprap Unvegetated	Straight	0.27 cfs	4.86 ft/s	0.17 ft	0.032	8 lbs/ft2	3.64 lbs/ft2	2.2	STABLE	--

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Version 5.0

Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 17

Discharge	1.00
Peak Flow Period	12
Channel Slope	0.05
Channel Bottom Width	0
Left Side Slope	1.5
Right Side Slope	1.5
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

P300 - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
P300 Unvegetated	Straight	1 cfs	3.22 ft/s	0.46 ft	0.034	2 lbs/ft2	1.42 lbs/ft2	1.41	STABLE	E
P300 Reinforced Vegetation	Straight	1 cfs	1.13 ft/s	0.77 ft	0.138	8 lbs/ft2	2.4 lbs/ft2	3.33	STABLE	E
Underlying Substrate	Straight	1 cfs	1.13 ft/s	0.77 ft	--	2 lbs/ft2	0.062 lbs/ft2	32.12	STABLE	--

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Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 18

Discharge	3.06
Peak Flow Period	12
Channel Slope	0.15
Channel Bottom Width	0
Left Side Slope	4
Right Side Slope	4
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

Rock Riprap - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Rock Riprap Unvegetated	Straight	3.06 cfs	5.69 ft/s	0.37 ft	0.032	6 lbs/ft2	3.43 lbs/ft2	1.75	STABLE	--

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Version 5.0

Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 19

Discharge	2.29
Peak Flow Period	12
Channel Slope	0.4
Channel Bottom Width	0
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

Rock Riprap - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Rock Riprap Unvegetated	Straight	2.29 cfs	8.73 ft/s	0.36 ft	0.032	9.33 lbs/ft2	9.04 lbs/ft2	1.03	STABLE	--

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Erosion Control Materials Design Software
Version 5.0

Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 20

Discharge	0.76
Peak Flow Period	12
Channel Slope	0.4
Channel Bottom Width	0
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

Rock Riprap - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Rock Riprap Unvegetated	Straight	0.76 cfs	6.63 ft/s	0.24 ft	0.032	6 lbs/ft2	5.98 lbs/ft2	1	STABLE	--

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Erosion Control Materials Design Software
Version 5.0

Project Name: Mockingbird Compressor Station
Project Number: 104109
Project Location: Wetzel County, West Virginia
Channel Name: Channel 21

Discharge	0.56
Peak Flow Period	24
Channel Slope	0.01
Channel Bottom Width	0
Left Side Slope	2
Right Side Slope	1.5
Low Flow Liner	
Retardance Class	C
Vegtation Type	Bunch Type
Vegetation Density	Good 75-95%
Soil Type	Silt Loam

P300 - Class C - Bunch Type - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
P300 Unvegetated	Straight	0.56 cfs	1.5 ft/s	0.46 ft	0.034	2 lbs/ft2	0.29 lbs/ft2	6.93	STABLE	E
P300 Reinforced Vegetation	Straight	0.56 cfs	0.35 ft/s	0.96 ft	0.24	8 lbs/ft2	0.6 lbs/ft2	13.32	STABLE	E
Underlying Substrate	Straight	0.56 cfs	0.35 ft/s	0.96 ft	--	2 lbs/ft2	0.005 lbs/ft2	435.41	STABLE	--

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, Dec 20 2016

Culvert 1

Invert Elev Dn (ft)	=	922.40
Pipe Length (ft)	=	108.68
Slope (%)	=	2.05
Invert Elev Up (ft)	=	924.63
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

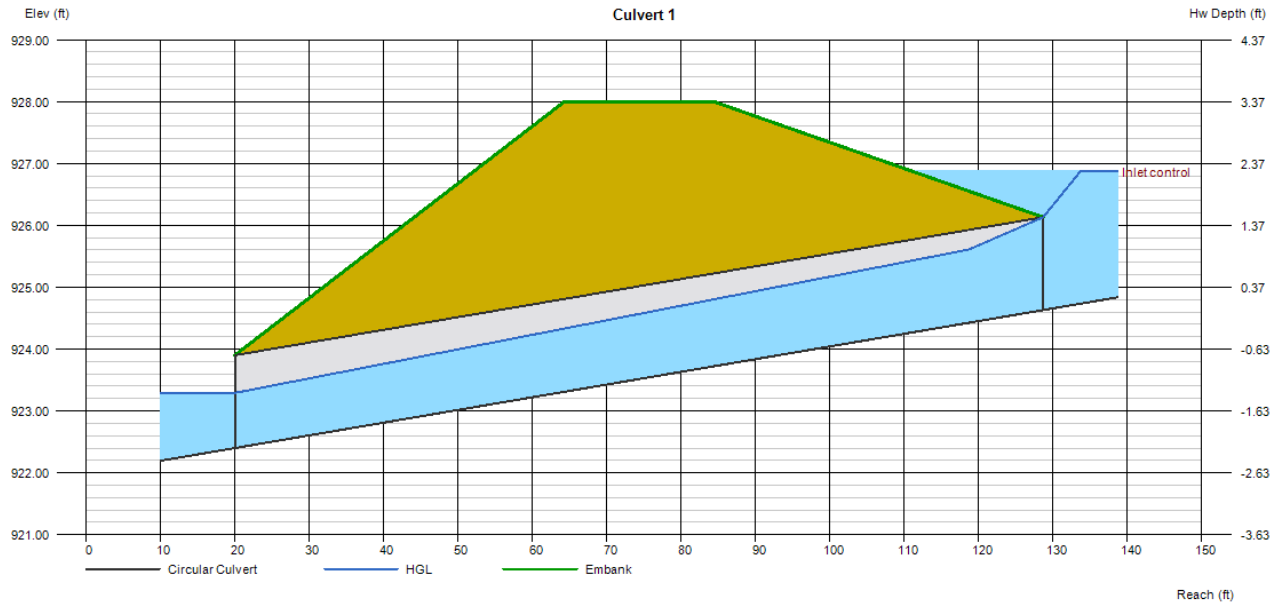
Top Elevation (ft)	=	928.00
Top Width (ft)	=	20.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	9.90
Qmax (cfs)	=	9.90
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	9.90
Qpipe (cfs)	=	9.90
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	9.05
Veloc Up (ft/s)	=	6.47
HGL Dn (ft)	=	923.29
HGL Up (ft)	=	925.84
Hw Elev (ft)	=	926.87
Hw/D (ft)	=	1.49
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, Dec 20 2016

Culvert 2

Invert Elev Dn (ft)	=	923.80
Pipe Length (ft)	=	43.33
Slope (%)	=	1.92
Invert Elev Up (ft)	=	924.63
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

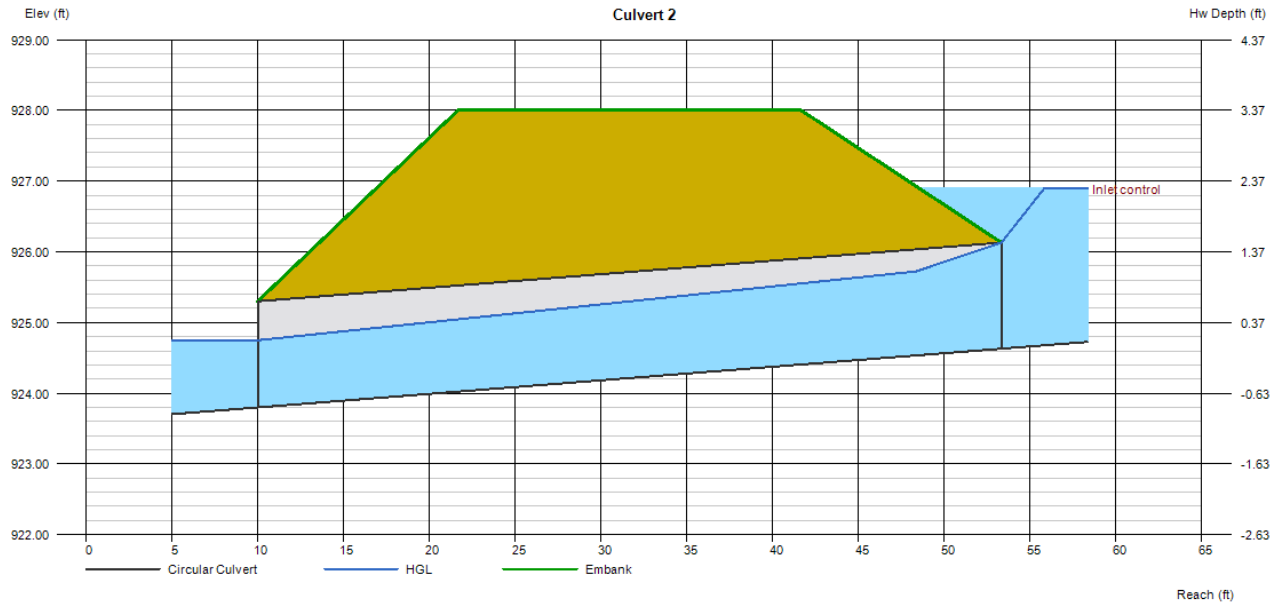
Top Elevation (ft)	=	928.00
Top Width (ft)	=	20.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	10.01
Qmax (cfs)	=	10.01
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	10.01
Qpipe (cfs)	=	10.01
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	8.49
Veloc Up (ft/s)	=	6.51
HGL Dn (ft)	=	924.75
HGL Up (ft)	=	925.85
Hw Elev (ft)	=	926.90
Hw/D (ft)	=	1.51
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, Dec 20 2016

Culvert 3

Invert Elev Dn (ft)	=	930.40
Pipe Length (ft)	=	18.78
Slope (%)	=	14.11
Invert Elev Up (ft)	=	933.05
Rise (in)	=	15.0
Shape	=	Circular
Span (in)	=	15.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

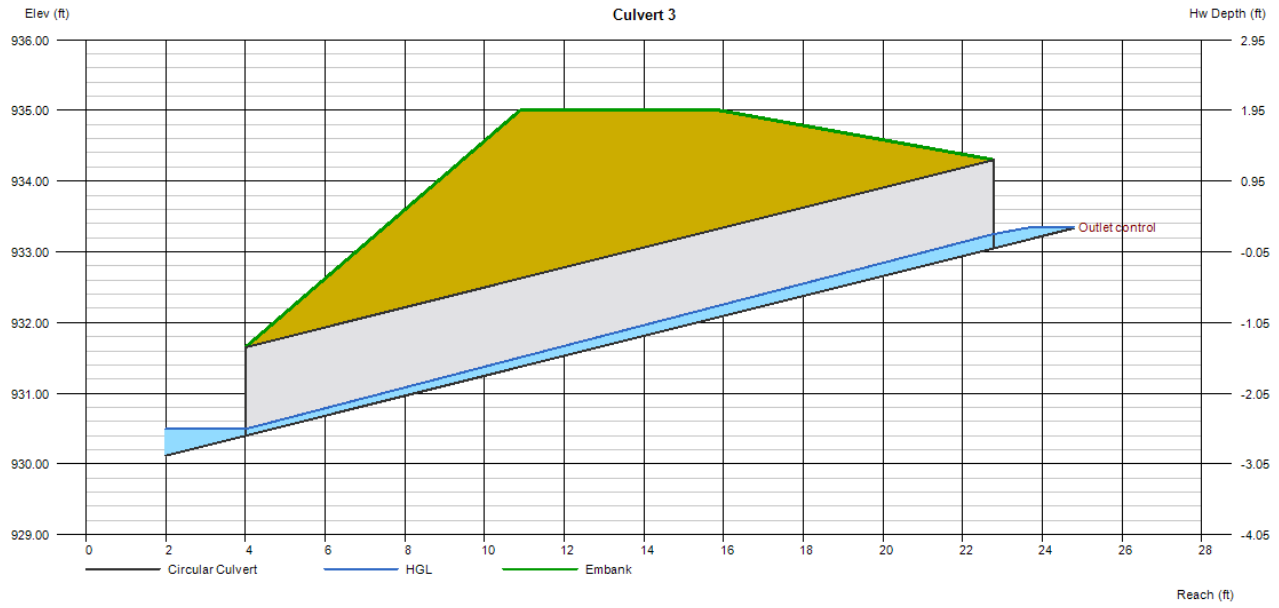
Top Elevation (ft)	=	935.00
Top Width (ft)	=	5.00
Crest Width (ft)	=	12.00

Calculations

Qmin (cfs)	=	0.27
Qmax (cfs)	=	0.27
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	0.27
Qpipe (cfs)	=	0.27
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	6.45
Veloc Up (ft/s)	=	2.12
HGL Dn (ft)	=	930.49
HGL Up (ft)	=	933.25
Hw Elev (ft)	=	933.36
Hw/D (ft)	=	0.24
Flow Regime	=	Outlet Control



Culvert Report

Culvert 4

Invert Elev Dn (ft)	=	913.50
Pipe Length (ft)	=	46.12
Slope (%)	=	2.12
Invert Elev Up (ft)	=	914.48
Rise (in)	=	15.0
Shape	=	Circular
Span (in)	=	15.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

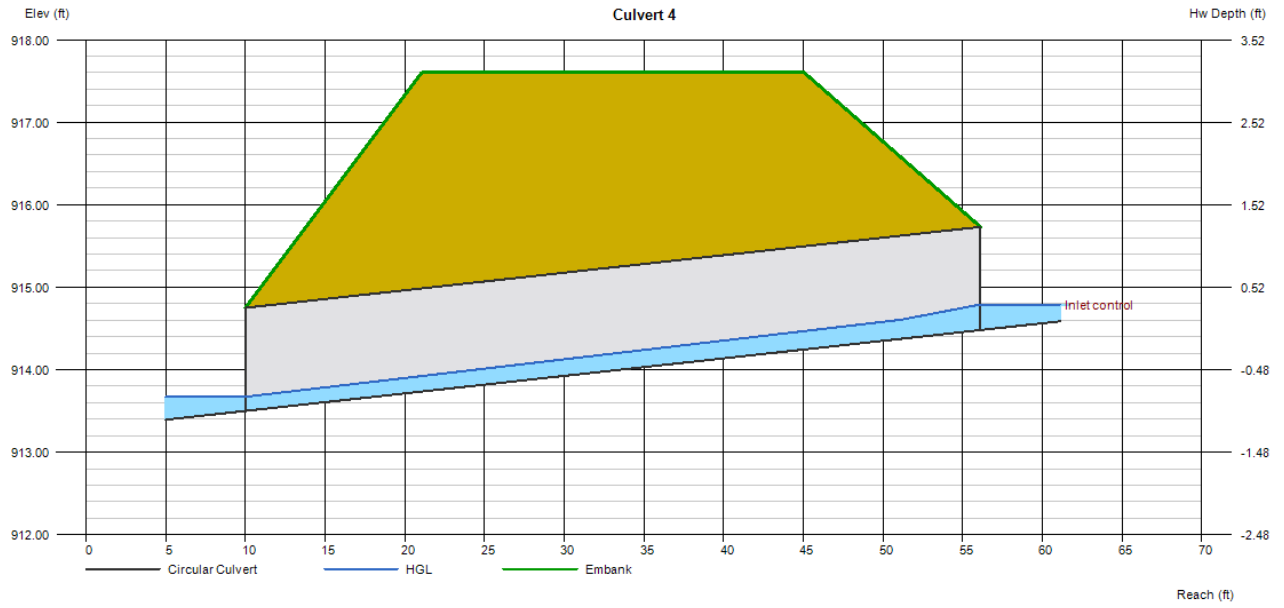
Top Elevation (ft)	=	917.60
Top Width (ft)	=	24.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	0.38
Qmax (cfs)	=	0.38
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	0.38
Qpipe (cfs)	=	0.38
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	3.73
Veloc Up (ft/s)	=	2.32
HGL Dn (ft)	=	913.67
HGL Up (ft)	=	914.72
Hw Elev (ft)	=	914.79
Hw/D (ft)	=	0.25
Flow Regime	=	Inlet Control



Culvert Report

Culvert 6

Invert Elev Dn (ft)	=	941.60
Pipe Length (ft)	=	20.70
Slope (%)	=	8.99
Invert Elev Up (ft)	=	943.46
Rise (in)	=	15.0
Shape	=	Circular
Span (in)	=	15.0
No. Barrels	=	1
n-Value	=	0.013
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Groove end projecting (C)
Coeff. K,M,c,Y,k	=	0.0045, 2, 0.0317, 0.69, 0.2

Embankment

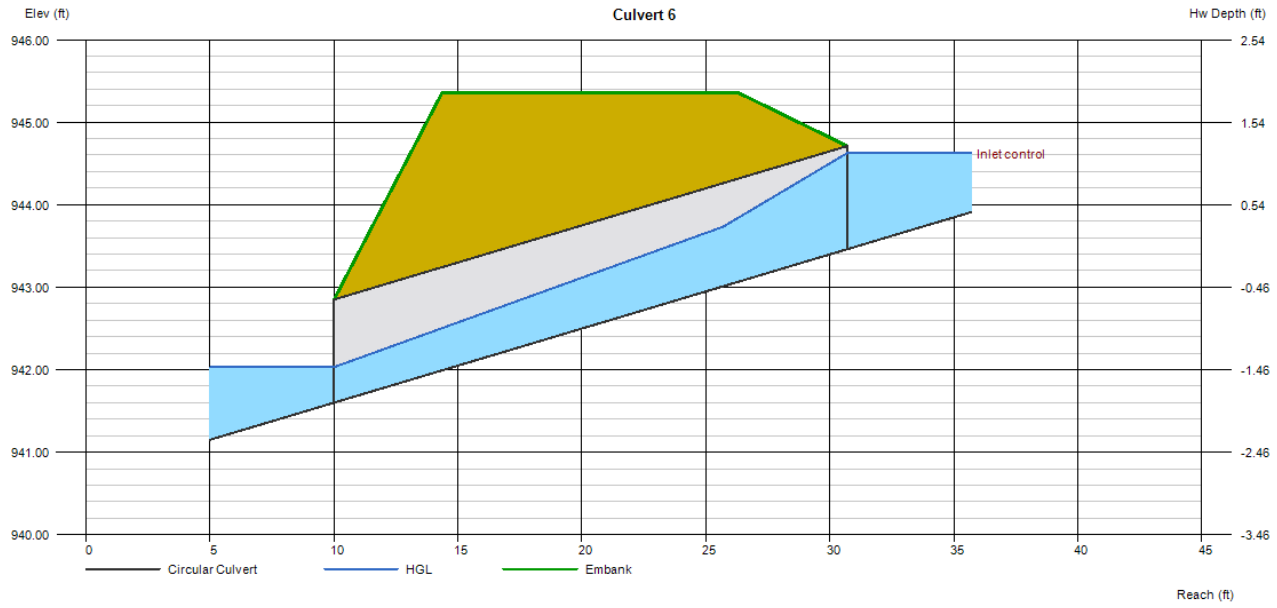
Top Elevation (ft)	=	945.35
Top Width (ft)	=	12.00
Crest Width (ft)	=	12.00

Calculations

Qmin (cfs)	=	4.06
Qmax (cfs)	=	4.06
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	4.06
Qpipe (cfs)	=	4.06
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	10.83
Veloc Up (ft/s)	=	4.79
HGL Dn (ft)	=	942.03
HGL Up (ft)	=	944.27
Hw Elev (ft)	=	944.63
Hw/D (ft)	=	0.93
Flow Regime	=	Inlet Control



Culvert Report

Culvert 7

Invert Elev Dn (ft)	=	957.21
Pipe Length (ft)	=	26.00
Slope (%)	=	10.73
Invert Elev Up (ft)	=	960.00
Rise (in)	=	15.0
Shape	=	Circular
Span (in)	=	15.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

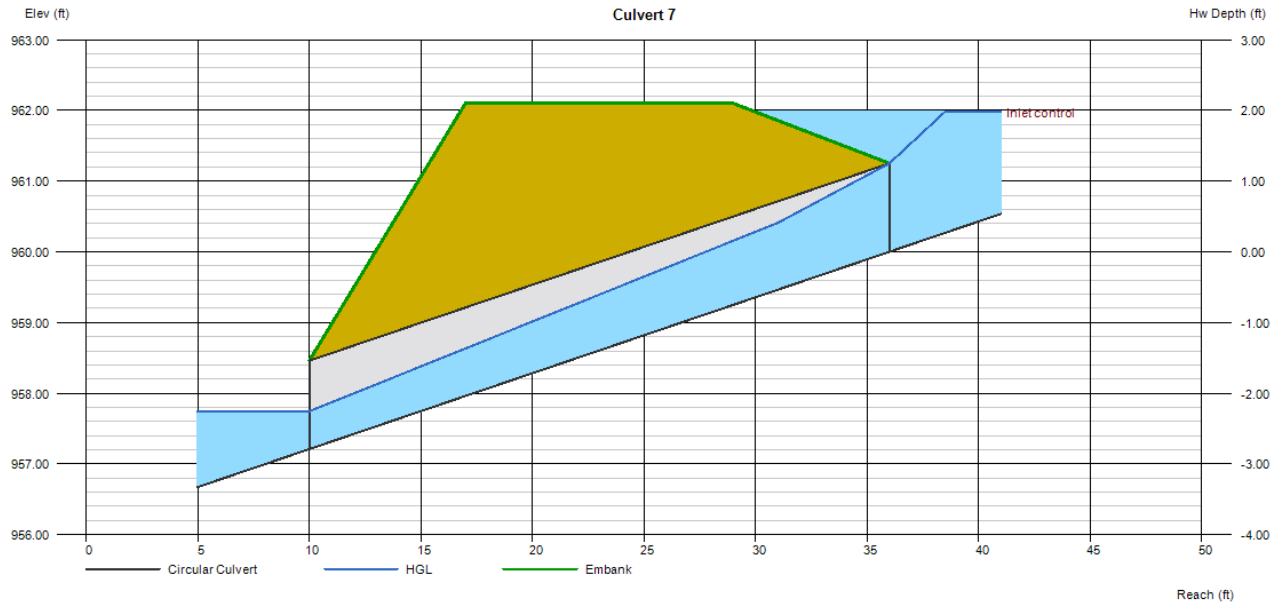
Top Elevation (ft)	=	962.10
Top Width (ft)	=	12.00
Crest Width (ft)	=	12.00

Calculations

Qmin (cfs)	=	6.77
Qmax (cfs)	=	6.77
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	6.77
Qpipe (cfs)	=	6.77
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	13.53
Veloc Up (ft/s)	=	6.18
HGL Dn (ft)	=	957.74
HGL Up (ft)	=	961.04
Hw Elev (ft)	=	961.98
Hw/D (ft)	=	1.59
Flow Regime	=	Inlet Control



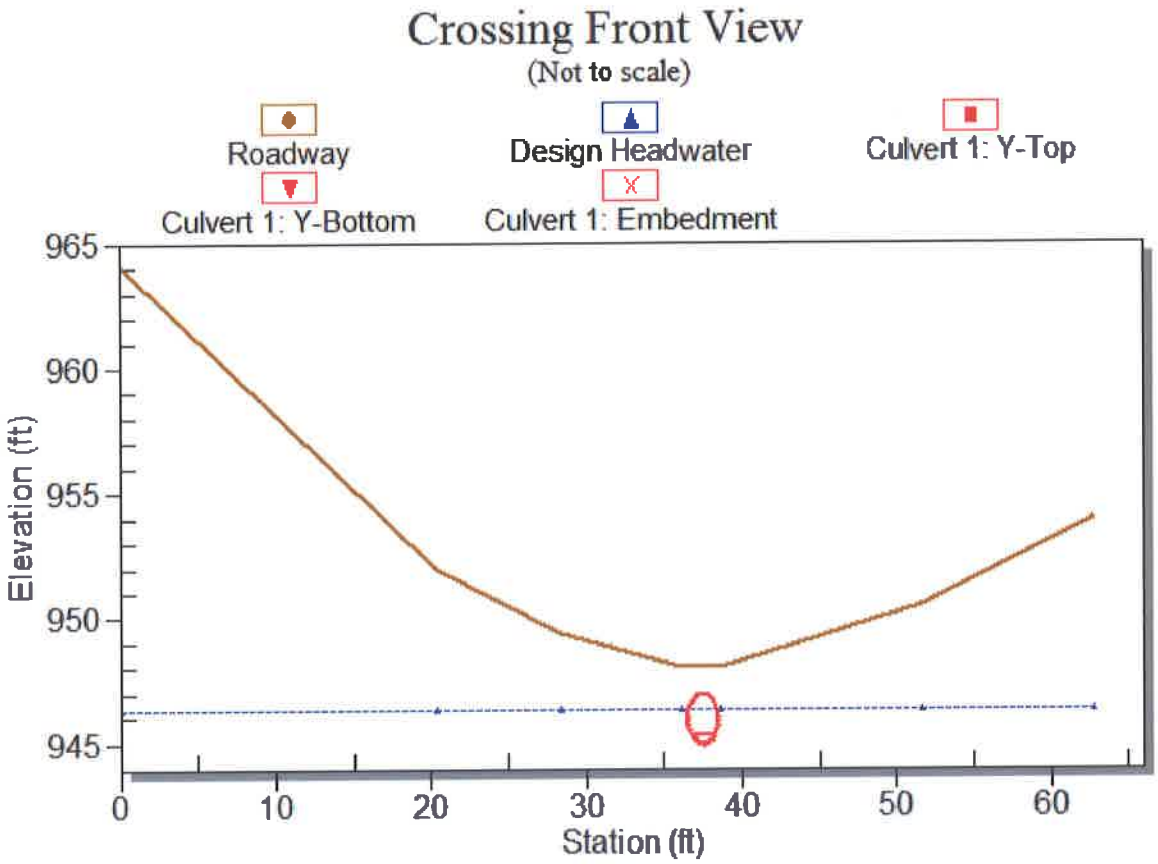
HY-8 Culvert Analysis Report

CULVERT 8

PREPARED BY: TGJ 12/14/2016

CHECKED BY: MEL 12/14/2016

Crossing Front View (Roadway Profile): Crossing 1



Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0 cfs

Design Flow: 8.93 cfs

Maximum Flow: 8.93 cfs

Table 1 - Summary of Culvert Flows at Crossing: Crossing 1

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
945.33	0.00	0.00	0.00	1
945.44	0.89	0.89	0.00	1
945.58	1.79	1.79	0.00	1
945.71	2.68	2.68	0.00	1
945.82	3.57	3.57	0.00	1
945.92	4.46	4.46	0.00	1
946.01	5.36	5.36	0.00	1
946.10	6.25	6.25	0.00	1
946.17	7.14	7.14	0.00	1
946.25	8.04	8.04	0.00	1
946.32	8.93	8.93	0.00	1
948.02	25.42	25.42	0.00	Overtopping

Rating Curve Plot for Crossing: Crossing 1

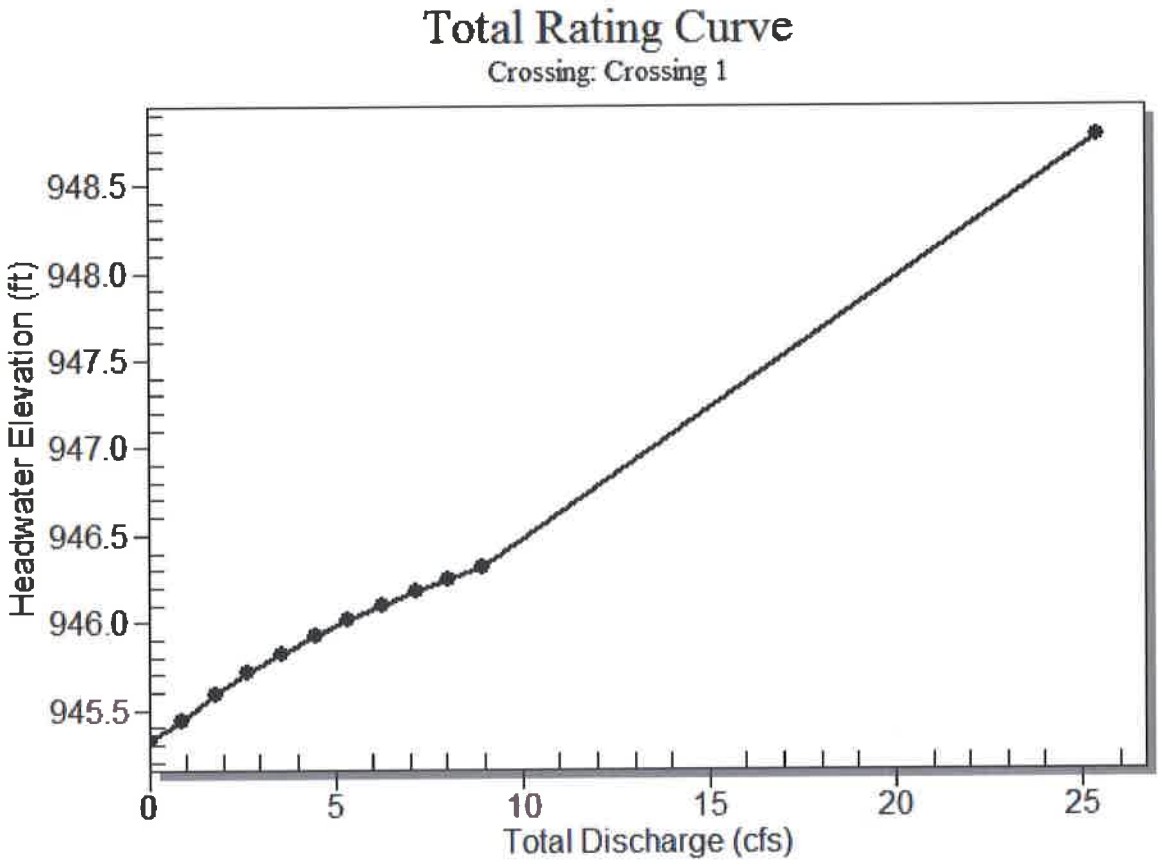


Table 2 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	945.33	0.000	0.000	0-NF	0.000	0.000	0.000	0.000	0.000	0.000
0.89	0.89	945.44	0.112	0.0*	1-S2n	0.104	0.203	0.104	0.205	4.007	2.918
1.79	1.79	945.58	0.255	0.0*	1-S2n	0.172	0.315	0.172	0.265	7.599	3.470
2.68	2.68	945.71	0.381	0.0*	1-S2n	0.216	0.419	0.216	0.309	7.204	3.840
3.57	3.57	945.82	0.493	0.0*	1-S2n	0.259	0.508	0.259	0.344	7.891	4.127
4.46	4.46	945.92	0.594	0.0*	1-S2n	0.299	0.585	0.299	0.374	8.485	4.363
5.36	5.36	946.01	0.684	0.0*	1-S2n	0.329	0.655	0.329	0.401	9.218	4.567
6.25	6.25	946.10	0.768	0.0*	1-S2n	0.359	0.717	0.359	0.424	9.724	4.746
7.14	7.14	946.17	0.845	0.0*	1-S2n	0.389	0.775	0.389	0.446	10.195	4.907
8.04	8.04	946.25	0.917	0.0*	1-S2n	0.419	0.828	0.419	0.466	10.594	5.054
8.93	8.93	946.32	0.987	0.0*	1-S2n	0.446	0.881	0.446	0.485	11.004	5.189

* Full Flow Headwater elevation is below inlet invert.

****

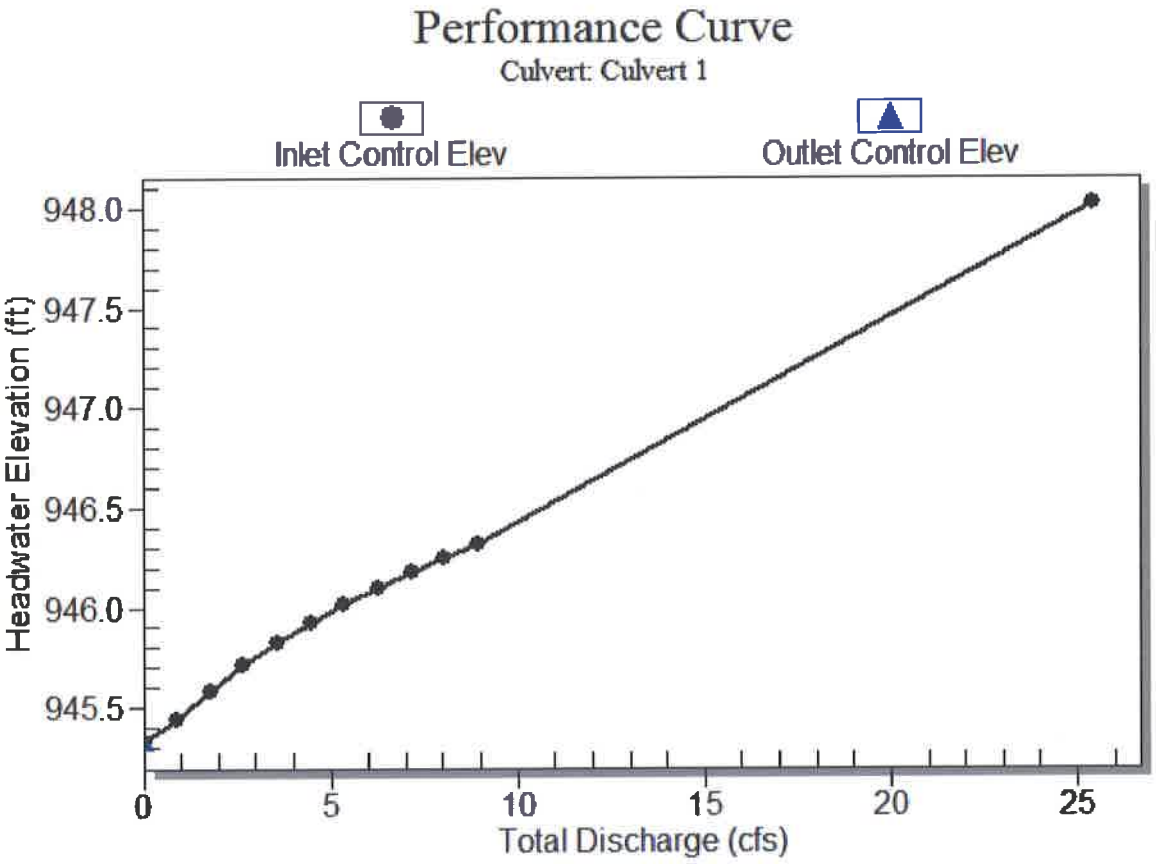
Straight Culvert

Inlet Elevation (invert): 945.33 ft, Outlet Elevation (invert): 906.00 ft

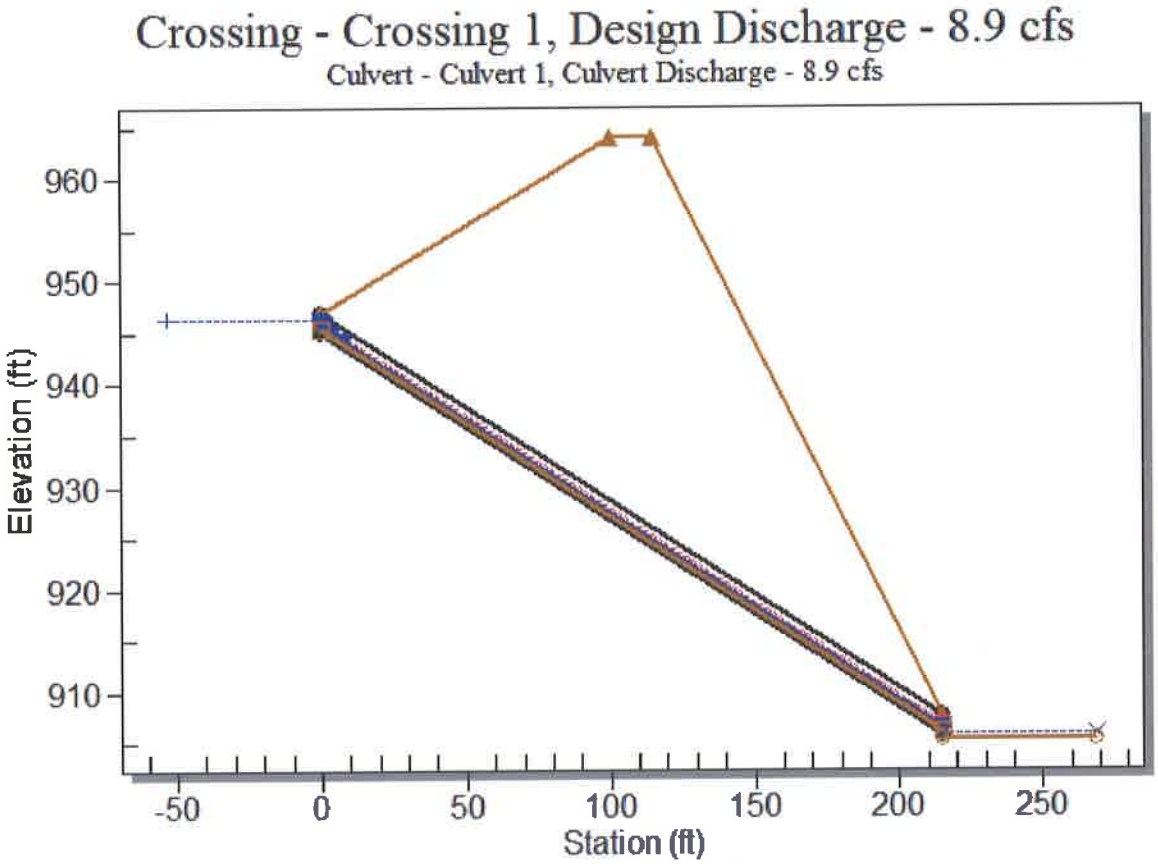
Culvert Length: 218.57 ft, Culvert Slope: 0.1829

****

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 944.93 ft

Outlet Station: 215.00 ft

Outlet Elevation: 905.60 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Smooth HDPE

Embedment: 4.80 in

Barrel Manning's n: 0.0120 (top and sides)

Manning's n: 0.0350 (bottom)

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 3 - Downstream Channel Rating Curve (Crossing: Crossing 1)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
0.00	905.37	0.00	0.00	0.00	0.00
0.89	905.57	0.20	2.92	1.28	1.61
1.79	905.64	0.27	3.47	1.66	1.68
2.68	905.68	0.31	3.84	1.93	1.72
3.57	905.71	0.34	4.13	2.15	1.75
4.46	905.74	0.37	4.36	2.33	1.78
5.36	905.77	0.40	4.57	2.50	1.80
6.25	905.79	0.42	4.75	2.65	1.82
7.14	905.82	0.45	4.91	2.78	1.83
8.04	905.84	0.47	5.05	2.91	1.84
8.93	905.86	0.49	5.19	3.03	1.86

Tailwater Channel Data - Crossing 1

Tailwater Channel Option: Irregular Channel

Roadway Data for Crossing: Crossing 1

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

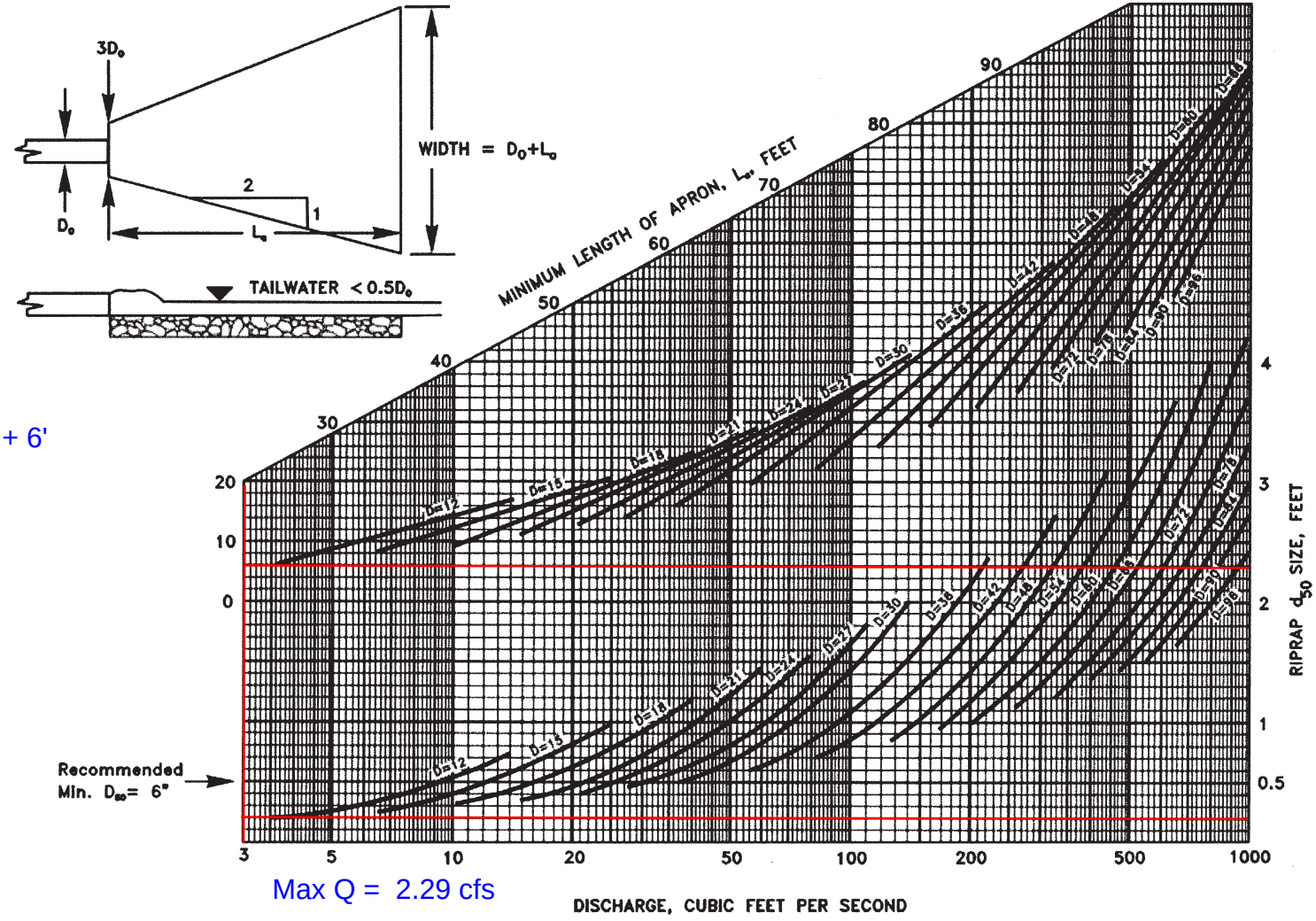
Roadway Surface: Gravel

Roadway Top Width: 15.00 ft

Name: Apron #10, 11, 16, 24 (Channel #7, 15, 19, 20)

FIGURE 3.17.2

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
MINIMUM TAILWATER CONDITION (T_w <0.5 DIAMETER) (USDA–NRCS)



La = 6'

W = 1' + 6'

W = 7'

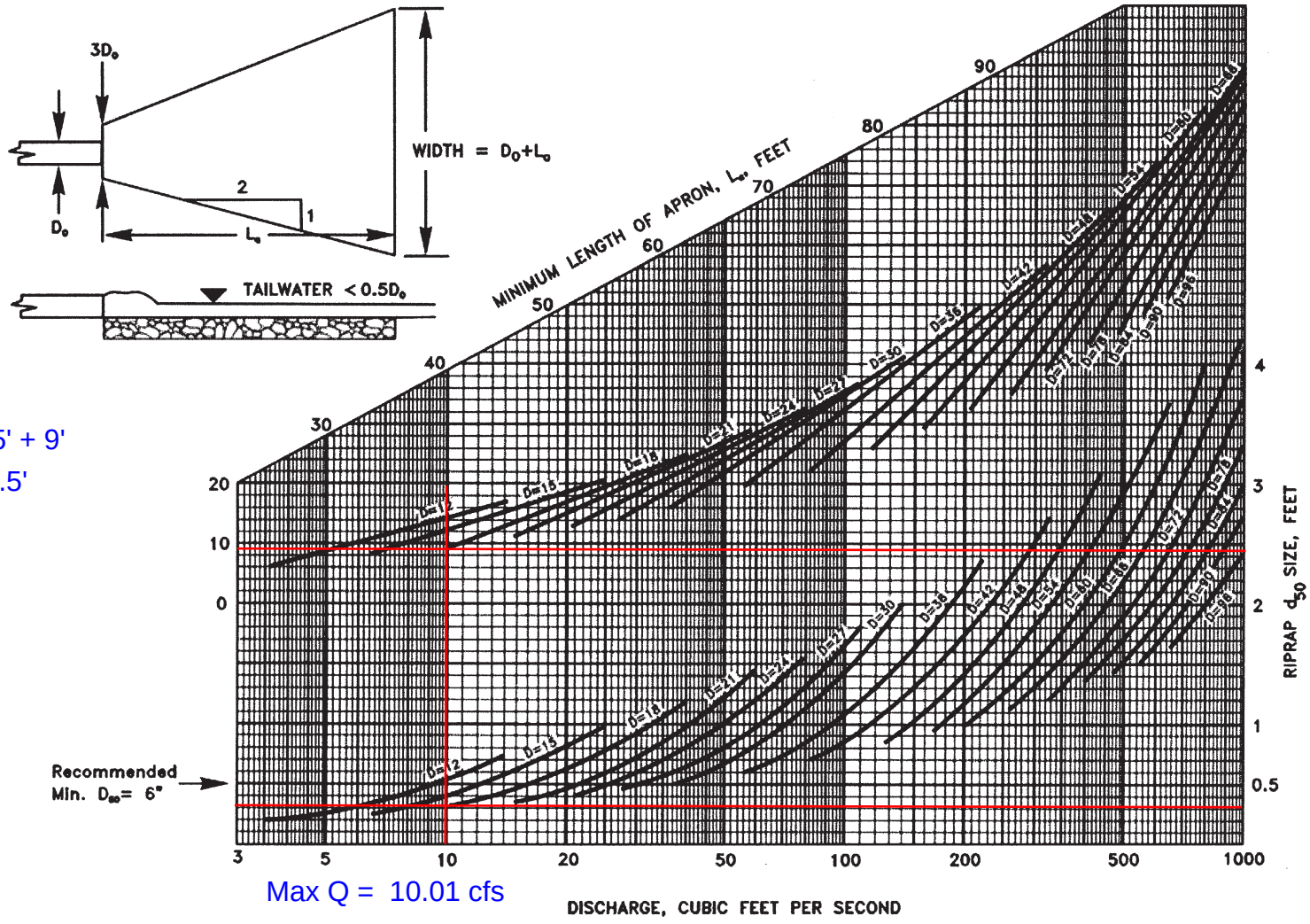
Max Q = 2.29 cfs

Max Velocity = 8.73 ft/s > Vmax for R-3 = 6.5 ft/s ====> Use R-4

Name: Apron #15 (Channel #2)

FIGURE 3.17.2

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
MINIMUM TAILWATER CONDITION (T_w <0.5 DIAMETER) (USDA–NRCS)



La = 9'

W = 1.5' + 9'

W = 10.5'

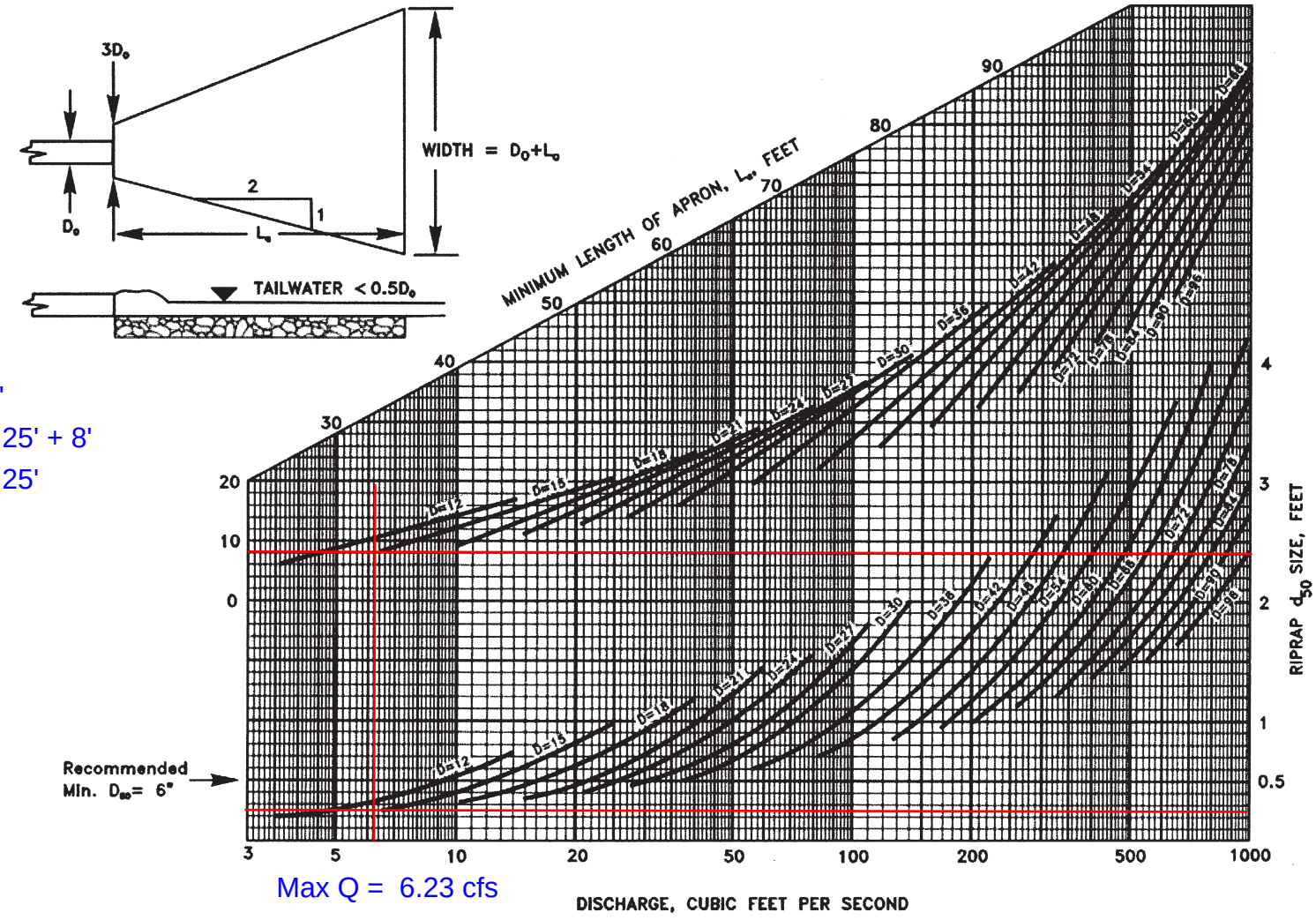
Max Q = 10.01 cfs

Max Velocity = 8.49 ft/s > Vmax for R-3 = 6.5 ft/s ====> Use R-4

Name: Apron #23 (MH2.1)

FIGURE 3.17.2

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
MINIMUM TAILWATER CONDITION (T_w <0.5 DIAMETER) (USDA–NRCS)



La = 8'

W = 1.25' + 8'

W = 9.25'

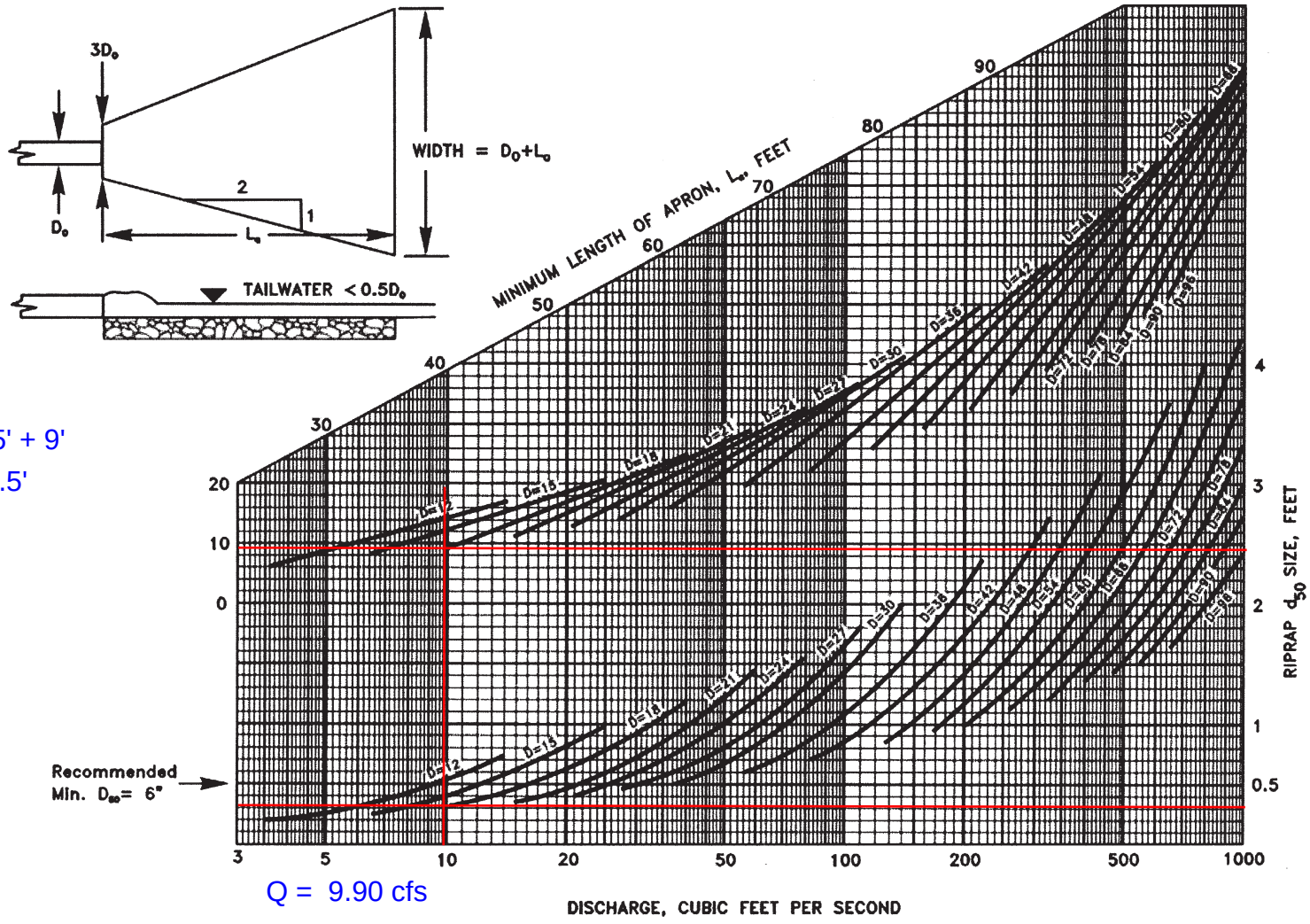
Max Q = 6.23 cfs

Max Velocity = 7.66 ft/s > Vmax for R-3 = 6.5 ft/s ====> Use R-4

Name: Apron #14 (Channel #3)

FIGURE 3.17.2

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
MINIMUM TAILWATER CONDITION (T_w <0.5 DIAMETER) (USDA–NRCS)



La = 9'

W = 1.5' + 9'

W = 10.5'

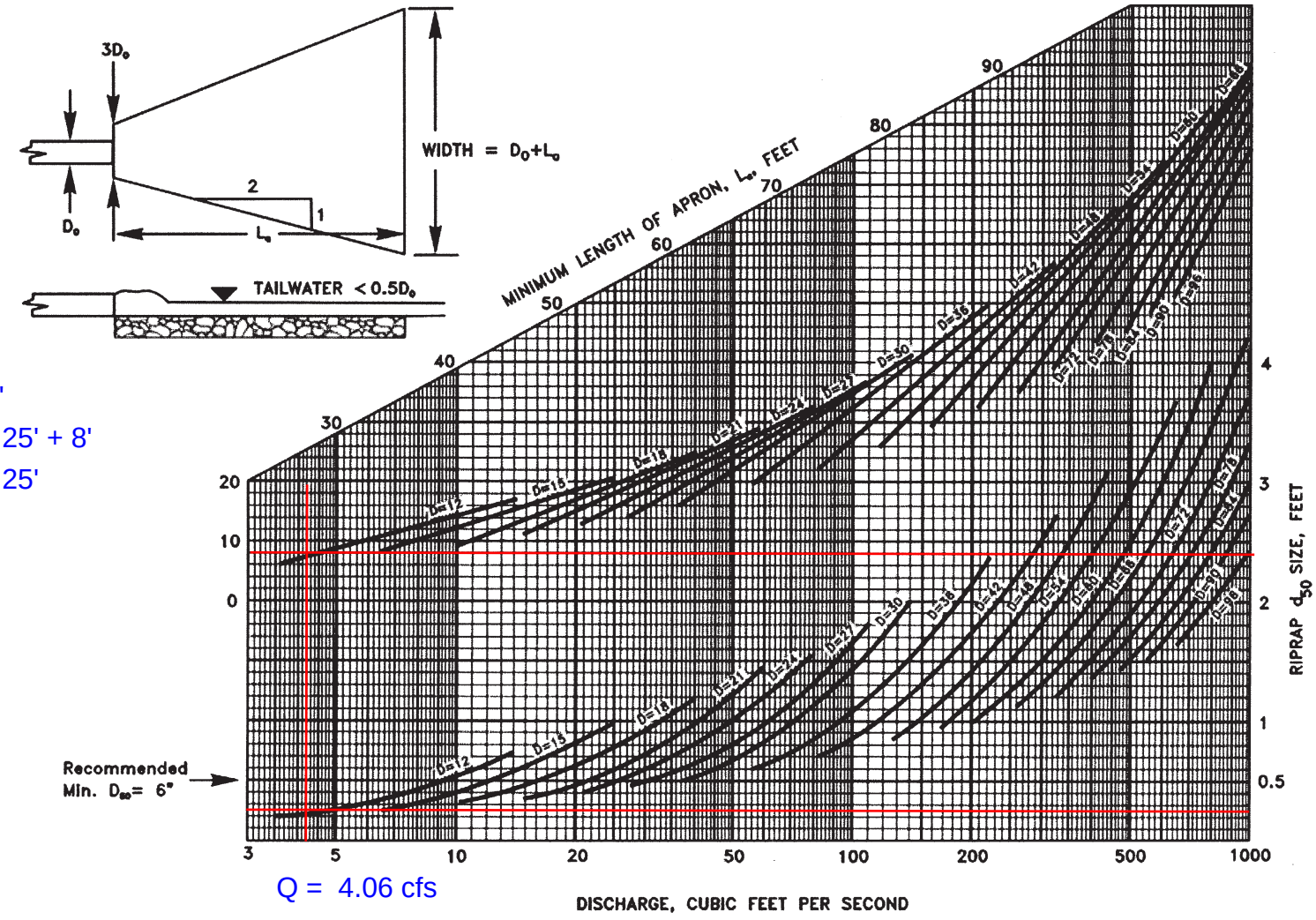
Q = 9.90 cfs

Velocity = 9.05 ft/s > Vmax for R-4 = 9.0 ft/s ====> Use R-5

Name: Apron #9 (Channel #17 & 18)

FIGURE 3.17.2

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
MINIMUM TAILWATER CONDITION (T_w <0.5 DIAMETER) (USDA–NRCS)



La = 8'

W = 1.25' + 8'

W = 9.25'

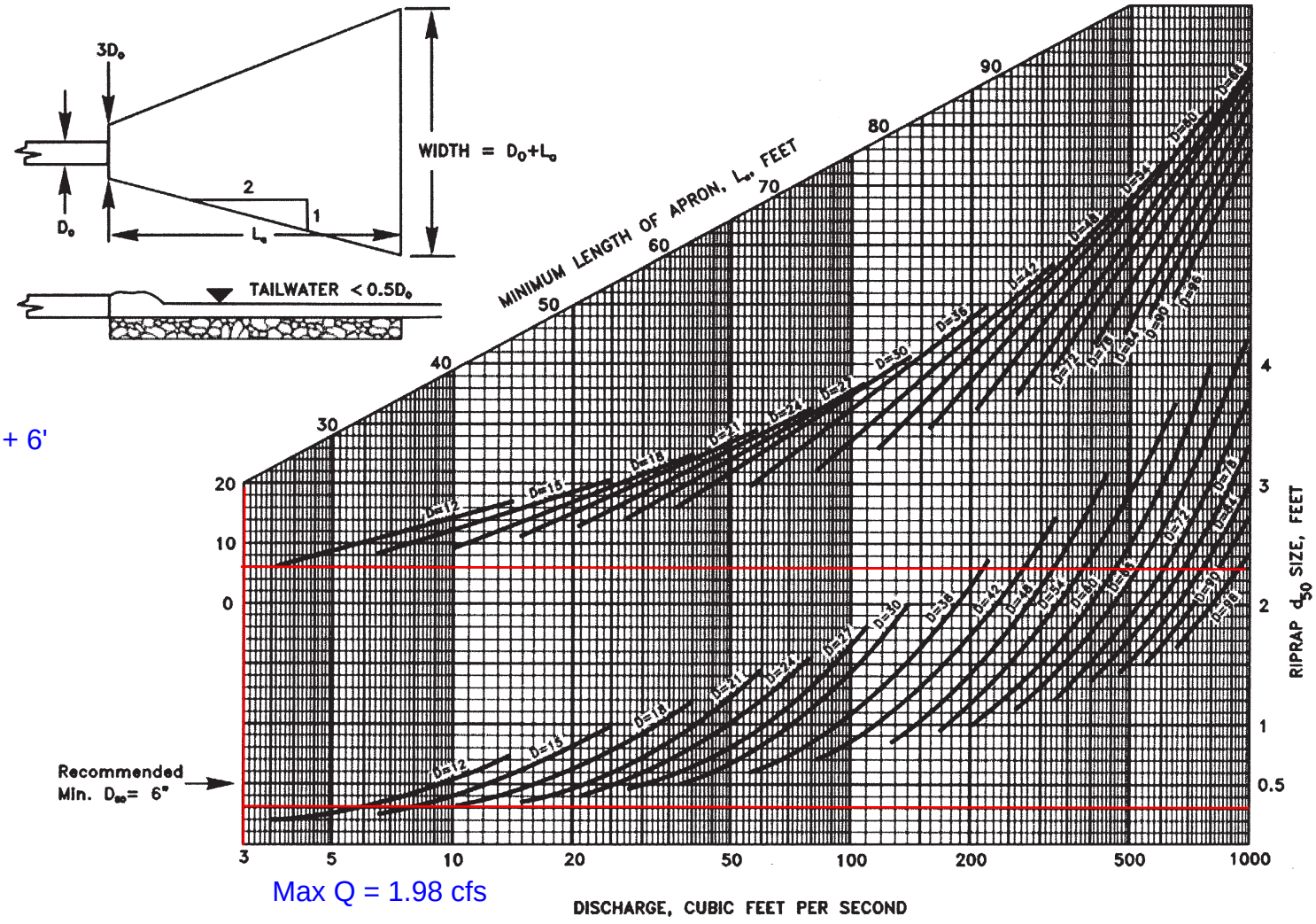
Q = 4.06 cfs

Velocity = 10.83 ft/s > Vmax for R-4 = 9.0 ft/s ====> Use R-5

Name: Apron #5-8, 13, 18, 21-22 (Channel #1,4-5, 8-9,13-14, 21)

FIGURE 3.17.2

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
MINIMUM TAILWATER CONDITION (T_w <0.5 DIAMETER) (USDA–NRCS)



La = 6'
W = 1' + 6'
W = 7'

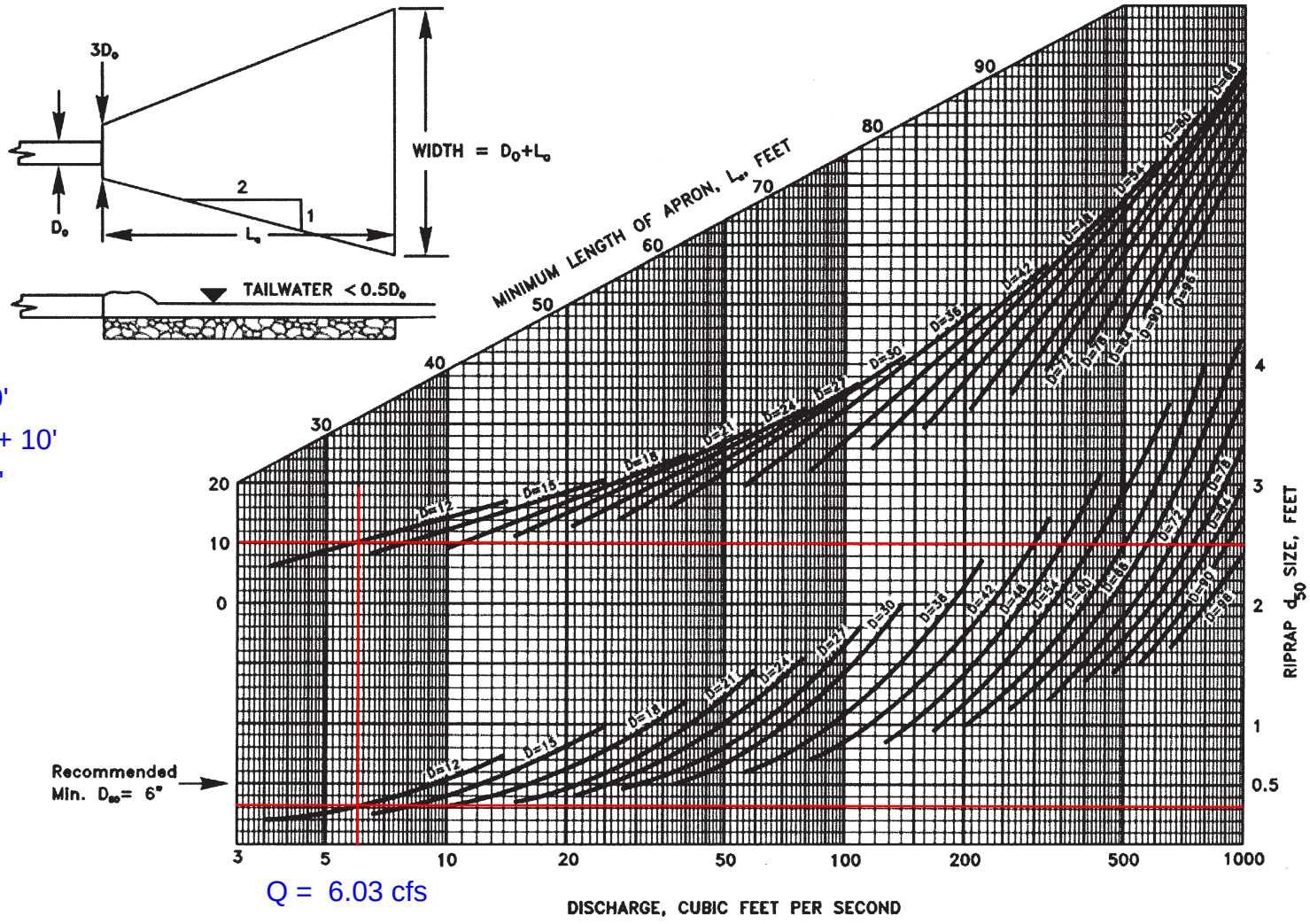
Max Q = 1.98 cfs

Max Velocity = 6.26 ft/s < Vmax for R-3 = 6.5 ft/s ====> Use R-3

Name: Apron #20 (Channel #16)

FIGURE 3.17.2

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
MINIMUM TAILWATER CONDITION (T_w <0.5 DIAMETER) (USDA–NRCS)



La = 10'

W = 1' + 10'

W = 11'

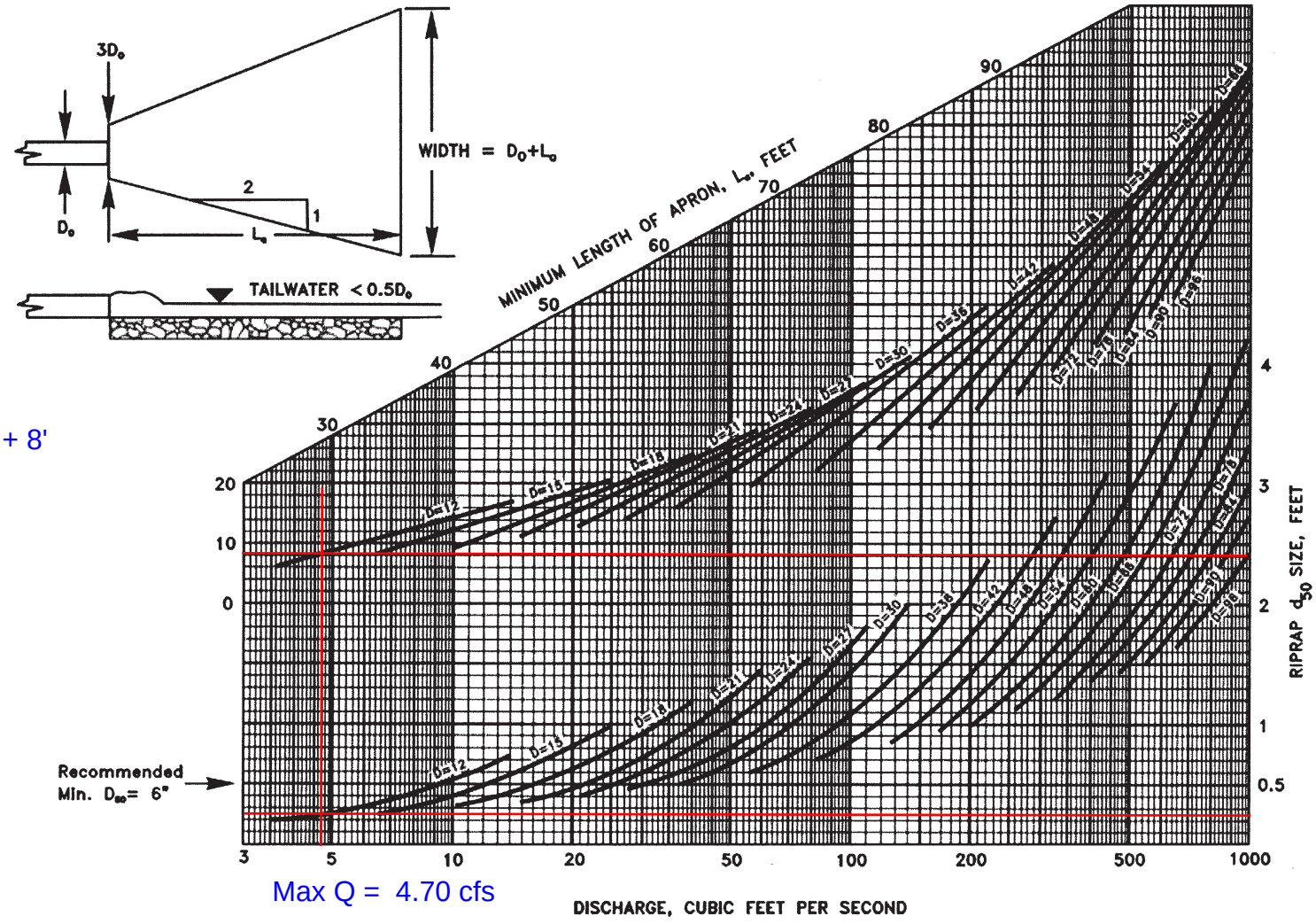
Q = 6.03 cfs

Velocity = 2.03 ft/s < Vmax for R-3 = 6.5 ft/s ====> Use R-3

Name: Apron #4 (Channel #12)

FIGURE 3.17.2

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
MINIMUM TAILWATER CONDITION (T_w <0.5 DIAMETER) (USDA–NRCS)



La = 8'

W = 1' + 8'

W = 9'

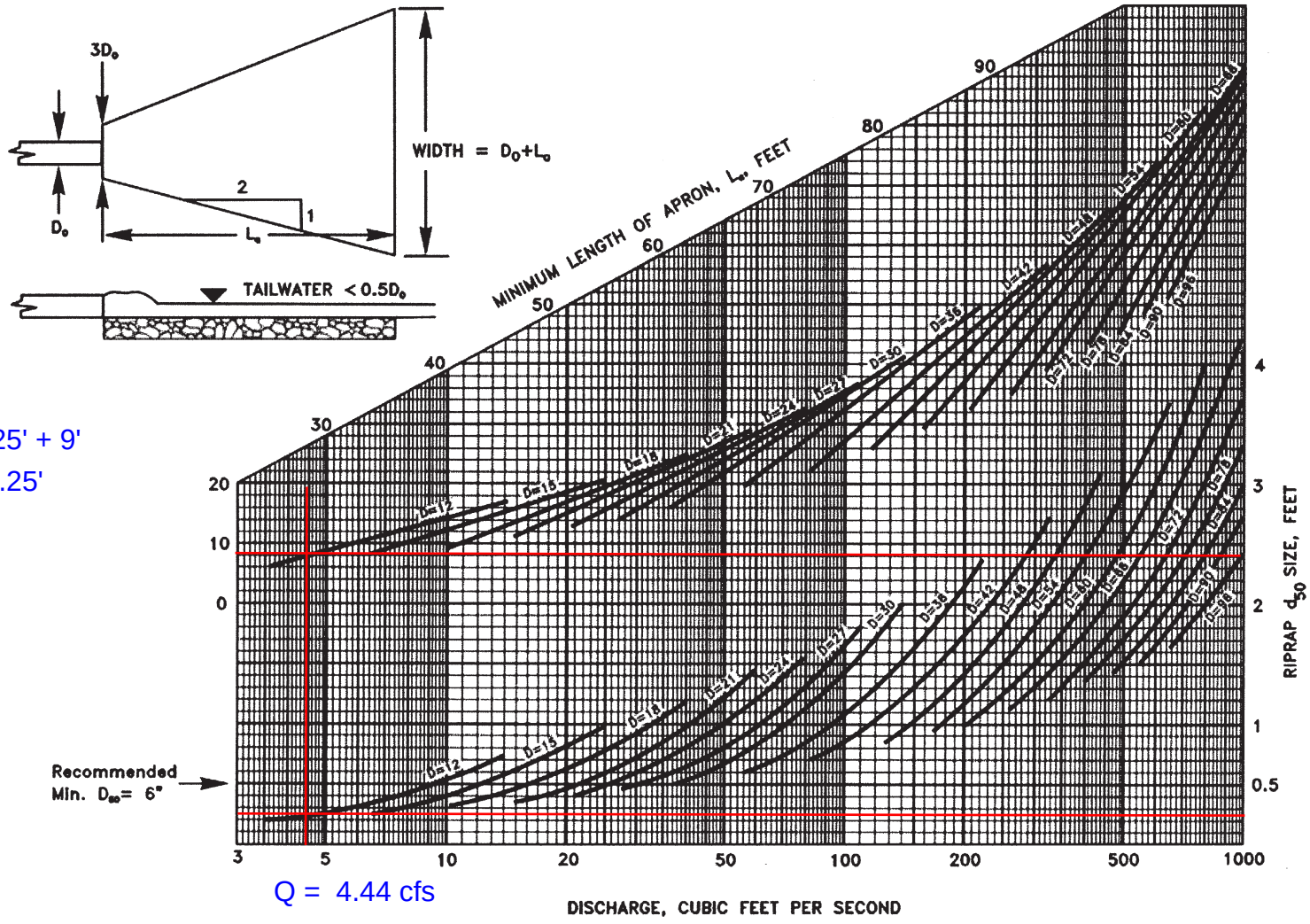
Max Q = 4.70 cfs

Max Velocity = 4.92 ft/s < Vmax for R-3 = 6.5 ft/s ====> Use R-3

Name: Apron #2, 3, 19 (Culvert #3, 4 and CB1.1)

FIGURE 3.17.2

DESIGN OF OUTLET PROTECTION FROM A ROUND PIPE FLOWING FULL
MINIMUM TAILWATER CONDITION (T_w <0.5 DIAMETER) (USDA–NRCS)



La = 9'

W = 1.25' + 9'

W = 10.25'

Q = 4.44 cfs

Velocity = 6.45 ft/s < Vmax for R-3 = 6.5 ft/s ====> Use R-3

MOCKINGBIRD COMPRESSOR STATION
CEC PROJECT NUMBER 161-104
SEDIMENT BASIN DESIGN

PREPARED BY: _____
DATE: _____
CHECKED BY: _____
DATE: _____

Contributing Drainage Area: (ac)	4.6	
Total Sediment Storage Volume Needed (Wet and Dry): (cf)	16,488	(drainage area * 3,600 cf/acre)
Sediment Storage Volume Needed (Wet): (cf)	8,244	
Cleanout Volume Needed: (cf)	4,122	

Total Volume Needed: (cf)	16,488
Total Volume Needed: (ac-ft)	0.38

Bottom Elevation of Basin	910
Top Elevation of Basin	920

Elevation	Area	Volume	
(FT)	(SF)	(CF)	(ACRE-FT)
910	2738	0	0.000
911	3279	3009	0.069
912	3796	6546	0.150
913	4346	10616	0.244
914	4920	15249	0.350
915	5521	20469	0.470
916	6149	26304	0.604
917	6806	32781	0.753
918	7491	39930	0.917
919	8205	47778	1.097
920	8950	56355	1.294

Clean-out Storage Volume EL	911.60
Clean-out Storage Surface Area (sf)	3540.80
Wet Storage Volume EL	912.90
Wet Storage Surface Area (sf)	4202.99
Dry Storage Volume EL	914.72
Dry Storage Surface Area (sf)	5244.58

MOCKINGBIRD COMPRESSOR STATION
CEC PROJECT NUMBER 161-104
SEDIMENT BASIN DESIGN
PRINCIPAL SPILLWAY FLOW CALCULATION

PREPARED BY: _____
DATE: _____
CHECKED BY: _____
DATE: _____

RISER DIA. (FT) =	3	OUTLET PIPE SIZE (IN):	24	EM. SP. WIDTH (FT) =	10	PERF. DIA. (FT) =	0.08
RISER ELEV. =	914.7	MANNING n =	0.012	EM. SP. ELEV. =	918.6	NO. OF PERF./ROW =	3.00
GRATE AREA (SQ FT) =	7.07	PIPE LENGTH (FT) =	192	C =	2.8	ROW 1 INVERT ELEV =	912.9
WEIR COEFF. =	3.1	PIPE INSIDE DIA. (FT) =	2.00			ROW 2 INVERT ELEV =	
ORIFICE COEFF. =	0.6	OUTLET INVERT ELEV. =	861.1			ROW 3 INVERT ELEV =	
WEIR LENGTH (FT) =	9.42	INLET INVERT ELEV. =	910.0			ROW 4 INVERT ELEV =	
						ROW 5 INVERT ELEV =	

	PERMANENT RISER STRUCTURE					OUTLET PIPE				EMERGENCY SPILLWAY		
						INLET CONTROL		OUTLET CONTROL				
WS EL (FT)	HEAD ON RISER (FT)	PERF. FLOW (CFS)	WEIR FLOW (CFS)	ORIFICE FLOW (CFS)	DISCHARGE (CFS)	HEAD (FT)	PIPE FLOW (CFS)	HEAD (FT)	PIPE FLOW (CFS)	HEAD ON SPILLWAY (FT)	DISCHARGE (CFS)	TOTAL DISCHARGE (CFS)
920.00	5.3	0.21	354.23	78.16	78.37	9.00	45.36	57.90	95.54	1.40	46.38	91.74
919.90	5.2	0.21	344.21	77.42	77.63	8.90	45.10	57.80	95.46	1.30	41.50	86.61
919.80	5.1	0.21	334.29	76.67	76.87	8.80	44.85	57.70	95.38	1.20	36.81	81.66
919.70	5.0	0.21	324.47	75.91	76.11	8.70	44.59	57.60	95.29	1.10	32.30	76.90
919.60	4.9	0.20	314.74	75.14	75.35	8.60	44.34	57.50	95.21	1.00	28.00	72.34
919.50	4.8	0.20	305.12	74.37	74.57	8.50	44.08	57.40	95.13	0.90	23.91	67.99
919.40	4.7	0.20	295.59	73.59	73.79	8.40	43.82	57.30	95.05	0.80	20.04	63.85
919.30	4.6	0.20	286.17	72.80	73.00	8.30	43.56	57.20	94.96	0.70	16.40	59.96
919.20	4.5	0.20	276.84	72.00	72.19	8.20	43.29	57.10	94.88	0.60	13.01	56.31
919.10	4.4	0.20	267.63	71.19	71.38	8.10	43.03	57.00	94.80	0.50	9.90	52.93
919.00	4.3	0.19	258.51	70.37	70.57	8.00	42.76	56.90	94.71	0.40	7.08	49.85
918.90	4.2	0.19	249.50	69.54	69.74	7.90	42.49	56.80	94.63	0.30	4.60	47.10
918.80	4.1	0.19	240.60	68.71	68.90	7.80	42.23	56.70	94.55	0.20	2.50	44.73
918.70	4.0	0.19	231.81	67.86	68.05	7.70	41.95	56.60	94.46	0.10	0.89	42.84
918.60	3.9	0.19	223.13	67.00	67.19	7.60	41.68	56.50	94.38	0.00	0.00	41.68
918.50	3.8	0.19	214.56	66.13	66.32	7.50	41.41	56.40	94.30	0.00	0.00	41.41
918.40	3.7	0.18	206.10	65.25	65.44	7.40	41.13	56.30	94.21	0.00	0.00	41.13
918.30	3.6	0.18	197.75	64.36	64.54	7.30	40.85	56.20	94.13	0.00	0.00	40.85
918.20	3.5	0.18	189.52	63.45	63.63	7.20	40.57	56.10	94.04	0.00	0.00	40.57
918.10	3.4	0.18	181.41	62.53	62.71	7.10	40.29	56.00	93.96	0.00	0.00	40.29
918.00	3.3	0.18	173.42	61.60	61.78	7.00	40.00	55.90	93.88	0.00	0.00	40.00
917.90	3.2	0.18	165.55	60.66	60.83	6.90	39.71	55.80	93.79	0.00	0.00	39.71
917.80	3.1	0.17	157.80	59.69	59.87	6.80	39.43	55.70	93.71	0.00	0.00	39.43
917.70	3.0	0.17	150.17	58.72	58.89	6.70	39.13	55.60	93.62	0.00	0.00	39.13
917.60	2.9	0.17	142.68	57.72	57.89	6.60	38.84	55.50	93.54	0.00	0.00	38.84
917.50	2.8	0.17	135.31	56.71	56.88	6.50	38.55	55.40	93.46	0.00	0.00	38.55
917.40	2.7	0.17	128.07	55.68	55.85	6.40	38.25	55.30	93.37	0.00	0.00	38.25
917.30	2.6	0.17	120.97	54.63	54.80	6.30	37.95	55.20	93.29	0.00	0.00	37.95
917.20	2.5	0.16	114.00	53.56	53.73	6.20	37.65	55.10	93.20	0.00	0.00	37.65
917.10	2.4	0.16	107.18	52.47	52.63	6.10	37.34	55.00	93.12	0.00	0.00	37.34
917.00	2.3	0.16	100.49	51.36	51.52	6.00	37.03	54.90	93.03	0.00	0.00	37.03
916.90	2.2	0.16	93.95	50.22	50.38	5.90	36.72	54.80	92.95	0.00	0.00	36.72
916.80	2.1	0.16	87.56	49.05	49.21	5.80	36.41	54.70	92.86	0.00	0.00	36.41
916.70	2.0	0.15	81.32	47.86	48.01	5.70	36.10	54.60	92.78	0.00	0.00	36.10
916.60	1.9	0.15	75.24	46.63	46.79	5.60	35.78	54.50	92.69	0.00	0.00	35.78
916.50	1.8	0.15	69.31	45.38	45.53	5.50	35.46	54.40	92.61	0.00	0.00	35.46
916.40	1.7	0.15	63.55	44.08	44.23	5.40	35.13	54.30	92.52	0.00	0.00	35.13
916.30	1.6	0.15	57.96	42.75	42.90	5.30	34.81	54.20	92.44	0.00	0.00	34.81
916.20	1.5	0.14	52.54	41.38	41.52	5.20	34.48	54.10	92.35	0.00	0.00	34.48
916.10	1.4	0.14	47.31	39.95	40.09	5.10	34.14	54.00	92.27	0.00	0.00	34.14
916.00	1.3	0.14	42.26	38.48	38.62	5.00	33.81	53.90	92.18	0.00	0.00	33.81
915.90	1.2	0.14	37.40	36.94	37.08	4.90	33.47	53.80	92.10	0.00	0.00	33.47
915.80	1.1	0.13	32.75	35.34	32.88	4.80	33.12	53.70	92.01	0.00	0.00	32.88
915.70	1.0	0.13	28.30	33.66	28.43	4.70	32.78	53.60	91.93	0.00	0.00	28.43
915.60	0.9	0.00	24.08	31.90	24.08	4.60	32.43	53.50	91.84	0.00	0.00	24.08
915.50	0.8	0.00	20.09	30.03	20.09	4.50	32.07	53.40	91.75	0.00	0.00	20.09
915.40	0.7	0.00	16.35	28.04	16.35	4.40	31.71	53.30	91.67	0.00	0.00	16.35
915.30	0.6	0.00	12.88	25.89	12.88	4.30	31.35	53.20	91.58	0.00	0.00	12.88
915.20	0.5	0.00	9.69	23.55	9.69	4.20	30.98	53.10	91.50	0.00	0.00	9.69
915.10	0.4	0.00	6.82	20.95	6.82	4.10	30.61	53.00	91.41	0.00	0.00	6.82
915.00	0.3	0.00	4.31	17.98	4.31	4.00	30.24	52.90	91.32	0.00	0.00	4.31
914.90	0.2	0.00	2.22	14.41	2.22	3.90	29.86	52.80	91.24	0.00	0.00	2.22
914.80	0.1	0.00	0.65	9.58	0.65	3.80	29.47	52.70	91.15	0.00	0.00	0.65
914.70	0.0	0.00	0.00	0.00	0.00	3.70	29.08	52.60	91.06	0.00	0.00	0.00

25-Year Storm (cfs)
22.32

MARTS COMPRESSOR STATION
CEC PROJECT NUMBER 160-781
SEDIMENT BASIN DESIGN
DEWATERING ORIFICE SIZE AND TIME DESIGN

Ao = As x (2h)^0.5/(T x Cd x 20,428)
Where
Ao = total area of dewatering holes, ft^2
As – surface area of the basin, sq.ft.
H = head of water above the hole, ft
Cd = coefficient of contraction for an orifice, ~ 0.6
T = detention time needed to dewater the basin, hours

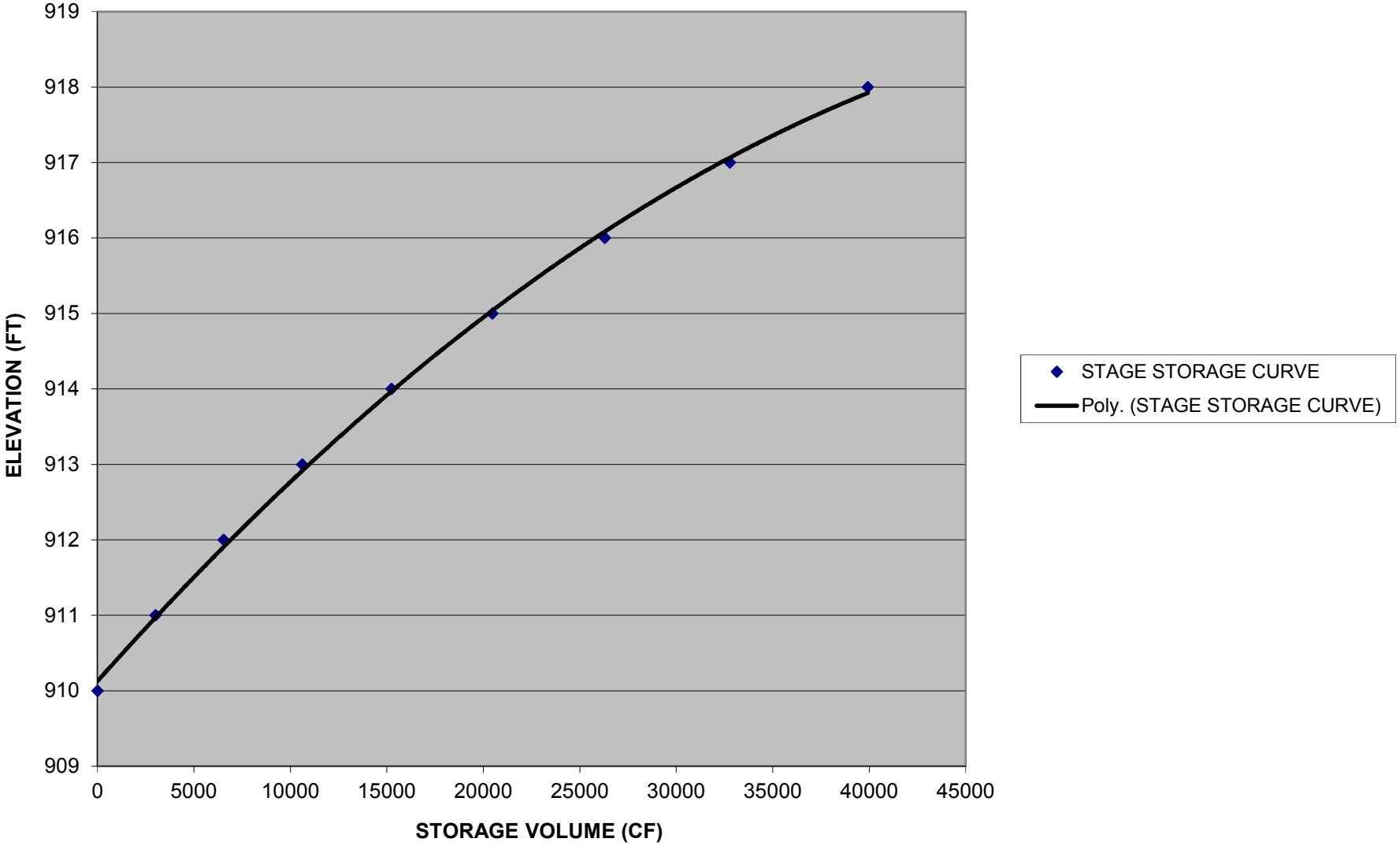
48 HOURS	
As*	5245
H	1.82
T	48
Cd	0.6
$Ao_{REQUIRED}$	0.017

72 HOURS	
As*	5245
H	1.82
T	72
Cd	0.6
$Ao_{REQUIRED}$	0.011

* Determined by Interpolation

ORIFICE DESIGN	
Perforation Dia (in)	1.00
Perforation Dia (ft)	0.0833
Perforation Area (sf)	0.005
Number of Perforations	3
Total Area of Perforations (sf)	0.016
Total Dewatering Time (hours)	50

SEDIMENT BASIN A - STAGE STORAGE CURVE



161-104
MOCKINGBIRD COMPRESSOR STATION
Dry Detention Basin #1
Anti-Seep Collar

MADE BY: TGJ
DATE: 10/26/2016
CHECKED BY:
DATE:

$$L_s = y\,(z+4)\left[1+\frac{\text{pipe slope (ft/ft)}}{0.25-\text{pipe slope}}\right]$$

Where:

y = Distance from upstream invert of outlet pipe to top of dewatering volume

= 916.08 - 908.9

= 7.18 ft

z = Horizontal component of upstream embankment slope

= 3

p = Pipe slope

= 0.01 ft/ft

L_s= 7.18 ft (3 + 4) [1 + 0.01 / (0.25 - 0.01)]

= 52.35 ft

For a permanent basin, the increase in flow path is 15%

L_f= 52.35 ft x 1.15

= 60.21 ft

Minimum collar projection (V_{min}) = flow path increase/twice the number of collars

Using 2 collars:

V_{min} = (60.21 ft - 52.35 ft) / 2 (2)

= 2.00 ft

Space collars evenly along length of pipe in phreatic zone

Spacing = L_s /(No. of collars +1)

= 52.35 ft / (2 + 1)

= 17.45 ft

Check minimum and maximum collar spacing

$L_{s\,min}$ = 5 x V = 5 x 2 ft

= 10.0 ft

$L_{s\,max}$ = 14 x V = 14 x 2 ft

= 28.0 ft

Use 2 collars spaced 10.0 ft apart with one placed 10.0 ft from upstream end of the culvert with overall dimensions of 6' by 6'

COMPOST SOCK SEDIMENT TRAP #1
MOCKINGBIRD HILL COMPRESSOR STATION
CEC PROJECT NUMBER 161-104

PREPARED BY: GSZ DATE: 10/21/2016
CHECKED BY: DATE:

TRIBUTARY DRAINAGE AREA (ac): 0.53
REQUIRED STORAGE CAPACITY (cf): 1060 (TRIBUTARY DRAINAGE AREA x 2,000 cf/acre)

TRAP BASE ELEVATION: 900
TRAP TOP ELEVATION: 903.6 (TRAP BASE ELEVATION + PROPOSED EFFECTIVE TRAP HEIGHT)

ELEVATION	AREA (sf)	AVERAGE AREA (sf)	STORAGE VOLUME (cf) INCREMENTAL	STORAGE VOLUME (cf) TOTAL	
900	0	0	0	0	
900.2	67	34	7	7	
900.4	135	101	20	27	
900.6	202	169	34	61	
900.8	270	236	47	108	
901	337	303	61	169	
901.2	404	371	74	243	
901.4	472	438	88	330	
901.6	539	506	101	431	
901.8	607	573	115	546	
902	674	640	128	674	
902.2	791	733	147	821	
902.4	909	850	170	991	
902.6	1,026	967	193	1,184	← REQUIRED STORAGE CAPACITY
902.8	1,143	1,085	217	1,401	
903	1,261	1,202	240	1,641	
903.2	1,378	1,319	264	1,905	
903.4	1,495	1,436	287	2,192	
903.6	1,612	1,554	311	2,503	
903.8	1,730	1,671	334	2,837	
904	1,847	1,788	358	3,195	
904.2	1,951	1,899	380	3,575	
904.4	2,055	2,003	401	3,975	
904.6	2,160	2,108	422	4,397	
904.8	2,264	2,212	442	4,839	
905	2,368	2,316	463	5,303	
905.2	2,472	2,420	484	5,787	
905.4	2,576	2,524	505	6,291	
905.6	2,681	2,629	526	6,817	
905.8	2,785	2,733	547	7,364	
906	2,889	2,837	567	7,931	

REQUIRED TRAP HEIGHT

	902.6	EL. @ REQ'D STORAGE CAPACITY
-	900	TRAP BASE ELEVATION
+	1	FOOT (FREEBOARD)
	3.6	FEET

PROPOSED TRAP CONFIGURATION

QTY	NOMINAL	EFFECTIVE
	8 " SOCK	6.5 " SOCK
1	12 " SOCK	9.5 " SOCK
2	18 " SOCK	14.5 " SOCK
3	24 " SOCK	19 " SOCK
	32 " SOCK	26 " SOCK
TOTAL	43 " EFFECTIVE TRAP HEIGHT	
	3.6 ' EFFECTIVE TRAP HEIGHT	

SEDIMENT BARRIER DESIGN

PROJECT NAME: Mockingbird Compressor Stations
PROJECT #: 161-104

PREPARED BY GSZ **DATE:** 10/14/16 **CHECKED BY** BRT **DATE:** 10/19/16

BARRIER A

SILT FENCE/SOCK TYPE:	SUPER SILT FENCE

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	38	SLOPE LENGTH =	58	75	17	23%	75	OK
SEGMENT B	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-
SEGMENT C	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-

TOTAL ACTUAL SLOPE LENGTH (FT)	58

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMIUM ALLOWABLE SLOPE LENGTH **SUPER SILT FENCE** **IS ACCEPTABLE**

BARRIER B

SILT FENCE/SOCK TYPE:	SUPER SILT FENCE

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	50	SLOPE LENGTH =	28	50	22	44%	50	OK
SEGMENT B	SLOPE =	14	SLOPE LENGTH =	23	200	65	33%	88	OK
SEGMENT C	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-

TOTAL ACTUAL SLOPE LENGTH (FT)	51

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMIUM ALLOWABLE SLOPE LENGTH **SUPER SILT FENCE** **IS ACCEPTABLE**

SEDIMENT BARRIER DESIGN

PROJECT NAME: Mockingbird Compressor Stations
PROJECT #: 161-104

PREPARED BY GSZ **DATE:** 10/14/16 **CHECKED BY** BRT **DATE:** 10/19/16

BARRIER C

SILT FENCE/SOCK TYPE:	30 INCH SILT FENCE

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	26	SLOPE LENGTH =	17	45	28	62%	45	OK
SEGMENT B	SLOPE =	8	SLOPE LENGTH =	73	150	20	14%	94	OK
SEGMENT C	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-

TOTAL ACTUAL SLOPE LENGTH (FT)	90

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMIUM ALLOWABLE SLOPE LENGTH **30 INCH SILT FENCE** **IS ACCEPTABLE**

BARRIER D

SILT FENCE/SOCK TYPE:	30 INCH SILT FENCE

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	11	SLOPE LENGTH =	23	100	77	77%	100	OK
SEGMENT B	SLOPE =	22	SLOPE LENGTH =	29	55	13	24%	43	OK
SEGMENT C	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-

TOTAL ACTUAL SLOPE LENGTH (FT)	52

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMIUM ALLOWABLE SLOPE LENGTH **30 INCH SILT FENCE** **IS ACCEPTABLE**

SEDIMENT BARRIER DESIGN

PROJECT NAME: Mockingbird Compressor Stations
PROJECT #: 161-104

PREPARED BY GSZ **DATE:** 10/14/16 **CHECKED BY** BRT **DATE:** 10/19/16

BARRIER E

SILT FENCE/SOCK TYPE:	SUPER SILT FENCE

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	50	SLOPE LENGTH =	42	50	8	16%	50	OK
SEGMENT B	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-
SEGMENT C	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-

TOTAL ACTUAL SLOPE LENGTH (FT)	42

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMIUM ALLOWABLE SLOPE LENGTH **SUPER SILT FENCE** **IS ACCEPTABLE**

BARRIER F

SILT FENCE/SOCK TYPE:	SUPER SILT FENCE

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	24	SLOPE LENGTH =	98	100	2	2%	100	OK
SEGMENT B	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-
SEGMENT C	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-

TOTAL ACTUAL SLOPE LENGTH (FT)	98

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMIUM ALLOWABLE SLOPE LENGTH **SUPER SILT FENCE** **IS ACCEPTABLE**

SEDIMENT BARRIER DESIGN

PROJECT NAME: Mockingbird Compressor Stations
PROJECT #: 161-104

PREPARED BY GSZ **DATE:** 10/14/16 **CHECKED BY** BRT **DATE:** 10/19/16

BARRIER G

SILT FENCE/SOCK TYPE:	SUPER SILT FENCE

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	50	SLOPE LENGTH =	19	50	31	62%	50	OK
SEGMENT B	SLOPE =	37	SLOPE LENGTH =	18	75	29	38%	47	OK
SEGMENT C	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-

TOTAL ACTUAL SLOPE LENGTH (FT)	37

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMIUM ALLOWABLE SLOPE LENGTH SUPER SILT FENCE IS ACCEPTABLE

BARRIER H

SILT FENCE/SOCK TYPE:	32 INCH FILTREXX SILT SOCK

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	41	SLOPE LENGTH =	80	80	0	0%	80	OK
SEGMENT B	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-
SEGMENT C	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-

TOTAL ACTUAL SLOPE LENGTH (FT)	80

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMIUM ALLOWABLE SLOPE LENGTH 32 INCH FILTREXX SILT SOCK IS ACCEPTABLE

SEDIMENT BARRIER DESIGN

PROJECT NAME: Mockingbird Compressor Stations
PROJECT #: 161-104

PREPARED BY GSZ **DATE:** 10/14/16 **CHECKED BY** BRT **DATE:** 10/19/16

BARRIER I

SILT FENCE/SOCK TYPE:	SUPER SILT FENCE

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	18	SLOPE LENGTH =	33	200	167	84%	200	OK
SEGMENT B	SLOPE =	45	SLOPE LENGTH =	31	50	11	22%	42	OK
SEGMENT C	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-

TOTAL ACTUAL SLOPE LENGTH (FT)	64

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMIUM ALLOWABLE SLOPE LENGTH SUPER SILT FENCE IS ACCEPTABLE

BARRIER J

SILT FENCE/SOCK TYPE:	32 INCH FILTREXX SILT SOCK

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	22	SLOPE LENGTH =	105	180	75	42%	180	OK
SEGMENT B	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-
SEGMENT C	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-

TOTAL ACTUAL SLOPE LENGTH (FT)	105

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMIUM ALLOWABLE SLOPE LENGTH 32 INCH FILTREXX SILT SOCK IS ACCEPTABLE

SEDIMENT BARRIER DESIGN

PROJECT NAME: Mockingbird Compressor Stations
PROJECT #: 161-104

PREPARED BY GSZ **DATE:** 10/14/16 **CHECKED BY** BRT **DATE:** 10/19/16

BARRIER K

SILT FENCE/SOCK TYPE:	SUPER SILT FENCE

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	22	SLOPE LENGTH =	100	100	0	0%	100	OK
SEGMENT B	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-
SEGMENT C	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-

TOTAL ACTUAL SLOPE LENGTH (FT)	100

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMIUM ALLOWABLE SLOPE LENGTH **SUPER SILT FENCE** **IS ACCEPTABLE**

BARRIER L

SILT FENCE/SOCK TYPE:	30 INCH SILT FENCE

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	12	SLOPE LENGTH =	17	100	83	83%	100	OK
SEGMENT B	SLOPE =	31	SLOPE LENGTH =	17	40	16	41%	34	OK
SEGMENT C	SLOPE =		SLOPE LENGTH =		0	0	0%	0	-

TOTAL ACTUAL SLOPE LENGTH (FT)	34

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMIUM ALLOWABLE SLOPE LENGTH **30 INCH SILT FENCE** **IS ACCEPTABLE**

SEDIMENT BARRIER DESIGN

PROJECT NAME: Mockingbird Compressor Stations
PROJECT #: 161-104

PREPARED BY GSZ **DATE:** 10/14/16 **CHECKED BY** **DATE:**

BARRIER M

SILT FENCE/SOCK TYPE:	32 INCH FILTREXX SILT SOCK

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	21	SLOPE LENGTH =	95	180	85	47%	180	OK
SEGMENT B	SLOPE =	20	SLOPE LENGTH =	20	250	98	39%	119	OK
SEGMENT C	SLOPE =	50	SLOPE LENGTH =	23	60	1	1%	24	OK

TOTAL ACTUAL SLOPE LENGTH (FT)	138

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMIUM ALLOWABLE SLOPE LENGTH **32 INCH FILTREXX SILT SOCK IS ACCEPTABLE**

BARRIER N

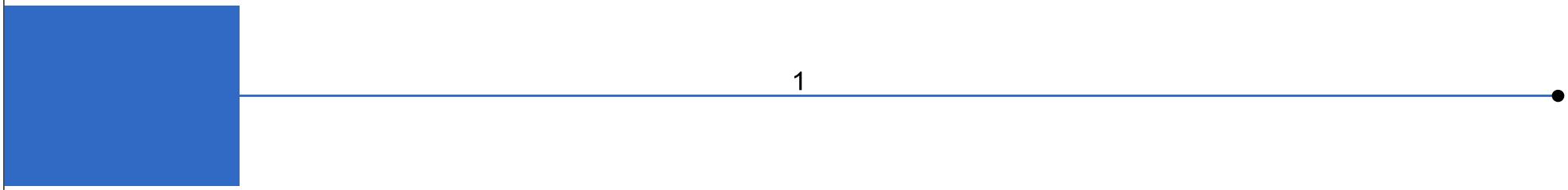
SILT FENCE/SOCK TYPE:	32 INCH FILTREXX SILT SOCK

SLOPE SEGMENT	ACTUAL SLOPE	%	ACTUAL SLOPE LENGTH	FEET	ALLOWABLE LENGTH (FT)	REMAINING LENGTH (FT)	PERCENTAGE REMAINING	MAXIMUM ALLOWABLE LENGTH (FT)	RESULT
SEGMENT A	SLOPE =	15	SLOPE LENGTH =	41	350	309	88%	350	OK
SEGMENT B	SLOPE =	21	SLOPE LENGTH =	137	180	22	12%	159	OK
SEGMENT C	SLOPE =	20	SLOPE LENGTH =	31	250	-1	0%	0	NO GOOD

TOTAL ACTUAL SLOPE LENGTH (FT)	209

SINCE THE ACTUAL SLOPE LENGTH IS LESS THAN THE MAXIMIUM ALLOWABLE SLOPE LENGTH **32 INCH FILTREXX SILT SOCK IS ACCEPTABLE**

Hydraflow Storm Sewers Extension for Autodesk® AutoCAD® Civil 3D® Plan



Project File: Storm Sewer 1.stm	Number of lines: 1	Date: 10/24/2016

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	CB1.1	DropGrate	929.34	Rect	4.00	2.00	15	Cir	926.60			

Project File: Storm Sewer 1.stm | Number of Structures: 1 | Run Date: 10/24/2016

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
1	End	15.177	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	4.44	6.95	5.49	15	0.99	926.45	926.60	927.18	927.45	928.81	929.34	P 1.0

Project File: Storm Sewer 1.stm

Number of lines: 1

Run Date: 10/24/2016

NOTES:Intensity = 69.87 / (Inlet time + 13.10) ^ 0.87; Return period =Yrs. 2 ; c = cir e = ellip b = box

Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q Byp (cfs)	Junc Type	Curb Inlet		Grate Inlet			Gutter							Inlet			Byp Line No
							Ht (in)	L (ft)	Area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	Depth (ft)	Spread (ft)	Depth (ft)	Spread (ft)	Depr (in)	
1	CB1.1	4.44*	0.00	4.44	0.00	DrGrt	0.0	0.00	8.00	4.00	2.00	Sag	2.00	0.020	0.020	0.000	0.25	26.76	0.25	26.76	0.0	Off

Project File: Storm Sewer 1.stm | Number of lines: 1 | Run Date: 10/24/2016

NOTES: Inlet N-Values = 0.016; Intensity = 69.87 / (Inlet time + 13.10) ^ 0.87; Return period = 2 Yrs. ; * Indicates Known Q added. All curb inlets are throat.

Storm Sewer Inlet Time Tabulation

Line No.	Line ID	Tc Method	Sheet Flow					Shallow Concentrated Flow					Channel Flow							Total Travel Time (min)
			n-Value	flow Length (ft)	2-yr 24h P (in)	Land Slope (%)	Travel Time (min)	flow Length (ft)	Water Slope (%)	Surf Descr	Ave Vel (ft/s)	Travel Time (min)	X-sec Area (sqft)	Wetted Perim (ft)	Chan Slope (%)	n-Value	Vel	flow Length (ft)	Travel Time (min)	
1	P 1.0	User																		0.00

Project File: Storm Sewer 1.stm | Min. Tc used for intensity calculations = 5 min | Number of lines: 1 | Date: 10/24/2016