

# Commercial/Industrial Floodplain Development Permit

## Doddridge County, WV Floodplain Management

This permit has been issued to **EQT Production Company**, and is for the approved commercial and/or industrial development project associated with this permit that impacts the FEMA-designated floodplain and/or floodway of Doddridge County, WV, pursuant to the rules and regulations established by all applicable Federal, State and local laws and ordinances, including the Doddridge County Floodplain Ordinance. This permit must be posted at the site of work as to be clearly visible, and must remain posted during entirety of development.

### Permit: #15-345 SMI 27 Well Pad Modification

**Date Approved: 04/10/2015**

**Expires: N/A**

**Issued to: EQT Production Company**

**POC: Loco Corder  
304-848-0066**

**Company Address: 115 Professional Place  
Bridgeport, WV 26330**

**Project Address: Grant District**

**Lat/Long: 39.365904N/80.702235W**

**Purpose of development: Well pad modification project. Project does not impact floodplain.**

**Issued by: Edwin L. "Bo" Wriston, Doddridge County FPM (or designee)**

**Date: 04/10/2015**

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For additional information regarding this permit, please contact  
Doddridge County Floodplain Manager at 304.873.2631, or via email at  
doddridgecountyfpm@gmail.com  
118 East Court Street; West Union, WV 26456

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March 24, 2015

Mr. Bo Wriston  
Floodplain Coordinator  
Doddridge County Commission  
118 East Court Street  
West Union, WV 26456

2015 MAR 26 AM 11:43

BETH A. ROGERS  
COUNTY CLERK  
DODDRIDGE COUNTY, WV

Re: EQT Production Company, SMI 27 Well Site  
Doddridge County, WV, SLS Project No. 7584

Mr. Wriston,

On behalf of EQT Production Company, Smith Land Surveying, Inc. would like to notify you that the attached SMI 27 Site Plan Modification has been submitted to the WVDEP. The current site consists of an access road, well pad and a completion pit. EQT is proposing to re-construct a reclaimed flowback pit in order to drill 4 additional Marcellus Shale gas wells. The site entrance is located in Doddridge County, approximately 1.2 miles east of the junction of Co. Rt. 3 and Co. Rt. 3/1. The entrance to the site is located at Latitude 39.365904, Longitude -80.702235 (NAD 83).

Based on the information presented on the site FIRM, this project is not located within FEMA Flood Zone. No fill shall be placed within the floodplain limits for this project. No other permitting is necessary for this project.

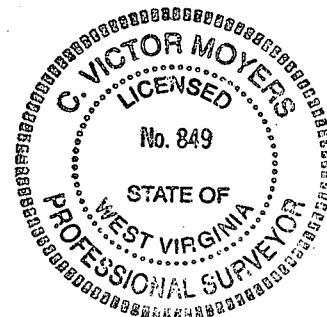
Included in the attachments are the following: cover letter, FEMA map with the site location, vicinity map, and site plans dated 11/18/14.

If you have any questions please feel free to contact me at (304) 462-5634 or Wes Wayne (Design Coordinator) with SLS at 304-904-9184 or [wwayne@slssurveys.com](mailto:wwayne@slssurveys.com), should you have any questions or comments.

Respectfully submitted,

C. Victor Moyers, P.S.

cc: Lacoa L. Corder, EQT Environmental Coordinator.



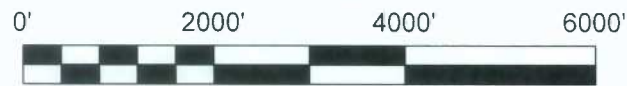
# SMI 27 WELL SITE; FEMA MAP



**SMI 27 WELL PAD**

**NOTES**  
 FEMA FIRM  
 MAP # 54017C0130C

**SCALE**  
 1 INCH = 2000-FEET



JOB #: 7584  
 DRAWN BY: K.E.S.  
 DATE: 3/24/15  
 SCALE: 1" = 2000'

**SMI 27 FEMA**  
 THIS DOCUMENT WAS PREPARED BY:  
 SMITH LAND SURVEYING, INC.  
 FOR: EQT

**Professional Energy Consultants**  
A DIVISION OF SMITH LAND SURVEYING, INC.

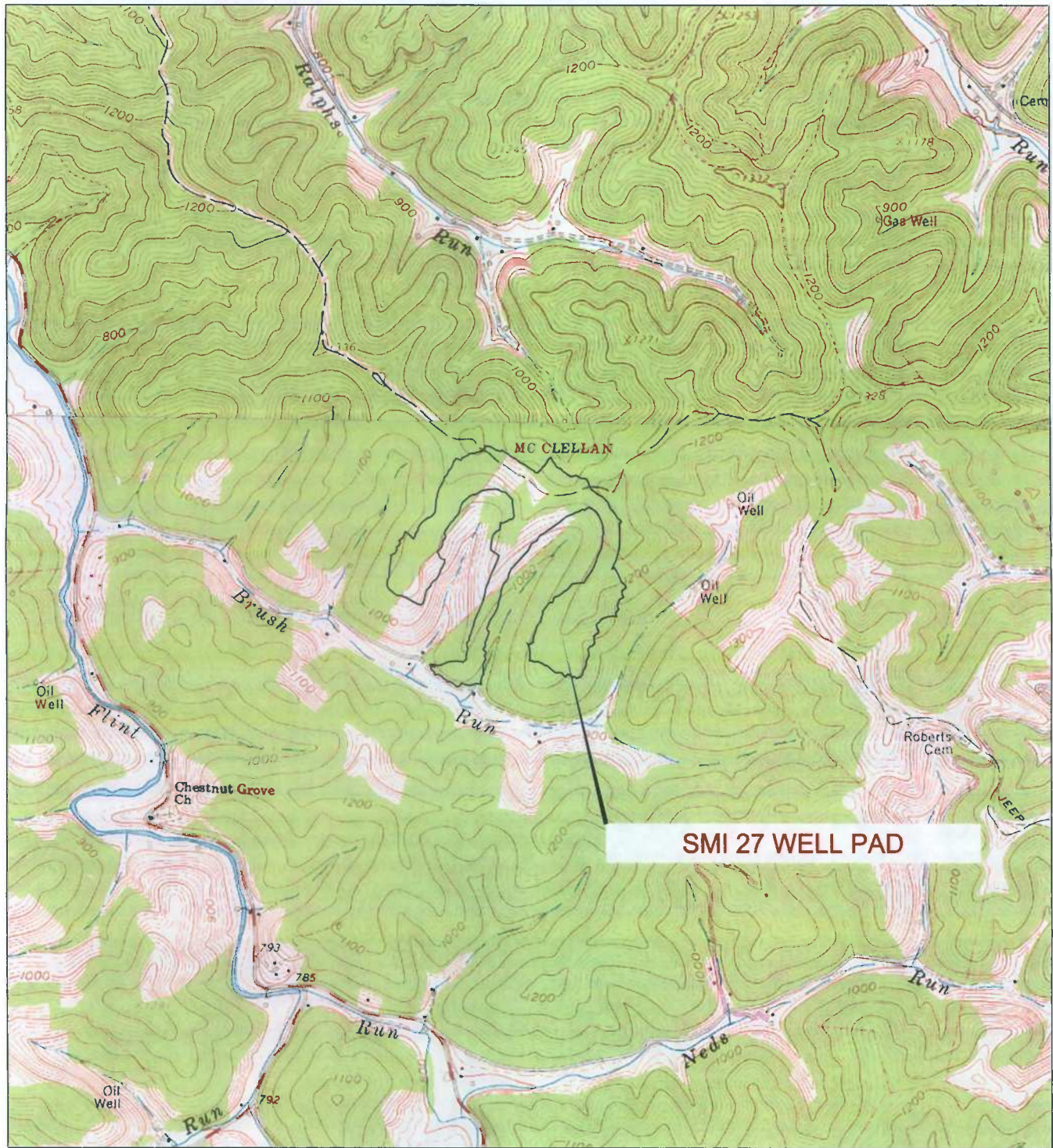


**SURVEYORS  
 ENGINEERS  
 ENVIRONMENTAL  
 PROJECT MGMT.**  
(304) 462-5634  
 WWW.SLSSURVEYS.COM



**EQT**  
 Where energy meets innovation.

# SMI 27 VICINITY MAP



**SMI 27 WELL PAD**

SCALE

1 INCH = 2000-FEET

**NOTES**  
USGS SMITHBURG  
TOPO QUADRANGLE

0'      2000'      4000'      6000'



**SMI 27**

THIS DOCUMENT WAS PREPARED BY:  
SMITH LAND SURVEYING, INC.  
FOR: EQT



**Professional Energy Consultants**  
A DIVISION OF SMITH LAND SURVEYING, INC.



(304) 462-5634

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Where energy meets innovation.

JOB #: 7584  
DRAWN BY: K.E.S.  
DATE: 3/24/15  
SCALE: 1" = 2000'

STATE OF WEST VIRGINIA,  
COUNTY OF DODDRIDGE, TO WIT

I, Virginia Nicholson, Editor of THE  
HERALD RECORD, a weekly newspaper  
published regularly, in Doddridge County,  
West Virginia, Do Hereby Certify  
That the Accompanying Legal Notice  
Entitled:

*Floodplain Permit*  
*# 15-345*

was published in said paper for *2*

successive weeks beginning with the issue  
of *April 7<sup>th</sup>* 2015 and

ending with the issue of

*April 14<sup>th</sup>* 2015 and

that said notice contains *210*

WORD SPACE at *115* cents a word

amounts to the sum of \$ *24.15*

FOR FIRST PUBLICATION, SECOND  
PUBLICATION IS 75% OF THE FIRST  
PUBLICATION

\$ *18.13*  
and each publication thereafter

\$ *42.27* TOTAL

EDITOR

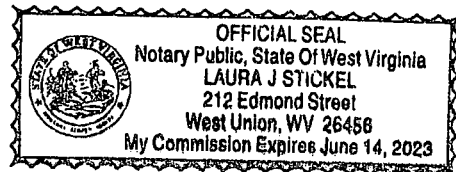
*Virginia Nicholson*

SWORN TO AND SUBSCRIBED

BEFORE ME THIS THE *14<sup>th</sup>* DAY  
OF *April* 2015

NOTARY PUBLIC

*Laura J. Stickle*



LEGAL ADVERTISEMENT:  
Doddridge County  
Floodplain Permit Application

Please take notice that on the 26th day of March, 2015  
EQT Production Company filed an application for a  
Floodplain Permit to develop land located at or about:  
Grant District 39.365904N/80.702235W Permit #15-345  
SMI 27 Well Pad Expansion. (Note: This project is not  
within the floodplain.) The Application is on file with  
the Clerk of the County Court and may be inspected or  
copied during regular business hours. As this project is  
outside the FEMA identified floodplain of Doddridge  
County, Doddridge County Floodplain Management has  
no regulatory authority. Any interested persons who  
desire to comment shall present the same in writing by  
April 27, 2015.

Delivered to the:  
Clerk of the County Court  
118 E. Court Street, West Union, WV 26456  
Beth A. Rogers, Doddridge County Clerk  
Edwin L. "Bo" Wriston, Doddridge County Flood Plain  
Manager

4-7-2xb

# The Doddridge Independent

## The Doddridge Independent PUBLISHER'S CERTIFICATE

I, Michael D. Zorn, Publisher of The Doddridge Independent, A newspaper of general circulation published in the town of West Union, Doddridge County, West Virginia, do hereby certify that:

**EQT Production Company**

filed an application for a Floodplain Permit to develop land located at or about:

**Grant District**

**39.365904N/80.702235W**

**Permit #15-345 SMI 27 Well Pad Expansion**

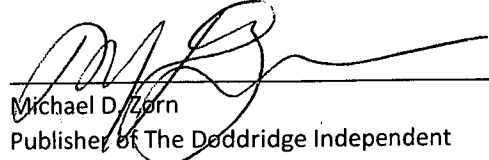
**(Note: This project is not within the floodplain)**

was published in The Doddridge Independent 2 times commencing on Friday, April 17, 2015 and Ending on Friday, April 24, 2015 at the request of:

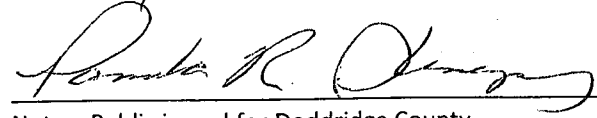
**Edwin Wriston, Doddridge County Floodplain Manager & Doddridge County Commission**

Given under my hand this Friday, April 24, 2015

The publisher's fee for said publication is:  
**\$ 25.27 1st Run/\$ 18.95 Subsequent Runs**  
**This Legal Ad Total: \$ 44.22**

  
Michael D. Zorn  
Publisher of The Doddridge Independent

Subscribed to and sworn to before me on  
this date: 4/27/15

  
Notary Public in and for Doddridge County  
My Commission expires on  
The 17<sup>th</sup> day of May 2019

Legal Advertisement: 4/13 - 4/20  
Doddridge County  
Floodplain Permit Application

Please take notice that on the 26th day of March, 2015  
**EQT Production Company**  
filed an application for a Floodplain Permit to develop land located at or about:

**Grant District**

**39.365904N/80.702235W**

**Permit #15-345 SMI 27 Well Pad Expansion**

**(Note: This project is not within the floodplain)**

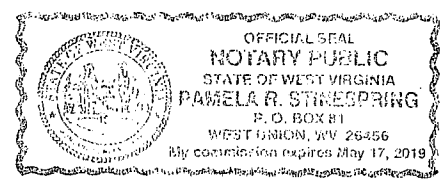
The Application is on file with the Clerk of the County Court and may be inspected or copied during regular business hours. As this project is outside the FEMA identified floodplain of Doddridge County, Doddridge County Floodplain Management has no regulatory authority. Any interested persons who desire to comment shall present the same in writing by April 27, 2015, delivered to:

Clerk of the County Court

118 E. Court Street, West Union, WV.26456

Beth A Rogers, Doddridge County Clerk

Edwin L. "Bo" Wriston, Doddridge County Flood Plain Manager



# SMI-27 SITE PLAN MODIFICATION EQT PRODUCTION COMPANY

**EXISTING WELL API#** 47-017-06052 (H2-WV 513163), 47-017-06051 (H1-WV 513162), 47-017-06056 (H6-WV 513167), 47-017-06054 (H4-WV 513165), 47-017-06061 (H11-WV 514209), 47-017-06057 (H7-WV 514135), 47-017-06059 (H9-WV 514137), 47-017-06062 (H12-WV 514210), 47-017-06060 (H10-WV 514138), 47-017-06063 (H13-WV 514211), 47-017-06058 (H8-WV 513136), 47-017-06055 (H5-WV 513166), & 47-017-06053 (H3-WV 513164)

SITUATE ON THE WATERS OF TRIBUTARIES OF BRUSH RUN OF FLINT RUN  
IN GRANT DISTRICT, DODDRIDGE COUNTY, WEST VIRGINIA.

**PROJECT INFORMATION**

PROJECT NAME: SMI-27 SITE PLAN MODIFICATION  
TAX PARCEL: GRANT DISTRICT  
MAP 6-15

**SURFACE OWNER:**  
BETH CROWDER & DAVID WENTZ  
GRANT DISTRICT  
DODDRIDGE COUNTY, WV  
PROPERTY AREA: 30± ACRES

**ROYALTY OWNER:**  
PATTY J. & R. KEITH CRIFIELD  
GRANT DISTRICT  
DODDRIDGE COUNTY, WV  
PROPERTY AREA: 351.0± ACRES

**SITE LOCATION:**  
THE SMI-27 SITE IS LOCATED ON A POINT NORTHEAST OF CO. RT. 3/1, APPROXIMATELY 1.2 MILES EAST OF CO. RT. 3 AND CO. RT. 3/1 INTERSECTION.

**SMI-27 LOCATION COORDINATES**

**ENTRANCE**  
LATITUDE: 39.38590 LONGITUDE: -80.70233 (NAD 83)  
N: 4357424.427 E: 525842.507 (UTM NAD 83 ZONE 17)

**WELL PAD**  
LATITUDE: 39.36735 LONGITUDE: -80.69709 (NAD 83)  
N: 4423375.133 E: 508961.911 (UTM NAD 83 ZONE 17)

**ASSOCIATED IMPOUNDMENT**  
LATITUDE: 39.36978 LONGITUDE: -80.70421 (NAD 83)  
N: 4357854.491 E: 525479.145 (UTM NAD 83 ZONE 17)

**ASSOCIATED PIT**  
LATITUDE: 39.36978 LONGITUDE: -80.70421 (NAD 83)  
N: 4357854.491 E: 525479.145 (UTM NAD 83 ZONE 17)

**SITE DISTURBANCE COMPUTATIONS**

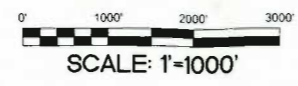
ORIGINAL LOD ACREAGE= 39.68± ACRES  
PROPOSED ADDITIONAL LOD ACREAGE= 1.57± ACRES  
DELETED (UNDISTURBED) LOD ACREAGE= 0.87± ACRES  
RE-DISTURBED AREA WITHIN LOD = 2.30± ACRES  
TOTAL ACREAGE AFTER MODIFICATION IS APPROVED = 42.68± ACRES

**GENERAL DESCRIPTION**

THE SMI-27 WELL PAD AND ASSOCIATED IMPOUNDMENT ARE CONSTRUCTED. THE ASSOCIATED PIT WILL BE CONSTRUCTED. ALL THREE STRUCTURES WILL AID IN THE DEVELOPMENT OF ADDITIONAL MARCELLUS SHALE GAS WELLS.

MISS Utility of West Virginia  
1-800-245-4848  
West Virginia State Law  
(Section XIV: Chapter 24-C)  
Requires that you call two  
business days before you dig in  
the state of West Virginia.  
**IT'S THE LAW!!**

GRID NORTH AND ELEVATIONS  
SHOWN HEREON WERE  
ESTABLISHED BY SURVEY  
GRADE GPS



**LIST OF DRAWINGS**

- 1 - COVER SHEET
- 2 - CONSTRUCTION NOTES
- 3 - INDEX SHEET
- 4 - ACCESS ROAD & STOCKPILE
- 5 - ACCESS ROAD
- 6 - ACCESS ROAD & STOCKPILE
- 7 - ACCESS ROAD
- 8 - FLOWBACK PIT, & STOCKPILE AREA
- 9 - ACCESS ROAD
- 10 - COMPLETION PIT & STOCKPILE
- 11 - PROFILES & CROSS SECTIONS
- 12 - PROFILES & CROSS SECTIONS
- 13 - CONSTRUCTION DETAILS
- 14 - CONSTRUCTION DETAILS
- 15 - CONSTRUCTION DETAILS
- 16 - CONSTRUCTION DETAILS

LEGEND	
ORIGINAL SMI-27 LOD	(Symbol)
ADDITIONAL LOD AREA	(Symbol)
SUBTRACTED LOD AREA	(Symbol)
PROPOSED COMPOST FILTER SOCK	(Symbol)
EX. ROAD EDGE OF GRAVEL/DIRT	(Symbol)
EX. ROAD EDGE OF PAVEMENT	(Symbol)
EX. ROAD CENTERLINE	(Symbol)
EX. DITCHLINE	(Symbol)
EX. CULVERT	(Symbol)
EX. SAFETY FENCE	(Symbol)
EX. GATE	(Symbol)
EX. OVERHEAD UTILITY	(Symbol)
EX. OVERHEAD UTILITY R/W	(Symbol)
EX. POWER POLE	(Symbol)
EX. TELEPHONE LINE	(Symbol)
EX. GASLINE	(Symbol)
EX. GASLINE R/W	(Symbol)
PROPOSED RIP RAP	(Symbol)
EX. RIP RAP	(Symbol)
EX. BRUSH PILE	(Symbol)
EX. DELINEATED STREAM	(Symbol)
EX. STRUCTURE	(Symbol)
EX. PIPELINE MARKER	(Symbol)
RIG FOOTPRINT	(Symbol)
EDGE OF GRAVEL PAD	(Symbol)
EDGE OF BERM	(Symbol)
EX. SUPER SILT FENCE	(Symbol)
EX. REINFORCED SILT FENCE	(Symbol)
BERM	(Symbol)
GRAVEL	(Symbol)
ORIGINAL GROUND 2' CONTOURS	(Symbol)
AS BUILT 2' CONTOURS	(Symbol)
PROPOSED 2' CONTOURS	(Symbol)
EXISTING WELL LOCATIONS	(Symbol)
PROPOSED WELL LOCATIONS	(Symbol)
SPOT ELEVATIONS	(Symbol)
MATCHLINE	(Symbol)

**SURVEY NOTE**  
1. THE CERTIFICATION OF THIS DRAWING APPLIES ONLY TO THE TOPOGRAPHIC MAPPING AS GENERATED FROM THE FIELD DATA OBTAINED AT THE TIME OF THE FIELD SURVEYS ON 5-8-13, 5-14-13, 5-15-13, 5-16-13, 5-17-13, 5-17-13, 5-21-13, 5-29-13, 5-30-13, 5-31-13, 6-3-13, 6-7-13, 6-10-13, 6-11-13, 8-5-14, AND 8-7-14.

REVISION	DATE	DESCRIPTION

**Professional Energy Consultants**  
A DIVISION OF SMITH LAND SURVEYING, INC.  
SURVEYORS  
ENGINEERS  
ENVIRONMENTAL  
PROJECT MGMT.  
WWW.SLSURVEYS.COM  
(304) 482-8834

THIS DOCUMENT WAS PREPARED BY:  
SMITH LAND SURVEYING, INC.  
FOR: EQT

**SMI-27 SITE PLAN MODIFICATION**

THIS DOCUMENT WAS PREPARED BY:  
SMITH LAND SURVEYING, INC.  
FOR: EQT PRODUCTION COMPANY

DATE: 11-18-14
EQT:
SCALE: 1" = 1000'
DESIGNED BY: DBS
FILE NO. 7584
SHEET: 1 OF 16
SS FILE: 7584-SMI-27-SITE-PLAN-REV-PIT-DESIGN

# SMI-27 SITE PLAN MODIFICATION NOTES

## EQT PRODUCTION COMPANY

### CONSTRUCTION NOTES:

1. METHODS AND MATERIALS USED IN THE CONSTRUCTION OF THE IMPROVEMENTS HEREIN SHALL CONFORM TO THE CURRENT COUNTY CONSTRUCTION STANDARDS AND SPECIFICATIONS AND/OR CURRENT WDEP EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL STANDARDS AND SPECIFICATIONS.
2. MEASURES TO CONTROL EROSION AND SILTATION, INCLUDING DETENTION PONDS SERVING AS SILT BASINS DURING CONSTRUCTION, MUST BE PROVIDED PRIOR TO ISSUANCE OF THE SITE DEVELOPMENT PERMIT. THE APPROVAL OF THESE PLANS IN NO WAY RELIEVES THE DEVELOPER OR HIS AGENT OF THE RESPONSIBILITIES CONTAINED IN THE WDEP EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE MANUAL.
3. AN APPROVED SET OF PLANS AND ALL APPLICABLE PERMITS MUST BE AVAILABLE AT THE CONSTRUCTION SITE. ALSO, A REPRESENTATIVE OF THE DEVELOPER MUST BE AVAILABLE AT ALL TIMES.
4. THE CONTRACTOR SHALL PROVIDE ADEQUATE MEANS OF CLEANING MUD FROM TRUCKS AND/OR OTHER EQUIPMENT PRIOR TO ENTERING PUBLIC STREETS, AND IT IS THE CONTRACTOR'S RESPONSIBILITY TO CLEAN STREETS, ALLAY DUST, AND TO TAKE WHATEVER MEASURES ARE NECESSARY TO ENSURE THAT THE STREETS ARE MAINTAINED IN A CLEAN, MUD AND DUST FREE CONDITION AT ALL TIMES.
5. NOTIFICATION SHALL BE GIVEN TO THE APPROPRIATE UTILITY COMPANY PRIOR TO CONSTRUCTION OF WATER AND/OR GAS PIPE LINES. INFORMATION SHOULD ALSO BE OBTAINED FROM THE APPROPRIATE AUTHORITY CONCERNING PERMITS, CUT SHEETS, AND CONNECTIONS TO EXISTING LINES.
6. THE LOCATION OF EXISTING UTILITIES SHOWN IN THESE PLANS ARE FROM FIELD LOCATIONS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE EXACT HORIZONTAL AND VERTICAL LOCATION OF ALL EXISTING UTILITIES AS NEEDED PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL INFORM THE ENGINEER OF ANY CONFLICTS ARISING FROM HIS EXISTING UTILITY VERIFICATION AND THE PROPOSED CONSTRUCTION.
7. THE DEVELOPER WILL BE RESPONSIBLE FOR ANY DAMAGE TO THE EXISTING STREETS AND UTILITIES WHICH OCCURS AS A RESULT OF HIS CONSTRUCTION PROJECT WITHIN OR CONTIGUOUS TO THE EXISTING RIGHT-OF-WAY.
8. WHEN GRADING IS PROPOSED WITHIN EASEMENTS OF UTILITIES, LETTERS OF PERMISSION FROM ALL INVOLVED COMPANIES MUST BE OBTAINED PRIOR TO GRADING AND/OR SITE DEVELOPMENT.
9. THE DEVELOPER WILL BE RESPONSIBLE FOR THE RELOCATION OF ANY UTILITIES WHICH IS REQUIRED AS A RESULT OF HIS PROJECT. THE RELOCATION SHOULD BE DONE PRIOR TO CONSTRUCTION.
10. THE CONTRACTOR IS TO VERIFY FIELD CONDITIONS PRIOR TO AND DURING CONSTRUCTION AND SMITH LAND SURVEYING AT (304) 462-5634 IMMEDIATELY OF ANY DISCREPANCIES BETWEEN ACTUAL FIELD CONDITIONS AND THE APPROVED PLAN.
11. CONTRACTORS SHALL NOTIFY OPERATORS WHO MAINTAIN UNDERGROUND UTILITY LINES IN THE AREA OF PROPOSED EXCAVATING OR BLASTING AT LEAST TWO (2) WORKING DAYS, BUT NOT MORE THAN TEN (10) WORKING DAYS, PRIOR TO COMMENCEMENT OF EXCAVATION OR DEMOLITION.
12. CONTRACTOR TO CONTACT OPERATOR AND ENGINEER IF GROUNDWATER IS ENCOUNTERED DURING CONSTRUCTION.
13. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED BY THE CONTRACTOR DAILY AND CHECKED AFTER EVERY RAINFALL. ALL DRAIN INLETS SHALL BE FREE OF SILTATION AND DEBRIS. INEFFECTIVE MEASURES SHALL BE REPLACED, AS NECESSARY.
14. THE CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING WITH THE EROSION AND SEDIMENT CONTROL INSPECTOR, 2 DAYS PRIOR TO THE START OF CONSTRUCTION.
15. WITHIN SIX MONTHS OF THE EXPIRATION OF APPROVAL OF THE WELL PAD AND TANK PADS. THIS SITE SHALL BE CLOSED AND RESTORED TO PRE-CONSTRUCTION CONDITION. ALL PIPING FOR THE GROUNDWATER DEWATERING SYSTEM, WATER LINES, AND ASSOCIATED STRUCTURES SHALL BE REMOVED. ALL EXISTING BMPS SHOWN SHALL BE INSPECTED FOR DAMAGE AND REPLACED AS NECESSARY BEFORE RECLAMATION CAN BEGIN. THE SITE SHALL BE REGRADED AS INDICATED ON THE PLAN TO PRE-CONSTRUCTION GRADES. UPON COMPLETION OF GRADING, THE SITE SHALL BE SEEDED AND MULCHED PER THE REVEGETATION DETAILS ON SHEET 16.
16. ANY AREAS BACKFILLED DURING CONSTRUCTION WILL BE COMPLETED USING A MAXIMUM 12" LIFT THICKNESS AND WILL BE COMPACTED AT LEAST 95% OF THE STANDARD PROCTOR (ASTM D-698).

### SITE CLEANUP & RECYCLE PROGRAM

1. GARBAGE, FUELS OR ANY SUBSTANCE HARMFUL TO HUMAN, AQUATIC OR FISH LIFE, SHALL BE PREVENTED FROM ENTERING SPRINGS, STREAMS, PONDS, LAKES, WETLANDS OR ANY WATER COURSE OR WATER BODY.
2. OILS, FUELS, LUBRICANTS AND COOLANTS SHALL BE PLACED IN SUITABLE CONTAINERS AND DISPOSED PROPERLY.
3. ALL TRASH AND GARBAGE WILL BE COLLECTED AND DISPOSED PROPERLY.
4. ALL SEDIMENT REMOVED FROM SEDIMENT CAPTURING DEVICES SHALL BE PLACED AT AN AREA IN THE PLANT (4 MILE ROUND TRIP), THEN SEEDED AND MULCHED.

### MAINTENANCE PROGRAM

ALL MAINTENANCE ACTIVITIES WILL BE PERFORMED BY THE CONTRACTOR DURING THE ACTIVE CONSTRUCTION PHASE OF THE PROJECT. UPON COMPLETION OF THE ACTIVE CONSTRUCTION PHASE, FIELD ENGINEER/OPERATOR WILL PERFORM MAINTENANCE ACTIVITIES.

1. BMP'S WILL BE INSPECTED ON A WEEKLY BASIS AND AFTER EACH MEASURABLE RAINFALL EVENT DURING THE ACTIVE CONSTRUCTION PHASE OF THE PROJECT.
2. ALL REVEGETATED ACCESS ROADS AND FACILITIES ARE TO BE MAINTAINED THROUGHOUT THE LIFE OF EACH STRUCTURE.
3. CULVERTS, ROAD DITCHES, BROAD-BASED DIPS, DIVERSION DITCHES, AND ROCK CHECK DAMS MUST BE MAINTAINED IN PROPER WORKING ORDER AND WILL BE CLEANED OUT, REPAIRED, OR REPLACED AS NECESSARY.
4. FILTER STRIPS AND/OR SILT FENCE WILL BE MAINTAINED.
5. ALL AREAS OF EARTH DISTURBANCE WILL BE REPAIRED WHERE SIGNS OF ACCELERATED EROSION ARE DETECTED.
6. SEEDING AND MULCHING WILL BE REPEATED IN THOSE AREAS THAT APPEAR TO BE FAILING OR HAVE FAILED.

### CONSTRUCTION SEQUENCE

THE DEVELOPMENT OF THIS SITE SHALL BE CONSISTENT WITH THE FOLLOWING GENERAL SEQUENCE OF CONSTRUCTION. THE CONTRACTOR SHALL IMPLEMENT, MAINTAIN, AND OPERATE ALL PROPOSED EROSION AND SEDIMENT CONTROL MEASURES TO EFFECTIVELY MITIGATE THE HAZARD OF ACCELERATED EROSION AND SEDIMENTATION TO ACCEPTABLE LEVELS. MINOR DEVIATIONS FROM THIS SEQUENCE SHALL BE EXECUTED BY THE PROJECT'S SUPERINTENDENT AS NEEDED TO ELIMINATE ANY POTENTIAL EROSION CONDITION THAT MAY ARISE FOR THE DURATION OF THE PROJECT. THE WDEP OFFICE OF OIL AND GAS SHALL BE NOTIFIED OF ANY AND ALL SUCH DEVIATIONS FROM THE APPROVED PLANS.

1. THE EXISTING WELL PAD AND ACCESS ROAD ARE MOSTLY STABILIZED WITH VEGETATION. ANY AREAS THAT APPEAR UNSTABLE AND/OR EROSION DURING THE DRILLING PROCESS SHALL BE ADEQUATELY STABILIZED IMMEDIATELY.
2. ADEQUATE OUTLET PROTECTION SHALL BE INSTALLED AT ALL EXISTING CULVERTS.
3. ROCK CHECK DAMS SHALL BE INSTALLED IN ALL EXISTING DITCH LINES, AS NECESSARY.
4. ADDITIONAL GRAVEL SHALL BE PLACED ON THE WELL PAD AND ACCESS ROAD, AS NECESSARY.
5. ANY EXISTING SILT FENCE ALONG THE TOE OF SLOPE SHALL BE PREPARED, AS NECESSARY.

BY		DESCRIPTION	
REVISION	DATE		
			
			
THIS DOCUMENT WAS PREPARED BY: SMITH LAND SURVEYING, INC. FOR: EQT			
			
<b>SMI-27 SITE PLAN MODIFICATION</b> THIS DOCUMENT WAS PREPARED BY: SMITH LAND SURVEYING, INC. FOR: EQT PRODUCTION COMPANY			
DATE: 11-17-14			
EQT:			
SCALE: N/A			
DESIGNED BY: DBS			
FILE NO. 7564			
SHEET: 2 OF 16			
35 FILE 7564 SMI-27 SITE AS-BUILT REV PT DESIGN			

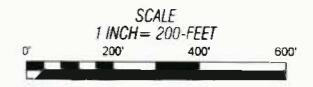
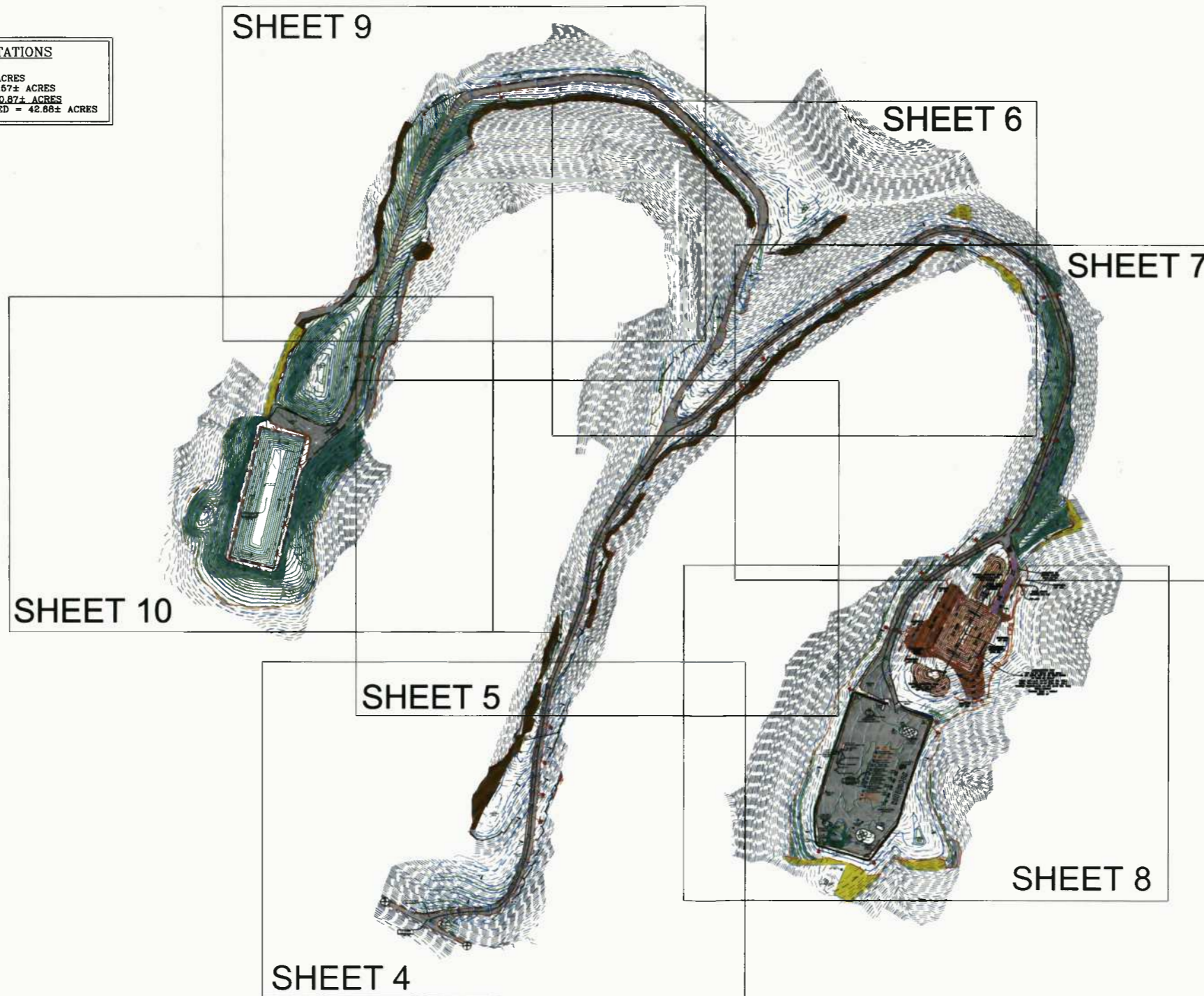


GRID NORTH AND SURVEYED ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY DGPS SURVEY GRADE.



# SMI-27 SITE PLAN MODIFICATION EQT PRODUCTION COMPANY

**SITE DISTURBANCE COMPUTATIONS**  
 ORIGINAL LOD ACREAGE= 41.98± ACRES  
 PROPOSED ADDITIONAL LOD ACREAGE= 1.57± ACRES  
 DELETED (UNDISTURBED) LOD ACREAGE= 0.87± ACRES  
 TOTAL ACREAGE AFTER MODIFICATION IS APPROVED = 42.68± ACRES



REVISION	DATE	DESCRIPTION	BY



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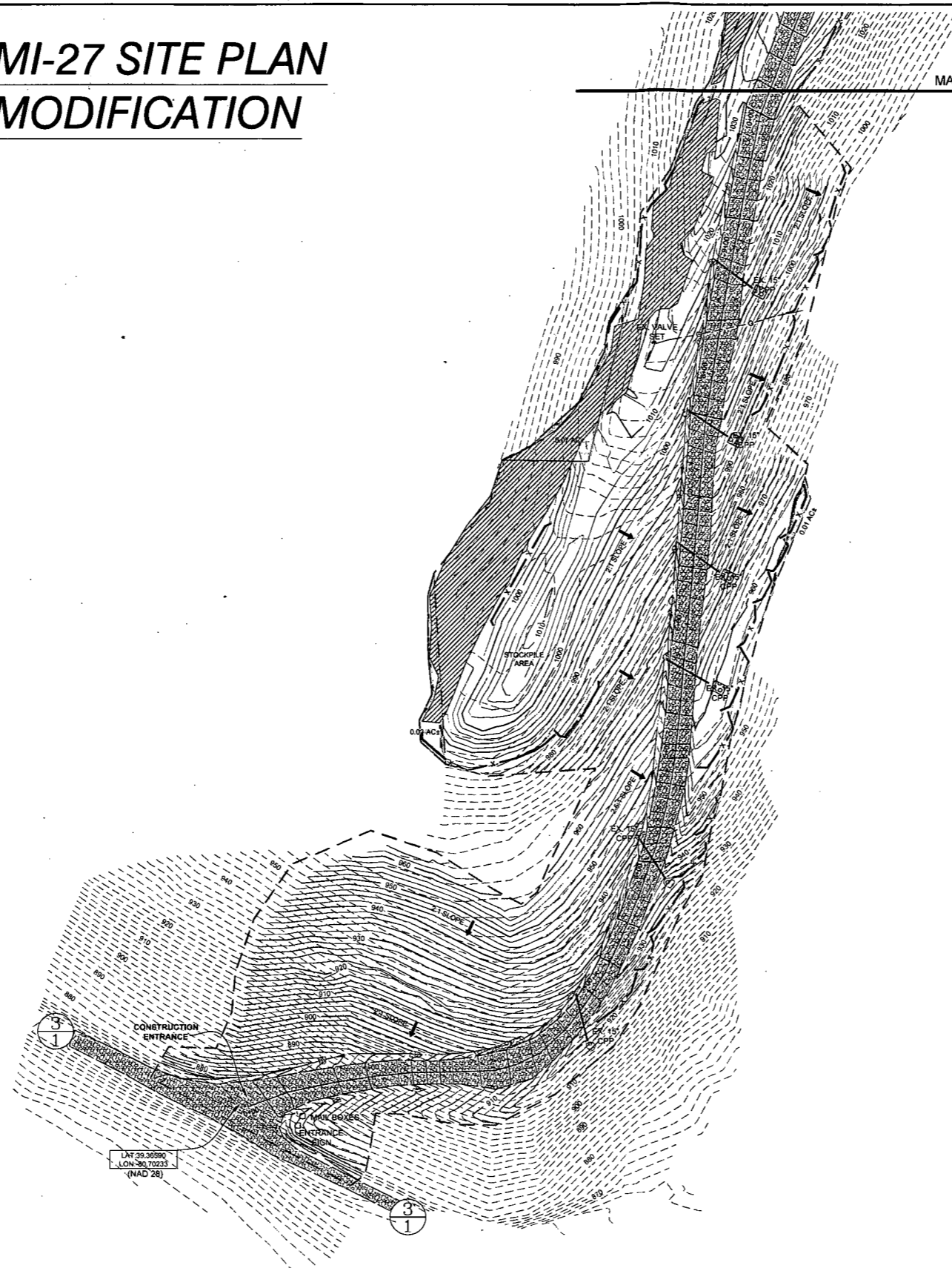
**SMI-27 SITE PLAN MODIFICATION**  
 THIS DOCUMENT WAS PREPARED BY:  
 SMITH LAND SURVEYING, INC.  
 FOR: EQT PRODUCTION COMPANY

DATE: 11-17-14  
 EQT:  
 SCALE: N/A  
 DESIGNED BY: DBS  
 FILE NO. 7584  
 SHEET: 3 OF 16  
 95 FILE:  
 75M SMI-27 SITE AS-BUILT REV PIT DESIGN

GRID NORTH AND SURVEYED ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY DGPS SURVEY GRADE.

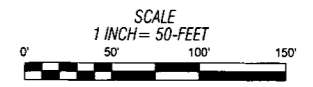


# SMI-27 SITE PLAN MODIFICATION



MATCHLINE SHEET 5

LAT 39.36590  
LON -90.70233  
(NAD 28)



REVISION	DATE	DESCRIPTION	BY



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FOR: EQT

KIP R. HALL  
REGISTERED  
15176  
STATE OF  
KANSAS  
SURVEYOR  
11/17/14

**SMI-27 SITE PLAN MODIFICATION**

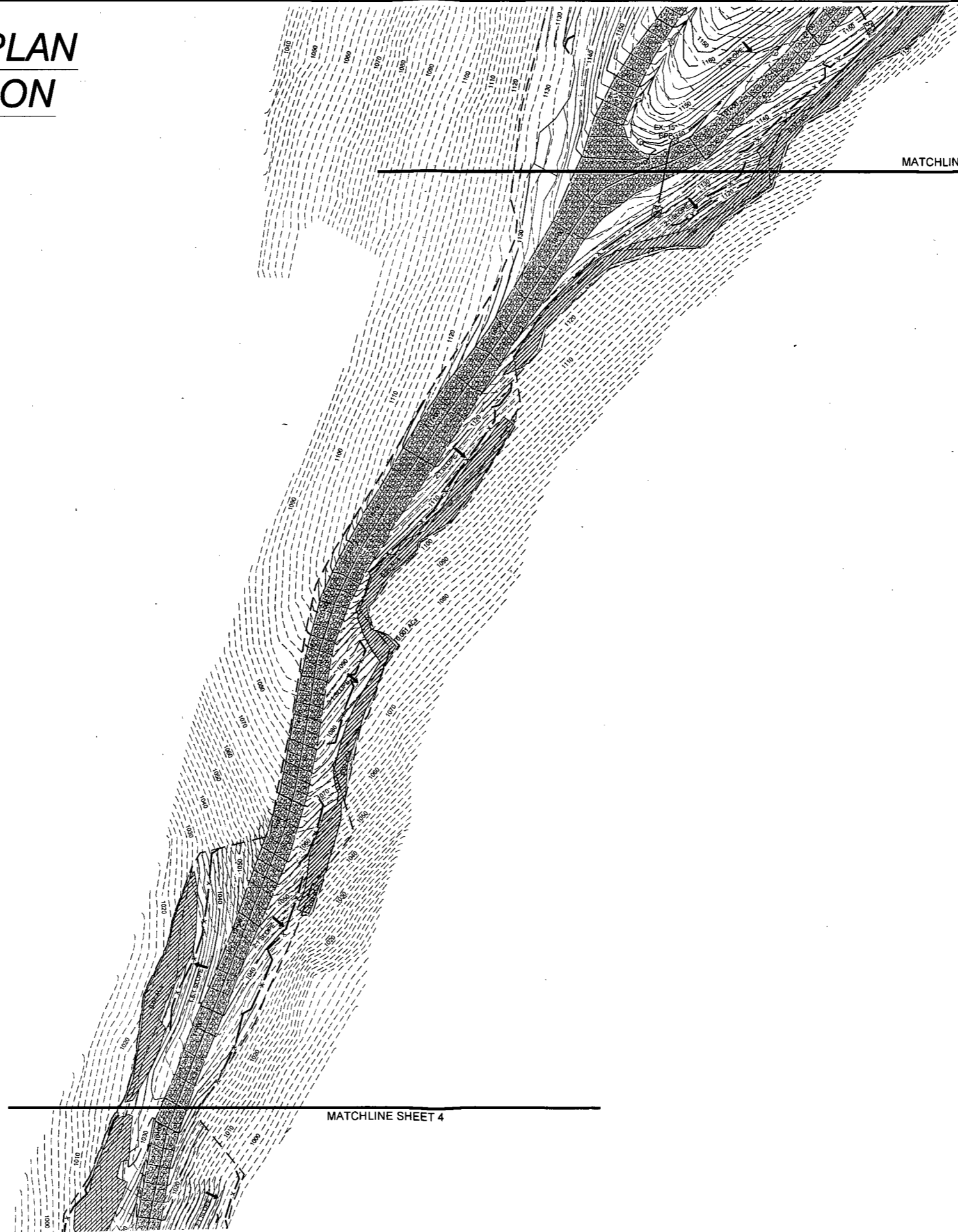
THIS DOCUMENT WAS PREPARED BY:  
SMITH LAND SURVEYING, INC.  
FOR: EQT PRODUCTION COMPANY

DATE: 11-17-14
EQT:
SCALE: N/A
DESIGNED BY: DBS
FILE NO. 7584
SHEET: 4 OF 16
SS FILE: 7584 SMI-27 SITE AS-BUILT REV P11 DESGN

GRID NORTH AND SURVEYED ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY DGPS SURVEY GRADE.

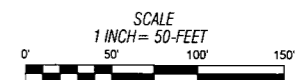


# SMI-27 SITE PLAN MODIFICATION



MATCHLINE SHEET 6

MATCHLINE SHEET 4



REVISION	DATE	DESCRIPTION	BY

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**SMI-27 SITE PLAN  
MODIFICATION**

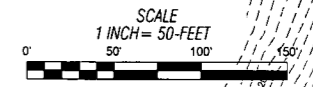
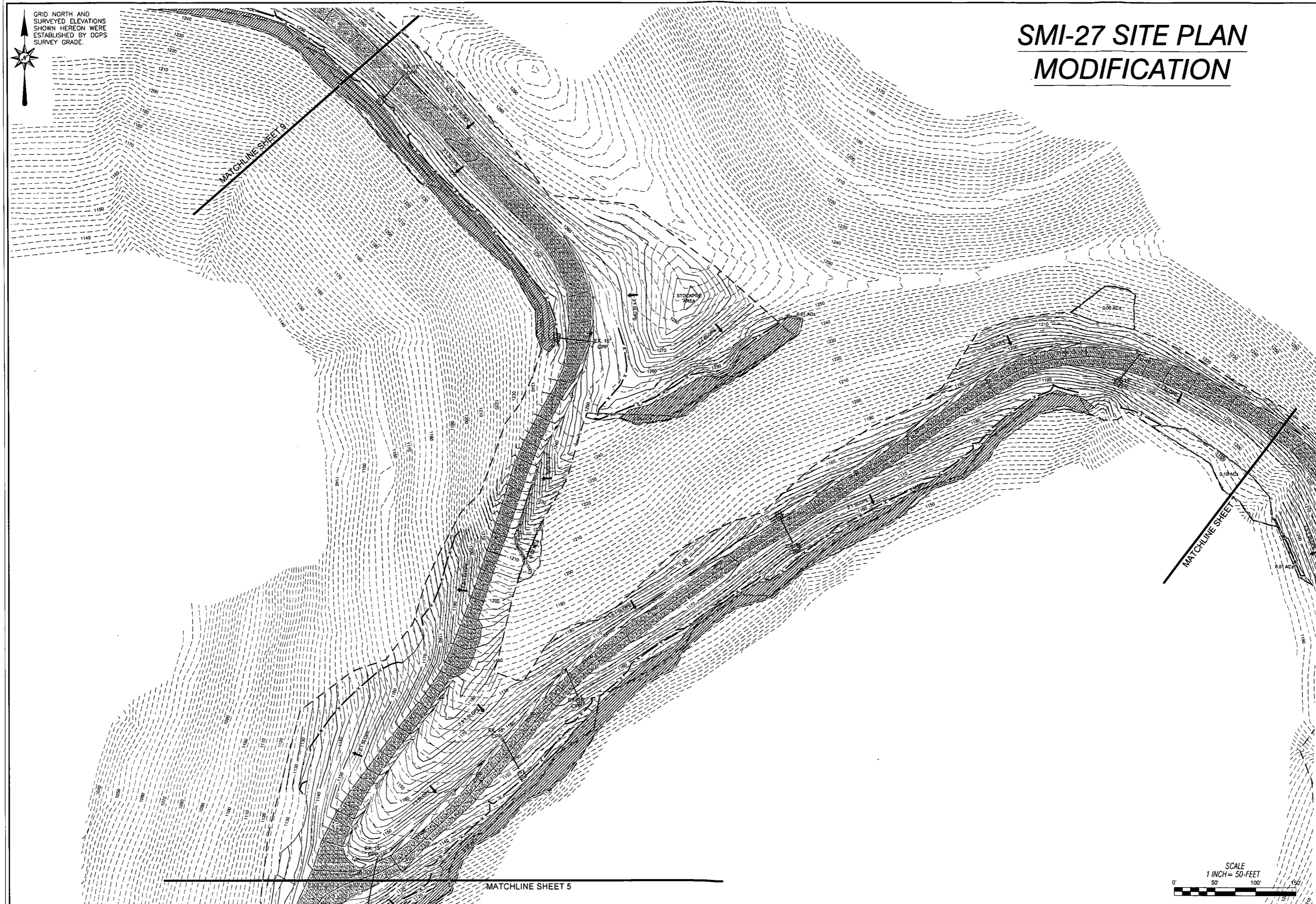
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SMITH LAND SURVEYING, INC.  
FOR: EQT PRODUCTION COMPANY

DATE: 11-17-14  
EQT:  
SCALE: N/A  
DESIGNED BY: DBS  
FILE NO. 7564  
SHEET: 5 OF 16  
35 FILE:  
7564 SMI-27 SITE AS-BUILT REV P11 DESIGN

GRID NORTH AND SURVEYED ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY DGPS SURVEY GRADE.



# SMI-27 SITE PLAN MODIFICATION

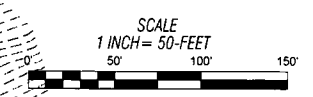


<p><b>Professional Energy Consultants</b>  <small>A DIVISION OF SMITH LAND SURVEYING, INC.</small>  <b>SMITH LAND SURVEYING, INC.</b>          SURVEYORS          ENGINEERS          ENVIRONMENTAL          PROJECT MGMT.  <small>WWW.SLSURVEYS.COM</small>          (304) 462-6634</p>	
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<p><b>KIP R. HALL</b>          REGISTERED          15176          STATE OF          WEST VIRGINIA          PROFESSIONAL SURVEYOR          11/17/14</p>	
<p><b>SMI-27 SITE PLAN          MODIFICATION</b>          THIS DOCUMENT WAS PREPARED BY:          SMITH LAND SURVEYING, INC.          FOR: EQT PRODUCTION COMPANY</p>	
DATE:	11-17-14
EQT:	
SCALE:	N/A
DESIGNED BY:	DBS
FILE NO.	7584
SHEET:	6 OF 16
<p>75M SMI-27 SITE AS-BUILT REV PI DESIGN</p>	

GRID NORTH AND SURVEYED ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY DGPS SURVEY GRADE.



# SMI-27 SITE PLAN MODIFICATION



BY	
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DATE	
REVISION	
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DATE:	11-17-14
EQT:	
SCALE:	N/A
DESIGNED BY:	DBS
FILE NO.:	7584
SHEET:	7 OF 16
<small>7584 SMI-27 SITE AS-BUILT REV P11 DESIGN</small>	

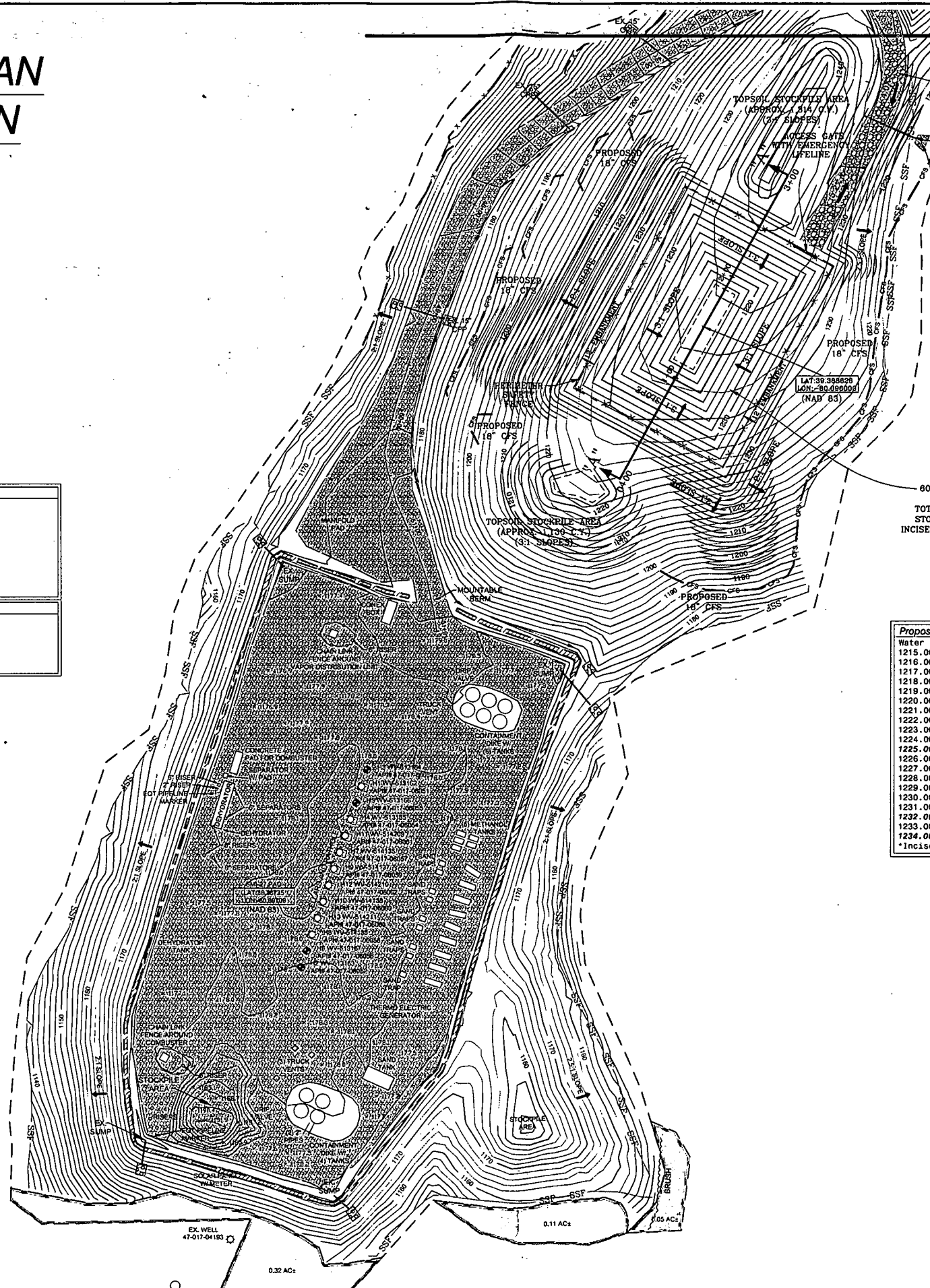
GRID NORTH AND SURVEYED ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY DGPS SURVEY GRADE.



# SMI-27 SITE PLAN MODIFICATION

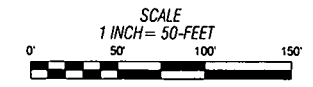
MATCHLINE SHEET 7

<p><b>Proposed Associated Pit</b>          Topsoil Removal: 34,951.5 C.F., 1,294.5 C.Y.          Total cut: 243,774.9 C.F., 9,028.7 C.Y. (Cut/Shrink=1)          Total fill: 349,145.1 C.F., 12,931.3 C.Y. (Fill/Shrink=1)          Cut slope percent grade: 50.00%, slope ratio: 2:1          Fill slope percent grade: 50.00%, slope ratio: 2:1          Interior slope percent grade: 33.33%, slope ratio: 3:1          Top of dam elevation: 1234.0'          Bottom of pit elevation: 1215.0'          Top of dam width: 12.0'</p>
<p><b>Proposed Associated Pit Access Road</b>          Total cut: 19,726.2 C.F., 730.6 C.Y. (Cut/Shrink=1)          Total fill: 10,521.9 C.F., 389.7 C.Y. (Fill/Shrink=1)          Cut slope percent grade: 50.00%, slope ratio: 2:1          Fill slope percent grade: 50.00%, slope ratio: 2:1          Gravel (6" depth): 3,094.2 C.F., 114.6 C.Y.</p>



**ASSOCIATED PIT**  
 \*PIT TO BE FULLY LINED WITH 80 MIL LINER AND 10 OZ. FELT LINER TO ELEV. OF 1234.0'  
 TOTAL VOL.=4.81 AC.-FT. (1.56 MIL. GAL.)  
 STOR. VOL.=3.74 AC.-FT. (1.22 MIL. GAL.)  
 INCISED VOLUME=1.23 AC.-FT. (0.40 MIL. GAL.)  
 W.S.E.=1232.0'  
 INCISED ELEV. = 1225.0'  
 DEPTH 19'

Water Elev.	Ac.-Ft.	Gallons	8rls.
1215.00	0.00	0.0	0.0
1216.00	0.03	12509.3	297.8
1217.00	0.09	29861.7	710.9
1218.00	0.16	52435.0	1248.4
1219.00	0.24	80786.8	1923.4
1220.00	0.35	115482.8	2749.5
1221.00	0.48	157045.0	3739.1
1222.00	0.63	205994.8	4904.6
1223.00	0.80	262895.6	6259.4
1224.00	1.00	328295.3	7816.5
1225.00*	1.23	402708.9	8588.3
1226.00	1.49	486972.8	11587.4
1227.00	1.78	580723.5	13826.7
1228.00	2.10	685400.0	16319.0
1229.00	2.45	801271.8	19077.9
1230.00	2.85	928886.4	22116.3
1231.00	3.27	1068759.5	25446.6
1232.00	3.74	1221417.5	29881.3
1233.00	4.25	1387396.9	33033.2
1234.00	4.81	1567472.6	37920.7
*Incised Volume Elev.=1225.00			



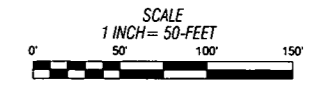
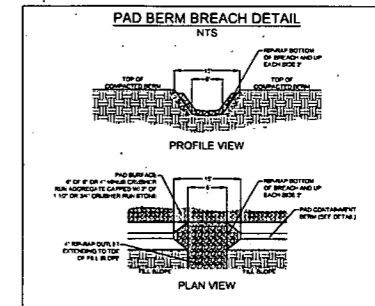
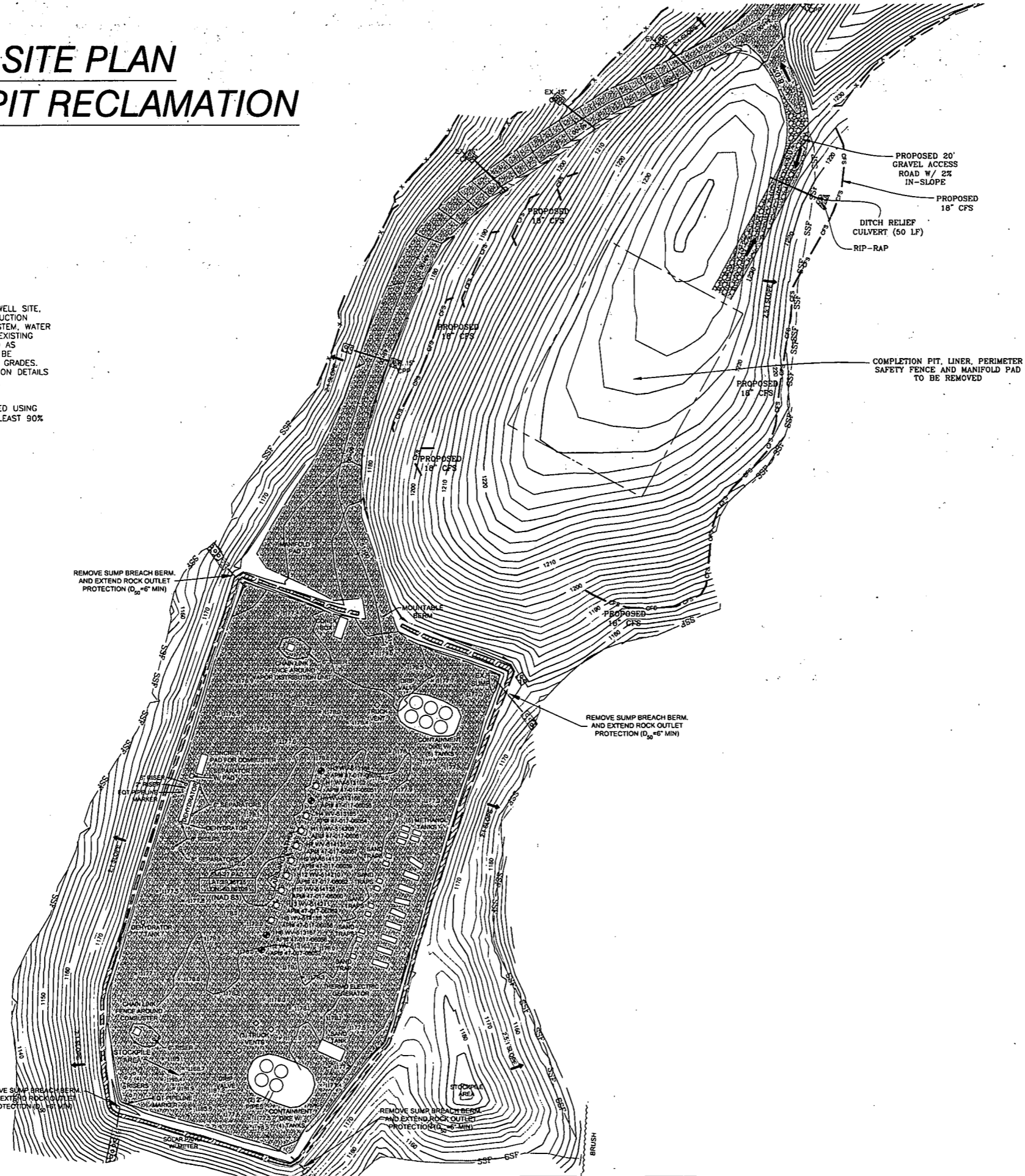
BY	
DESCRIPTION	
DATE	
REVISION	
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<p>SMI-27 SITE PLAN MODIFICATION          THIS DOCUMENT WAS PREPARED BY:          SMITH LAND SURVEYING, INC.          FOR: EQT PRODUCTION COMPANY</p>	
DATE:	11-18-14
EQT:	
SCALE:	N/A
DESIGNED BY:	DBS
FILE NO.:	7584
SHEET:	8 OF 10
SS FILE:	7584 SM-27 SITE AS-BUILT REV PI DESIGN

GRID NORTH AND SURVEYED ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY DGPS SURVEY GRADE.

# SMI-27 SITE PLAN ASSOCIATED PIT RECLAMATION

**SITE RECLAMATION NARRATIVE:**  
WITHIN SIX MONTHS OF THE EXPIRATION OF APPROVAL OF THE WELL SITE, THIS SITE SHALL BE CLOSED AND RESTORED TO A PRE-CONSTRUCTION CONDITION. ALL PIPING FOR ANY GROUNDWATER DEWATERING SYSTEM, WATER LINES AND ASSOCIATED STRUCTURES SHALL BE REMOVED. ALL EXISTING BMPs SHOWN SHALL BE INSPECTED FOR DAMAGE AND REPLACED AS NECESSARY BEFORE RECLAMATION CAN BEGIN. THE SITE SHALL BE REGRADED AS INDICATED ON THE PLAN TO PRE-CONSTRUCTION GRADES. THE SITE SHALL BE SEEDED AND MULCHED PER THE REVEGETATION DETAILS ON SHEET 16.

**NOTE:**  
ANY AREAS BACKFILLED DURING RECLAMATION WILL BE COMPLETED USING MAXIMUM 24" LIFT THICKNESS AND WILL BE COMPACTED TO AT LEAST 90% OF THE STANDARD PROCTOR (ASTM D-698).



REVISION	DATE	DESCRIPTION	BY

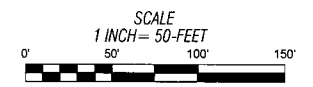
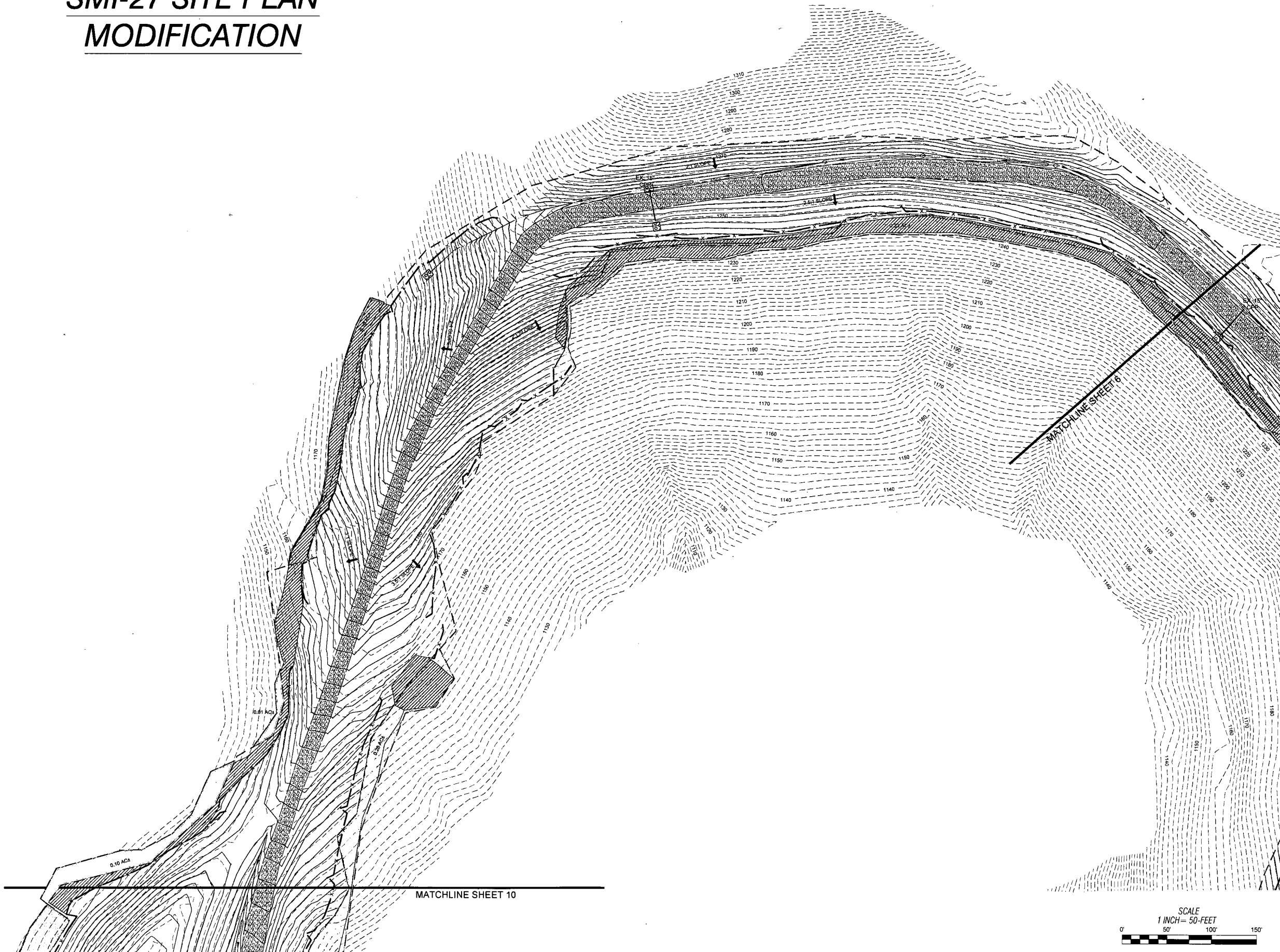
  

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<p>11/18/14</p>	
<p>SMI-27 SITE PLAN ASSOCIATED PIT RECLAMATION</p> <p>THIS DOCUMENT WAS PREPARED BY: SMITHLAND SURVEYING, INC. FOR: EQT PRODUCTION COMPANY</p>	
DATE:	11-18-14
EQT:	
SCALE:	N/A
DESIGNED BY:	DBS
FILE NO.	7584
SHEET:	08 OF 16
SS FILE:	7584 94-276 PI REC PLAN.dwg

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# SMI-27 SITE PLAN MODIFICATION



BY	
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DATE:	11-17-14
EQT:	
SCALE:	N/A
DESIGNED BY:	DBS
FILE NO.:	7584
SHEET:	9 OF 16
SEE FILE:	7584 SMI-27 SITE AS-BUILT REV P11 DESGN

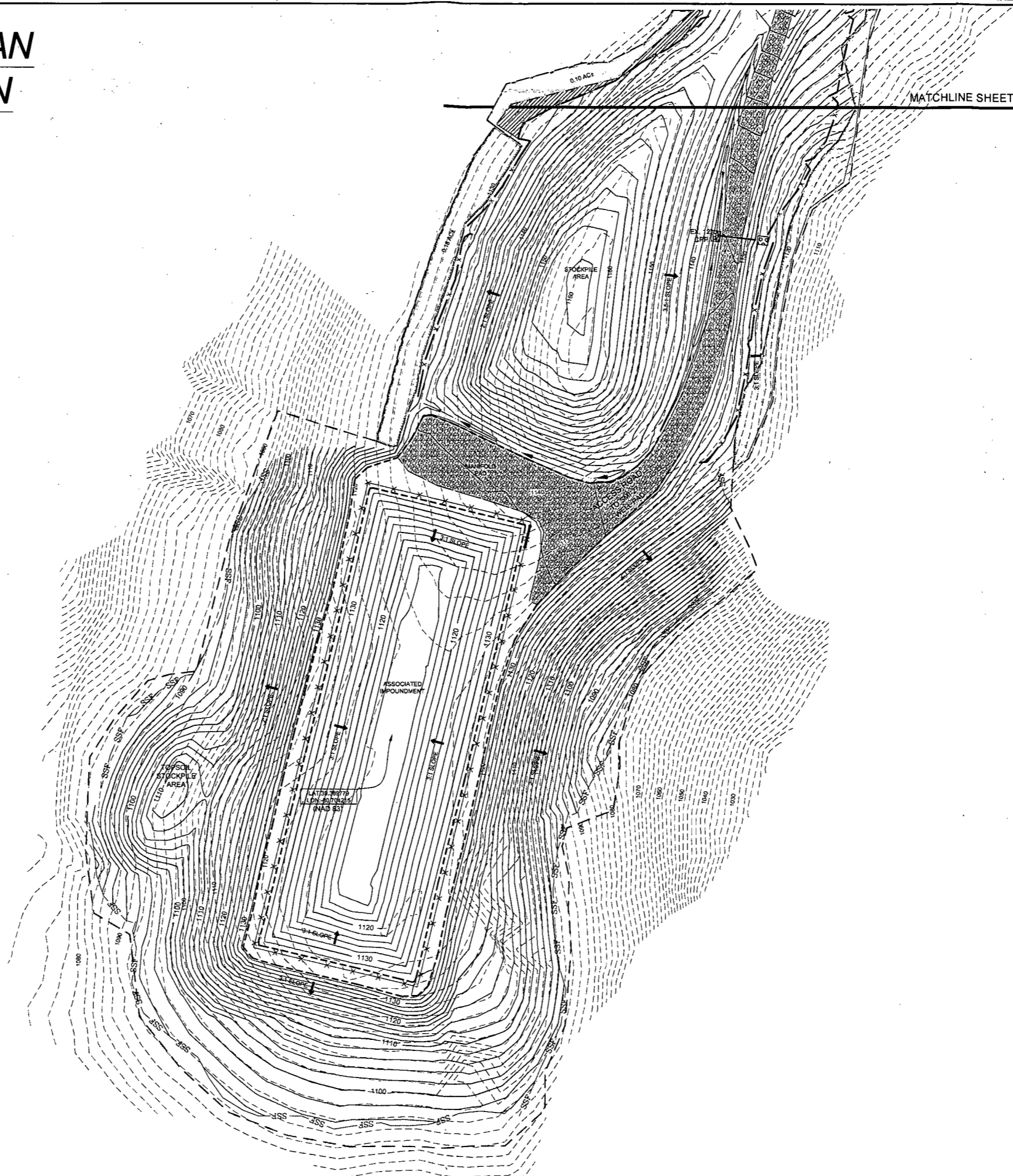


GRID NORTH AND SURVEYED ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY DGPS SURVEY GRADE.



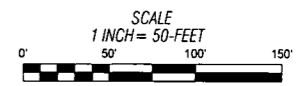
# SMI-27 SITE PLAN MODIFICATION

MATCHLINE SHEET 9



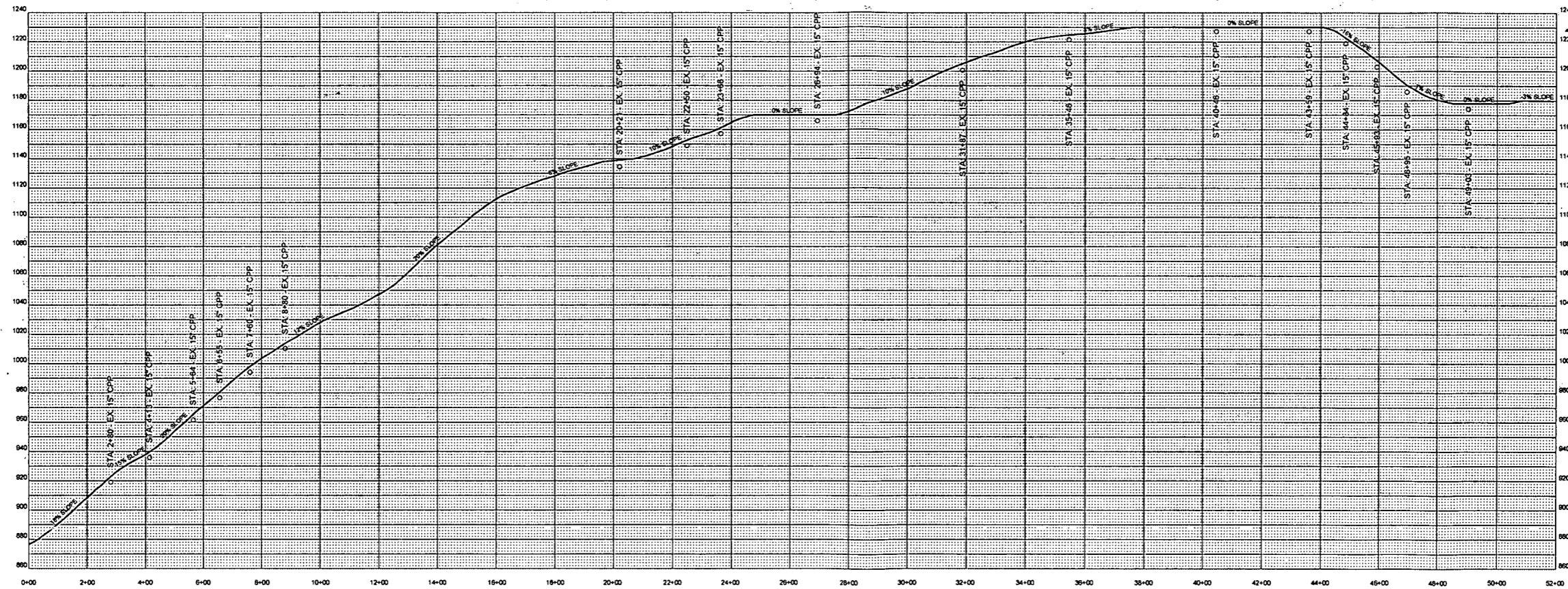
**ASSOCIATED IMPOUNDMENT VOLUMES AT 1 INCREMENTS**

Elevation	(CY)	(Acre-ft)	(Gallons)	(Barrels)
0'	1113.2	0.01	0.01	0.01
1'	1114.2	0.04	27433.6	633.0
2'	1115.2	0.08	120052.7	2858.4
3'	1116.2	0.13	229907.9	5474.0
4'	1117.2	0.19	357457.3	8310.6
5'	1118.2	0.26	503406.0	11985.7
6'	1119.2	0.33	669386.5	15914.1
7'	1120.2	0.41	852927.6	20308.0
8'	1121.2	0.50	1057659.6	25182.3
9'	1122.2	0.60	1283106.9	30550.0
10'	1123.2	0.71	1528575.1	36418.3
11'	1124.2	0.83	1797461.7	42788.8
12'	1125.2	0.96	2087221.9	49695.7
13'	1126.2	1.10	2399559.8	57127.3
14'	1127.2	1.25	2734501.2	65107.2
15'	1128.2	1.41	3093186.0	73647.3
16'	1129.2	1.58	3476132.0	82785.0
17'	1130.2	1.76	3883667.3	92467.9
18'	1131.2	1.95	4316460.2	102772.9
19'	1132.2	2.14	4775152.7	113893.9
20'	1133.2	2.34	5260544.0	126250.7



BY		DESCRIPTION	
REVISION	DATE	DATE	DESCRIPTION
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DATE: 11-17-14			
EQT:			
SCALE: N/A			
DESIGNED BY: DBS			
FILE NO. 7584			
SHEET: 10 OF 16			
<p>DATE: 11-17-14</p> <p>SCALE: 1 INCH = 50 FEET</p> <p>7584 06-27 976 AG-BILT REV PH DESIGN</p>			

# SMI-27 SITE PLAN MODIFICATION



**ACCESS ROAD PROFILE " STA 0+00 - 51+91"**  
SCALE: HORIZ. 1" = 200' VERT. 1" = 40'

	REVISION	DATE	DESCRIPTION	BY
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<p style="font-size: x-small;">Professional Energy Consultants A DIVISION OF SMITH LAND SURVEYING, INC. SURVEYORS ENGINEERS ENVIRONMENTAL PROJECT MGMT. WWW.SLSURVEY.COM (304) 482-8604</p>				
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<p style="font-size: x-small;">SMI-27 SITE PLAN MODIFICATION</p> <p style="font-size: x-small;">THIS DOCUMENT WAS PREPARED BY: SMITH LAND SURVEYING, INC. FOR: EQI PRODUCTION COMPANY</p>				
DATE: 11-17-14				
EQI:				
SCALE: N/A				
DESIGNED BY: DBS				
FILE NO. 7564				
SHEET: 11 OF 16				
SS FILE 754 98-27 SITE AS-BUILT REV FH DESIGN				

\$135,000

Steve Shattuck

462-  
4934

Ranomas  
shop  
& 2 apts

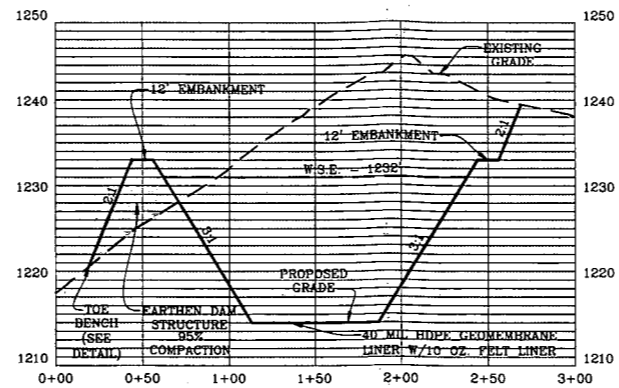
house by high school

Sumac Ct | apt  
set up

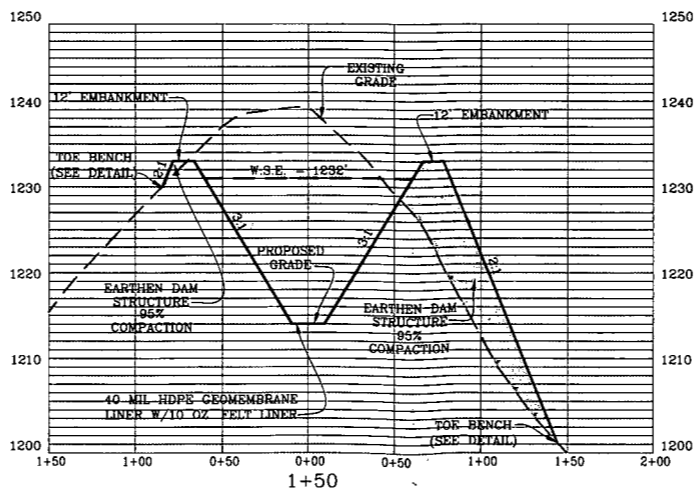
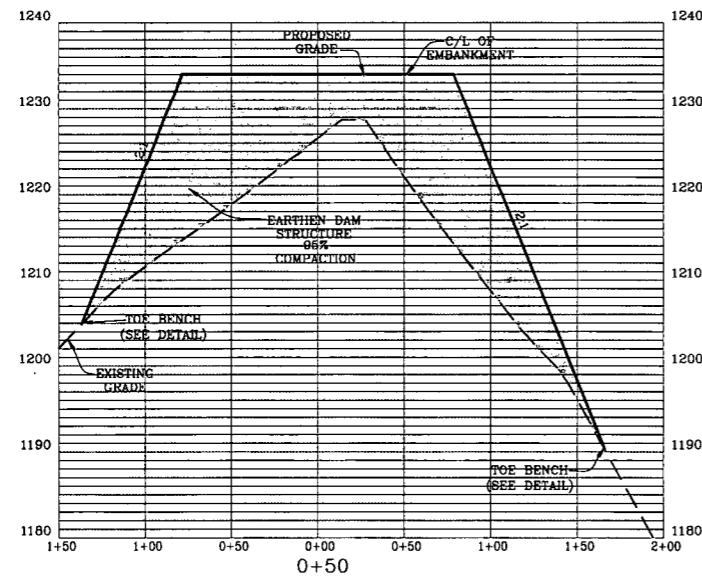
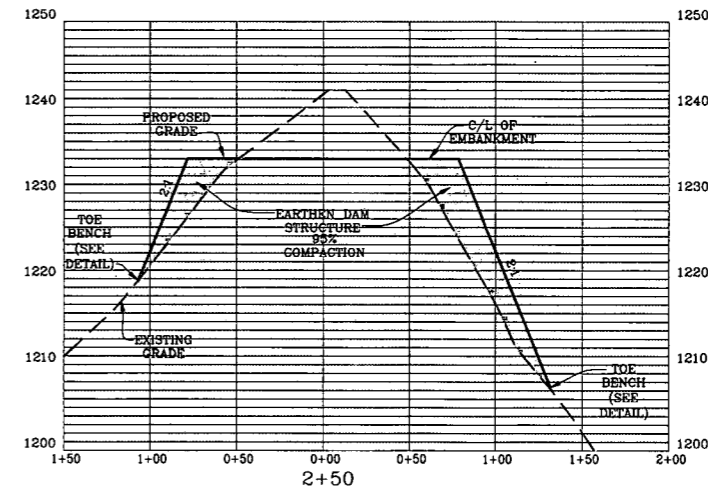
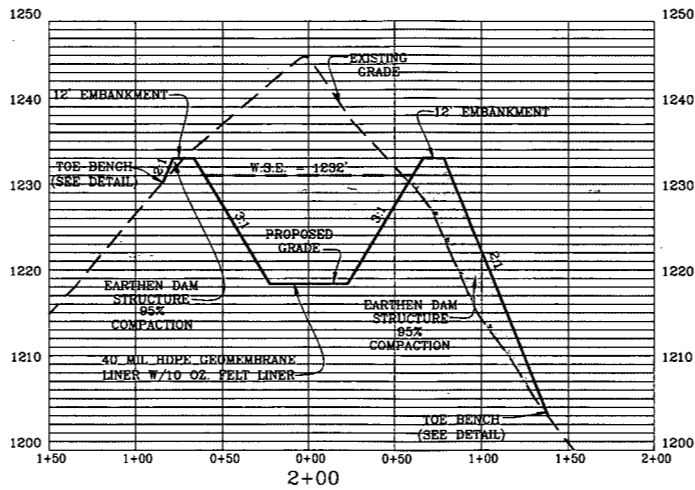
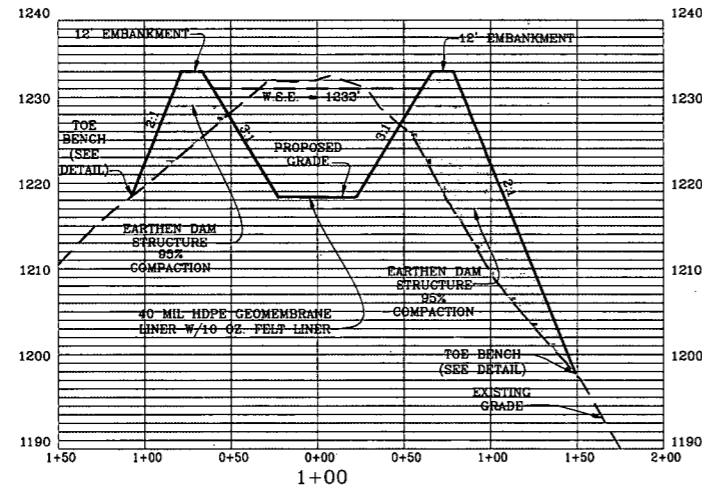
needs kitchen app. & cupboards

# SMI-27 SITE PLAN MODIFICATION

ASSOCIATED PIT CROSS-SECTION "A-A"  
SCALE: HORIZ. 1" = 50' VERT. 1" = 10'



ASSOCIATED PIT CROSS-SECTIONS ALONG BASELINE "A-A"  
SCALE: HORIZ. 1" = 50' VERT. 1" = 10'



REVISION	DATE	DESCRIPTION	BY



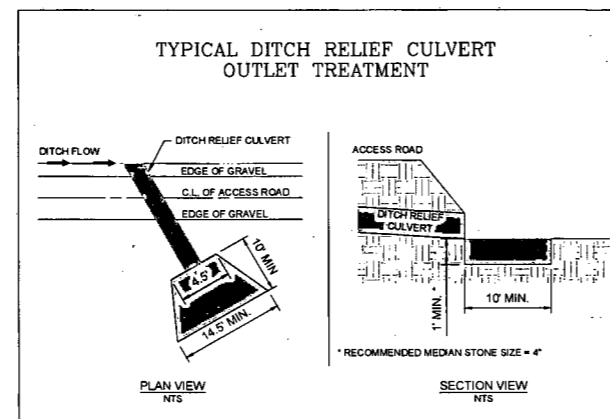
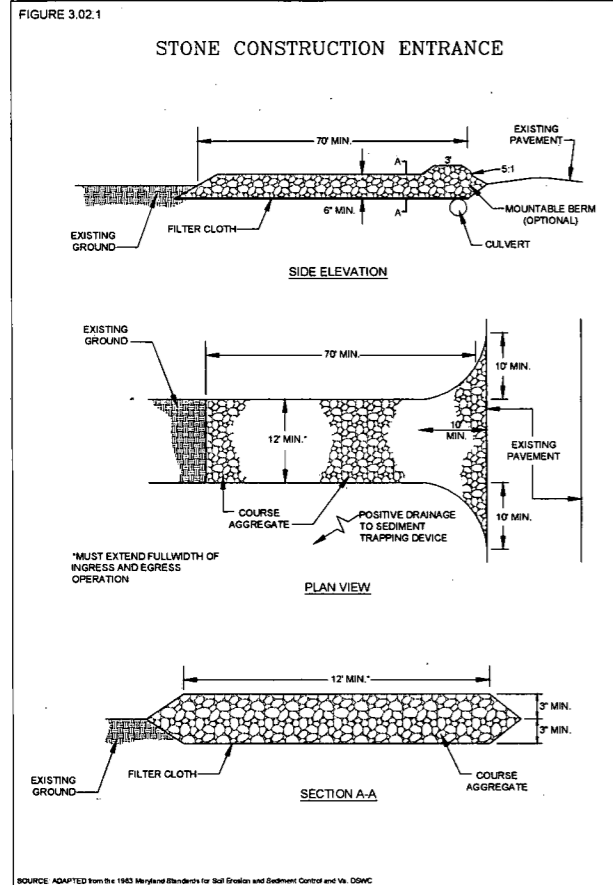
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THIS DOCUMENT WAS PREPARED BY:  
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FOR: EQT



SMI-27 SITE PLAN  
MODIFICATION  
THIS DOCUMENT WAS PREPARED BY:  
SMITH LAND SURVEYING, INC.  
FOR: EQT PRODUCTION COMPANY

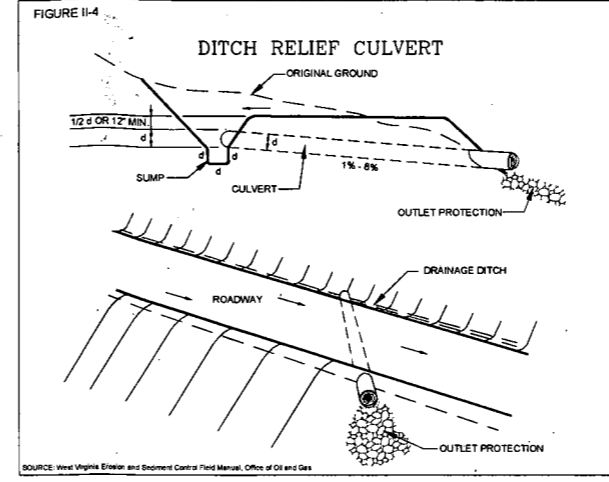
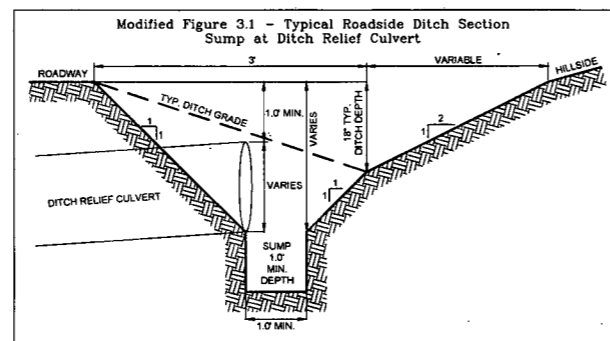
DATE: 11-17-14  
EQT  
SCALE: N/A  
DESIGNED BY: DBS  
FILE NO. 7564  
SHEET: 12 OF 16  
SLS REC.  
7564 SMI-27 SITE AS-BUILT REV PIT DESIGN



**NOTE:**  
ALL DITCH LINE PROTECTION SHALL BE INSTALLED AS RECOMMENDED IN THE WEST VIRGINIA EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICE (BMP) MANUAL. DITCH LINE PROTECTION SHALL BE BASED ON THE FOLLOWING GRADATIONS:

1. LESS THAN 9% - GRASSSED
2. 3-9% - GRASS WITH ROLLED EROSION CONTROL PRODUCTS (RECP)
3. GREATER THAN 9% - RIPRAP OR EQUIVALENT GEOTEXTILE

IF HIGH EROSION SOILS ARE ENCOUNTERED DURING CONSTRUCTION, THE ENGINEER SHOULD BE CONTACTED FOR FURTHER EVALUATION.



**Table II-5**

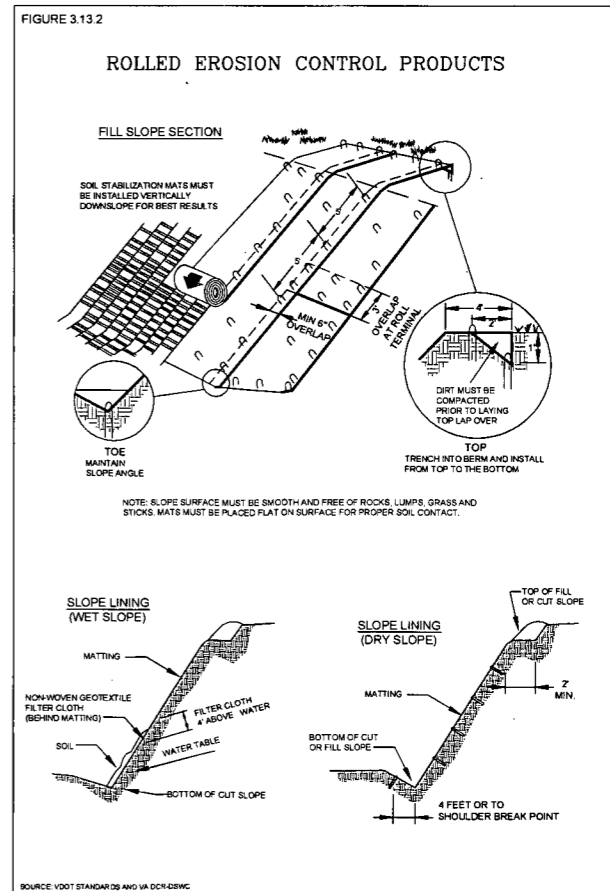
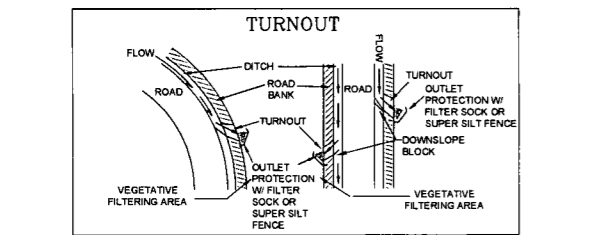
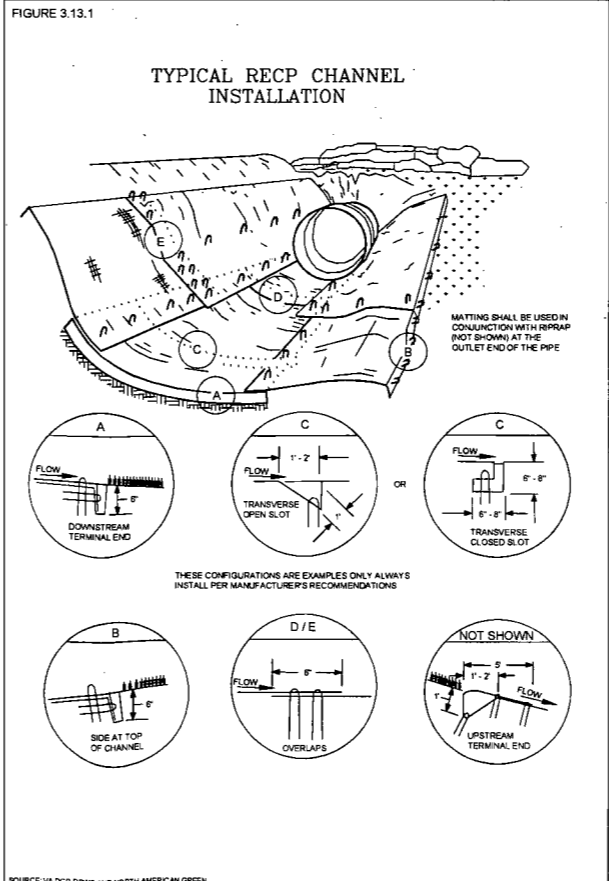
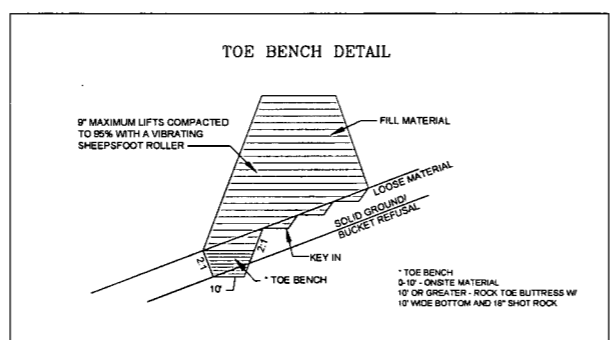
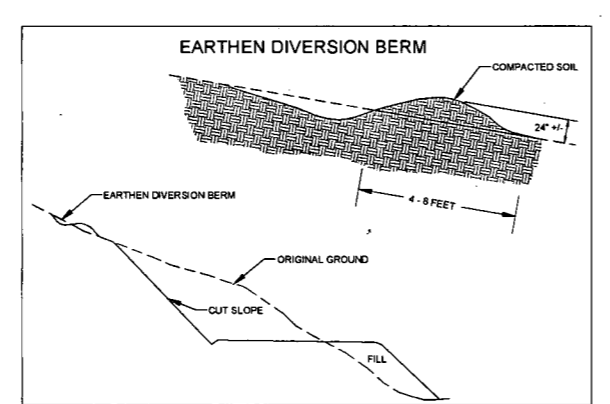
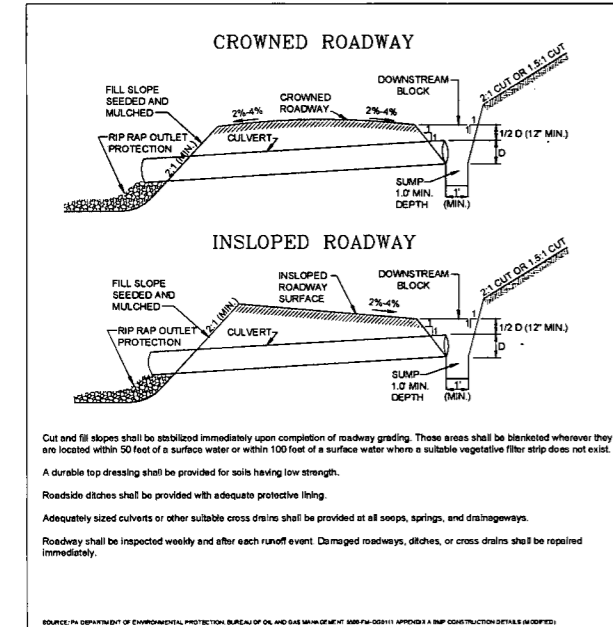
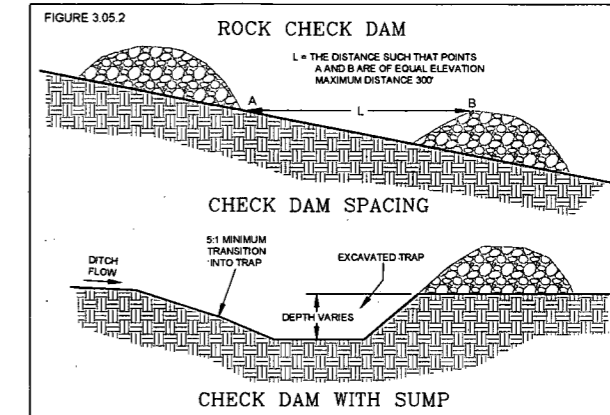
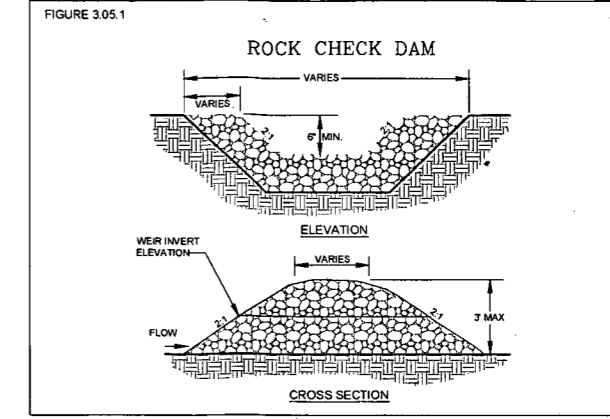
**Pipe Sizes for Culverts Across Roads**

Drainage Area (Ac)	Pipe Diameter (in)	Pipe Capacity (Cfs)
10	15	5
20	18	8
30	21	12
50	24	18
80	27	24
100	30	29
300	36	60
500	42	85

**Table II-6**

**Spacing of Culverts**

Road Grade %	Distance (ft)
2-5	500-300
6-10	300-200
11-15	200-100
16-20	100



BY \_\_\_\_\_

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NOVEMBER 11, 2014

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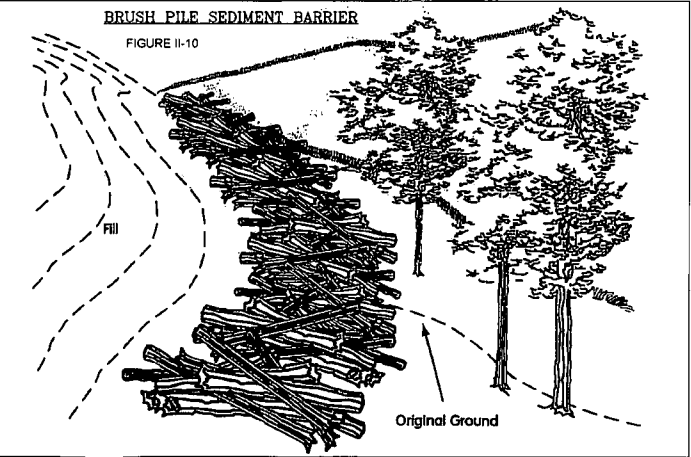
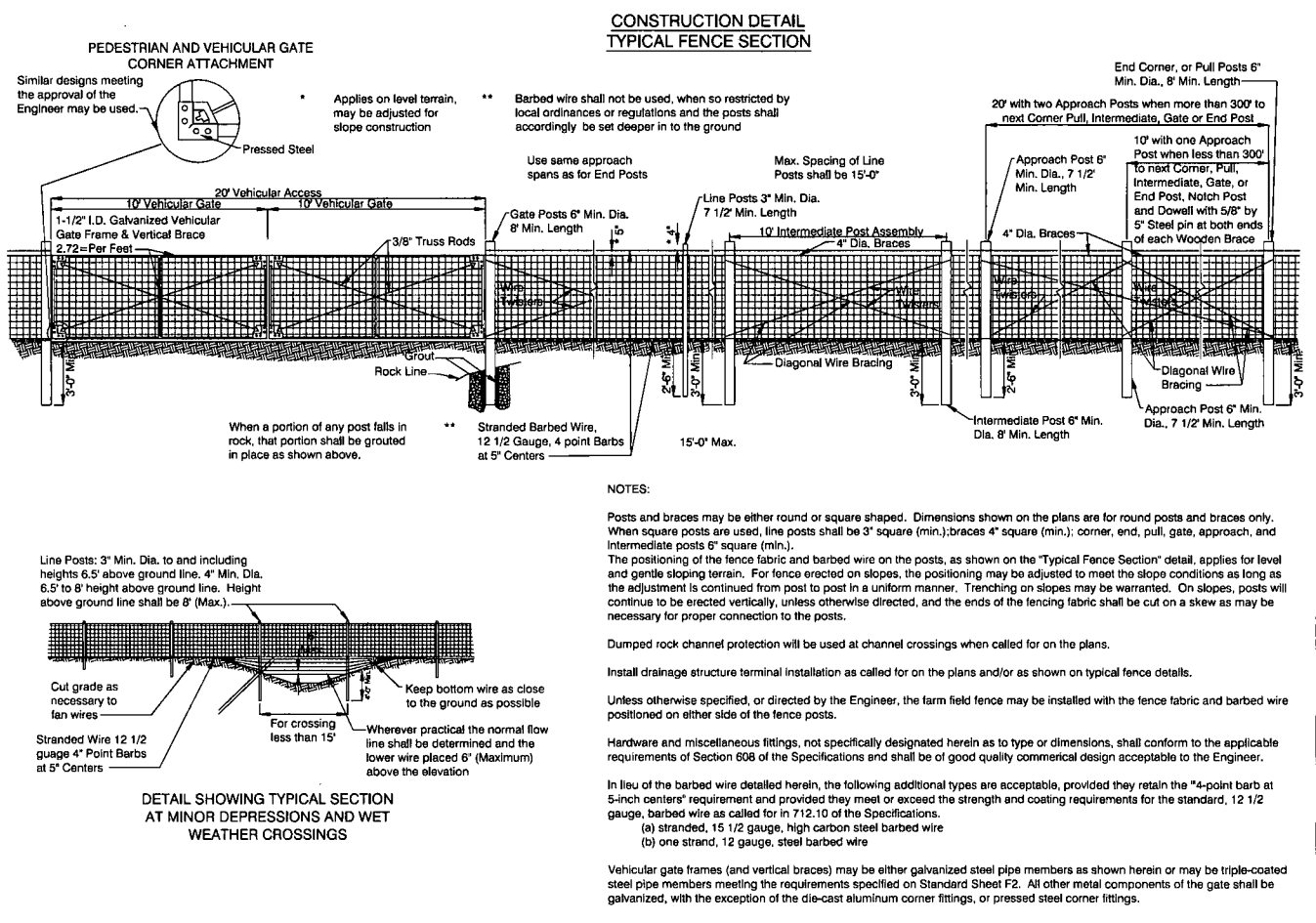
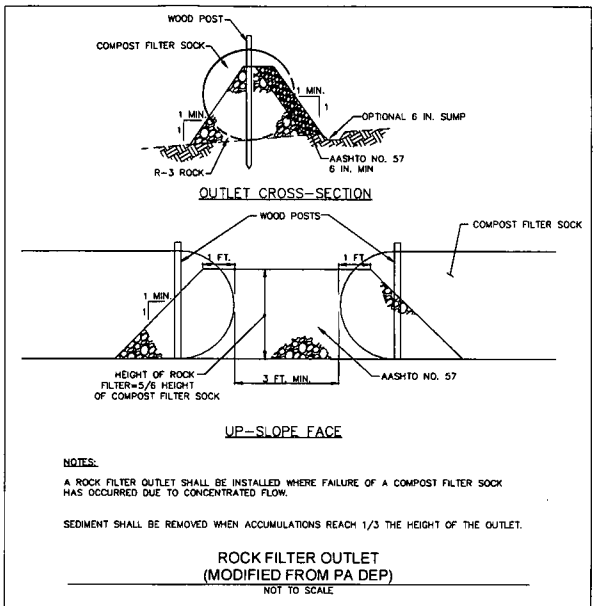
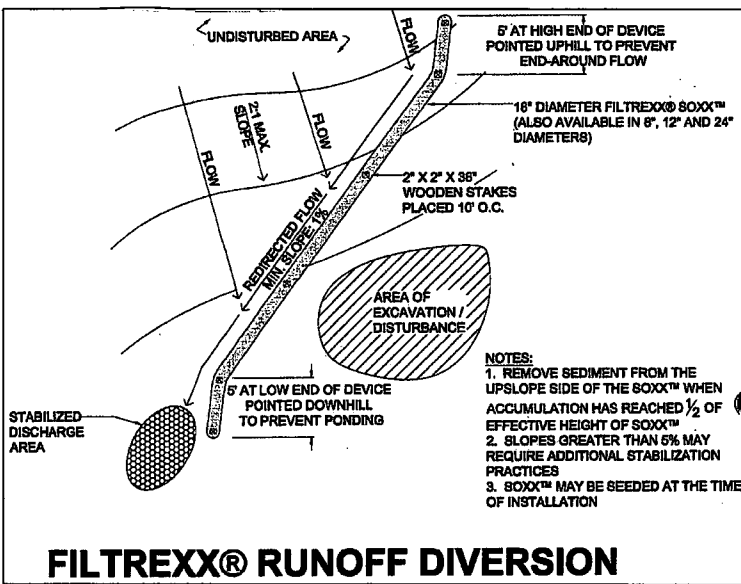
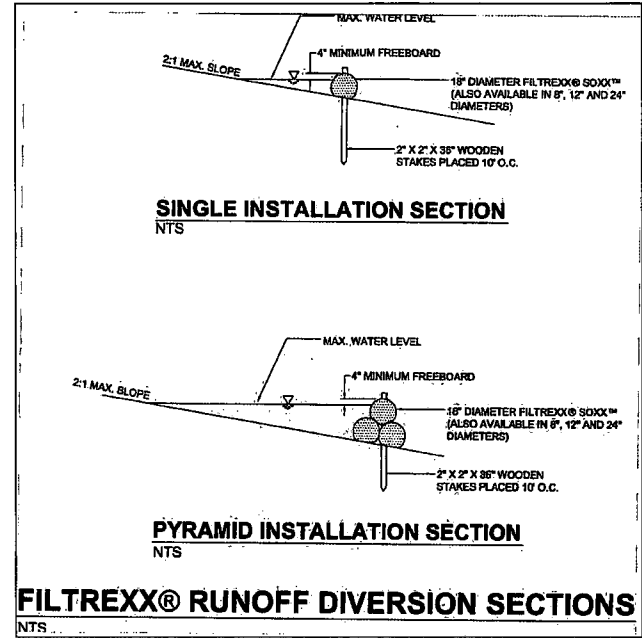
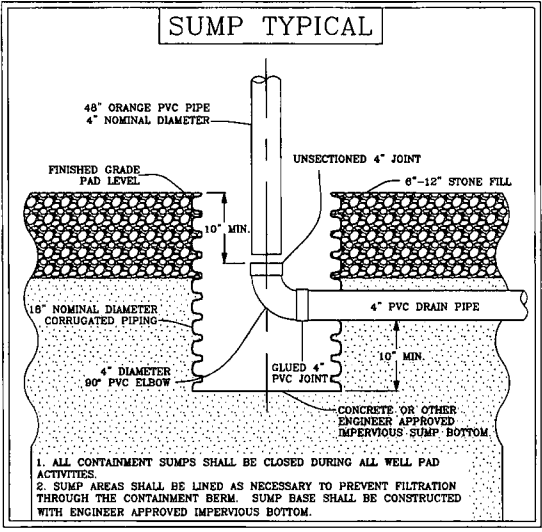
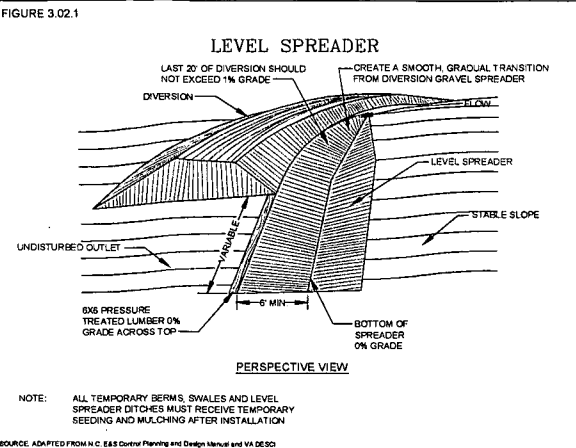
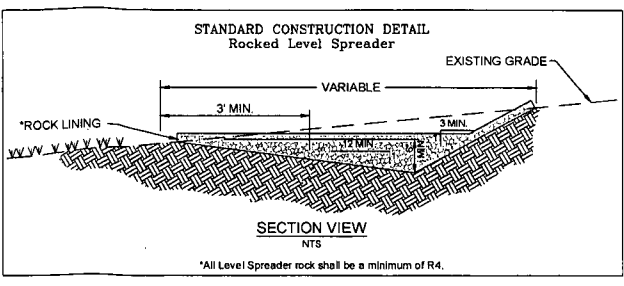
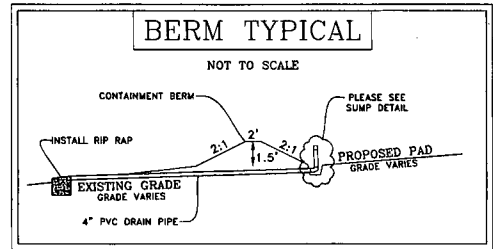
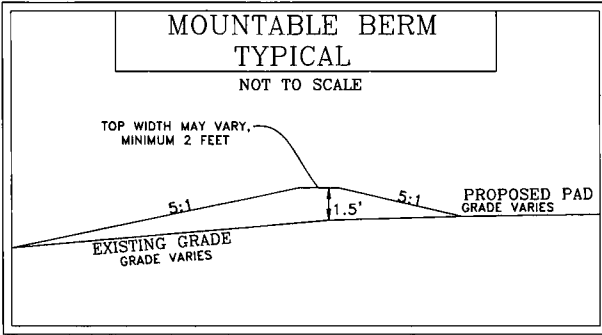
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FILE NO. 7584

SHEET: 13 OF 16

35 FILE

7584 SMI-27 SITE AS-BUILT REV P11 DESIGN



#### Table 4.1

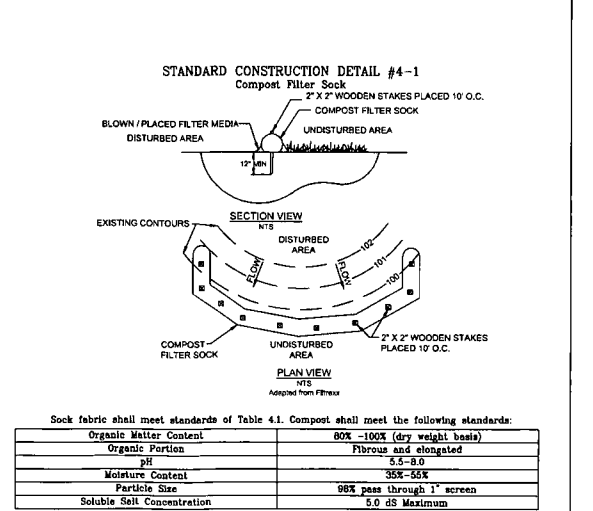
Compost Sock Fabric Minimum Specifications

Material Type	3 mil HDPE	5 mil HDPE	5 mil HDPE	Multi-Filament Polypropylene (MPPF)	Heavy Duty Multi-Filament Polypropylene (HMPPF)
Material Characteristics	Photo-degradable	Photo-degradable	Bio-degradable	Photo-degradable	Photo-degradable
Sock Diameters	12", 18"	18", 24"	18", 24", 32"	12", 18", 24", 32"	12", 18", 24", 32"
Mesh Opening	3/8"	3/8"	3/8"	3/8"	1/8"
Textile Strength	28 psi	28 psi	28 psi	44 psi	202 psi
Ultraviolet Stability % Original Strength (ASTM C-155)	23% at 1000 hr.	23% at 1000 hr.	23% at 1000 hr.	100% at 1000 hr.	100% at 1000 hr.
Minimum Functional Longevity	8 months	9 months	8 months	1 year	2 years

Two-ply systems

Inner Containment Netting	HDPE biaxial net
	Continuously wound Fusion-welded junctures
Outer Filtration Mesh	3/4" x 3/4" Max. aperture size
	Composite Polypropylene Fabric (Woven layer & non-woven fleece mechanically fused via needle punch)
3/16" Max. aperture size	

Sock fabrics composed of burlap may be used on projects lasting 8 months or less.



Soil fabric shall meet standards of Table 4.1. Compost shall meet the following standards:

Organic Matter Content	80% - 100% (dry weight basis)
Organic Portion	Fibrous and elongated
Moisture Content	45-60
Particle Size	35X-55X
Soluble Salt Concentration	98% pass through 1" screen
	5.0 dS Maximum

Compost Filter Sock shall be placed at existing level grade. Both ends of the sock shall be extended at least 8 feet up the slope at 45 degrees to the main sock alignment. Maximum slope length above any sock shall not exceed manufacturer's maximum permissible slope length.

Traffic shall not be permitted to cross filter socks.

Accumulated Sediment shall be removed when it reaches 1/2 the above ground height of the sock and disposed in the manner described elsewhere in the plan.

Socks shall be inspected weekly and after each runoff event. Damaged socks shall be repaired according to manufacturer's specifications or replaced within 24 hours of inspection.

Biodegradable filter socks shall be replaced after 6 months; photodegradable socks after 1 year. Polypropylene socks shall be replaced according to manufacturer's recommendations.

Upon stabilization of the area tributary to the sock, stakes shall be removed. The sock may be left in place and vegetated or removed. In the latter case, the mesh shall be cut open and the mesh spread as a soil supplement.

In the event the ground is frozen, #5 rebar with safety caps shall be used instead of wooden stakes to anchor the filter sock. Once the ground thaws the rebar anchors shall be removed and replaced with 2" x 2" wooden stakes and installed as shown in the detail above.

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PROFESSIONAL SURVEYOR  
NO. 11111  
11/17/14

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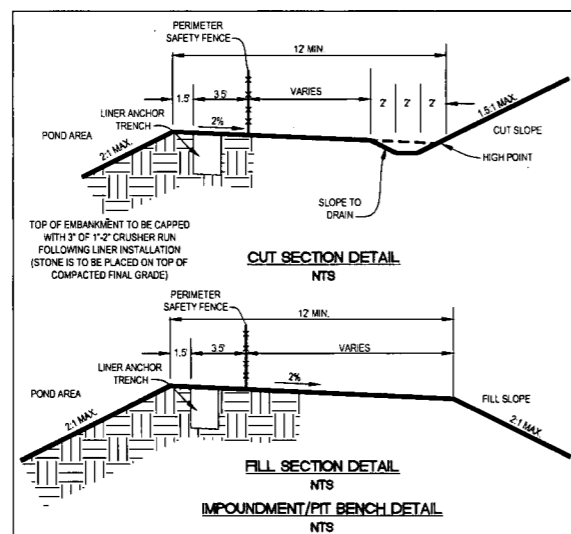
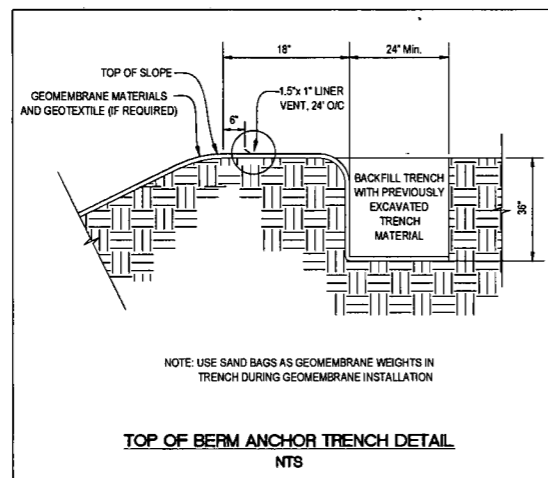
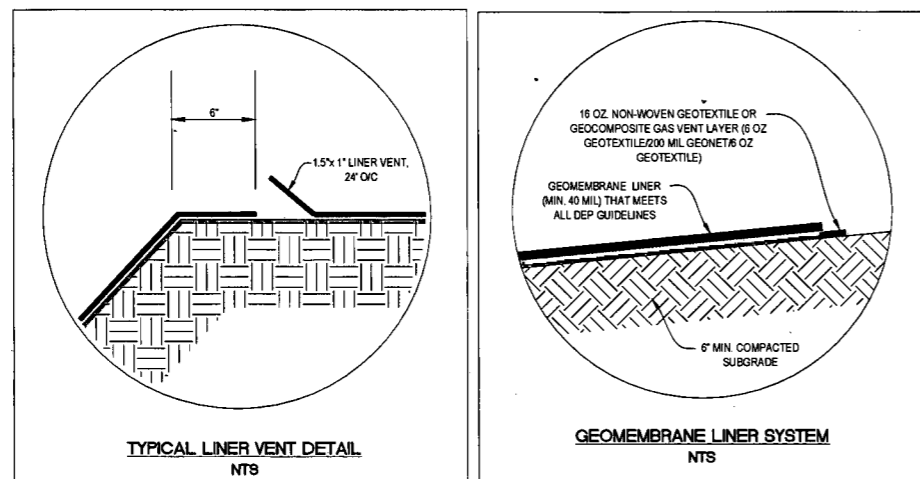
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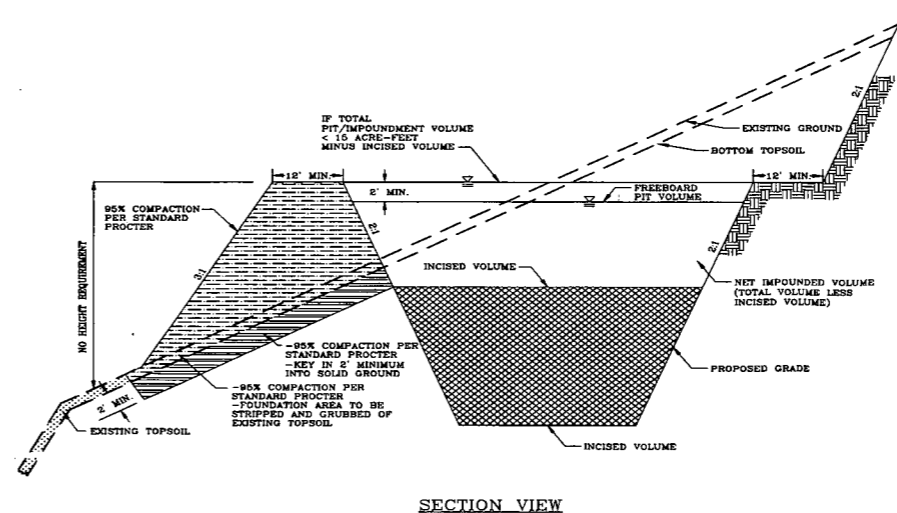
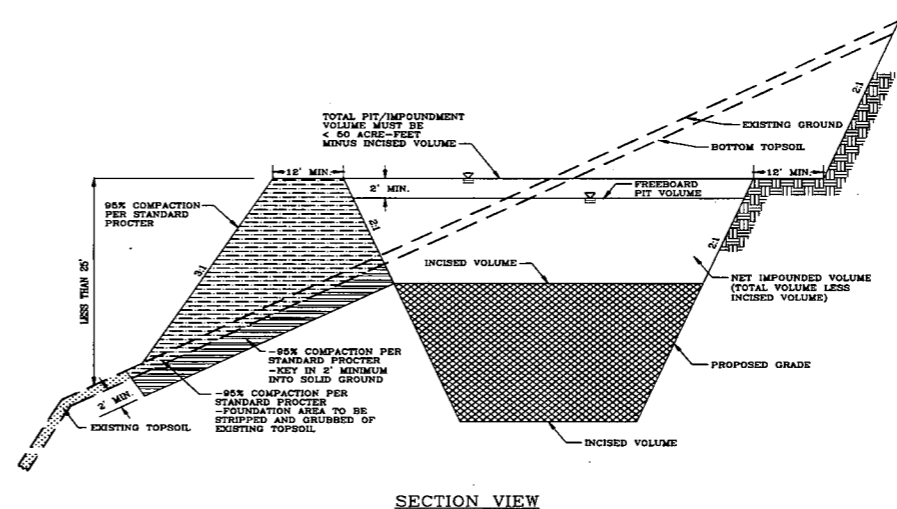
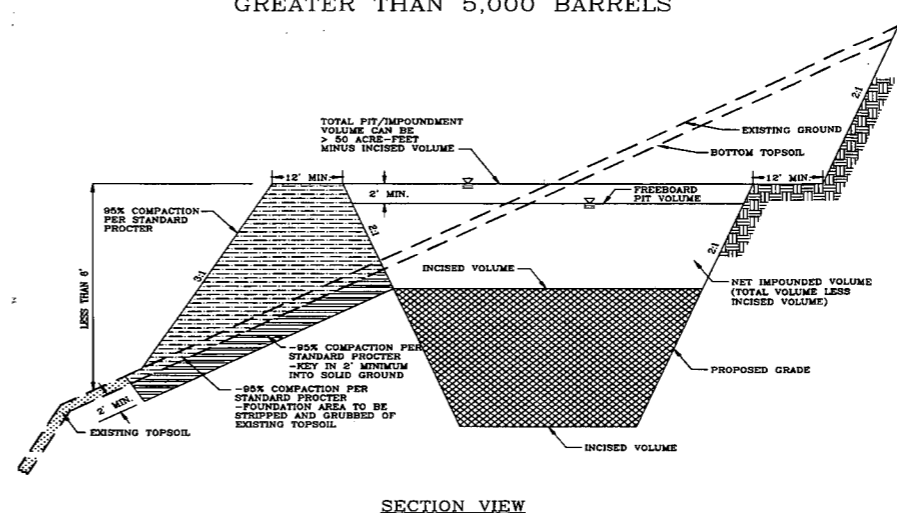
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SHEET: 14 OF 16

95 FILE:  
7564 SMI-27 SITE AS-BUILT REV 01 DESIGN



WEST VIRGINIA CODE 35 CSR 4  
DESIGN AND CONSTRUCTION REQUIREMENTS  
FOR ASSOCIATED PITS, ASSOCIATED IMPOUNDMENTS, &  
CENTRALIZED IMPOUNDMENTS  
GREATER THAN 5,000 BARRELS



NOTES:  
1. ALL FILL SHOULD BE KEYED IN TO ORIGINAL GROUND EVERY 2-5 VERTICAL FEET DEPENDING ON EXISTING GROUND SLOPE  
2. MINIMUM OUTSIDE AND INSIDE EMBANKMENT (FILL) SLOPES SHALL BE 2H:1V. THE INSIDE AND OUTSIDE SLOPES MUST ADD UP TO 5H:1V.

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SHEET: 15 OF 16  
95 REE  
7584 SM-27 SITE AS-BUILT REV PT DESGN

**REVEGETATION**  
Taken from the  
West Virginia Erosion and Sediment Control Field Manual  
West Virginia Division of Environmental Protection Office of Oil and Gas  
Charleston, W.Va.  
Section IV

**Temporary Seeding**

- a. General Conditions Where Practice Applies**  
Where exposed soil surfaces are not to be fine-graded or worked for periods longer than 21 days. Temporary vegetative cover with sediment controls must be established where runoff will go directly into a stream. Immediately upon construction of the site (site includes road and location), vegetation must be established on road bank and location slopes. A permanent vegetative cover shall be applied to areas that will be left un-worked for a period of more than six months.
- b. Seed Mixtures and Planting Dates**  
Refer to Tables 2 through 4 for recommended dates to establish vegetative cover and the approved lists of temporary and permanent plant species, and planting rates. Table 3 gives recommended types of temporary vegetation, rates of application, and optimum seeding dates. In situations where another cover is desired, contact the local soil conservation district for seeding recommendations.
- c. Seed Application**  
Apply seed by broadcasting, drilling, or by hydroseed according to the rates indicates in Table IV-3. Perform all planting operations at right angles to the slope. Necessary site preparation and roughening of the soil surface should be done just prior to seeding. Seedbed preparation may not be required on newly disturbed areas.

**Permanent Seeding**

- a. General**  
Permanent vegetative cover will be established where no further soil disturbance is anticipated or needed. Soil fertility and pH level should be tested and adjusted according to seed species planted. Planting of permanent vegetative covers must be performed on all disturbed areas after completion of the drilling process. Any site that contains significant amounts of topsoil shall have the topsoil removed and stockpiled when feasible. Necessary site preparation and roughening of the soil surface should be done just prior to seeding. Seedbed preparation may not be required on newly disturbed areas.
- b. Lime and Fertilizer**  
1. Lime shall be applied to all permanent seedings. The pH of the soil is to be determined and lime applied accordingly. Once the pH is known, select the amount of lime to be applied from Table IV-5.  
2. Fertilizer shall be applied in all permanent seedings. Apply the equivalent for 500 lbs. minimum 10-20-20 fertilizer per acre or use the amount of fertilizer and lime recommended by a certified soil test.  
3. Application: For best results and maximum benefits, the lime and fertilizer are to be applied at the time of seedbed preparation.

- c. Permanent Seed Mixtures**  
Planners should take into consideration the species makeup of the existing pasture and the landowner's future pasture management plans when recommending seed mixtures. Selection: From Tables IV 4a and b, Permanent Seeding Mixtures Suitable for Establishment in West Virginia.
- Notes:**  
1. All legumes must be planted with the proper inoculants prior to seeding.  
2. *Lathco* Flatpea is potentially poisonous to some livestock.  
3. Only endophyte free varieties of Tall Fescue should be used. Tall Fescue and Crownvetch are also very invasive species, non-native to WV.  
4. For unprepared seedbeds or seeding outside the optimum timeframes, add 50% more seed to the specified rate. Mixtures in Table 4b are more wildlife and farm friendly; those listed in bold are suitable for use in shaded woodland settings. Mixtures in italic are suitable for use in filter strips.

- d. Seeding for Wildlife Habitat**  
Consider the use of the native plants or locally adapted plants when selecting cover types and species for wildlife habitat. Wildlife friendly species or mixes that have multiple values should be considered. See wildlife friendly species/mixtures in Table IV-4b. Consider selecting no or low maintenance long-lived plants adaptable to sites which may be difficult to maintain with equipment.

**Mulching**

- a. General Organic Mulches**  
The application of straw, hay or other suitable materials to the soil surface to prevent erosion. Straw made from wheat or oats is the preferred mulch, the use of hay is permissible, but not encouraged due to the risk of spreading invasive species. Mulch must be applied to all temporary and permanent seeding on all disturbed areas. Depending on site conditions, in critical areas such as waterways or steep slopes, additional or substitute soil protective measures may be used if deemed necessary. Examples include jute mesh and soil stabilization blankets or erosion control matting. Areas that have been temporarily or permanently seeded should be mulched immediately following seeding. Mulches conserve desirable soil properties, reduce soil moisture loss, prevent crusting and sealing of the soil surface and provide a suitable microclimate for seed germination. Areas that cannot be seeded because of the season should be mulched to provide some protection to the soil surface. An organic mulch, straw or hay should be used and the area then seeded as soon as weather or seasonal conditions permit. Do not use fiber mulch (cellulose-hydroseed) alone for this practice; at normal application rates it will not give the soil protection of other types of mulch. Wood cellulose fiber mulch is used in hydroseeding operations and applied as part of the slurry. It creates the best seed-soil contact when applied over the top of (as a separate operation) newly seeded areas. Fiber mulch does not alone provide sufficient protection on highly erodible soils, or during less than favorable growing conditions. Fiber mulch should not be used alone during the dry summer months or when used for late fall mulch cover. Use straw mulch during these periods and fiber mulch may be used to tack (anchor) the straw mulch. Fiber mulch is well suited for steep slopes, critical areas and areas susceptible to wind.

- b. Chemical Mulches, Soil Binders and Tackifiers**  
A wide range of synthetic spray on materials are marketed to stabilize and protect the soil surface. These are mixed with water and sprayed over the mulch and to the soil. They may be used alone in some cases as temporary stabilizers, or in conjunction with fiber mulch, straw or hay. When used alone most chemical mulches do not have the capability to insulate the soil or retain soil moisture that organic mulches have.

- c. Specifications**  
From Table IV-6 select the type of mulch and rate of application that will best suit the conditions at the site.

- d. Anchoring**  
Depending on the field situation, mulch may not stay in place because of wind action or rapid water runoff. In such cases, mulch is to be anchored mechanically or with mulch netting.  
1. Mechanical Anchoring  
Apply mulch and pull mulch anchoring tool over the mulch. When a disk is used set the disk straight and pull across slope. Mulch material should be tugged into the soil about three inches.  
2. Mulch netting  
Follow manufacturer's recommendation when positioning and stapling the mulch netting in the soil.

**Table IV-1  
Recommended Seeding Dates**

Planting Dates	Suitability
March 1 - April 15 and August 1 - October 1	Best Seeding Periods
April 15 - August 1	HIGH RISK - moisture stress likely.
October 1 - December 1	HIGH RISK - freeze damage to young seedlings
December 1 - March 1	Good seeding period. Dormant seeding

**Table 2  
Acceptable Fertilization Recommendation**

Species	N (lbs/ac)	P2O5 (lbs/ac)	Example Rec (per acre)
Cool Season Grass	40	80	400 lbs. 10-20-20
CS Grass & Legume	30	60	300 lbs. 10-20-20
Temporary Cover	40	40	200 lbs. 19-19-19

**Table 3  
Temporary Cover**

Species	Seeding Rate (lbs/acre)	Optimum Seeding Dates	Drainage	pH Range
Annual Ryegrass	40	3/1 - 6/15 or 8/15 - 9/15	Well - Poorly	5.5 - 7.5
Field Bromegrass	40	3/1 - 6/15 or 8/15 - 9/15	Well - Mod. Well	6.0 - 7.0
Spring Oats	96	3/1 - 6/15	Well - Poorly	5.5 - 7.0
Sundagrass	40	5/15 - 8/15	Well - Poorly	5.5 - 7.5
Winter Rye	168	8/15 - 10/15	Well - Poorly	5.5 - 7.5
Winter Wheat	180	8/15 - 11/15	Well - Mod. Well	5.5 - 7.0
Japanese Millet	30	6/15 - 8/15	Well	4.5 - 7.0
Redtop	5	3/1 - 6/15	Well	4.0 - 7.5
Annual Ryegrass	26	3/1 - 6/15	Well - Poorly	5.5 - 7.5
Spring Oats	64	3/1 - 6/15	Well - Poorly	5.5 - 7.5

NOTE: These rates should be increased by 50% if planted April 15 - August 1 and October 1 - March 1.

**Table 4a  
Permanent Seeding Mixture**

Species/Mixture	Seeding Rate (lbs/acre)	Soil Drainage preference	pH Range
Crownvetch / Tall Fescue	10 - 15	Well - Mod. Well	5.0 - 7.5
Crownvetch / Perennial Ryegrass	10 - 15	Well - Mod. Well	5.0 - 7.5
Flatpea or Perennial Pea / Tall Fescue	20 / 15	Well - Mod. Well	4.0 - 8.0
Ladino Clover / Serecia-Lespedeza / Tall Fescue	30 / 25 / 2	Well - Mod. Well	4.5 - 7.5
Tall Fescue / Ladino Clover / Redtop	40 / 3 / 3	Well - Mod. Well	5.0 - 7.5
Crownvetch / Tall Fescue / Redtop	10 / 20 / 3	Well - Mod. Well	5.0 - 7.5
Tall Fescue / Birdsfoot Trefoil / Redtop	40 / 10 / 3	Well - Mod. Well	5.0 - 7.5
Serecia-Lespedeza / Tall Fescue / Redtop	25 / 30 / 3	Well - Mod. Well	4.5 - 7.5
Redtop / Tall Fescue / Creeping Red	30 / 3 / 50	Well - Mod. Well	5.0 - 7.5
Tall Fescue / Perennial Ryegrass / Tall Fescue / Lathco Flatpea *	50 / 10 / 15 / 20	Well - Poorly / Well - Poorly	4.5 - 7.5 / 5.8 - 8.0

\* *Lathco* Flatpea is potentially poisonous to some livestock. All legumes should be planted with proper inoculants prior to seeding. For unprepared seedbeds or seeding outside the optimum timeframe, add 50% more seed to the specified rate. Mixtures listed in bold are suitable for use in shaded woodland settings; those in italics are suitable for use in filter strips.

**Table 4b  
Wildlife and Farm Friendly Seed Mixtures**

Species/Mixture	Seeding Rate (lbs/acre)	Soil Drainage preference	pH Range
KY Bluegrass / Redtop	20 / 3	Well - Mod. Well	5.5 - 7.5
Ladino Clover or Birdsfoot Trefoil	2 / 10		
Timothy / Alfalfa	5 / 12	Well - Mod. Well	6.5 - 8.0
Timothy / Birdsfoot Trefoil	5 / 8	Well - Poorly	5.5 - 7.5
Orchardgrass / Ladino Clover / Redtop	10 / 2 / 3	Well - Mod. Well	5.5 - 7.5
Orchardgrass / Ladino Clover	10 / 2	Well - Mod. Well	5.5 - 7.5
Orchardgrass / Perennial Ryegrass	20 / 10	Well - Mod. Well	5.5 - 7.5
Creeping Red Fescue / Perennial Ryegrass	30 / 10	Well - Mod. Well	5.5 - 7.5
Orchardgrass or KY Bluegrass	20	Well - Mod. Well	6.0 - 7.5
Birdsfoot Trefoil / Redtop / Orchardgrass	10 / 5 / 20	Well - Mod. Well	5.5 - 7.5
<i>Lathco Flatpea</i> * / Perennial Ryegrass	30 / 20	Well - Mod. Well	5.5 - 7.5
<i>Lathco Flatpea</i> * / Orchardgrass	30 / 20	Well - Mod. Well	5.5 - 7.5

\* *Lathco* Flatpea is potentially poisonous to some livestock. All legumes should be planted with proper inoculants prior to seeding. For unprepared seedbeds or seeding outside the optimum timeframe, add 50% more seed to the specified rate. Mixtures listed in bold are suitable for use in shaded woodland settings; those in italics are suitable for use in filter strips.

**Table IV-5  
Lime and Fertilizer Application Table**

pH of Soil	Lime in Tons per Acre	Fertilizer, Lbs. per Acre (10-20-20 or Equivalent)
Above 6.0	2	500
5.0 to 6.0	3	500
Below 5.0	4	500

The pH can be determined with a portable pH testing kit or by sending the soil samples to a soil testing laboratory. When 4 tons of lime per acre are applied it must be incorporated into the soil by disking, backblading or tracking up and down the slope.

**Table IV-6  
Mulch Materials Rates and Uses**

Material	Minimum Rates per acre	Coverage	Remarks
Hay or Straw	2 to 3 Tons	Cover 75% to 90% of Surface	Subject to wind blowing or washing unless tied down
Wood Fiber	100 to 150 bales	Cover all	For hydroseeding
Pulp Fiber	1000 to 1500 lbs.	Disturbed Areas	
Wood - Cellulose			
Recirculated Paper			

Tables IV 1-4 taken from Natural Resources Conservation Service Manual 'Critical Area Planting'

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REGISTERED PROFESSIONAL ENGINEER  
NO. 15176  
11/17/14

**SMI-27 SITE PLAN  
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