ERM NC, Inc.

15720 Brixham Hill Avenue
Suite 120
Charlotte, NC 28277
(704) 541-8345
(704) 624-7928 (fax)

October 16, 2014

NCDENR – Division of Waste Management
Solid Waste Section
1646 Mail Service Center
Raleigh, North Carolina 27699-1646
Attention: Ms. Jackie Drummond – Compliance Hydrogeologist

Via Email

Reference: Groundwater Corrective Action Application
Swift Creek CCB Structural Fill, Battleboro, Nash County
CCB0057

On behalf of Full Circle Solutions Inc. (Full Circle) and ReUse Technology Inc. (ReUse), ERM NC, Inc. (ERM) is submitting a North Carolina Solid Waste Groundwater Corrective Action Application (Attachment A) and associated supporting documents for the Swift Creek Coal Combustion By-Product (CCB) Structural Fill Project site in Battleboro, North Carolina. The application is submitted in response to your Warning Notice dated May 16, 2014 issued to Full Circle and ReUse and your August 21, 2014 approval letter of ERM's request to extend the submittal date to October 16, 2014. The application and supporting documents present the corrective action selected by Full Circle and ReUse for groundwater quality remediation at the referenced site.

Background

Based on previously submitted reports, "On November 11, 1991, ReUse Technology, Inc. submitted a letter to the Solid Waste Management Section seeking approval to use CCBs as structural fill material in the development of 25 acres of commercial property along Highway 301 at Swift Creek. On December 3, 1991, the Solid Waste Section issued a letter to ReUse that stated "Based upon the information received, the project appears to meet the guidelines previously agreed to for such reuse." In September 1992, ReUse began placement of CCBs at the site. In January 2003, the last shipment of CCBs was accepted at the site. According to records of Full Circle Solutions, Inc., a total of approximately 134,000 tons of CCBs were placed at the project. On March 23, 2003, the site had been graded, compacted, covered with an 18 inch soil cap and planted with grass seed. On November 4, 2004, the Closure Notice was forwarded to the Solid Waste Section.

In March 2006, a Comprehensive Site Assessment (CSA) for the Swift Creek Project was submitted to the Solid Waste Section. In December 2006, an Assessment Monitoring Plan was submitted to the Solid Waste Section. On February 22, 2007, the Assessment Monitoring Plan was approved by the Solid Waste Section."

The Assessment Plan included the installation of an underdrain "cutoff" trench along the western boundary of the fill along US Highway 301 in order to lower the local groundwater table to provide a minimum 2-foot vertical separation between coal ash and seasonal high

groundwater elevations. Semi-annual sampling and laboratory analytical testing for eight (8) groundwater monitoring locations and three (3) surface water monitoring locations was also included within the Assessment Plan. The reported results of the groundwater monitoring conducted at the site since 2005 indicated groundwater quality impacts including concentrations of sulfate and lead at levels above the respective North Carolina 2L groundwater standards. The monitoring indicated no impacts to surface water quality adjacent to the facility.

The Division of Waste Management issued a "Warning Notice" to Full Circle Solutions, Inc. and ReUse Technology, Inc. dated May 16, 2014. The notice states that the required groundwater vertical separation between filled CCBs and seasonal high groundwater elevations has not been achieved and exceedances of the North Carolina 2L groundwater standards have been routinely reported. As a result, the project must submit a "Groundwater Corrective Action Application" for approval.

Existing Conditions and Site Visit

ERM NC, Inc. (ERM) visited the Swift Creek Project site on July 24, 2014 to assess the current site conditions (David Wasiela, P.E., Tom Wilson, P.G. and Frans Lowman, P.G.). ERM met with Mr. Paul Oden of Full Circle Solutions, Inc. The following was noted following ERM's site visit:

- Groundwater monitoring wells and piezometers are in place as noted in the Groundwater Assessment Monitoring Reports previously submitted to the Division of Waste Management (some piezometers have been damaged from mowing activities and has been noted in the reports).

- The southernmost cleanout riser pipe for the "cutoff" drain was damaged.

- At the north end of the "cutoff" drain a concrete valve box was observed that serves to discharge collected groundwater from the "cutoff" drain system. Upon removal of the valve box lid, water levels within the valve box were observed to be approximately 2 feet higher than the surrounding swamp water elevation indicating that the "cutoff" drain was not functioning effectively. This condition was addressed and repaired in August 2014, based on information provided by Sherrill Environmental in the Assessment Monitoring Report, June 26-27, 2014 submitted to NCDENR in August 2014.

- Storm water structures were observed along the western border of the fill area between Highway 301 and the fill limits. It could not be determined if the structures were active and pipe outlets could not be located.

- The fill area has a well-established and well maintained stand of vegetation that appears to be mowed on a regular basis.

- Existing grades and elevations over the majority of the project area are relatively flat and therefore poorly drained.

- The site is bordered on three sides (north, east and south) by swamp areas with standing water that will establish and affect local groundwater elevations.

- The CCB fill is a dry storage design which is not subject to potential catastrophic release of CCB material compared to a wet storage design of a CCB pond. The cap and side slopes are well vegetated, minimizing erosion, and precipitation that falls around the perimeter of the CCB fill is diverted around the fill, which also minimizes erosion.

File & Data Review

ERM reviewed files and information made available by others in order to assess current site conditions and to develop conceptual cross sections of the project site. From the existing data, the vertical limits of the CCB fill were established using records of piezometer installation. Existing groundwater elevations were determined based on the most recent Assessment Monitoring Report prepared by Sherrill Environmental, Inc. March 2014. Historic seasonal high water table elevations were determined based on the Assessment Monitoring Report prepared by Sherrill Environmental, Inc. March 2014 including water table elevations from 2005 to 2014.

Based on historic groundwater elevation recordings at the project site, downgradient groundwater elevations are controlled by surrounding swamp areas. The swamp-influenced groundwater elevations are reflected at monitoring wells MW-2, MW-6 and MW-8. Based on historic readings reported at these locations between 2005 and 2013, the seasonal high groundwater table elevation would range from 91.5 to 92.5 ft msl. In order to meet the 2-foot vertical separation criteria between CCBs and seasonal high groundwater table, CCBs could not be lower than approximately 93.5 to 94.5 along the perimeter of the fill area. Based on available information, CCBs are present at elevations below 94.5.

Exceedances of North Carolina 2L Groundwater Standards have been reported at the site. These exceedances are a result of either infiltration of rainfall through the CCB fill area and into the shallow groundwater system or from CCBs in direct contact with groundwater; or a combination of both.

A review of existing groundwater elevation data shows a low hydraulic gradient for the groundwater at the site, which combined with the estimated low hydraulic conductivity characteristics of the CCBs and underlying soils, is anticipated to result in very low groundwater flow velocities. Consequently, contaminant migration rates in groundwater are expected to be relatively low (i.e. on the order of tens of years to migrate from beneath the coal CCB fill to nearby downgradient surface water receptors). The primary downgradient

receptors are the creeks and swampy areas immediately adjacent to the CCB fill. Groundwater quality downgradient of the CCB fill is monitored by existing monitor wells MW-1S, MW-1D, MW-2S, MW-2D, MW-7 and MW-8.

Based on available design information, ERM performed a 10-year leachate generation simulation using the HELP Model developed for the USEPA by the US Army Corp of Engineers. The results of the simulation include an annual average quantity of rainfall infiltration through the CCB fill and into the local shallow groundwater system. Based on the HELP Model results, an average of 2.65 million gallons of rainfall infiltration through CCBs and into the shallow groundwater could be expected.

PROPOSED GROUNDWATER CORRECTIVE ACTION

Based on the site conditions and a preliminary remedial alternatives analysis, the proposed corrective action is Structural Fill Reconstruction with Cap to consolidate the fill footprint within a reduced area underlain by a raised disposal floor elevation and capped with a synthetic linear low density polyethylene (LLDPE) liner. After completion of the fill construction improvements to address source area control, the affected groundwater would be remediated by natural processes. The proposed selected remedy was developed to address two key components:

Establish vertical separation of 2-feet minimum between CCBs and seasonal high groundwater table as established from nine (9) years of routine monitoring.
Improve site drainage and minimize rainfall infiltration into and through the CCB fill footprint.

A description of these technologies along with contingency plans are provided below. Enclosed as Attachment A is the North Carolina Solid Waste Groundwater Corrective Action Application and supporting documents.

Source Area Control

With this proposed remedy, phased construction would be required to remove approximately one half of the fill area footprint, temporarily stockpile CCBs and cover soils, import and place clean fill soils to elevations supporting 2-foot separation from seasonal high groundwater table. Removed CCBs could then be placed back into the original fill footprint on the raised soil floor with an 18-inch soil cover. The second half of the fill area footprint would follow by placing removed CCBs above the newly developed area. The consolidated footprint would be developed with 4H:1V slopes improving site drainage and reducing rainfall infiltration. Additionally, installation of a 40-mil LLDPE liner system with geocomposite drainage layer above would be installed to cap the fill footprint. Finally, 18-inches of protective soil cover would be placed above the liner system and seeded. This proposed remedy would provide for the required vertical separation from groundwater and address the long term infiltration of rainfall through the CCB fill. While doing so, the CCB fill footprint will be consolidated reducing the total fill footprint from 10 acres to approximately 5 – 6 acres. Preliminary plans are enclosed as Attachment B.

The proposed synthetic liner and drainage improvements along with footprint reduction provide source control measures that will significantly reduce or eliminate rainfall infiltration and leachate

generation from the CCB fill. This decrease in leachate generation will reduce further effects to groundwater at the site and will effectively result in a gradual reduction of constituent concentrations in groundwater to levels protective of human health. Improvements to water quality as a result of the synthetic liner installation and drainage modifications will be observed via a network of groundwater monitoring wells and surface water sampling locations.

Intrinsic Remediation with Performance Monitoring

Reduction of rainfall infiltration and leachate generation from the CCB fill via the liner installation and drainage improvements will mitigate the migration of contaminants from the CCB fill and allow natural processes to gradually restore water quality beyond the compliance boundary. Routine groundwater and surface water monitoring will be conducted at the Site to monitor contaminant concentrations and concentration trends over time. The performance monitoring results will be used to evaluate the effectiveness of the source area control remedy for the remediation of the affected groundwater and surface water.

Historically, ground water sampling at the site has been conducted using bailers rather than low-flow sampling techniques which are preferable for groundwater quality assessments for metals. For all future groundwater monitoring events, the use of low-flow sampling techniques is proposed to better evaluate the metals concentrations in groundwater at the site.

As determined by historical monitoring data, the streams, swamps and tributaries near the perimeter of the CCB fill area serve as hydraulic boundaries for groundwater flow and effectively limit the extent of migration of site-related contaminants in groundwater.

PROPOSED CONTINGENCY PLANS

As required in the Groundwater Corrective Action Application, two contingency plans are proposed in the event that source area control with intrinsic remediation is determined to be ineffective. The alternate remedial options will be considered in the event that source area control is ineffective and the performance monitoring results indicate a sustained increase in contaminant concentrations beyond the compliance boundary.

Contingency Plan A – Permeable Reactive Barrier

The first proposed corrective action contingency consists of in-situ groundwater treatment utilizing permeable reactive barrier (PRB) technology. A PRB consists of a zone of reactive material, such as granular iron, installed in the path of a dissolved contaminant plume. As the groundwater flows through the reactive zone, the contaminants come in contact with the reactive medium and are degraded to potentially nontoxic compounds. The PRB would be designed to intercept and treat the impacted groundwater before it exits the site in order to address the exceedances of North Carolina 2L Groundwater Standards.

Existing groundwater monitoring information has demonstrated that arsenic, barium, cadmium, sulfate, lead and mercury are present in groundwater beneath the site at concentrations that exceed the North Carolina 2L Groundwater Standards. Based on the different physical and

chemical characteristics of these contaminants, the conceptual design consists of a multi-phase PRB system comprised of two reactive barrier zones installed in series. Arsenic and mercury impacted groundwater would be treated using a PRB containing the reactive media zero-valent iron (ZVI). Arsenic and mercury removal by ZVI is controlled by adsorption and co-precipitation with iron corrosion products. Cadmium, barium, lead and sulfate impacted groundwater would be treated using a separate PRB containing the reactive media apatite, a group of phosphate minerals. Cadmium, barium, lead and sulfate removal occurs as a result of a Phosphate-Induced Metal Stabilization (PIMS) process as they react with the apatite mineral.

Prior to a full scale implementation, bench-scale testing will be conducted. Bench-scale testing will include submittal of site-generated contaminated soil and groundwater to a treatment laboratory for confirmation testing of the apatite and ZVI materials to determine their general viability in the removal of the contaminants under site-specific groundwater conditions. Different combinations and thicknesses of the reactive media will be utilized to assess the effectiveness of each reactive media under different simulated contact times. Information obtained from the bench-scale tests would be used in the final design of the multi-phase PRB.

The bottom of the entire PRB system would be placed on top of the layer of clayey marine sediments that is present at a depth of approximately 10 feet below ground surface and reportedly serves as a confining layer at the base of the shallow aquifer at the site.

Contingency Plan B – In-Situ Injection Treatment

The second proposed corrective action contingency consists of augmenting the previously constructed PRB system by injecting an apatite and ZVI slurry downgradient of the PRB to provide additional in-situ treatment as a polishing step. Pilot testing of Contingency Plan B would be conducted utilizing a pre-determined injection test area and observation points.

CLOSING

Source area contaminant control and intrinsic remediation with performance monitoring are proposed as effective methods for remediation of water quality at and beyond the compliance boundary at the site. Upon NCDENR approval of the proposed remedial strategy, a detailed Corrective Action Plan (CAP) will be prepared for submittal to NCDENR. The CAP will include additional conceptual design details of the proposed corrective action, contingency plans as well as an updated performance monitoring plan.

Please contact us if you have any questions or require additional information.

Sincerely,

NORTH CAROLINA PROFESSIONAL SEAL 20770 ENGINEER DAVID W. WASIELA

10-16-14

Thomas M Wilson

David W. Wasiela, P.E.
Project Manager

Thomas M. Wilson, P.G.
Principal-in-Charge

Attachments:
A - *North Carolina Solid Waste Groundwater Corrective Action Application & Proclamation Letter*
B – *Preliminary Plans for Selected Remedial Alternatives*

cc: Perrin Dargan – K&L Gates LLP
David Franchina – K&L Gates LLP
Lawrence Gold – Carlton Fields Jorden Burt

Attachment A
North Carolina Solid Waste Groundwater Corrective Action Application & Proclamation Letter

North Carolina Solid Waste Groundwater Corrective Action Application

Groundwater quality at this solid waste management facility is subject to the "Classifications and Water Quality Standards Applicable to the Groundwaters of North Carolina," 15A NCAC 2L.

Due to groundwater exceedances at this solid waste management facility, groundwater corrective action is required to be implemented. First, a selected remedy should be proposed for Solid Waste Section approval. A public meeting is not a requirement for this facility at this time, however, the Solid Waste Section highly recommends conducting a voluntary public meeting and also notifying all adjacent property owners regarding the contamination and the proposed selected remedy. Then once the Solid Waste Section approves a selected remedy for this facility, a Corrective Action Plan (CAP) will be required to be submitted for approval prior to its implementation.

Please complete the North Carolina Solid Waste Groundwater Corrective Action Application and please attach the following:

(1) a signed resolution/proclamation/document adopting the proposed selected remedy;
(2) a site map designating the locations of the groundwater monitoring wells and surface water monitoring locations that will or may be impacted by the proposed selected remedy;
(3) any draft conceptual schematics/figures/plans relating to the proposed selected remedy;
(4) a list and copies of any required registrations, permits, notifications, and approvals;
(5) a copy of the facility's closure letter issued by the Solid Waste Section (if available);
(6) if a public meeting is conducted, a copy of the minutes (if applicable); and
(7) if adjacent property owner notification is conducted, a copy of the notification letter and a copy of the certified receipt.

Please e-mail the completed application in addition to the attachments to the Project Manager or mail to NCDENR-DWM, Solid Waste Section, Compliance Unit, 1646 Mail Service Center, Raleigh, NC 27699-1646. This application and any documents attached to this application are "Public Records" as defined in NC General Statute 132-1. As such, these documents are available for inspection and examination by any person upon request (NC General Statute 132-6).

Please type all information.

I. Site Identification

Permit Number: CB0057

Facility Name: Swift Creek CCB Structural Fill

Facility Physical Address: US Highway 301 North

City: Battleboro, NC

ZIP Code: 27809

County: Nash

Waste Type: Coal Combustion Byproducts

II. Owner and Operator Information

Owner

Name: Full Circle Solutions, Inc.

Address: 665 Molly Lane, Suite 100, Woodstock, Georgia 30189

Phone Number: (706) 253-1051

E-mail Address: bwaldrop@fcsi.biz

III. Groundwater Corrective Action

Proposed Selected Remedy: Structural Fill Reconstruction with Cap

Proposed Contingency Plan A: Permeable Reactive Barrier

Proposed Contingency Plan B: In-Situ Injection Treatment

IV. Project Schedule (Upon Division Approval)

Approximate Date of Implementation of Remedy: 3 months following Division approval

Approximate Date of Remedy Construction Completion (if applicable): 9 months following approval

Approximate Date of Submittal of the Corrective Action Evaluation Report (CAER): 5 years

V. Environmental Consultant

Consulting Company Firm: ERM NC, Inc.

Contact Person: David W. Wasiela, P.E.

Address: 15720 Brixham Hill Avenue, Suite 120, Charlotte, NC 28277

Phone Number: (704) 541-8345

E-mail Address: dave.wasiela@erm.com

VI. Signatures

To the best of my knowledge, the information reported and statements made in this North Carolina Solid Waste Groundwater Corrective Action Application are true and correct. I am aware that there are significant penalties for making any false statement, representation, or certification including the possibility of fine and imprisonment.

Robert J. Waldrop with express permission on file — 10-16-14

Owner — Date

Owner Name (Printed or Typed): Robert J. Waldrop - President - Full Circle Solutions, Inc.

Owner — Date

Owner Name (Printed or Typed):

10/16/14

NC Professional Geologist or NC Professional Engineer — Date

Name (Printed or Typed): David W. Wasiela, P.E.

Affix NC Professional Geologist or Engineer Seal:

NORTH CAROLINA PROFESSIONAL SEAL 28710 ENGINEER DAVID W. WASIELA

10-16-14

October 16, 2014

NCDENR - Division of Waste Management
Solid Waste Section
1646 Mail Service Center
Raleigh, North Carolina 27699-1646
Attention: Ms. Jackie Drummond - Compliance Hydrogeologist
Via Email

Subject: Adoption of Selected Remedy
Groundwater Corrective Action Application
Swift Creek CCB Structural Fill
Battleboro, North Carolina

Dear Ms. Drummond:

Full Circle Solutions, Inc., owner of the referenced site, is submitting the enclosed *North Carolina Solid Waste .0500 Groundwater Corrective Action Application* and associated supporting documents. The revised application is submitted in response to your May 16, 2014 Warning Letter and your August 21, 2014 approval letter of ERM's request to extend the submittal date to October 16, 2014. The application and supporting documents present the corrective action selected for groundwater and surface water quality remediation at the referenced site.

The selected remedy includes source area contaminant control and intrinsic remediation with performance monitoring as remedial technologies for restoration of water quality at and beyond the compliance boundary at the site. Details regarding these remedial technologies along with the required contingency alternatives are provided in the enclosed summary letter by ERM.

If you should have any questions or require additional information concerning this letter, please contact the undersigned.

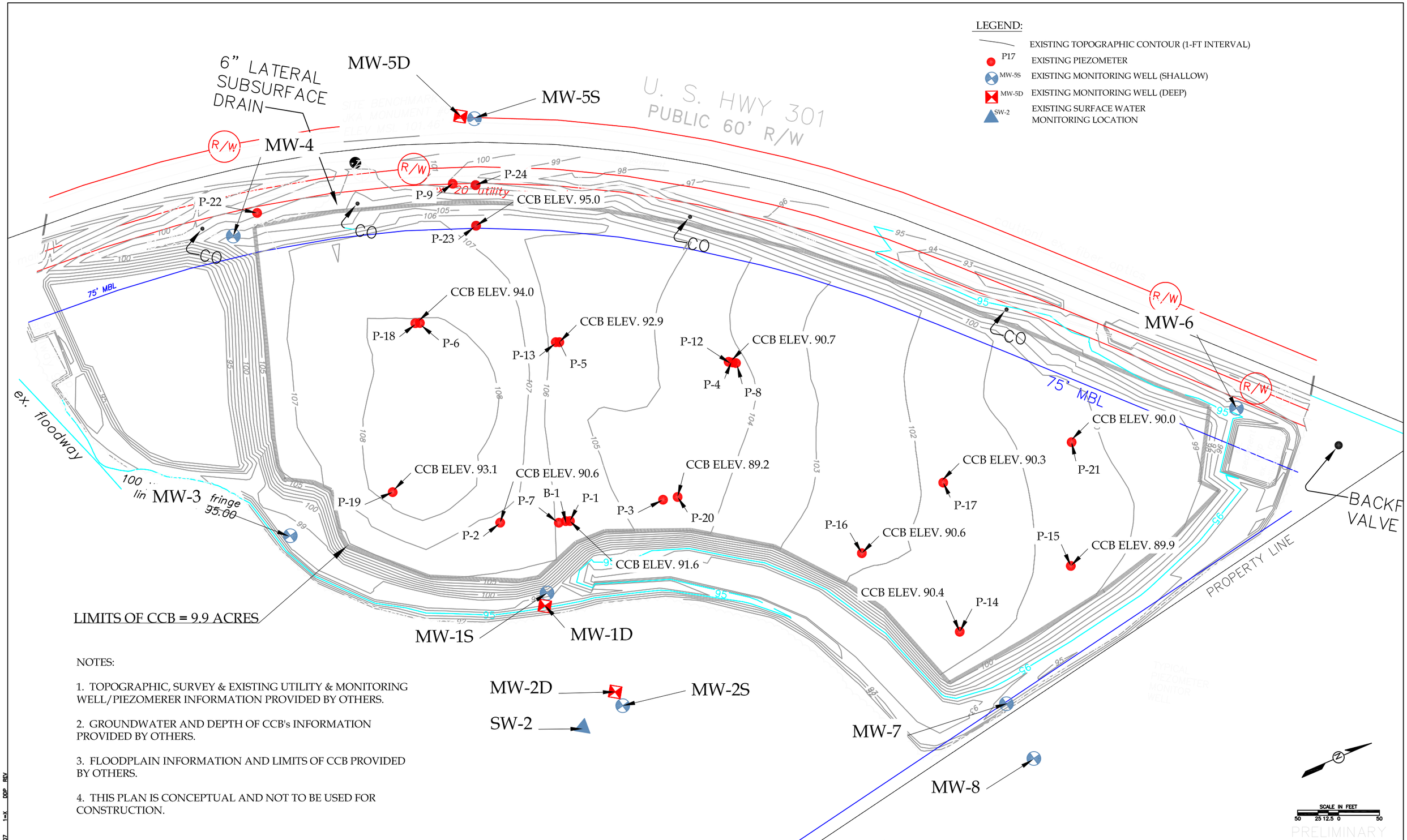
Sincerely,

Robert J. Waldrop
with express permission engaged
Robert J. Waldrop
President

Attachments:
Groundwater Corrective Action Application Package (ERM)

cc: David W. Wasiela, P.E. - ERM

Attachment B
Preliminary Plans for Selected Remedial Alternatives



NOTES:

1. TOPOGRAPHIC, SURVEY & EXISTING UTILITY & MONITORING WELL/PIEZOMERER INFORMATION PROVIDED BY OTHERS.

2. GROUNDWATER AND DEPTH OF CCB's INFORMATION PROVIDED BY OTHERS.

3. FLOODPLAIN INFORMATION AND LIMITS OF CCB PROVIDED BY OTHERS.

4. THIS PLAN IS CONCEPTUAL AND NOT TO BE USED FOR CONSTRUCTION.

NO.	DATE	APPR.	REVISION	NO.	DATE	APPR.	REVISION

SWIFT CREEK PROJECT

BATTLEBORO, NORTH CAROLINA

DRAWN BY DWW
DESIGN ENGINEER DWW
PROJECT ENGINEER DWW
PROJECT MANAGER DWW

LICENSE #F-1223
ERM NC, INC.
15720 BRIXHAM HILL AVENUE, SUITE 120
CHARLOTTE, NORTH CAROLINA 28277
(704) 541-8345

NOT FOR CONST-RUCTION

EXISTING SITE CONDITIONS

SCALE 1"=50'
DATE SEPTEMBER 16, 2014
PROJECT NO.
AutoCAD 2007 EXISTING SITE CONDITIONS.DWG

DRAWING NO. 1
REV. NO.
SHEET 1 OF 5

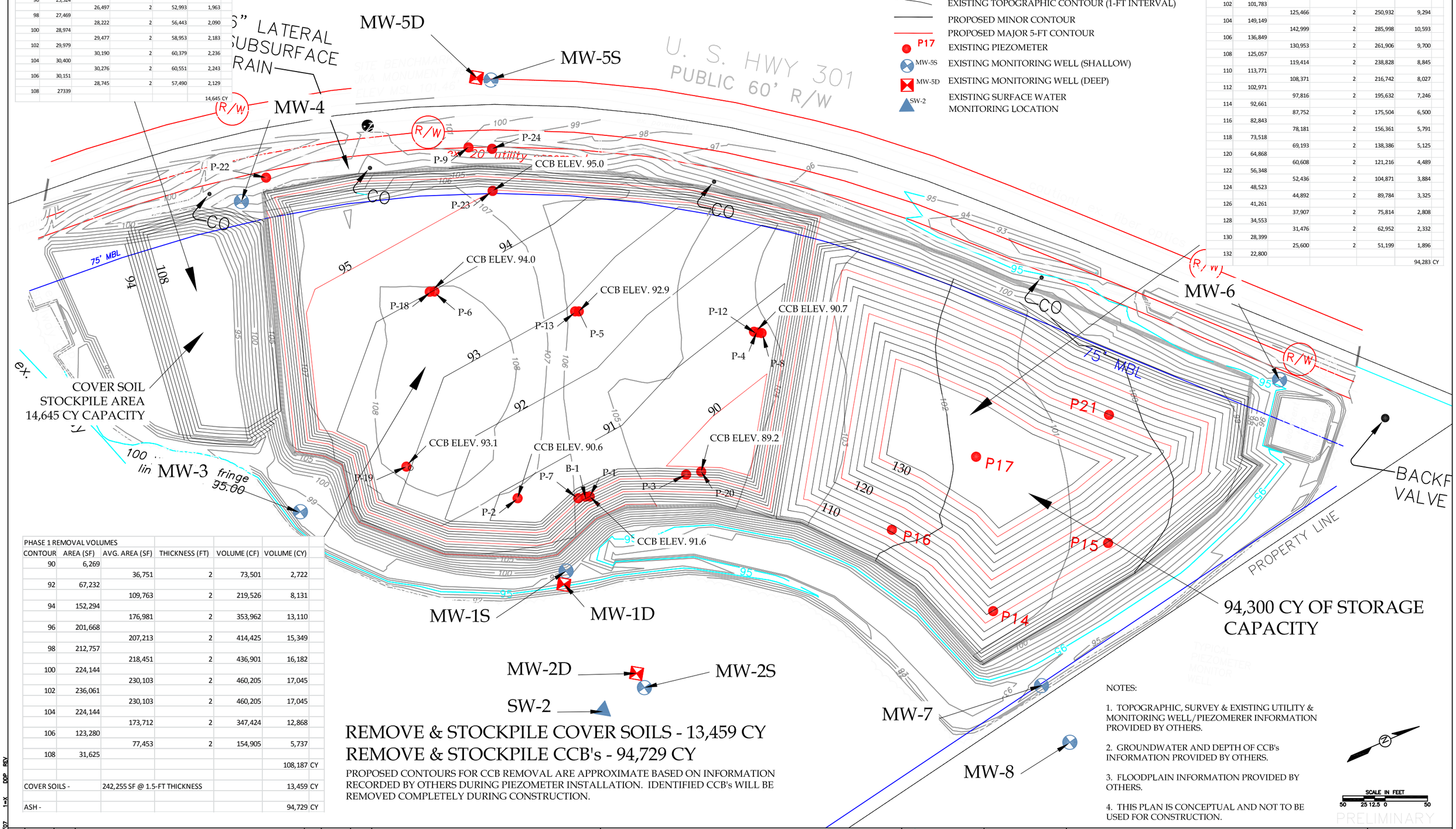
PROJ_NUM_SITE.DWG MM/DD/07 1=X DDP REV

PHASE 1 COVER SOIL STOCKPILE					
CONTOUR	AREA (SF)	AVG. AREA (SF)	THICKNESS (FT)	VOLUME (CF)	VOLUME (CY)
94	23,086				
		24,305	2	48,610	1,800
96	25,524				
		26,497	2	52,993	1,963
98	27,469				
		28,222	2	56,443	2,090
100	28,974				
		29,477	2	58,953	2,183
102	29,979				
		30,190	2	60,379	2,236
104	30,400				
		30,276	2	60,551	2,243
106	30,151				
		28,745	2	57,490	2,129
108	27339				
					14,645 CY

PHASE 1 STORAGE CAPACITY					
CONTOUR	AREA (SF)	AVG. AREA (SF)	THICKNESS (FT)	VOLUME (CF)	VOLUME (CY)
100	17,728				
		59,756	2	119,511	4,426
102	101,783				
		125,466	2	250,932	9,294
104	149,149				
		142,999	2	285,998	10,593
106	136,849				
		130,953	2	261,906	9,700
108	125,057				
		119,414	2	238,828	8,845
110	113,771				
		108,371	2	216,742	8,027
112	102,971				
		97,816	2	195,632	7,246
114	92,661				
		87,752	2	175,504	6,500
116	82,843				
		78,181	2	156,361	5,791
118	73,518				
		69,193	2	138,386	5,125
120	64,868				
		60,608	2	121,216	4,489
122	56,348				
		52,436	2	104,871	3,884
124	48,523				
		44,892	2	89,784	3,325
126	41,261				
		37,907	2	75,814	2,808
128	34,553				
		31,476	2	62,952	2,332
130	28,399				
		25,600	2	51,199	1,896
132	22,800				
					94,283 CY

LEGEND:

- EXISTING TOPOGRAPHIC CONTOUR (1-FT INTERVAL)
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR 5-FT CONTOUR
- P17 EXISTING PIEZOMETER
- MW-5S EXISTING MONITORING WELL (SHALLOW)
- MW-5D EXISTING MONITORING WELL (DEEP)
- SW-2 EXISTING SURFACE WATER MONITORING LOCATION



PHASE 1 REMOVAL VOLUMES						
CONTOUR	AREA (SF)	AVG. AREA (SF)	THICKNESS (FT)	VOLUME (CF)	VOLUME (CY)	
90	6,269					
		36,751	2	73,501	2,722	
92	67,232					
		109,763	2	219,526	8,131	
94	152,294					
		176,981	2	353,962	13,110	
96	201,668					
		207,213	2	414,425	15,349	
98	212,757					
		218,451	2	436,901	16,182	
100	224,144					
		230,103	2	460,205	17,045	
102	236,061					
		230,103	2	460,205	17,045	
104	224,144					
		173,712	2	347,424	12,868	
106	123,280					
		77,453	2	154,905	5,737	
108	31,625					
					108,187	CY
COVER SOILS -		242,255 SF @ 1.5-FT THICKNESS			13,459	CY
ASH -					94,729	CY

REMOVE & STOCKPILE COVER SOILS - 13,459 CY

REMOVE & STOCKPILE CCB's - 94,729 CY

PROPOSED CONTOURS FOR CCB REMOVAL ARE APPROXIMATE BASED ON INFORMATION RECORDED BY OTHERS DURING PIEZOMETER INSTALLATION. IDENTIFIED CCB's WILL BE REMOVED COMPLETELY DURING CONSTRUCTION.

NOTES:

1. TOPOGRAPHIC, SURVEY & EXISTING UTILITY & MONITORING WELL/PIEZOMERER INFORMATION PROVIDED BY OTHERS.
2. GROUNDWATER AND DEPTH OF CCB's INFORMATION PROVIDED BY OTHERS.
3. FLOODPLAIN INFORMATION PROVIDED BY OTHERS.
4. THIS PLAN IS CONCEPTUAL AND NOT TO BE USED FOR CONSTRUCTION.

SCALE IN FEET
50 25 12.5 0 50

PRELIMINARY

NO.	DATE	APPR.	REVISION	NO.	DATE	APPR.	REVISION

SWIFT CREEK PROJECT

BATTLEBORO, NORTH CAROLINA

DRAWN BY DWW
DESIGN ENGINEER DWW
PROJECT ENGINEER DWW
PROJECT MANAGER DWW

LICENSE #F-1223
ERM NC, INC.
15720 BRIXHAM HILL AVENUE, SUITE 120
CHARLOTTE, NORTH CAROLINA 28277
(704) 541-8345

NOT FOR CONST-RUCTION

PHASE 1 SOUTHERN CCB REMOVAL

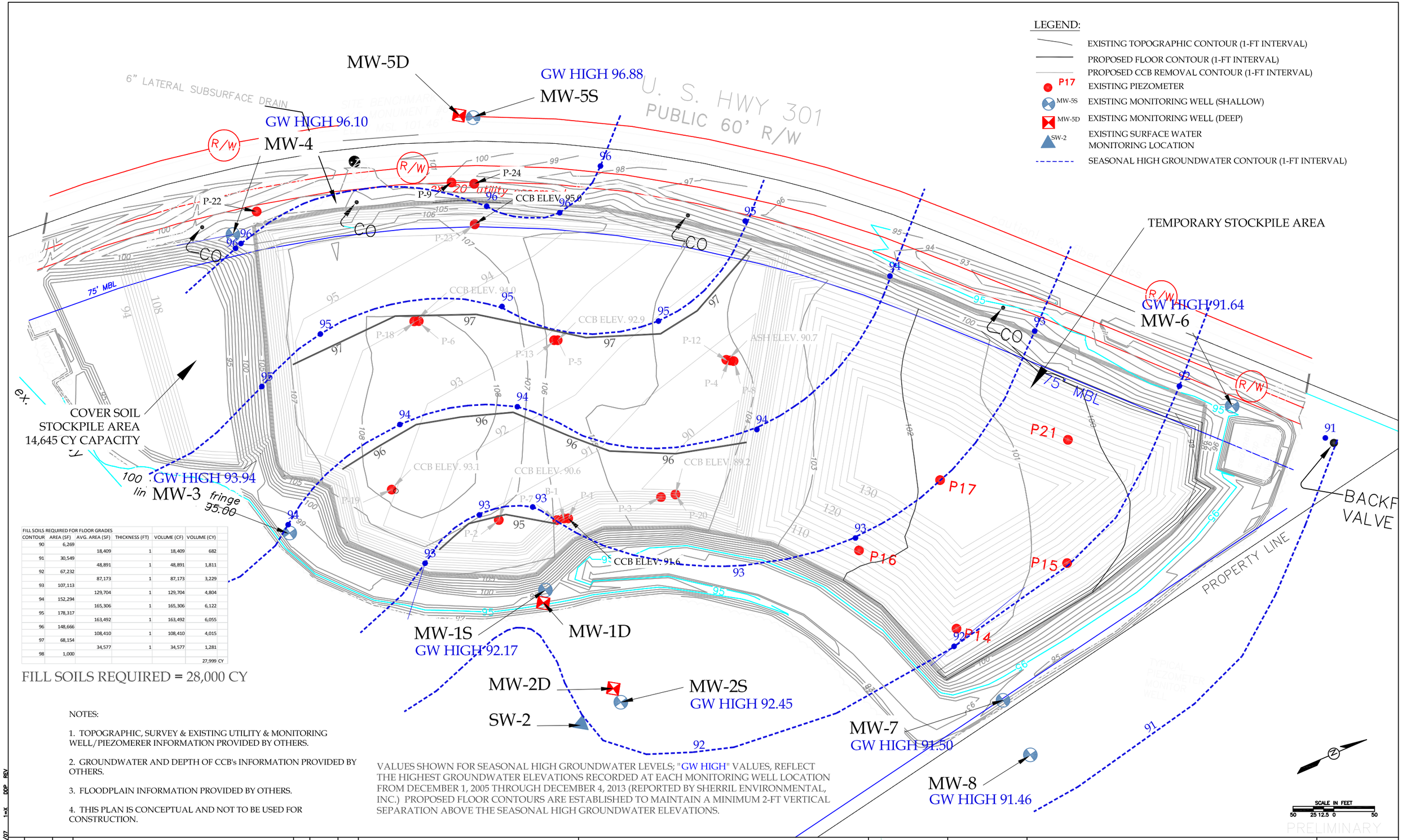
SCALE 1"=50'
DATE SEPTEMBER 16, 2014
PROJECT NO.
AutoCAD 2002 PHASE 1 REMOVAL & STOCKPILE.DWG

DRAWING NO. 2
REV. NO.
SHEET 2 OF 5

PROJ_NUM_SITE.DWG MM/DD/07 1=X DDP REV

LEGEND:

- EXISTING TOPOGRAPHIC CONTOUR (1-FT INTERVAL)
- PROPOSED FLOOR CONTOUR (1-FT INTERVAL)
- PROPOSED CCB REMOVAL CONTOUR (1-FT INTERVAL)
- P17 EXISTING PIEZOMETER
- MW-5S EXISTING MONITORING WELL (SHALLOW)
- MW-5D EXISTING MONITORING WELL (DEEP)
- SW-2 EXISTING SURFACE WATER MONITORING LOCATION
- SEASONAL HIGH GROUNDWATER CONTOUR (1-FT INTERVAL)



FILL SOILS REQUIRED FOR FLOOR GRADES					
CONTOUR	AREA (SF)	AVG. AREA (SF)	THICKNESS (FT)	VOLUME (CF)	VOLUME (CY)
90	6,269				
		18,409	1	18,409	682
91	30,549				
		48,891	1	48,891	1,811
92	67,232				
		87,173	1	87,173	3,229
93	107,113				
		129,704	1	129,704	4,804
94	152,294				
		165,306	1	165,306	6,122
95	178,317				
		163,492	1	163,492	6,055
96	148,666				
		108,410	1	108,410	4,015
97	68,154				
		34,577	1	34,577	1,281
98	1,000				
					27,999 CY

FILL SOILS REQUIRED = 28,000 CY

NOTES:

1. TOPOGRAPHIC, SURVEY & EXISTING UTILITY & MONITORING WELL/PIEZOMERER INFORMATION PROVIDED BY OTHERS.

2. GROUNDWATER AND DEPTH OF CCB's INFORMATION PROVIDED BY OTHERS.

3. FLOODPLAIN INFORMATION PROVIDED BY OTHERS.

4. THIS PLAN IS CONCEPTUAL AND NOT TO BE USED FOR CONSTRUCTION.

VALUES SHOWN FOR SEASONAL HIGH GROUNDWATER LEVELS; "GW HIGH" VALUES, REFLECT THE HIGHEST GROUNDWATER ELEVATIONS RECORDED AT EACH MONITORING WELL LOCATION FROM DECEMBER 1, 2005 THROUGH DECEMBER 4, 2013 (REPORTED BY SHERRIL ENVIRONMENTAL, INC.) PROPOSED FLOOR CONTOURS ARE ESTABLISHED TO MAINTAIN A MINIMUM 2-FT VERTICAL SEPARATION ABOVE THE SEASONAL HIGH GROUNDWATER ELEVATIONS.

NO.	DATE	APPR.	REVISION	NO.	DATE	APPR.	REVISION

SWIFT CREEK PROJECT

BATTLEBORO, NORTH CAROLINA

DRAWN BY DWW
DESIGN ENGINEER DWW
PROJECT ENGINEER DWW
PROJECT MANAGER DWW

ERM NC, INC.
LICENSE #F-1223
15720 BRIXHAM HILL AVENUE, SUITE 120
CHARLOTTE, NORTH CAROLINA 28277
(704) 541-8345

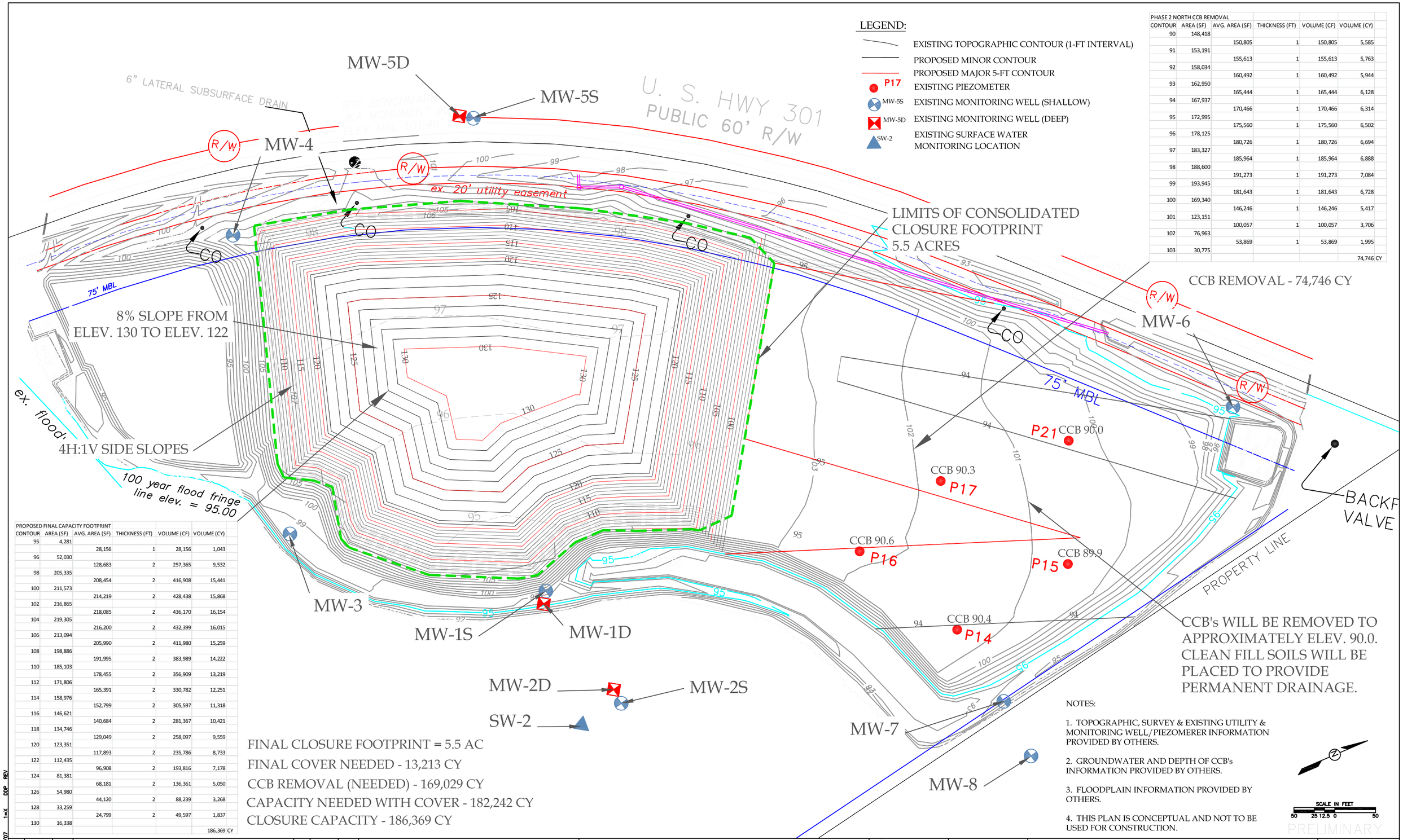
NOT FOR CONST-RUCTION

PROPOSED PHASE 1 FLOOR GRADES

SCALE 1"=50'
DATE SEPTEMBER 16, 2014
PROJECT NO.
AutoCAD 2002 PHASE 1 SOUTH FLOOR RAISING.DWG

DRAWING NO. 3
REV. NO.
SHEET 3 OF 5

PROJ_NUM_SITE.DWG MM/DD/07 1=X DDP REV



LEGEND:

- EXISTING TOPOGRAPHIC CONTOUR (1-FT INTERVAL)
- PROPOSED MINOR CONTOUR
- PROPOSED MAJOR 5-FT CONTOUR
- P17 EXISTING PIEZOMETER
- MW-5S EXISTING MONITORING WELL (SHALLOW)
- MW-5D EXISTING MONITORING WELL (DEEP)
- SW-2 EXISTING SURFACE WATER MONITORING LOCATION

PHASE 2 NORTH CCB REMOVAL

CONTOUR	AREA (SF)	AVG. AREA (SF)	THICKNESS (FT)	VOLUME (CF)	VOLUME (CY)
90	148,418				
		150,805	1	150,805	5,585
91	153,191				
		155,613	1	155,613	5,763
92	158,034				
		160,492	1	160,492	5,944
93	162,950				
		165,444	1	165,444	6,128
94	167,937				
		170,466	1	170,466	6,314
95	172,995				
		175,560	1	175,560	6,502
96	178,125				
		180,726	1	180,726	6,694
97	183,327				
		185,964	1	185,964	6,888
98	188,600				
		191,273	1	191,273	7,084
99	193,945				
		181,643	1	181,643	6,728
100	169,340				
		146,246	1	146,246	5,417
101	123,151				
		100,057	1	100,057	3,706
102	76,963				
		53,869	1	53,869	1,995
103	30,775				
					74,746 CY

PROPOSED FINAL CAPACITY FOOTPRINT

CONTOUR	AREA (SF)	AVG. AREA (SF)	THICKNESS (FT)	VOLUME (CF)	VOLUME (CY)
95	4,281				
		28,156	1	28,156	1,043
96	52,030				
		128,683	2	257,365	9,532
98	205,335				
		208,454	2	416,908	15,441
100	211,573				
		214,219	2	428,438	15,868
102	216,865				
		218,085	2	436,170	16,154
104	219,305				
		216,200	2	432,399	16,015
106	213,094				
		205,990	2	411,980	15,259
108	198,886				
		191,995	2	383,989	14,222
110	185,103				
		178,455	2	356,909	13,219
112	171,806				
		165,391	2	330,782	12,251
114	158,976				
		152,799	2	305,597	11,318
116	146,621				
		140,684	2	281,367	10,421
118	134,746				
		129,049	2	258,097	9,559
120	123,351				
		117,893	2	235,786	8,733
122	112,435				
		96,908	2	193,816	7,178
124	81,381				
		68,181	2	136,361	5,050
126	54,980				
		44,120	2	88,239	3,268
128	33,259				
		24,799	2	49,597	1,837
130	16,338				
					186,369 CY

FINAL CLOSURE FOOTPRINT = 5.5 AC
FINAL COVER NEEDED - 13,213 CY
CCB REMOVAL (NEEDED) - 169,029 CY
CAPACITY NEEDED WITH COVER - 182,242 CY
CLOSURE CAPACITY - 186,369 CY

NOTES:

1. TOPOGRAPHIC, SURVEY & EXISTING UTILITY & MONITORING WELL/PIEZOMERER INFORMATION PROVIDED BY OTHERS.

2. GROUNDWATER AND DEPTH OF CCB's INFORMATION PROVIDED BY OTHERS.

3. FLOODPLAIN INFORMATION PROVIDED BY OTHERS.

4. THIS PLAN IS CONCEPTUAL AND NOT TO BE USED FOR CONSTRUCTION.

SCALE IN FEET
50 25 12.5 0 50

PRELIMINARY

NO.	DATE	APPR.	REVISION	NO.	DATE	APPR.	REVISION

SWIFT CREEK PROJECT

BATTLEBORO, NORTH CAROLINA

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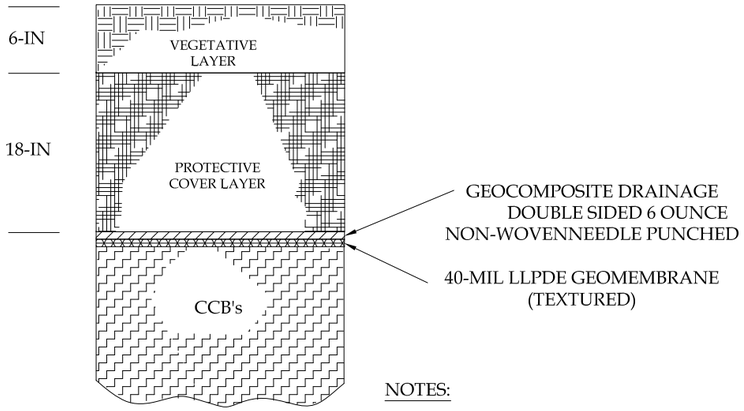
PROPOSED FINAL GRADES

SCALE 1"=50'
DATE SEPTEMBER 16, 2014
PROJECT NO.
AutoCAD 2007 PROPOSED FINAL GRADES.DWG

DRAWING NO. 4
REV. NO.
SHEET 4 OF 5

MM/DD/07 1=X DOP REV
PROJ_NUM_SITE.DWG

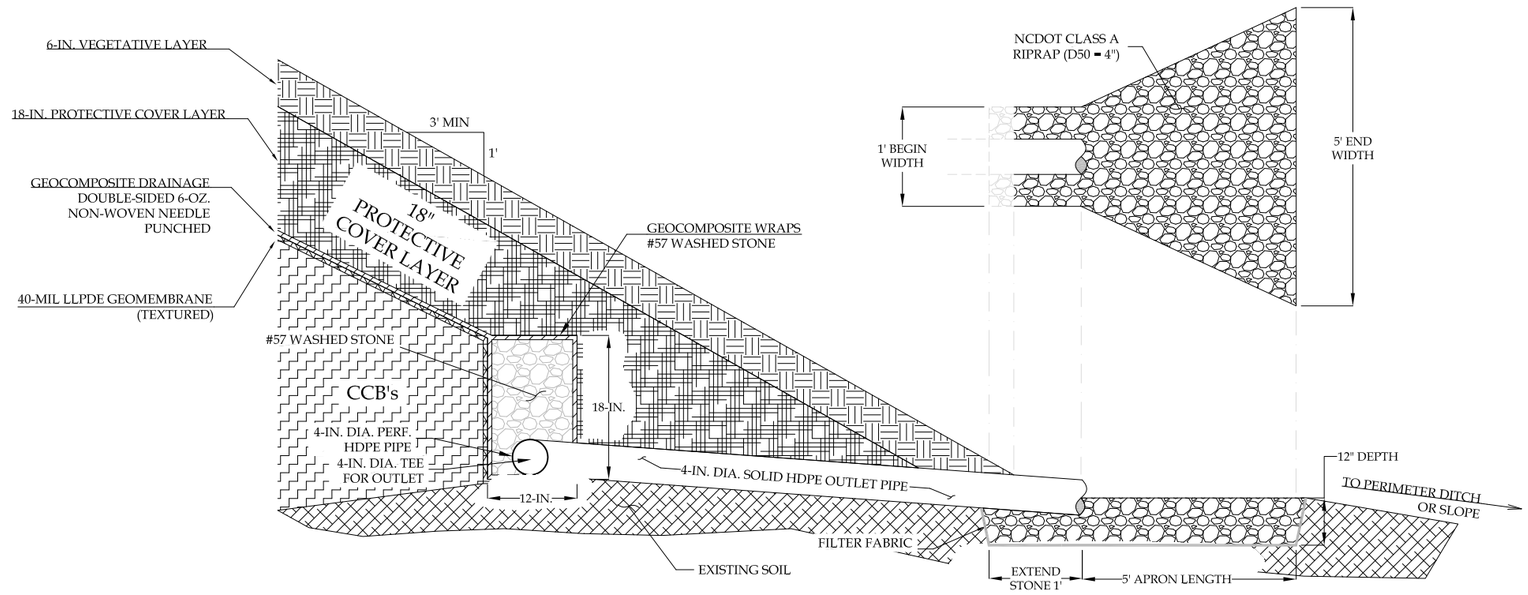


NOTES:

VEGETATIVE & PROTECTIVE SOIL LAYER ARE TAKEN FROM EXISTING FINAL COVER CURRENTLY IN PLACE.

SOILS WILL BE TEMPORARILY STOCKPILED AS THE LINER SECTION IS INSTALLED FOR FUTURE USE.

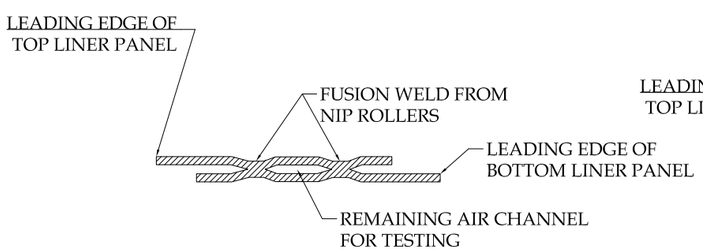
FINAL COVER SYSTEM DETAIL



NOTES:

1. THE GRADE SHALL BE ZERO FOR THE LENGTH OF THE APRON.

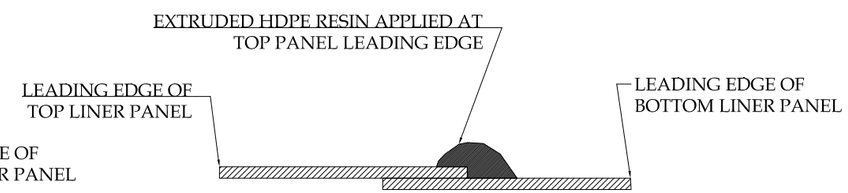
ANCHOR TRENCH AND DRAIN OUTLET DETAIL



LLDPE DOUBLE HOT WEDGE FUSION WELD DETAIL

NOTES:

1. LEADING EDGES ARE OVERLAPPED A MINIMUM OF 6 INCHES PRIOR TO WELDING.
2. LLDPE SURFACES SHALL BE CLEANED FREE OF DEBRIS AND SOIL PRIOR TO WELDING.

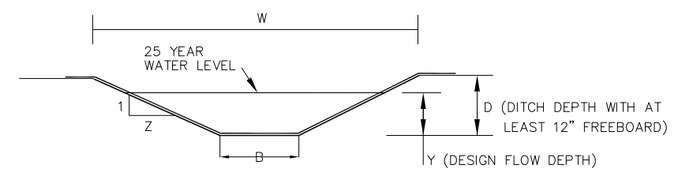


NOTE: LEADING EDGES ARE OVERLAPPED A MINIMUM OF 3 INCHES PRIOR TO WELDING.

LLDPE EXTRUSION WELD DETAIL

NOTES:

1. LEADING EDGES ARE OVERLAPPED A MINIMUM OF 6 INCHES PRIOR TO WELDING.
2. LLDPE SURFACES SHALL BE CLEANED FREE OF DEBRIS AND SOIL PRIOR TO WELDING.
3. GRINDING OF LLDPE SURFACES SHALL BE PERFORMED IN AREAS RECEIVING EXTRUDATE PRIOR TO WELDING TO SUPPLY AN ABRASIVE SURFACE. GRINDING BEYOND THE AREA RECEIVING EXTRUDATE IS NOT ALLOWED.



DITCH NO.	C	I	A(AC.)	Q_{25}(CFS)	S(MIN.)(ft./ft.)	Z	D	B	W	Y	V(FPS)	Q_{25}PROV. FULL FLOW (CFS)	COMMENTS
TYPICAL	0.23	5.11	3.24	3.8	0.138	2	1.5	4	10	0.35	2.36	3.9	TEMP LINER STRAW W/ NET

DITCH CROSS-SECTION DETAIL

THIS DETAIL ILLUSTRATES A TYPICAL STORM WATER DITCH FOR CCB FILL APPLICATIONS. STORM WATER DITCHES WILL BE DESIGNED BASED ON DRAINAGE AREAS AND THE 25-YR, 24-HR STORM EVENT FOR THE ROCKY MOUNT, NC AREA.

NO.	DATE	APPR.	REVISION	NO.	DATE	APPR.	REVISION

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LANDFILL FINAL CAP DETAILS

SCALE NOT TO SCALE	DATE SEPTEMBER 16, 2014
PROJECT NO.	AutoCAD 2002 LANDFILL CAP DETAILS.DWG

DRAWING NO. 5

REV. NO. 0

SHEET 5 OF 5