McGill ASSOCIATES

July 24, 2012

Fac/Perm/Co ID #	Date	Doc ID#
44-03	8,9,12	17014

Mr. Allen Gaither
Regional Engineer
Solid Waste Permitting Section
Division of Waste Management
North Carolina Department of Environment and Natural Resources
2090 U.S. Highway 70
Swannanoa, North Carolina 28778

RE: Construction Quality Assurance Certification Report – Landfill Gas Collection and Combustion System
Francis Farm Landfill Permit # 44-03
Haywood County, North Carolina

Dear Mr. Gaither:

On behalf of Haywood County, McGill Associates is pleased to submit the following Construction Quality Assurance Certification Report for the construction of the Landfill Gas Collection and Combustion System at the Francis Farm Landfill, Permit #44-03, Haywood County, North Carolina. The certification is for the work associated with the installation of the landfill gas collection system and associated appurtenances, the skid mounted landfill gas flare system, the landfill gas engine/generator system and the engine/generator monitoring and control switchgear package. Please find enclosed, one printed copy of each of the following documents pertaining to the closure certification for the Landfill Gas Collection and Combustion System:

- Construction Quality Assurance Certification Report:
  - Professional Engineering Design Certification
  - Project Description
  - Landfill Gas Extraction Well Completion Logs
  - Record of Gas Pressure Tests
  - Project Photographs
  - QA/QC Test Results
  - Air Permit Applicability Determination
  - Francis Farm Leachate Pump Station/Wastewater Collection System, Permit No. WQ0035486
  - Record Drawings
- Operations Plan, Landfill Gas Collection and Combustion System, Francis Farm Landfill, Permit No. 44-03.
- Record Drawing, Francis Farm Landfill, Landfill Gas Collection & Combustion System, Phases 1-3, Haywood County, Haywood County, North Carolina, Dated: July 23, 2012.

McGill Associates, P.A. • P.O. Box 2259, Asheville, NC 28802 • 55 Broad Street, Asheville, NC 28801
828-252-0575 • Fax: 828-252-2518

In addition to the printed copies listed above, please find enclosed a digital version of Construction Quality Assurance Certification Report and the Operations Plan for the Landfill Gas Collection and Combustion System at the Francis Farm Landfill.

We appreciate your assistance throughout the permitting and construction phases of this project. Should you have any questions or if we can be of further assistance, please give us a call.

Sincerely,
McGILL ASSOCIATES, P.A.

WILLIAM H. SPERRY, PE
Project Manager

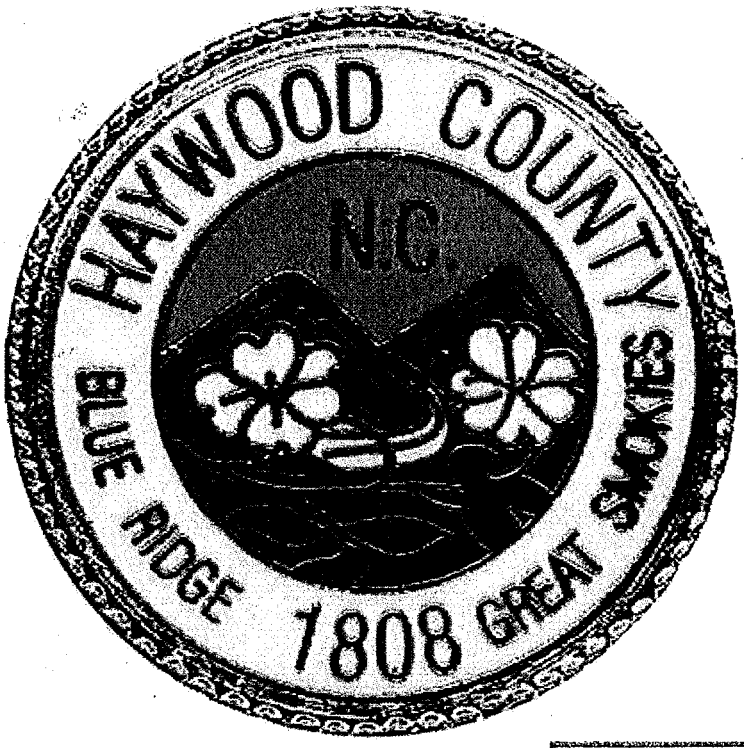
Enclosures

cc: Mr. Marty Stamey, County Manager, Haywood County, w/o enc.
Mr. David Francis, Director, Haywood County Tax Administration, w/o enc.
Mr. Stephen King, Director, Haywood County Solid Waste Department, w/o enc.
Mr. Mark Cathey, PE, McGill Associates, w/o enc.

P:\2009\09.00721\Letters\12 0724 - A Gaither - CQA Report - FFLF.doc

Francis Farm Landfill
Haywood County, North Carolina
Permit No. 44-03

CONSTRUCTION QUALITY ASSURANCE CERTIFICATION REPORT LANDFILL GAS COLLECTION AND COMBUSTION SYSTEM



Fac/Perm/Co ID #	Date	Doc ID#
44-03	8,9,12	17014

JULY 2012

McGill ASSOCIATES

PROFESSIONAL ENGINEERING DESIGN CERTIFICATION

I certify that the construction of the Landfill Gas Collection and Combustion System at the Francis Farm Landfill, Permit 44-03, Haywood County, North Carolina has been construction in substantial accordance with the approved plans and specifications, as presented in the Permit to Construct approved on March 17, 2010 and subsequently updated on April 5, 2010 to include the addition of an engine/generator system.

7/23/12

William H. Sperry, PE
Project Manager
McGill Associates, P.A.
North Carolina PE Registration # 36132

LANDFILL GAS COLLECTION AND COMBUSTION SYSTEM
FRANCIS FARM LANDFILL
HAYWOOD COUNTY, NORTH CAROLINA

PROJECT DESCRIPTION

The Francis Farm Landfill, Permit No. 44-03, is located in Haywood County, North Carolina on Francis Farm Road, (S.R. 1802), Waynesville, North Carolina. The Francis Farm Landfill began operation in the early 1970's and was operated as Haywood County's primary MSW landfill through 1994. The facility was officially closed per a Closure Certification prepared by RCF, Inc. Hazelwood, North Carolina dated September 14, 1994 and submitted to the North Carolina Department of Environment and Natural Resources (NCDENR). The original Permit for Closure was issued on December 13, 1995, with the most recent revision dated May 23, 2006. The facility encompasses approximately 33.1 acres. In addition to the closed landfill, the Haywood County School System operates a maintenance facility within the site. The Maintenance Facility includes a maintenance/bus garage building, equipment storage building, and maintenance storage building. The Maintenance Building consists of offices, carpentry shop and bus maintenance facility.

In March 2010 the County received approval from the North Carolina Department of Environment and Natural Resources (NCDENR), Division of Waste Management, Solid Waste Section (Section) to begin construction of a Landfill Gas Collection and Combustion System at the landfill. The initial phase of the project, referred to as Phase 1 was constructed in the fall of 2010 and involved the installation of twenty-one (21) landfill gas extraction wells strategically located within the waste mass. Phase 1 was constructed by Shaw Environmental and Infrastructure, Inc. of Baton Rouge, Louisiana and was completed in the fall of 2010. Wastes removed as a part of the construction of the landfill gas extraction wells was disposed of on site in accordance with the approved plan. The plan basically entailed removing the final cap in a specified area of the landfill, placing the removed waste in this area and replacing the final cap. The extraction wells were constructed as thirty-inch (30") diameter augered wells backfilled with stone media to within approximately ten feet (10') of the surface. At that point a bentonite well seal was installed and soil backfill placed to within a couple of feet of the surface whereby an additional bentonite seal was installed. A six-inch (6") schedule 80 perforated PVC pipe was installed in the well below the bentonite seal and solid schedule 80 PVC pipe was installed above the bentonite seal to a point approximately five feet (5') above the ground surface. An 180° elbow was installed to allow the well the naturally vent and prevent rain water from entering the well.

In January 2011 the County was awarded a grant by the North Carolina Energy Office through the American Recovery and Reinvestment Act of 2009. The grant covered the construction of the remaining portions of the originally proposed project (landfill gas flare system and associated landfill gas collection system) and included monies for the installation of a landfill gas engine generator system to produce electrical power for reuse or sale to the local electric utility. In April 2010 the County received approval from the Solid Waste Section to include the landfill gas engine generator in the overall landfill gas collection and combustion project.

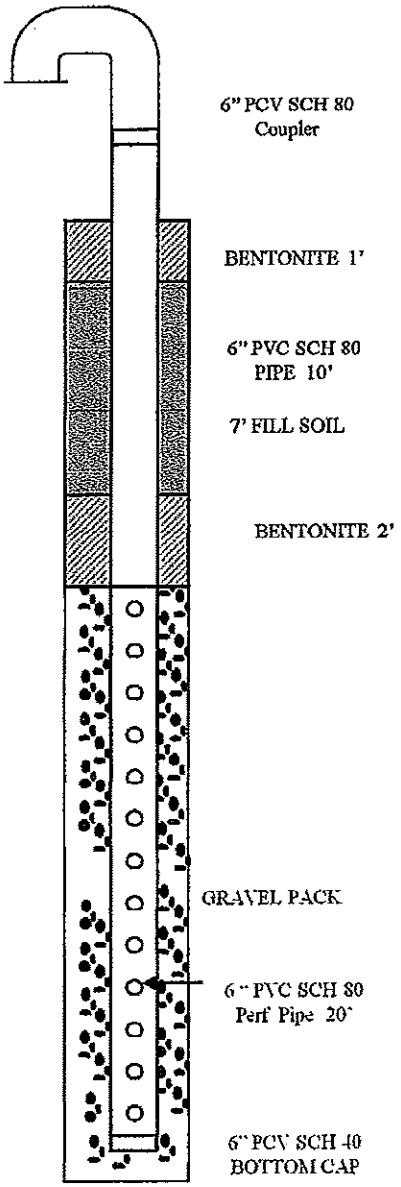
Upon receipt of the grant, the next phase of the project, referred to as Phase 2, was initiated. This portion of the project involved the construction and installation of the landfill gas flare system (Phase 2A) and the landfill gas collection piping system (Phase 2B). Phase 2A was bid in April 2011 and the skid-mounted landfill gas flare system was delivered to the site in late October 2011. The flare system was fabricated by Phillips Electric Company of Durham, Inc., dba Product Recovery Management, Inc. The system basically includes a knockout pot, blower system, flare controls and flare stack. The system has a capacity of approximately 200 scfm as well as the ability to divert the flow of landfill gas to an engine/generator system installed adjacent to the flare system.

Phase 2B, covering the landfill gas collection system, was bid in June 2011 and completed in December 2011. This work was performed by Payne, McGinn & Cummins, Inc. of Travelers Rest, South Carolina. Phase 2B included the installation of approximately 6,000 LF of 4", 6" and 8" HDPE (SDR17) landfill gas collection piping, wellheads, control valves and associated appurtenances. The work also included the installation of approximately 2,600 LF of 4", 6" and 8" HDPE (SDR 17) leachate collection piping, down-hole electrically operated leachate extraction pumps installed in strategically located landfill gas extraction wells. These leachate extraction pumps were installed to assist in the removal of liquid/leachate apparently trapped within the landfill's waste mass thereby enhancing the removal of landfill gas. The project also included the installation of a leachate pump station and 2" force main connecting with the City of Waynesville sanitary sewer system. Additional grading work was performed on the southern end of the landfill cap to correct some apparent settlement issues and enhance positive drainage. The landfill cap enhancement is in the same vicinity as the area that was utilized to dispose of waste removed during the construction of Phase 1. The additional fill material served to enhance the final cover over the waste disposal area. Upon completion of the Phase 2 portion of the project, the landfill gas collection system and the skid-mounted landfill gas flare system were commissioned and placed into operation in early January 2012.

Phase 3 of this project covered the installation of a landfill gas engine/generator package capable of producing electrical power for sale to Haywood EMC, the local electric utility serving Haywood County. This project was initially bid in August 2011. However, this portion of the project was subsequently broken into two phases. Phase 3A covered the landfill gas engine generator system capable of operating on a low Btu fuel supply (i.e., landfill gas) and Phase 3B which covered the utility interconnection switchgear equipment. The landfill gas engine/generator package covered by Phase 3A will be supplied by KSD Enterprises, LLC of Clarksburg, West Virginia. This system is capable of supplying a maximum output of 75kW, single Phase, 120/240 volt power. The power output on this project was regulated by Haywood EMC and their compliance with the North Carolina Utilities Commission. The utility interconnection switchgear meeting the Institute of Electrical and Electronics Engineers Standard 1547 (IEEE 1547) – Standard for Interconnecting Distributed Resources with Electric Power Systems will be assembled, installed and commissioned by PowerSecure, Inc. of Wake Forest, North Carolina. Phase 3A and 3B are complete and the system is producing electrical power for sale to the Haywood EMC.

SHAW WELL COMPLETION LOG

Project Name: Francis Farm
Project No.: 139834
Date: 8/19/10
Well No. EW-1



BORING DIA: 30"

DRILL	30'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	20'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-4	COVER	DRY
4-10	MSW	MOIST
10-20	MSW	MOIST
20-30	MSW	MOIST
30-40		
40-50		
50-60		
60-70		
70-80		
80-90		
90-100		

TD : 30'

COMMENTS:

Drilled to 30' and set 6" PVC SCH 80 Well at 30'

CLIENT REPRESENTATIVE DATE
NAME & TITLE

SHAW SUPERVISOR DATE 8/19/10

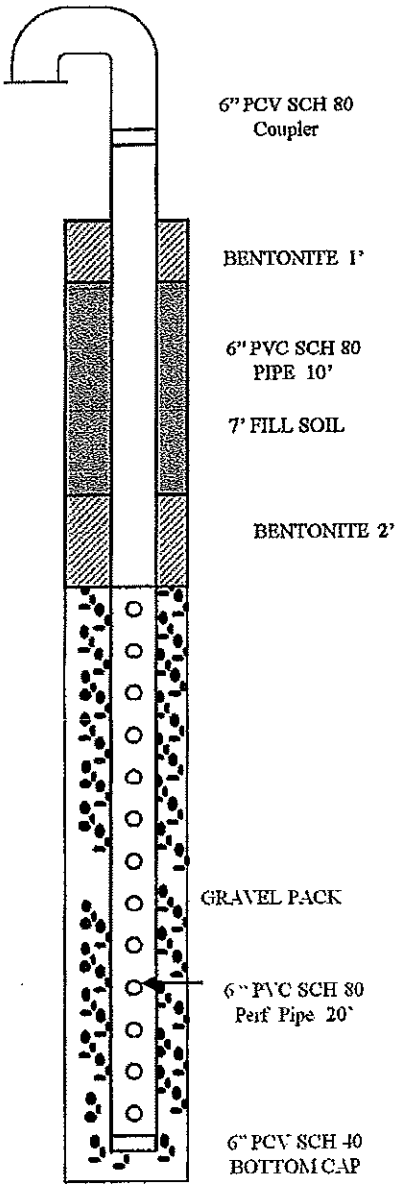
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/19/10

Well No. EW-2



BORING DIA: 30"

DRILL	30'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	20'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-3	COVER	DRY
3-10	MSW	MOIST
10-20	MSW	MOIST
20-30	MSW	MOIST
30-40		
40-50		
50-60		
60-70		
70-80		
80-90		
90-100		

TD : 30'

COMMENTS:

Drilled to 30' and set 6" PVC SCH 80 Well at 30'

CLIENT REPRESENTATIVE DATE

NAME & TITLE

SHAW SUPERVISOR DATE 8/19/10

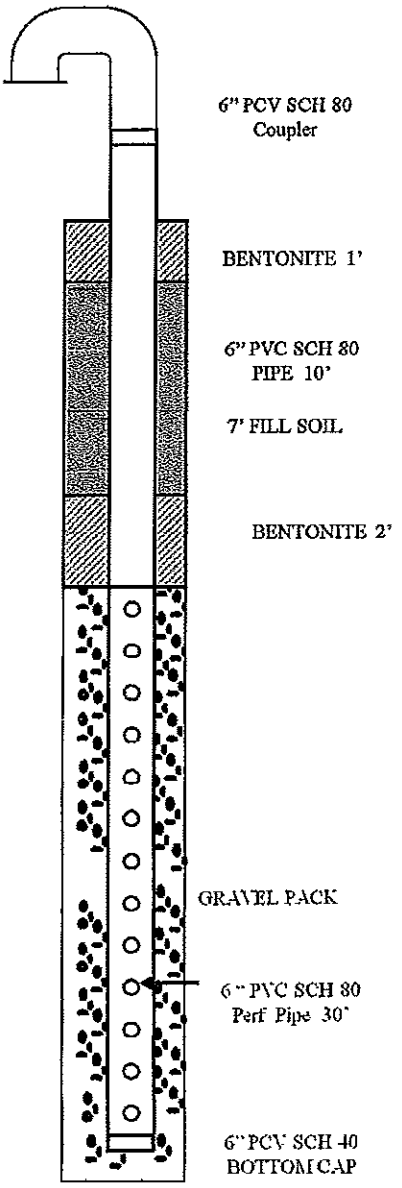
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/19/10

Well No. EW-3



BORING DIA: 30"

DRILL	40'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	30'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-3	COVER	DRY
3-10	MSW	MOIST
10-20	MSW	MOIST
20-30	MSW	MOIST
30-40	MSW	MOIST
40-50		
50-60		
60-70		
70-80		
80-90		
90-100		

TD : 40'

COMMENTS:

Drilled to 40' and set 6" PVC SCH 80 Well at 40'

CLIENT REPRESENTATIVE DATE

NAME & TITLE

SHAW SUPERVISOR DATE 8/19/10

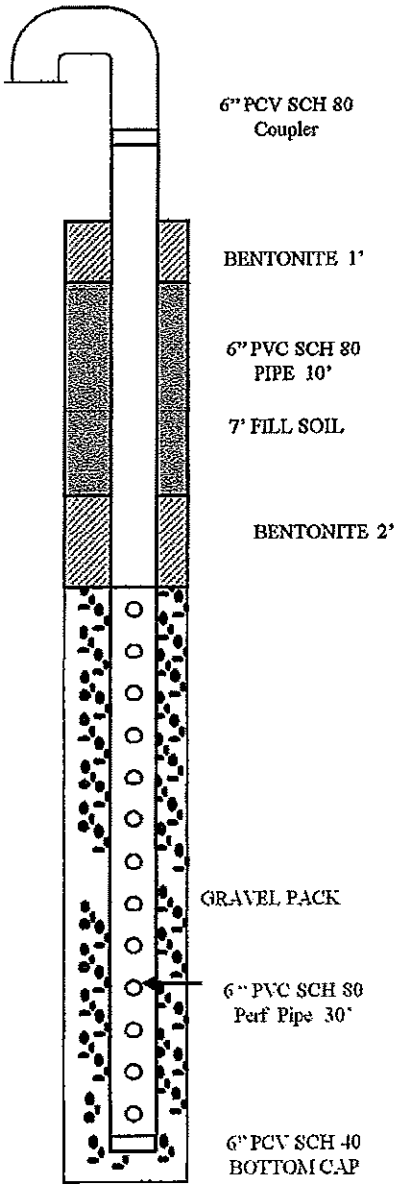
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/19/10

Well No. EW-4



BORING DIA: 30"

DRILL	40'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	30'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-3	COVER	DRY
3-10	MSW	MOIST
10-20	MSW	MOIST
20-30	MSW	MOIST
30-40	MSW	MOIST
40-50		
50-60		
60-70		
70-80		
80-90		
90-100		

TD : 40'

COMMENTS:

Drilled to 40' and set 6" PVC SCH 80 Well at 40'

CLIENT REPRESENTATIVE DATE

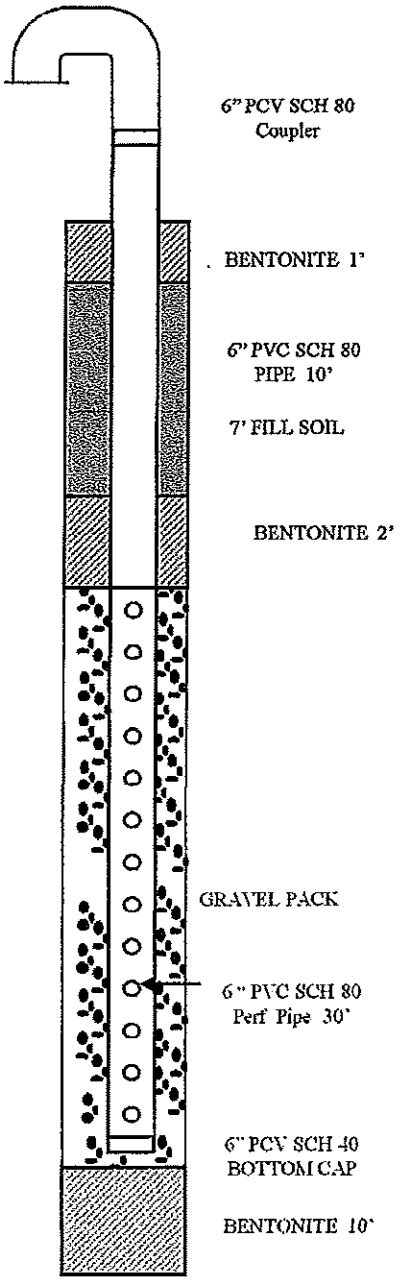
NAME & TITLE

Jesse Thomas 8/19/10

SHAW SUPERVISOR DATE

SHAW WELL COMPLETION LOG

Project Name: Francis Farm
Project No.: 139834
Date: 8/13/10
Well No. EW-5



BORING DIA: 30"

DRILL	50'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	30'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-4	COVER	DRY
4-10	MSW	MOIST
10-20	MSW	MOIST
20-30	MSW	MOIST
30-40	MSW	MOIST
40-50	NATIVE SOIL	DRY
50-60		
60-70		
70-80		
80-90		
90-100		

TD : 50'

COMMENTS:

Hit native soil at 40'. Well was drilled to 50' depth. Well set at 40' - 6" PVC SCH 80 Well, Also put a 10' plug of bentonite in bottom of well.

CLIENT REPRESENTATIVE DATE
NAME & TITLE

SHAW SUPERVISOR DATE 8/13/10

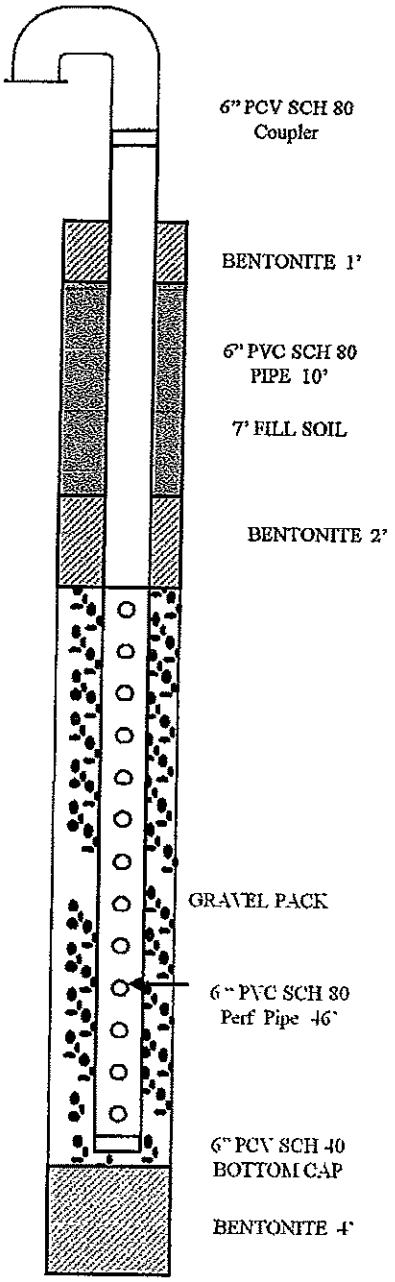
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/14/10

Well No. EW-6



BORING DIA: 30"

DRILL	60'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	46'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-6	COVER	DRY
6-10	MSW	MOIST
10-20	MSW	MOIST
20-30	MSW	MOIST
30-40	MSW	MOIST
40-56	MSW	MOIST
56-60	NATIVE SOIL	DRY
60-70		
70-80		
80-90		
90-100		

TD : 60'

COMMENTS:

Hit native soil at 56'. Well was drilled to 60' depth. Well set at 56' - 6" PVC SCH 80 Well. Also put a 4' plug of bentonite in bottom of well.

CLIENT REPRESENTATIVE DATE

NAME & TITLE

SHAW SUPERVISOR DATE 8/14/10

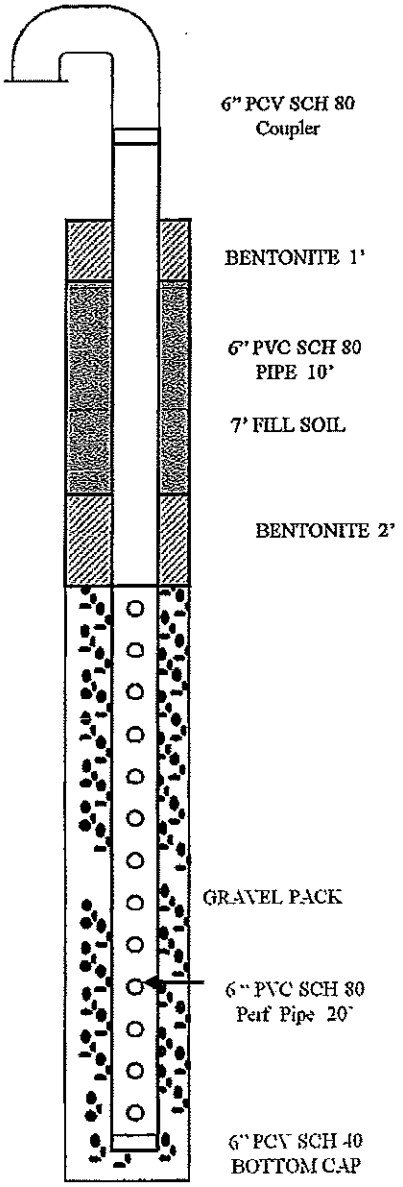
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/19/10

Well No. EW-7



BORING DIA: 30"

DRILL	30'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	20'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-4	COVER	DRY
4-10	MSW	MOIST
10-20	MSW	MOIST
20-30	MSW	MOIST
30-40		
40-50		
50-60		
60-70		
70-80		
80-90		
90-100		

TD : 30'

COMMENTS:

Drilled to 30' and set 6" PVC SCH 80 Well at 30'

CLIENT REPRESENTATIVE DATE

NAME & TITLE

SHAW SUPERVISOR DATE 8/19/10

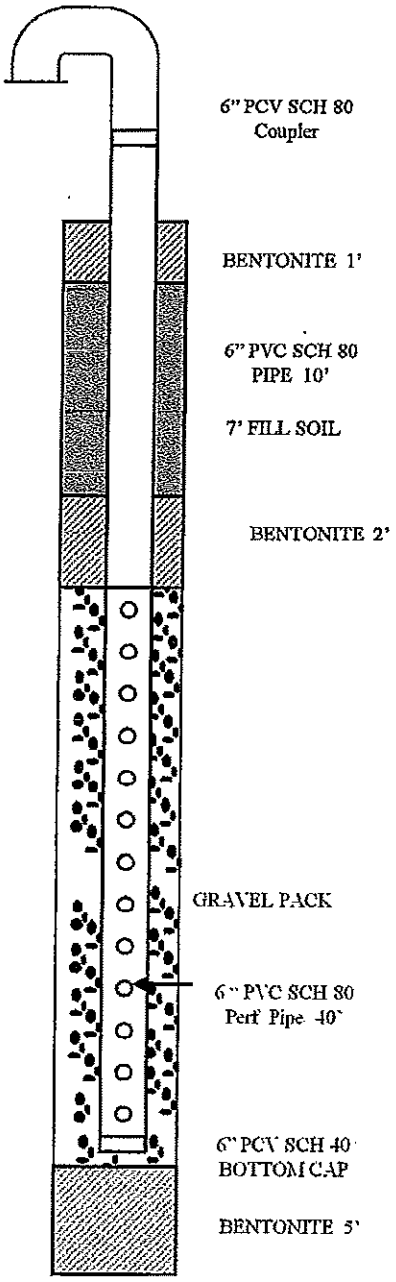
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/14/10

Well No. EW-8



BORING DIA: 30"

DRILL	55'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	40'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-3	COVER	DRY
3-10	MSW	MOIST
10-20	MSW	MOIST
20-30	MSW	WET
30-40	MSW	MOIST
40-50	MSW	MOIST
50-55	NATIVE SOIL	DRY
60-70		
70-80		
80-90		
90-100		

TD : 55'

COMMENTS:

Hit native soil at 50'. Well drilled to 55' depth. Well set at 50' - 6" PVC SCH 80 Well. Also put a 5' plug of bentonite in bottom of well (Hit water at 21')

CLIENT REPRESENTATIVE DATE

NAME & TITLE

Steve Thomas 8/14/10

SHAW SUPERVISOR DATE

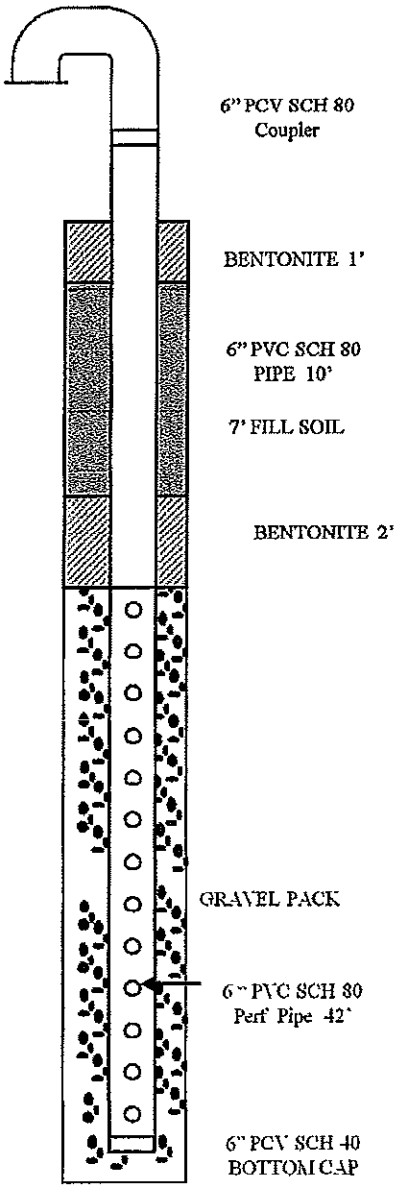
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/19/10

Well No. EW-9



BORING DIA: 30"

DRILL	52'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	42'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-3	COVER	DRY
3-10	MSW	MOIST
10-20	MSW	MOIST
20-30	MSW	MOIST
30-40	MSW	MOIST
40-52	MSW	MOIST
52-60		
60-70		
70-80		
80-90		
90-100		

TD : 52'

COMMENTS:

Drilled to 52' and set 6" PVC SCH 80 Well at 52'

CLIENT REPRESENTATIVE DATE

NAME & TITLE

SHAW SUPERVISOR DATE 8/19/10

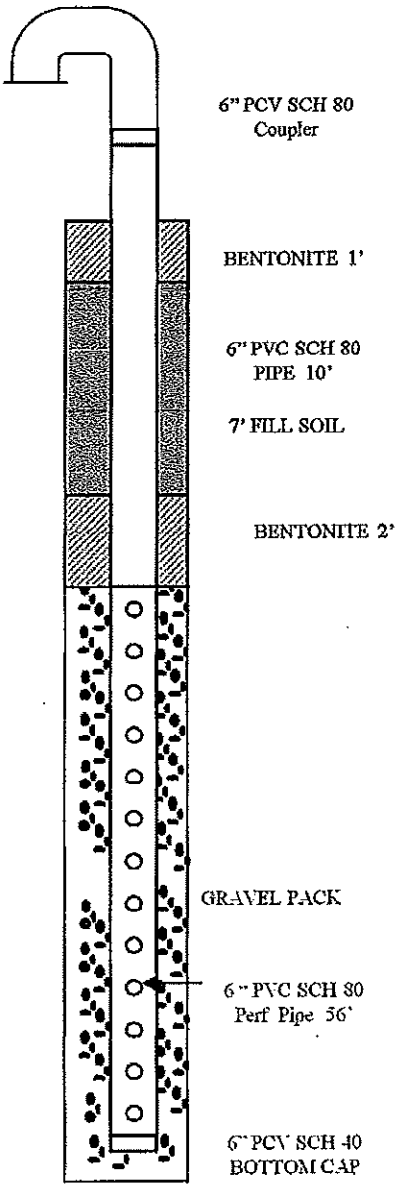
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/18/10

Well No. EW-10



BORING DIA: 30"

DRILL	66'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	56'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-5	COVER	DRY
5-10	MSW	MOIST
10-20	MSW	MOIST
20-30	MSW	MOIST
30-40	MSW	MOIST
40-50	MSW	MOIST
50-66	MSW	MOIST
66-70		
70-80		
80-90		
90-100		

TD : 66'

COMMENTS:

Drilled to 66' and set 6" PVC SCH 80 Well at 66'

CLIENT REPRESENTATIVE DATE

NAME & TITLE

Ethan Thomas 8/18/10

SHAW SUPERVISOR DATE

SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/18/10

Well No. EW-11

ABANDON WELL

DRILL		WEATHER	
COMP.		START	
ABAN.	30'	STOP	
SOLID			
PERF.			

BORING DIA: 30"

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-4	COVER	DRY
4-10	MSW	MOIST
10-20	MSW	WET
20-30	MUCK	WET
30-40		
40-45		
50-60		
60-70		
70-80		
80-90		
90-100		

TD : 30'

COMMENTS:

Drilled to 30' and Abandon Well, (Hit water at 14')

CLIENT REPRESENTATIVE DATE

NAME & TITLE

Steve Thomas 8/18/10

SHAW SUPERVISOR DATE

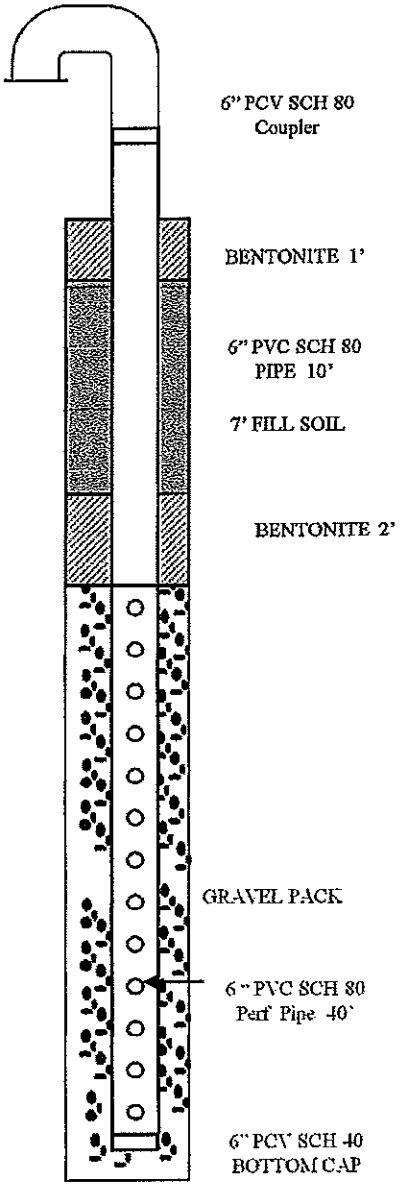
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/18/10

Well No. EW-11A



BORING DIA: 30"

DRILL	50'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	40'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-3	COVER	DRY
3-10	MSW	MOIST
10-20	MSW	MOIST
20-30	MSW	WET
30-40	MSW	MOIST
40-50	MSW	MOIST
50-60		
60-70		
70-80		
80-90		
90-100		

TD : 50'

COMMENTS:

Drilled to 50' and set 6" PVC SCH 80 Well at 50'(hit water at 21')

CLIENT REPRESENTATIVE DATE

NAME & TITLE

SHAW SUPERVISOR DATE 8/18/10

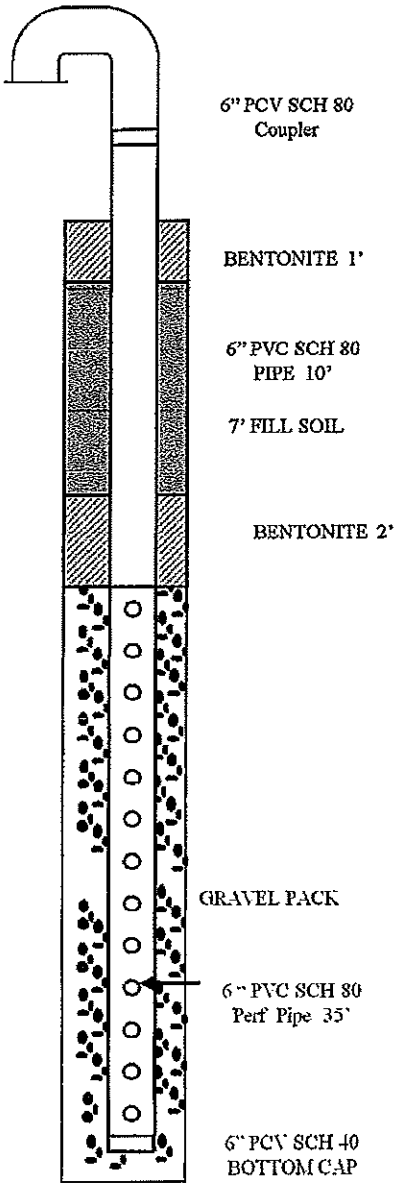
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/16/10

Well No. EW-12



BORING DIA: 30"

DRILL	45'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	35'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-3	COVER	DRY
3-10	MSW	MOIST
10-20	MSW	MOIST
20-30	MSW	WET
30-40	MSW	WET
40-45	MSW	WET
50-60		
60-70		
70-80		
80-90		
90-100		

TD : 45'

COMMENTS:

Drilled to 45' and set 6" PVC SCH 80 Well at 45', (Hit water at 23')

CLIENT REPRESENTATIVE DATE

NAME & TITLE

Eric Thomas 8/16/10

SHAW SUPERVISOR DATE

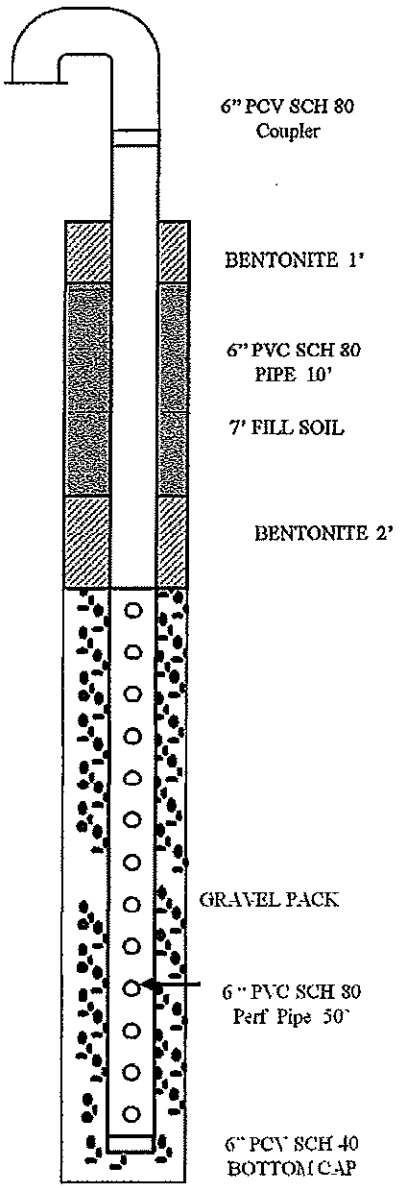
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/16/10

Well No. EW-13



BORING DIA: 30"

DRILL	60'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	50'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-3	COVER	DRY
3-10	MSW	MOIST
10-20	MSW	MOIST
20-30	MSW	MOIST
30-40	MSW	MOIST
40-50	MSW	MOIST
50-60	MSW	MOIST
60-70		
70-80		
80-90		
90-100		

TD : 60'

COMMENTS:

Drilled to 60' and set 6" PVC SCH 80 Well at 60',

CLIENT REPRESENTATIVE DATE

NAME & TITLE

Steve Thomas 8/16/10

SHAW SUPERVISOR DATE

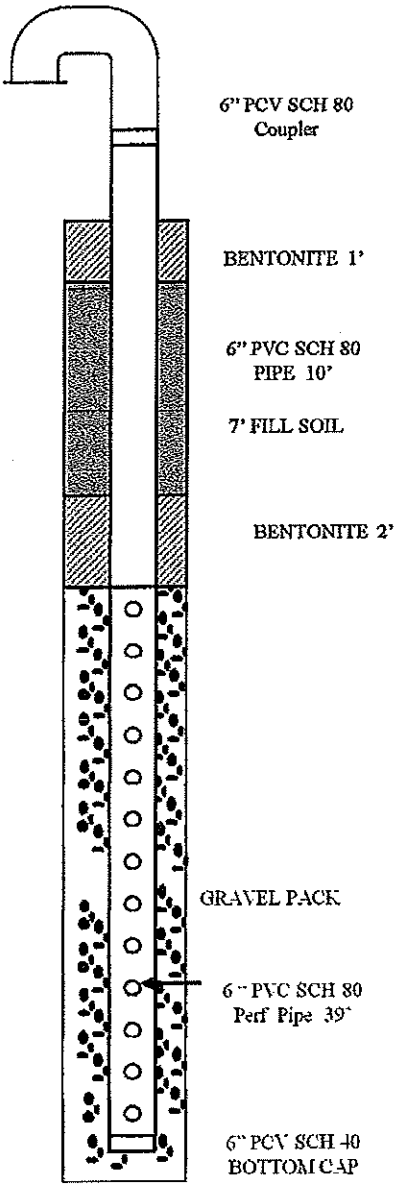
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/17/10

Well No. EW-14



BORING DIA: 30"

DRILL	49'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	39'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-4	COVER	DRY
4-10	MSW	MOIST
10-20	MSW	MOIST
20-30	MSW	MOIST
30-40	MSW	MOIST
40-49	MSW	MOIST
50-60		
60-70		
70-80		
80-90		
90-100		

TD : 49'

COMMENTS:

Drilled to 49' and set 6" PVC SCH 80 Well at 49'

CLIENT REPRESENTATIVE DATE

NAME & TITLE

Steve Thomas 8/17/10

SHAW SUPERVISOR DATE

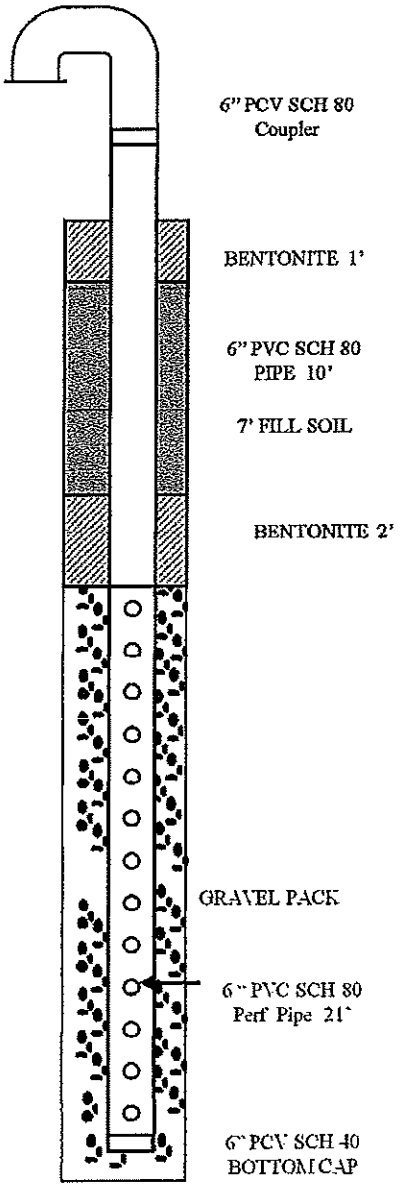
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/18/10

Well No. EW-15



BORING DIA: 30"

DRILL	31'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	21'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-3	COVER	DRY
3-10	MSW	MOIST
10-20	MSW	MOIST
20-31	MSW	MOIST
31-40		
40-50		
50-60		
60-70		
70-80		
80-90		
90-100		

TD : 31'

COMMENTS:

Drilled to 31' and set 6" PVC SCH 80 Well at 31'

CLIENT REPRESENTATIVE DATE

NAME & TITLE

SHAW SUPERVISOR DATE 8/18/10

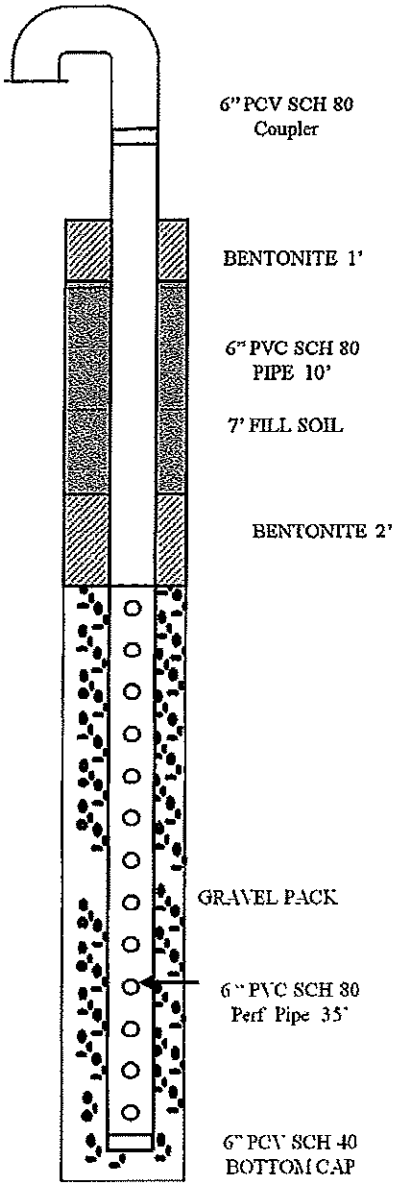
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/14/10

Well No. EW-16



BORING DIA: 30"

DRILL	50'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	35'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-3	COVER	DRY
3-10	MSW	MOIST
10-20	MSW	WET
20-30	MSW	WET
30-40	MSW	WET
40-50	MUCK	WET
50-60		
60-70		
70-80		
80-90		
90-100		

TD : 50'

COMMENTS:

Drilled to 50'. Set 6" PVC SCH 80 Well at 45' because of muck, (Hit water at 10')

CLIENT REPRESENTATIVE DATE

NAME & TITLE

SHAW SUPERVISOR DATE 8/14/10

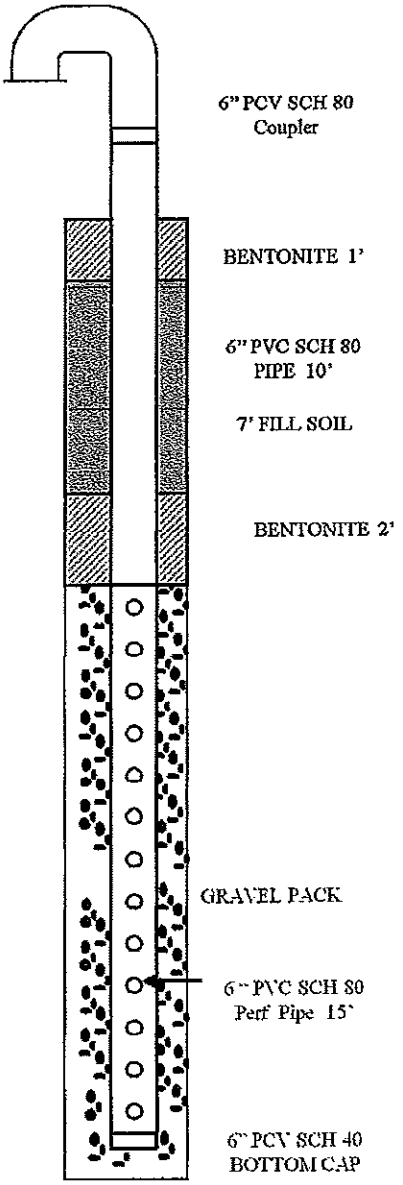
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/23/10

Well No. EW-17



BORING DIA: 30"

DRILL	25'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	15'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-5	COVER	DRY
5-10	MSW	MOIST
10-20	MSW	MOIST
20-25	MSW	MOIST
30-40		
40-50		
50-60		
60-70		
70-80		
80-90		
90-100		

TD : 25'

COMMENTS:

Drilled to 25' and set 6" PVC SCH 80 Well at 25'

CLIENT REPRESENTATIVE DATE

NAME & TITLE

SHAW SUPERVISOR DATE 8/23/10

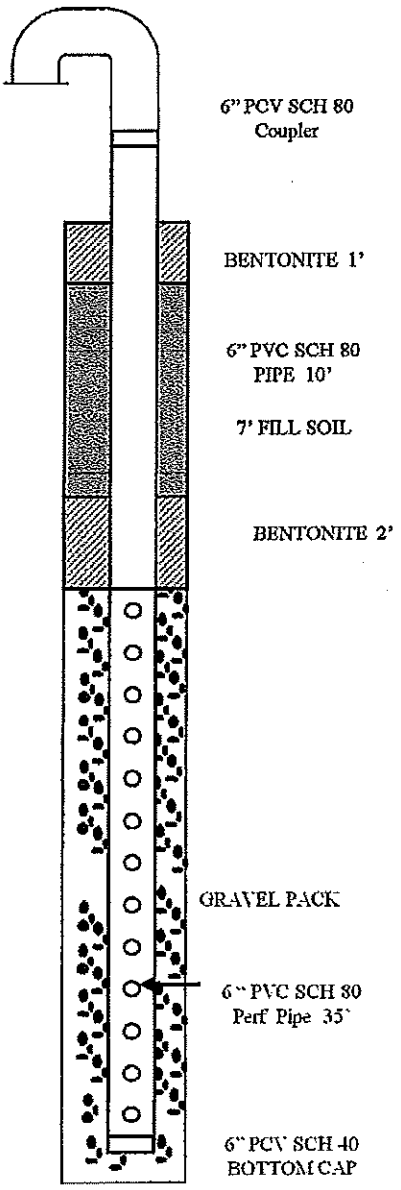
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/23/10

Well No. EW-18



BORING DIA: 30"

DRILL	45'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	35'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-5	COVER	DRY
5-10	MSW	MOIST
10-20	MSW	MOIST
20-30	MSW	MOIST
30-40	MSW	MOIST
40-45	MSW	MOIST
45-60		
60-70		
70-80		
80-90		
90-100		

TD : 45'

COMMENTS:

Drilled to 45' and set 6" PVC SCH 80 Well at 45'

CLIENT REPRESENTATIVE DATE

NAME & TITLE

Scott Howes 8/23/10

SHAW SUPERVISOR DATE

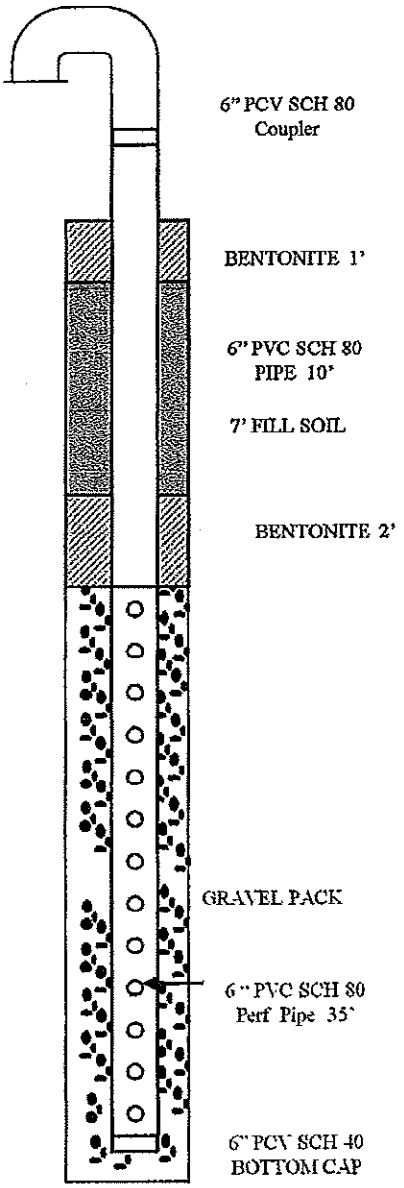
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/23/10

Well No. EW-19



BORING DIA: 30"

DRILL	45'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	35'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-10	COVER	DRY
10-20	MSW	MOIST
20-30	MSW	MOIST
30-40	MSW	MOIST
40-45	MSW	MOIST
45-60		
60-70		
70-80		
80-90		
90-100		

TD : 45'

COMMENTS:

Drilled to 45' and set 6" PVC SCH 80 Well at 45'

CLIENT REPRESENTATIVE DATE

NAME & TITLE

SHAW SUPERVISOR DATE 8/23/10

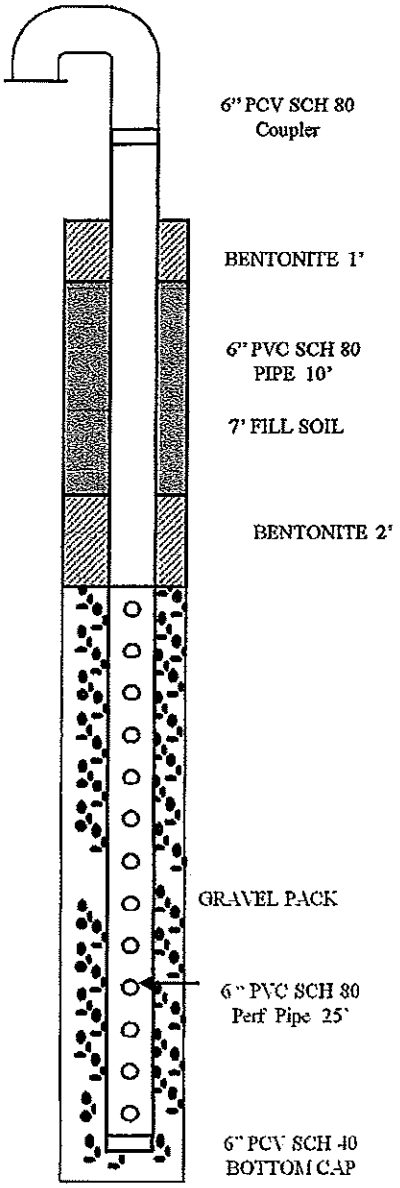
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/23/10

Well No. EW-20



BORING DIA: 30"

DRILL	35'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	25'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-7	COVER	DRY
7-10	MSW	MOIST
10-20	MSW	MOIST
20-35	MSW	MOIST
35-40		
40-50		
50-60		
60-70		
70-80		
80-90		
90-100		

TD : 35'

COMMENTS:

Drilled to 35' and set 6" PVC SCH 80 Well at 35'

CLIENT REPRESENTATIVE DATE

NAME & TITLE

SHAW SUPERVISOR DATE 8/23/10

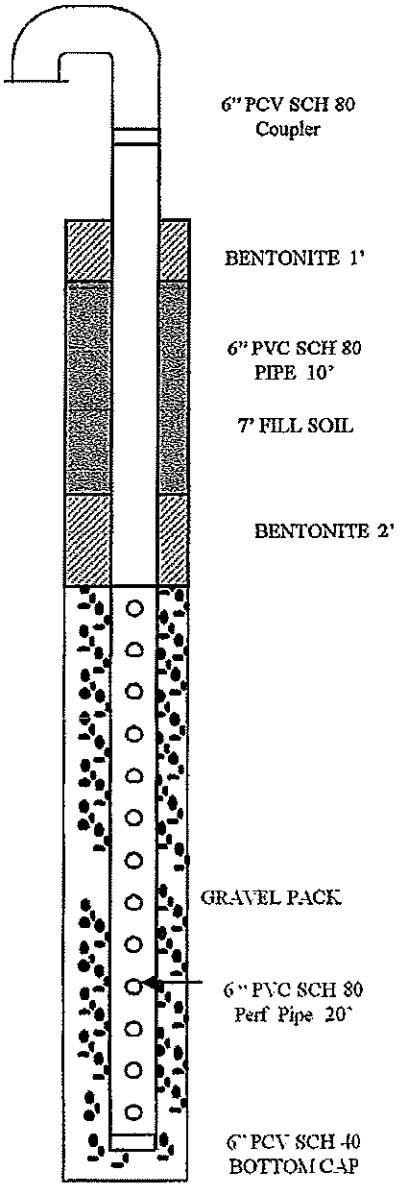
SHAW WELL COMPLETION LOG

Project Name: Francis Farm

Project No.: 139834

Date: 8/23/10

Well No. EW-21



BORING DIA: 30"

DRILL	30'	WEATHER	
COMP.		START	
ABAN.		STOP	
SOLID	10'		
PERF.	20'		

DEPTH	COMPOSITION	AMOUNT OF MOISTURE
0-1	COVER	DRY
1-10	MSW	MOIST
10-20	MSW	MOIST
20-30	MSW	MOIST
30-40		
40-50		
50-60		
60-70		
70-80		
80-90		
90-100		

TD : 30'

COMMENTS:

Drilled to 30' and set 6" PVC SCH 80 Well at 30'

CLIENT REPRESENTATIVE DATE

NAME & TITLE

SHAW SUPERVISOR DATE 8/23/10

RECORD OF ~~WATERLINE~~ GAS PRESSURE TESTS

PROJECT: FRANCIS FARM LANDFILL

CONTRACTOR: PAYNE, McGINNIS & CUMMINGS, INC.

OWNER: HAYWOOD COUNTY

FOREMAN: CHICO

PROJECT No.: 09.00721

DATE	LINE	PIPE SIZE	PIPE TYPE	STATIONS FROM	STATIONS TO	LENGTH	TEST PRESSURE	TEST TIME	MAKE UP WATER ALLOWED	MAKE UP WATER USED	PASS/ FAIL	CHLORINE RESIDUAL STATION	CHLORINE RESIDUAL PPM	BACTERIA Test
11-14-11		4"	HDPE			420'	(5) PSI	1 HR.			PASS			
11-14-11		6"	HDPE			300'	(5) PSI	1 HR.			PASS			
11-14-11		4"	HDPE			2415'	(5) PSI	1 HR.			PASS			
11-14-11		6"	HDPE			2955'	(5) PSI	1 HR.			PASS			
11-14-11		8"	HDPE			1205'	(5) PSI	1 HR.			PASS			
11-18-11		8"	HDPE			600'	(5) PSI	1 HR.			PASS			

McGill Associates CFR: JAY STEWART

ALLOWABLE MAKEUP WATER PER 1000 FEET OF PIPELINE (GPH)

TEST PRESS P.S.I.	NOMINAL PIPE DIAMETER												
	3	4	6	8	10	12	14	16	18	20	24	30	36
250	0.36	0.47	0.71	0.95	1.19	1.42	1.66	1.90	2.14	2.37	2.85	3.56	4.27
225	0.34	0.45	0.68	0.90	1.13	1.35	1.58	1.80	1.02	2.25	2.70	3.38	4.05
200	0.32	0.43	0.64	0.85	1.06	1.28	1.48	1.70	1.19	2.12	2.55	3.19	3.82
175	0.30	0.40	0.59	0.80	0.99	1.19	1.39	1.59	1.79	1.98	2.38	2.98	3.58
150	0.28	0.37	0.55	0.74	0.92	1.10	1.29	1.47	1.66	1.84	2.21	2.76	3.31
125	0.25	0.34	0.50	0.67	0.84	1.01	1.18	1.34	1.51	1.68	2.01	2.52	3.02
100	0.23	0.30	0.45	0.60	0.75	0.90	1.05	1.20	1.35	1.50	1.80	2.25	2.70
G/P/F	0.42	0.67	1.54	2.81	4.35	6.26	8.38	10.90	13.82	17.09	24.62	38.01	54.90

HDPE Pipe Welding Machine

HDPE Welded Pipe Joint

HDPE Pipe Installed Across the Landfill

HDPE Pipe Installation and Backfilling

Butterfly Valve Installation

Butterfly Valve and Test Port Installation at Collection System Header Junction

Completed Valve and Test Port Installation

Completed Lateral Collection Pipe and Marker Post

Landfill Gas Extraction Well and Completed Collection Piping

Installation of HDPE Collection Piping System and Electrical Conduit at
The Landfill Gas Flare Station

Landfill Gas Extraction Well Complete with Down Hole
Liquid Removal System

Landfill Gas Engine/Generator and Associated Electrical Switchgear Equipment

Landfill Gas Flare System

BLE INC.
BUNNELL-LAMMONS ENGINEERING , INC.
105 Fairview Road, Suite A
ASHEVILLE, NC 28803

Phone: (828) 277-0100
FAX: (828) 277-0110

CONCRETE CYLINDER TEST REPORT

10294

Project:	Francis Farm Landfill
BLE Project Number:	J11-1957-23
Client:	McGill & Associates
Sample Location:	Generator pad along the Southwest end of site. Sample taken at 5' off West corner to the North.

Date Sampled:	8/31/2011	Date Received:	9/2/2011
Sampled By:	Jack Stanford		
No. of Specimens:	5		
Supplier:	SCM		
Truck No.:	Smith	Ticket No.:	*
Batch Time:	10:10		
Sample Time:	10:35		

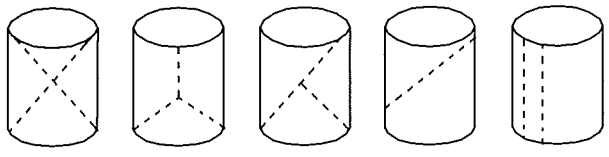
Mix Design No.:		Design Strength:	4,000 psi
Actual Slump:	4 in.	Specified Slump:	
Actual Air Content:		Specified Air Content:	
Air Temperature:	84 F	Mix Temperature:	79 F
Unit Weight:			
Admixtures:			
Gallons Water Added On Site:			

Cylinder Sample	Test Date	Age (days)	Load (lbs)	Dia. (in.)	Area (sq. in.)	Strength (psi)	Type of Fracture
1	9/7/11	7	39,594	4.00	12.57	3,150	B
2	9/28/11	28					
3	9/28/11	28					
4	9/28/11	28					
5		R					

Remarks: Ticket: Concrete ticket was handwritten as the computers were down at SCM.

Reported by: Jesse Jacobson

Copies to:



AASHTO T22

BLE INC.
BUNNELL-LAMMONS ENGINEERING, INC.
105 Fairview Road, Suite A
Asheville, North Carolina 28803

Phone (828) 277-0100
Fax (828) 277-0110

E-MAILED AUG 29 2011

To: Haywood County
Solid Waste Management
278 Recycle Road
Clyde, NC 28721

Date: August 10, 2011

Project Number: J11-1957-23

Project Name: Francis Farm Landfill

Attention: Mr. Stephen King
sking@haywoodnc.net

Attached is the Following:

1	Daily Field Report dated August 3, 2011
2	Moisture Density Relationship Test Reports dated August 3, 2011
1	Daily Field Report dated August 5, 2011
1	Field Density Test dated August 5, 2011

Jesse Jacobson, Project Manager

cc: McGill Associates, P.A. (Mr. Jeff Bishop - jeff.bishop@mcgillengineers.com)
(Mr. Bill Sperry - bill.sperry@mcgillengineers.com)

slv

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL, ENVIRONMENTAL AND CONSTRUCTION MATERIALS CONSULTANTS

PAGE 1 OF 1

DATE 8 / 03 / 11

DAILY FIELD REPORT

PROJECT: Francis Farm Landfill		WEATHER	SITE CONDITIONS	TRAVEL TIME: 1.25
LOCATION: Waynesville, NC		☑ SUNNY	☑ DRY	TIME ON SITE: 1.25
CLIENT: 1957-23		☐ OVERCAST	☐ DAMP	TOTAL TIME: 2.50
JOB #	MILEAGE:	☐ RAIN	☐ WET / MUDDY	
CONTRACTOR: P, M, & C.	TEMPERATURE:	☐ SNOW / ICE	☐ FROZEN	*STANDBY TIME:

FIELD TESTING PERFORMED						
	☐ SOIL DENSITY	☐ CONCRETE	☐ FOUNDATION	☐ REBAR	☐ MASONRY	☐ PROOFROLLING
	☐ STONE DENSITY	☐ ASPHALT	☐ STRUCTURAL STEEL	☐ FIREPROOFING	☑ OBSERVATION	☑ OTHER

On 8.03.11, a BLE rep visited Francis Farm Landfill to provide services. Upon arrived, rep observed progress of the Gas Line Trench placement, taking pictures of said progress. Rep also picked up two soil proctors and transported them back to the lab for moisture-density analysis.

* EXPLANATION OF STANDBY TIME:

COPY TO:	REV. BY:	DATE: 8.03.11	TECHNICIAN:

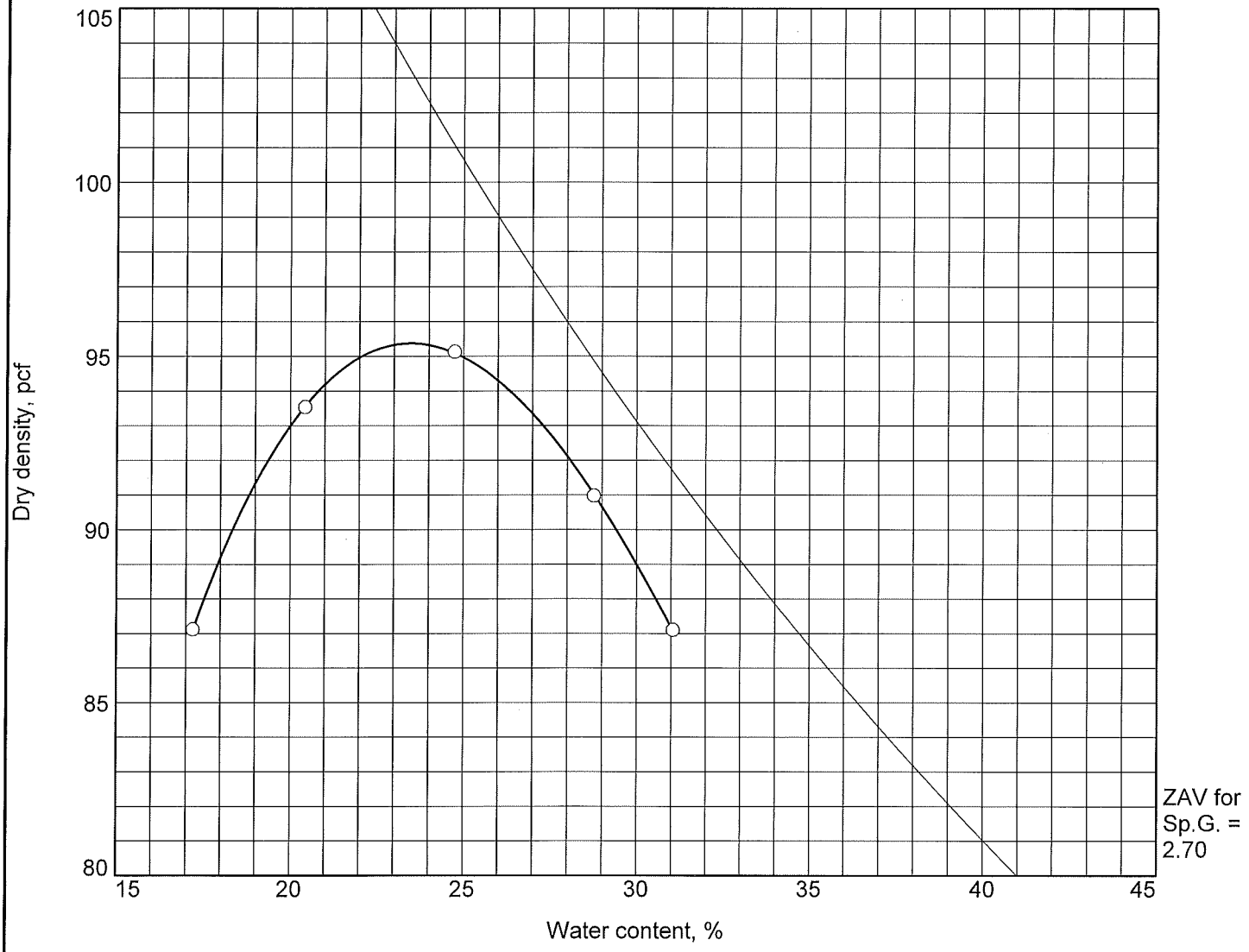
NOTE: All data subject to Engineering review.

BUNNELL-LAMMONS ENGINEERING, INC.

ASHEVILLE, NORTH CAROLINA • PHONE: (828) 277-0100 • FAX: (828) 277-0110

WHITE: BLE COPY **YELLOW:** CLIENT FIELD COPY **PINK:** TECH. COPY

MOISTURE DENSITY RELATIONSHIP TEST REPORT



Test specification: ASTM D 698-00 Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 95.4 pcf Optimum moisture = 23.5 %	Red sl. brown sl. mic. fi.-med. sandy SILT.

Project No. J11-1957-23 **Client:** Haywood County Solid Waste Management
Project: Francis Farm Landfill

○ **Location:** On Site **Sample Number:** 1

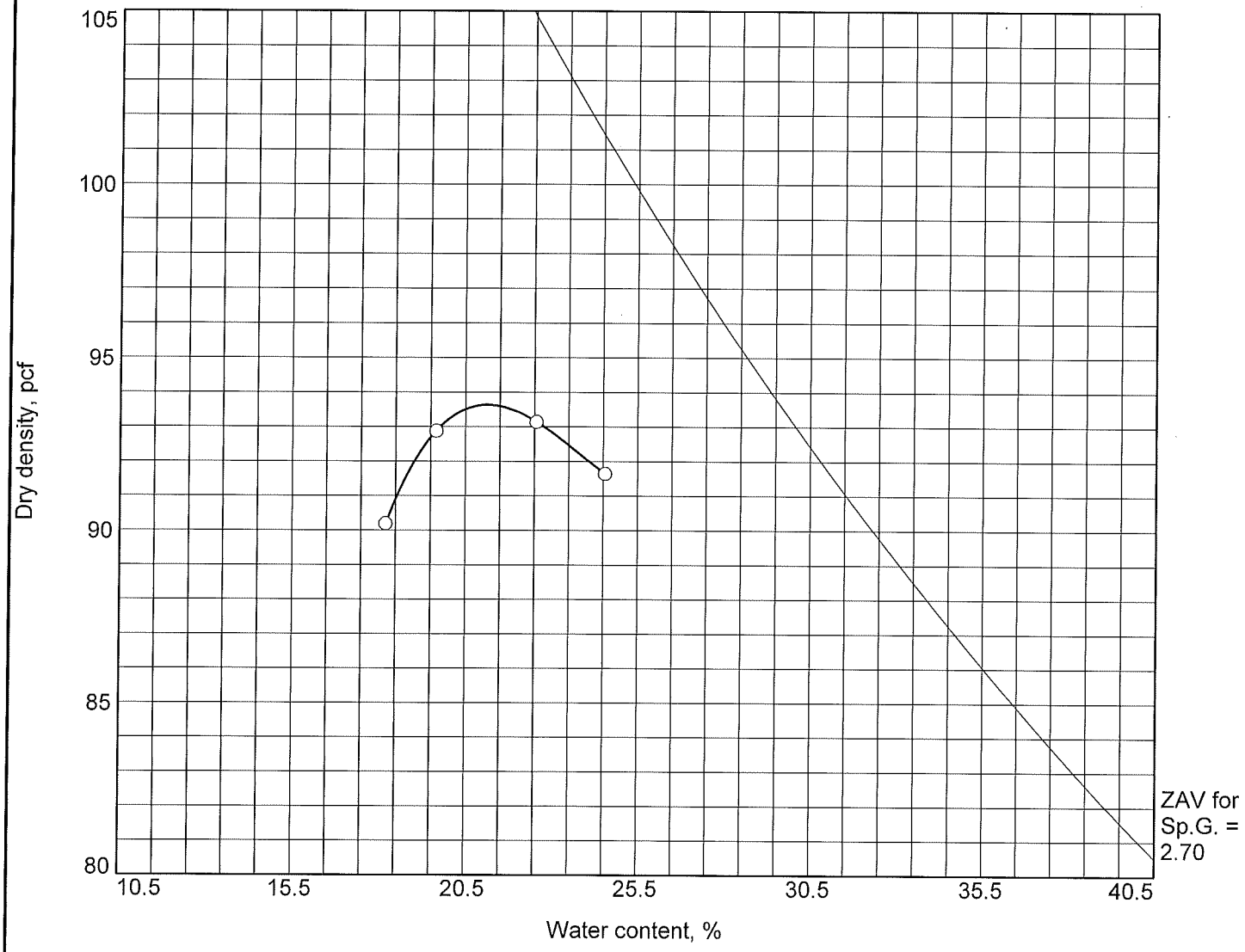
BUNNELL-LAMMONS ENGINEERING, INC.

Asheville, North Carolina

Remarks:
Sample taken 08/03/11.

Figure

MOISTURE DENSITY RELATIONSHIP TEST REPORT



Test specification: ASTM D 698-00 Method A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 93.6 pcf Optimum moisture = 21.1 %	Red sl. brown sl. mic. fi.-med. sandy SILT with bentonite.

Project No. J11-1957-23 **Client:** Haywood County Solid Waste Management
Project: Francis Farm Landfill

○ **Location:** On Site **Sample Number:** 2

BUNNELL-LAMMONS ENGINEERING, INC.

Asheville, North Carolina

Remarks:
Sample Taken 08/03/11

Figure

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL, ENVIRONMENTAL AND CONSTRUCTION MATERIALS CONSULTANTS

PAGE 1 OF 1

DATE 8/05/11

DAILY FIELD REPORT

PROJECT: Francis Farm Landfill		WEATHER	SITE CONDITIONS	TRAVEL TIME: 1.25
LOCATION: Waynesville, NC		☑ SUNNY	☑ DRY	TIME ON SITE: 3.25
CLIENT: 1957-23		☐ OVERCAST	☐ DAMP	TOTAL TIME: 4.53
JOB #	MILEAGE:	☐ RAIN	☐ WET / MUDDY	
CONTRACTOR: P, M & C	TEMPERATURE:	☐ SNOW / ICE	☐ FROZEN	*STANDBY TIME:

FIELD TESTING PERFORMED	☑ SOIL DENSITY	☐ CONCRETE	☐ FOUNDATION	☐ REBAR	☐ MASONRY	☐ PROOFROLLING
	☐ STONE DENSITY	☐ ASPHALT	☐ STRUCTURAL STEEL	☐ FIREPROOFING	☐ OBSERVATION	☐ OTHER

On 8.05.11, a BLE rep visited Francis Farm Landfill to conduct soil density tests on the Trench Line (Gas & Leachate) Backfill. A total of ten soil density tests were conducted today. Data from the tests will be given to the Project Manager for review. Rep also collected a bulk sample of the Trench Backfill (with bentonite) and transported it back to the Lab for analysis.

* EXPLANATION OF STANDBY TIME:

COPY TO:	REV. BY:	DATE: 8.05.11	TECHNICIAN: Ben Hiebert

NOTE: All data subject to Engineering review.

BUNNELL-LAMMONS ENGINEERING, INC.

ASHEVILLE, NORTH CAROLINA • PHONE: (828) 277-0100 • FAX: (828) 277-0110

WHITE: BLE COPY **YELLOW:** CLIENT FIELD COPY **PINK:** TECH. COPY

BLE INC.
105 Fairview Road, Suite A
Asheville, North Carolina 28803
Phone: (828) 277-0100
Fax: (828) 277-0110

REPORT OF FIELD DENSITY TESTS

PROJECT: Francis Farm Landfill
PROJECT NO: J11-1957-23
CLIENT: Haywood County Solid Waste Management

PROCTOR DATA:

Proctor I.D.	1
Maximum Dry Density (pcf)	95.4
Optimum Moisture (%)	23.5
Method	**D-698**

TEST DATA:

Date	Test No.	Depth or Elevation	Location	Proctor I.D.	Dry Density (pcf)	Moisture Content (%)	Compaction (%) Measured	Compaction (%) Required	"x" if fail
08/05/11	1		Trench Backfill between EW - 10 & EW - 12	1	83.6	28.4	88	95	x
08/05/11	2		Trench Backfill between EW - 8 & EW - 12	1	74.9	35.5	79	95	x
08/05/11	3		Trench Backfill between EW - 8 & EW - 9	1	83.6	31.4	88	95	x
08/05/11	4		Trench Backfill between EW - 4 & EW - 5	1	79.8	30.5	84	95	x
08/05/11	5		Trench Backfill ~ 20' South of EW - 2	1	85.5	29.0	90	95	x
08/05/11	6		Trench Backfill ~ 35' WE of EW - 3	1	86.3	20.6	90	95	x
08/05/11	7		Trench Backfill between EW-10 & EW12	1	84.0	32.9	88	95	x
08/05/11	8		Trench Backfill between EW - 6 & EW - 7	1	80.3	31.8	84	95	x
08/05/11	9		Trench Backfill between EW- 10 & EW - 13	1	78.0	22.1	82	95	x
08/05/11	10		Trench Backfill between EW - 15 & EW - 16	1	83.8	31.7	88	95	x

NOTE: Results represent only the test locations and elevations indicated on the report

Tests performed by Nuclear Gauge Method ASTM D-6938

BUNNELL-LAMMONS ENGINEERING, INC.
105 Fairview Road, Suite A
Asheville, North Carolina 28803

Phone (828) 277-0100
Fax (828) 277-0110

To: Haywood County
Solid Waste Management
278 Recycle Road
Clyde, NC 28721

Date: August 23, 2011

Project Number: J11-1957-23

Project Name: Francis Farm Landfill

Attention: Mr. Stephen King
sking@haywoodnc.net

E-MAILED AUG 23 2011

Attached is the Following:

1	Daily Field Report dated August 17, 2011
1	Daily Field Report dated August 19, 2011
1	Field Density Test dated August 19, 2011

Jesse Jacobson, Project Manager

cc: McGill Associates, P.A. (Mr. Jeff Bishop - jeff.bishop@mcgillengineers.com)
(Mr. Bill Sperry - bill.sperry@mcgillengineers.com)

slv

BUNNELL-LAMMONS ENGINEERING, INC.
GEOTECHNICAL, ENVIRONMENTAL AND CONSTRUCTION MATERIALS CONSULTANTS

PAGE 1 OF 1

DATE 8 / 17 / 11

DAILY FIELD REPORT

PROJECT: Francis Farm Landfill		WEATHER	SITE CONDITIONS	TRAVEL TIME: 1.25
LOCATION: Waynesville, NC		☑ SUNNY	☑ DRY	TIME ON SITE: 1.25
CLIENT: Haywood County Solid Waste		☐ OVERCAST	☐ DAMP	TOTAL TIME: 2.50
JOB # 1957-23	MILEAGE:	☐ RAIN	☐ WET / MUDDY	
CONTRACTOR:	TEMPERATURE:	☐ SNOW / ICE	☐ FROZEN	*STANDBY TIME:

FIELD TESTING PERFORMED						
	☐ SOIL DENSITY	☐ CONCRETE	☐ FOUNDATION	☐ REBAR	☐ MASONRY	☐ PROOFROLLING
	☐ STONE DENSITY	☐ ASPHALT	☐ STRUCTURAL STEEL	☐ FIREPROOFING	☐ OBSERVATION	☑ OTHER

On 8-17-11, a BLE rep visited Francis Farm Landfill to provide services. Upon arrival, rep collected six soil samples using a UD tube sampler (UD = Undisturbed) at three locations (two samples from each location) within the trench backfill on the landfill cap.

Samples will be transfered to the BLE Laboratory for proper testing. Results will be provided once the testing is completed.

* EXPLANATION OF STANDBY TIME:

COPY TO:	REV. BY:	DATE: 8-17-11	TECHNICIAN: Ben Hislett

NOTE: All data subject to Engineering review.

BUNNELL-LAMMONS ENGINEERING, INC.
GEOTECHNICAL, ENVIRONMENTAL AND CONSTRUCTION MATERIALS CONSULTANTS

PAGE 1 OF 1

DATE 8/19/11

DAILY FIELD REPORT

PROJECT: Francis Farm Landfill		WEATHER	SITE CONDITIONS	TRAVEL TIME: 1.25
LOCATION: Waynesville, NC		☑ SUNNY	☑ DRY	TIME ON SITE: 2.50
CLIENT: Haywood Co. Solid Waste		☐ OVERCAST	☑ DAMP	TOTAL TIME: 3.75
JOB # 1957-23	MILEAGE:	☐ RAIN	☐ WET / MUDDY	
CONTRACTOR:	TEMPERATURE:	☐ SNOW / ICE	☐ FROZEN	*STANDBY TIME:

FIELD TESTING PERFORMED	☑ SOIL DENSITY	☐ CONCRETE	☐ FOUNDATION	☐ REBAR	☐ MASONRY	☐ PROOFROLLING
	☐ STONE DENSITY	☐ ASPHALT	☐ STRUCTURAL STEEL	☐ FIREPROOFING	☐ OBSERVATION	☐ OTHER

On 8-19-11 a BLE rep visited Francis Farm Landfill to provide services. Upon arrival, rep conducted nine soil density tests on the landfill cap. Data from the tests will be given to the Project Manager for review.

* EXPLANATION OF STANDBY TIME:

COPY TO:	REV. BY:	DATE: 8-19-11	TECHNICIAN:

NOTE: All data subject to Engineering review.

BUNNELL-LAMMONS ENGINEERING, INC.
ASHEVILLE, NORTH CAROLINA • PHONE: (828) 277-0100 • FAX: (828) 277-0110

WHITE: BLE COPY **YELLOW:** CLIENT FIELD COPY **PINK:** TECH. COPY

BLE INC.
105 Fairview Road, Suite A
Asheville, North Carolina 28803
Phone: (828) 277-0100
Fax: (828) 277-0110

REPORT OF FIELD DENSITY TESTS

PROJECT: Francis Farm Landfill
PROJECT NO: J11-1957-23
CLIENT: Haywood County Solid Waste Management

PROCTOR DATA:

Proctor I.D.	1
Maximum Dry Density (pcf)	95.4
Optimum Moisture (%)	23.5
Method	**D-698**

TEST DATA:

Date	Test No.	Depth or Elevation	Location	Proctor I.D.	Dry Density (pcf)	Moisture Content (%)	Compaction (%) Measured	Compaction (%) Required	"x" if fail
08/19/11	11	SG	~ 40' East of EW - 12	1	82.5	34.7	86	95	x
08/19/11	12	SG	~ 30' South of EW - 10	1	84.4	26.7	88	95	x
08/19/11	13	SG	~ 30' Southeast of EW - 6	1	76.5	30.3	80	95	x
08/19/11	14	SG	~ 40' North of EW - 3	1	89.2	28.0	94	95	x
08/19/11	15	SG	~ 60' East of EW - 4	1	78.6	24.5	82	95	x
08/19/11	16	SG	~ 50' Southeast of EW - 8	1	88.1	25.9	92	95	x
08/19/11	17	SG	~ 40' West of EW - 14	1	86.1	29.6	90	95	x
08/19/11	18	SG	~ 60' East of EW - 9	1	71.2	36.7	75	95	x
08/19/11	19	SG	~ 30' East of EW - 1	1	92.1	24.4	97	95	

NOTE: Results represent only the test locations and elevations indicated on the report

Tests performed by Nuclear Gauge Method ASTM D-6938

BUNNELL-LAMMONS ENGINEERING, INC.
105 Fairview Road, Suite A
Asheville, North Carolina 28803

Phone (828) 277-0100
Fax (828) 277-0110

To: Haywood County
Solid Waste Management
278 Recycle Road
Clyde, NC 28721

Date: August 29, 2011

Project Number: J11-1957-23

Project Name: Francis Farm Landfill

Attention: Mr. Stephen King
sking@haywoodnc.net

E-MAILED AUG 29 2011

Attached is the Following:

1 Daily Field Report dated August 23, 2011

Jesse Jacobson, Project Manager

cc: McGill Associates, P.A. (Mr. Jeff Bishop - jeff.bishop@mcgillengineers.com)
(Mr. Bill Sperry - bill.sperry@mcgillengineers.com)

slv

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.
GEOTECHNICAL, ENVIRONMENTAL AND CONSTRUCTION MATERIALS CONSULTANTS

PAGE 1 OF 1

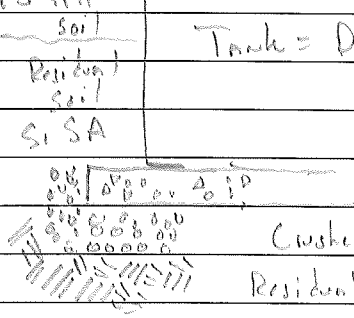
DATE 8/23/11

DAILY FIELD REPORT

PROJECT: Francis Farm Landfill		WEATHER	SITE CONDITIONS	TRAVEL TIME: 1.25
LOCATION: Waynesville, NC		☑ SUNNY	☑ DRY	TIME ON SITE: 1.25
CLIENT: McGill		☐ OVERCAST	☐ DAMP	TOTAL TIME: 2.5
JOB # J11-1957-03	MILEAGE: 59	☐ RAIN	☐ WET / MUDDY	
CONTRACTOR: Payne Mcginn Cumm	TEMPERATURE: 77°F	☐ SNOW / ICE	☐ FROZEN	*STANDBY TIME: —

FIELD TESTING PERFORMED						
	☐ SOIL DENSITY	☐ CONCRETE	☑ FOUNDATION	☐ REBAR	☐ MASONRY	☐ PROOFROLLING
	☐ STONE DENSITY	☐ ASPHALT	☐ STRUCTURAL STEEL	☐ FIREPROOFING	☑ OBSERVATION	☐ OTHER

Arrived on-site as requested by the Contractor (Payne McGinn & Cummins) to evaluate the foundation soil for the Knockout pot. BLE was met on-site by Doug w/ Payne McGinn & Cummins and by Mr. Scott Burnell with McGill. Upon arrival the excavations had been dug to a depth of ± 12½ to 13' below the existing ground surface. The excavation was shored with a large trench box. BLE evaluated the exposed soils with a steel probe rod. Visual observations indicated that the soil exposed was residual soil, it appears that ± top 4 to 5 feet below existing grade is fill material and the underlying soil is residual. The soil probe very tight with less than ½" to ¾" of penetration at the excavated level. Based on our field testing and observation today, it is our opinion that the exposed soils will provide suitable support for the proposed Prefabricated Knockout pot. Results were provided to McGill and Payne/McGinn/Cummings. While BLE was on-site Contractor placed ± 8"-10" of crushed stone in the excavation and formed up the area in preperation for the Concrete pad.



Tank = Perfab HDPE Knockout pot

* EXPLANATION OF STANDBY TIME:

on-site 200 Depart 315

COPY TO:	REV. BY:	DATE: 8/23/11	TECHNICIAN: SCI

NOTE: All data subject to Engineering review.

BUNNELL-LAMMONS ENGINEERING, INC.
105 Fairview Road, Suite A
Asheville, North Carolina 28803

Phone (828) 277-0100
Fax (828) 277-0110

To: Haywood County
Solid Waste Management
278 Recycle Road
Clyde, NC 28721

Date: September 21, 2011

Project Number: J11-1957-23

Project Name: Francis Farm Landfill

Attention: Mr. Stephen King
sking@haywoodnc.net

Attached is the Following:

1	Daily Field Report dated August 31, 2011
1	Cylinder/Prism Pick-Up Log dated September 2, 2011
1	Daily Field Report dated September 12, 2011
1	Field Density Test dated September 12, 2011
3	Hydraulic Conductivity Test Results dated August 29, 2011

Jesse Jacobson, Project Manager

cc: McGill Associates, P.A. (Mr. Jeff Bishop - jeff.bishop@mcgillengineers.com)
(Mr. Bill Sperry - bill.sperry@mcgillengineers.com)

slv

BLE INC.

BUNNELL-LAMMONS ENGINEERING, INC.

GEOTECHNICAL, ENVIRONMENTAL AND CONSTRUCTION MATERIALS CONSULTANTS

PAGE 1 OF 1

DATE 8/31/11

DAILY FIELD REPORT

PROJECT: Francis Farm Landfill		WEATHER	SITE CONDITIONS	TRAVEL TIME: 1.25
LOCATION: Waynesville NC		☒ SUNNY	☒ DRY	TIME ON SITE: 3.25
CLIENT:		☐ OVERCAST	☐ DAMP	TOTAL TIME: 4.50
JOB # 1957-23	MILEAGE:	☐ RAIN	☐ WET / MUDDY	
CONTRACTOR:	TEMPERATURE: 84	☐ SNOW / ICE	☐ FROZEN	*STANDBY TIME: 1.00

FIELD TESTING PERFORMED							
	☐ SOIL DENSITY	☒ CONCRETE	☐ FOUNDATION	☐ REBAR	☐ MASONRY	☐ PROOFROLLING
	☐ STONE DENSITY	☐ ASPHALT	☐ STRUCTURAL STEEL	☐ FIREPROOFING	☐ OBSERVATION	☐ OTHER

As Requested A BLE tech was on-site to provide testing Services. The tech performed Concrete testing for the gas pad Slabs approx. 500 l/ds from the entrance of the Site. The Contractor placed the mix & the Forms did not hold for the gen. pad. The contractor took a Trackhoe and placed enough soil on the back side of the form to hold the weight of the mix. The tech performed a Slump = 4.00" The temp = 84° air & 78° mix. The Concrete ticket provided by Southern Concrete was written in hand due to a Computer issue at their main office. a tech will return to transport the Cylinders to a BLE lab for further testing & review

* EXPLANATION OF STANDBY TIME:

COPY TO:	REV. BY:	DATE:	TECHNICIAN:

NOTE: All data subject to Engineering review.

BUNNELL-LAMMONS ENGINEERING, INC.

ASHEVILLE, NORTH CAROLINA • PHONE: (828) 277-0100 • FAX: (828) 277-0110

WHITE: BLE COPY **YELLOW:** CLIENT FIELD COPY **PINK:** TECH. COPY

BLE

Bunnell-Lammons Engineering, Inc.
Geotechnical, Environmental and
Construction Materials Consultants

CYLINDER/ PRISM PICK-UP LOG

Project: Francis Farm	Location: Waynesville	Travel Time: 1.25
Client: McGill & Assoc.	Weather: Sunny	Time On Site: 0.50
Job Number: 1957-23	Mileage:	Total Time: 1.75
Date: 9-2-11	Temp: 84°	

The site was visited by the undersigned to retrieve 1 ~~set(s)~~ of cylinders/prisms. They will be transported to our laboratory for compressive strength testing in a cylinder cradle with suitable cushioning material to prevent damage from jarring.

Technician: 

BUNNELL-LAMMONS ENGINEERING, INC.
GEOTECHNICAL, ENVIRONMENTAL AND CONSTRUCTION MATERIALS CONSULTANTS

PAGE 1 OF 1

DATE 9 / 12 / 11

DAILY FIELD REPORT

PROJECT: Francis Farm Landfill	WEATHER	SITE CONDITIONS	TRAVEL TIME: 1.50
LOCATION: Waynesville, NC	☒ SUNNY	☒ DRY	TIME ON SITE: 1.00
CLIENT: Haywood County Solid Waste Management	☐ OVERCAST	☐ DAMP	TOTAL TIME: 2.50
JOB # 1957-23 MILEAGE: 63 miles	☐ RAIN	☐ WET / MUDDY	
CONTRACTOR: Paine, McGinn + Cummins TEMPERATURE: 70°	☐ SNOW / ICE	☐ FROZEN	*STANDBY TIME:

FIELD TESTING PERFORMED						
☒ SOIL DENSITY	☐ CONCRETE	☐ FOUNDATION	☐ REBAR	☐ MASONRY	☐ PROOFROLLING
☐ STONE DENSITY	☐ ASPHALT	☐ STRUCTURAL STEEL	☐ FIREPROOFING	☐ OBSERVATION	☐ OTHER

Technician arrived onsite as requested. Contractors had backfilled a trench across Farmview Drive. A field density compaction test was performed, using the nuclear method, where the trench crossed the road. The test result was 98.9% based on a maximum dry density of the ABC stone provided by the quarry the stone came from. Daryl, with Paine, McGinn and Cummins was informed of the result.

* EXPLANATION OF STANDBY TIME:

COPY TO:	REV. BY:	DATE:	TECHNICIAN:

NOTE: All data subject to Engineering review.

BUNNELL-LAMMONS ENGINEERING, INC.
ASHEVILLE, NORTH CAROLINA • PHONE: (828) 277-0100 • FAX: (828) 277-0110

WHITE: BLE COPY **YELLOW:** CLIENT FIELD COPY **PINK:** TECH. COPY

IBLE INC.
105 Fairview Road, Suite A
Asheville, North Carolina 28803
Phone: (828) 277-0100
Fax: (828) 277-0110

REPORT OF FIELD DENSITY TESTS

PROJECT: Francis Farm Landfill
PROJECT NO: J11-1957-23
CLIENT: Haywood County Solid Waste Management

PROCTOR DATA:

Proctor I.D.	1	2
Maximum Dry Density (pcf)	95.4	149.5
Optimum Moisture (%)	23.5	6.2
Method	**D-698**	**D-698**

TEST DATA:

Date	Test No.	Depth or Elevation	Location	Proctor I.D.	Dry Density (pcf)	Moisture Content (%)	Compaction (%)		"x" if fail
							Measured	Required	
09/12/11	20	ABC Subbase	Gas line trench across Farmview Dr. - Center of road	2	147.9	3.8	99	95	

NOTE: Results represent only the test locations and elevations indicated on the report

Tests performed by Nuclear Gauge Method ASTM D-6938

BLB INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT: FRANCIS FARM LANDFILL
PROJECT NO.: J11-1957-23
DATE RECEIVED: 8-29-11

TESTED BY: JOHN MATHEW
CHECKED BY: PAUL YARBER

SAMPLE NO. EW-4&5
TYPE UNDISTURBED

SAMPLE LOCATION:
SAMPLE DESCRIPTION: BROWN FI.-MED. SANDY SILT

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.956	7.508	2.990	7.595
Sample Diameter	2.860	7.264	2.869	7.287
Length/Diameter Ratio		1.03		
Moisture Content (%)	WW= 157.2 DW= 121.0	29.9	WW= 172.7 DW= 122.8	40.6
Sample Wet Weight (grams)	495.0		552.5	
Wet Density (pcf)	99.3		108.9	
Dry Density (pcf)	76.4		77.4	
Saturation (%) ASSUMED SG= 2.7	67		93	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

FALLING HEAD TEST

Confining Pressure (psi) 70.2 | Influent Pressure (psi) 68.2 | Effluent Pressure (psi) 68 | B-Value 0.95

Date	Clock Time		Elapsed Time	Pipet Readings				Head		Temp	Gradient	K	Temp	$K_{20°C}$
				Initial		Final		Initial	Final					
	Start	End	seconds	in	out	in	out	cm	cm	°C		(cm/sec)	Correction	(cm/sec)
8-31-11	3:31:40	3:32:41	61	1.0	23.0	2.0	22.0	40.092	37.726	21.0	5	7.7E-05	0.976	7.5E-05
8-31-11	3:32:41	3:33:46	65	2.0	22.0	3.0	21.0	37.726	35.361	21.0	5	7.7E-05	0.976	7.5E-05
8-31-11	3:33:46	3:34:55	69	3.0	21.0	4.0	20.0	35.361	32.995	21.0	5	7.7E-05	0.976	7.5E-05
8-31-11	3:34:55	3:36:09	74	4.0	20.0	5.0	19.0	32.995	30.629	21.0	5	7.7E-05	0.976	7.6E-05
		Pipet Length, cm		28.390	28.390									
		Pipet Volume, cc		24	24									
		Cross-sectional Area of Pipet, cm^2		0.8454	0.8454									

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 7.5E-05 cm/sec

IBLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	FRANCIS FARM LANDFILL	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-1957-23	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	8-29-11		

SAMPLE NO.	EW-6	SAMPLE LOCATION:	
TYPE	UNDISTURBED	SAMPLE DESCRIPTION:	BROWN FI.-MED. SANDY SILT

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.900	7.366	2.940	7.468
Sample Diameter	2.857	7.257	2.861	7.267
Length/Diameter Ratio		1.02		
Moisture Content (%)	WW= 172.7 DW= 137.5	25.6	WW= 242.3 DW= 183.6	32.0
Sample Wet Weight (grams)	542.4		567.4	
Wet Density (pcf)	111.1		114.4	
Dry Density (pcf)	88.5		86.7	
Saturation (%) ASSUMED SG= 2.7	76		91	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

FALLING HEAD TEST

Confining Pressure (psi) 70.2	Influent Pressure (psi) 68.2	Effluent Pressure (psi) 68	B-Value 0.95

Date	Clock Time		Elapsed Time	Pipet Readings				Head		Temp	Gradient	K	Temp	$K_{20°C}$
				Initial		Final		Initial	Final					
	Start	End	seconds	in	out	in	out	cm	cm	°C		(cm/sec)	Correction	(cm/sec)
8-31-11	3:52:50	3:55:38	168	1.0	23.0	2.0	22.0	40.092	37.726	21.0	5	2.8E-05	0.976	2.7E-05
8-31-11	3:55:38	3:58:37	179	2.0	22.0	3.0	21.0	37.726	35.361	21.0	5	2.8E-05	0.976	2.7E-05
8-31-11	3:58:37	4:01:52	195	3.0	21.0	4.0	20.0	35.361	32.995	21.0	5	2.7E-05	0.976	2.6E-05
8-31-11	4:01:52	4:05:20	208	4.0	20.0	5.0	19.0	32.995	30.629	21.0	5	2.7E-05	0.976	2.7E-05
		Pipet Length, cm		28.390	28.390									
		Pipet Volume, cc		24	24									
		Cross-sectional Area of Pipet, cm^2		0.8454	0.8454									

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 2.7E-05 cm/sec

BLE INC.

HYDRAULIC CONDUCTIVITY TEST REPORT

CONSTANT VOLUME APPARATUS (ASTM D 5084)

PROJECT:	FRANCIS FARM LANDFILL	TESTED BY:	JOHN MATHEW
PROJECT NO.:	J11-1957-23	CHECKED BY:	PAUL YARBER
DATE RECEIVED:	8-29-11		

SAMPLE NO.	EW-12	SAMPLE LOCATION:	
TYPE	UNDISTURBED	SAMPLE DESCRIPTION:	BROWN FI.-MED. SANDY SILT

SAMPLE DIMENSIONS AND PROPERTIES

ITEM	INITIAL		FINAL	
	inches	centimeters	inches	centimeters
Sample Length	2.990	7.595	3.049	7.744
Sample Diameter	2.861	7.267	2.913	7.399
Length/Diameter Ratio		1.05		
Moisture Content (%)	WW= 144.9 DW= 112.9	28.3	WW= 222.2 DW= 159.6	39.2
Sample Wet Weight (grams)	510.9		559.0	
Wet Density (pcf)	101.3		104.8	
Dry Density (pcf)	78.9		75.3	
Saturation (%) ASSUMED SG= 2.7	67		86	

HYDRAULIC CONDUCTIVITY TESTING MEASUREMENT

FALLING HEAD TEST

Confining Pressure (psi) 70.2	Influent Pressure (psi) 68.2	Effluent Pressure (psi) 68	B-Value 0.95

Date	Clock Time		Elapsed Time	Pipet Readings				Head		Temp	Gradient	K	Temp	$K_{20°C}$
				Initial		Final		Initial	Final					
	Start	End	seconds	in	out	in	out	cm	cm	°C		(cm/sec)	Correction	(cm/sec)
8-31-11	4:10:00	4:10:48	48	1.0	23.0	2.0	22.0	40.092	37.726	21.0	5	9.6E-05	0.976	9.4E-05
8-31-11	4:10:48	4:11:39	51	2.0	22.0	3.0	21.0	37.726	35.361	21.0	5	9.7E-05	0.976	9.4E-05
8-31-11	4:11:39	4:12:34	55	3.0	21.0	4.0	20.0	35.361	32.995	21.0	5	9.6E-05	0.976	9.4E-05
8-31-11	4:12:34	4:13:33	59	4.0	20.0	5.0	19.0	32.995	30.629	21.0	5	9.6E-05	0.976	9.4E-05
		Pipet Length, cm		28.390	28.390									
		Pipet Volume, cc		24	24									
		Cross-sectional Area of Pipet, cm^2		0.8454	0.8454									

HYDRAULIC CONDUCTIVITY ($K_{20°C}$) 9.4E-05 cm/sec

BLE INC.
BUNNELL-LAMMONS ENGINEERING , INC.
105 Fairview Road, Suite A
ASHEVILLE, NC 28803

Phone: (828) 277-0100
FAX: (828) 277-0110

CONCRETE CYLINDER TEST REPORT

10294

Project:	Francis Farm Landfill
BLE Project Number:	J11-1957-23
Client:	McGill & Associates
Sample Location:	Generator pad along the Southwest end of site. Sample taken at 5' off West corner to the North.

Date Sampled:	8/31/2011	Date Received:	9/6/2011
Sampled By:	Jack Stanford		
No. of Specimens:	5		
Supplier:	SCM		
Truck No.:	Smith	Ticket No.:	*
Batch Time:	10:10		
Sample Time:	10:35		

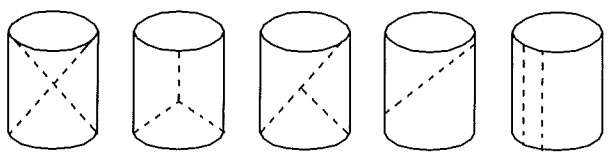
Mix Design No.:		Design Strength:	4,000 psi
Actual Slump:	4 in.	Specified Slump:	
Actual Air Content:		Specified Air Content:	
Air Temperature:	84 F	Mix Temperature:	79 F
Unit Weight:			
Admixtures:			
Gallons Water Added On Site:			

Cylinder Sample	Test Date	Age (days)	Load (lbs)	Dia. (in.)	Area (sq. in.)	Strength (psi)	Type of Fracture
1	9/7/11	7	39,594	4.00	12.57	3,150	B
2	9/28/11	28	47,264	4.00	12.57	3,760	A
3	9/28/11	28	56,423	4.00	12.57	4,490	A
4	9/28/11	28	52,390	4.00	12.57	4,170	A
5		R					

Remarks: Ticket: Concrete ticket was handwritten as the computers were down at SCM.

Reported by: SC1
Jesse Jacobson

Copies to:



AASHTO T22

NCDENR

North Carolina Department of Environment and Natural Resources
Division of Air Quality

Beverly Eaves Perdue
Governor

Sheila C. Holman
Director

Dee Freeman
Secretary

July 14, 2011

Mr. Stephen King
Director, Haywood County Solid Waste Department
Francis Farm Landfill
278 Recycle Drive
Clyde, NC 28721

SUBJECT: Air Permit Applicability Determination
Applicability Determination Application No. 1756
Francis Farm Landfill
Waynesville, Haywood County

Dear Mr. King:

The Division of Air Quality received your completed application on July 1, 2011 requesting that this Office determine whether an Air Quality Permit is necessary for the proposed methane gas combustion system at the Francis Farm Landfill, Haywood County, North Carolina. The approximately 89 scfm landfill gas combustion system will include a generator (approximately 75 kW / 35 scfm) and a flare.

The July 1, 2011 letter indicates that actual air emissions of criteria air pollutants from the project, including nitrogen oxides and carbon monoxide, will each be less than 5 tons per year. NC Regulation 15A NCAC 2Q .0102(c)(2)(E)(ii) exempts facilities from air quality permitting as follows:

> *any facility whose actual emissions of particulate, sulfur dioxide, nitrogen oxides, volatile organic compounds, and carbon monoxide before air pollution control devices, i.e., uncontrolled emissions, are each less than five tons per year, whose potential emissions of all hazardous air pollutants are below their lesser quantity cutoff emission rate, and none of whose sources would violate an applicable emissions standard;*

Therefore, this Office has determined that an Air Quality Permit is not required for the proposed methane gas combustion system. It should be noted that this exemption from the permitting requirement does not exempt the Haywood County Solid Waste Department from complying with any applicable regulations.

Furthermore, should you decide to modify the process such that the result is an increase of emissions of air pollutants including toxic air pollutants, an Air Quality Permit may be required and the Haywood County Solid Waste Department should submit a permit application to this Office prior to such actions.

It should also be noted that future Regulations including Federal Maximum Achievable Control Technology (MACT) for hazardous air pollutant (HAP) may be promulgated and adopted by the Division which apply to this type of facility. If so the Haywood County Solid Waste Department may be required to apply for an Air Quality Permit for this equipment at that date.

The gas-fired engine may be subject to the following federal rules and the Haywood County Solid Waste Department should ensure compliance if applicable: 40 CFR 60 Subpart JJJJ *Standards of Performance for Stationary Spark Ignition Internal Combustion Engines* and 40 CFR 63 Subpart ZZZZ *National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines.*

This exemption from the permitting requirement is based upon your statement that equipment will be operated under the threshold levels as outlined in the Regulation. Please be advised that the operation of any air pollution emission sources which results in emissions in excess of the threshold levels without an Air Quality Permit is a violation of 15A NCAC 2Q.0101, "Required Air Quality Permits." If this facility is required to obtain an Air Quality Permit for this equipment in the future because of increased emissions, each day of operation of the emission sources without an Air Quality Permit represents a separate violation. Such violations may be subject to enforcement action, including a civil penalty of up to $25,000 per violation and/or injunctive relief, pursuant to NCGS 143-215.114A.

If you have any questions, with reference to the above matter, please do not hesitate to contact Brendan Davey at (828) 296-4500.

Sincerely,

Paul K. Muller

Paul K. Muller, P.E.
Regional Air Quality Supervisor

PKM:bgd

cc: Asheville Regional Office
William Sperry (McGill Associates)

North Carolina Department of Environment and Natural Resources
Division of Water Quality

Beverly Eaves Perdue
Governor

Coleen H. Sullins
Director

Dee Freeman
Secretary

July 29, 2011

Marty Stamey, County Manager
Haywood County, North Carolina
215 N. Main Street
Waynesville, NC 28786

Subject: Permit No. WQ0035486
Haywood County
Francis Farm Leachate Pump Station
Wastewater Collection System

Dear Mr.Stamey:

In accordance with your application received July 1, 2011, we are forwarding herewith Permit No. WQ0035486, dated July 29, 2011, to Haywood County for the construction and operation of the subject wastewater collection system extension. This permit shall be effective from the date of issuance until rescinded, and shall be subject to the conditions and limitations as specified therein. This cover letter shall be considered a part of this permit and is incorporated therein by reference. Please send Jeff Menzel or Don Price a copy of the "notice to proceed" issued to your contractor for this collection system extension.

Please pay particular attention to Permit Condition 3 which requires that the wastewater collection facilities be properly operated and maintained in accordance with 15A NCAC 2T .0403 or any individual system-wide collection system permit issued to the Permittee.

Permitting of this project does not constitute an acceptance of any part of the project that does not meet 15A NCAC 2T; the Division of Water Quality's (Division) Gravity Sewer Minimum Design Criteria adopted February 12, 1996 as applicable; and the Division's Minimum Design Criteria for the Fast-Track Permitting of Pump Stations and Force Mains adopted June 1, 2000 as applicable, unless specifically mentioned herein. Division approval is based on acceptance of the certification provided by the North Carolina-licensed Professional Engineer named in the application. It shall be the Permittee's responsibility to ensure that the as-constructed project meets the appropriate design criteria and rules. Failure to comply may result in penalties in accordance with North Carolina General Statute §143-215.6A through §143-215.6C, construction of additional or replacement wastewater collection facilities, and/or referral of the North Carolina-licensed Professional Engineer to the licensing board.

In accordance with the provisions of Article 21 of Chapter 143, General Statutes of North Carolina as amended, and other applicable Laws, Rules, and Regulations, permission is hereby granted to Haywood County for the construction and operation of approximately 1,212 linear feet of 2-inch force main and pump station with duplex pumps with on-site audible and visual high water alarms, as part of the Francis Farm Leachate Pump Station project, and the discharge of collected landfill leachate wastewater into the Town of Waynesville existing sewerage system, pursuant to the application received July 1, 2011 and in conformity with 15A NCAC 2T; the Division's Gravity Sewer Minimum Design Criteria adopted February 12, 1996 as applicable; the Division's Minimum Design Criteria for the Fast-Track Permitting of Pump Stations and Force Mains adopted June 1, 2000 as applicable; and other supporting data subsequently filed and approved by the Department of Environment and Natural Resources and considered a part of this permit;

The sewage and wastewater collected by this system shall be treated in the Town of Waynesville Wastewater Treatment Facility (Permit No. NC0025321) prior to being discharged into the receiving stream.

This permit shall become voidable unless the agreement between Haywood County and Town of Waynesville for the collection and final treatment of wastewater is in full force and effect.

If any parts, requirements, or limitations contained in this permit are unacceptable, you have the right to request an adjudicatory hearing upon written request within 30 days following receipt of this permit. This request must be in the form of a written petition, conforming to Chapter 150B of North Carolina General Statutes, and filed with the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, NC 27699-6714. Unless such demands are made, this permit shall be final and binding.

If you need additional information concerning this matter, please contact Jeff Menzel or Don Price at (828) 296-4500.

Sincerely,

Roger C. Edwards

for Coleen H. Sullins, Director
Division of Water Quality

cc: Town of Waynesville WWTP NC0025321
William Sperry, Project Manager/McGill Associated
Surface Water Protection Section Central Files
PERCS Files

S:\SWP\Haywood\Collection Systems\Waynesville Collection System\WQ0035486 Francis Farm Landfill 07-29-2011.doc

NORTH CAROLINA

ENVIRONMENTAL MANAGEMENT COMMISSION

DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

RALEIGH

WASTEWATER COLLECTION SYSTEM EXTENSION PERMIT

This permit shall be effective from the date of issuance until rescinded and shall be subject to the following specified conditions and limitations:

1. This permit shall become voidable unless the wastewater collection facilities are constructed in accordance with the conditions of this permit; 15A NCAC .0200; the Division of Water Quality's (Division) Gravity Sewer Minimum Design Criteria adopted February 12, 1996 as applicable; the Division's Minimum Design Criteria for the Fast-Track Permitting of Pump Stations and Force Mains adopted June 1, 2000 as applicable; and other supporting materials unless specifically mentioned herein.

2. This permit shall be effective only with respect to the nature and volume of wastes described in the application and other supporting data.

3. The wastewater collection facilities shall be properly maintained and operated at all times. The Permittee shall maintain compliance with an individual system-wide collection system permit for the operation and maintenance of these facilities as required by 15A NCAC 2T .0403. If an individual permit is not required, the following performance criteria shall be met as provided in 15A NCAC 2T .0403:

   a. The sewer system shall be effectively maintained and operated at all times to prevent discharge to land or surface waters, and any contravention of the groundwater standards in 15A NCAC 2L .0200 or the surface water standards in 15A NCAC 2B .0200.

   b. A map of the sewer system shall be developed and shall be actively maintained.

   c. An operation and maintenance plan shall be developed and implemented.

   d. Pump stations that are not connected to a telemetry system shall be inspected every day (i.e. 365 days per year). Pump stations that are connected to a telemetry system shall be inspected at least once per week.

   e. High-priority sewer lines shall be inspected at least once per every six-month period of time.

   f. A general observation of the entire sewer system shall be conducted at least once per year.

   g. Inspection and maintenance records shall be maintained for a period of at least three years.

   h. Overflows and bypasses shall be reported to the appropriate Division regional office in accordance with 15A NCAC 2B .0506(a), and public notice shall be provided as required by North Carolina General Statute §143-215.1C.

4. **This permit shall not be transferable.** In the event there is a desire for the wastewater collection facilities to change ownership, or there is a name change of the Permittee, a formal permit request shall be submitted to the Division accompanied by documentation from the parties involved, and other supporting materials as may be appropriate. The approval of this request shall be considered on its merits and may or may not be approved.

5. Construction of the gravity sewers, pump stations, and force mains shall be scheduled so as not to interrupt service by the existing utilities nor result in an overflow or bypass discharge of wastewater to the surface waters of the State.

6. Upon completion of construction and prior to operation of these permitted facilities, a certification, a copy of the construction record drawings, as well as supporting design calculations for any pump stations permitted as part of this project shall be received from a North Carolina-licensed Professional Engineer certifying that the facilities have been installed in accordance with this permit; 15A NCAC 2T; the Division's Gravity Sewer Design Criteria adopted February 12, 1996 as applicable; the Division's Minimum Design Criteria for the Fast-Track Permitting of Pump Station and Force Main adopted June 1, 2000 as applicable; and other supporting materials. If this project is to be completed in phases and partially certified, you shall retain the responsibility to track further construction approved under the same permit, and shall provide a final certificate of completion once the entire project has been completed. A copy of the construction record drawings, indicating the facilities constructed in the phase being certified, shall be submitted with each partial certification. Mail the Engineer's Certification, one copy of the "Construction Record Drawings," and one copy of the supporting design calculations to the Non-Discharge Permitting Unit, 1617 Mail Service Center, Raleigh, NC 27699-1617.

7. A copy of the construction record drawings shall be maintained on file by the Permittee for the life of the wastewater collection facilities.

8. Failure to abide by the conditions and limitations contained in this permit; 15A NCAC 2T.; the Division's Gravity Sewer Design Criteria adopted February 12, 1996 as applicable; the Division's Minimum Design Criteria for the Fast-Track Permitting of Pump Station and Force Mains adopted June 1, 2000 as applicable; and other supporting materials may subject the Permittee to an enforcement action by the Division, in accordance with North Carolina General Statutes §143-215.6A through §143-215.6C.

9. In the event that the wastewater collection facilities fail to perform satisfactorily, including the creation of nuisance conditions, the Permittee shall take immediate corrective action, including those as may be required by this Division, such as the construction of additional or replacement facilities.

10. The issuance of this permit shall not exempt the Permittee from complying with any and all statutes, rules, regulations, or ordinances that may be imposed by other government agencies (local, state and federal) which have jurisdiction, including but not limited to applicable river buffer rules in 15A NCAC 2B .0200, erosion and sedimentation control requirements in 15A NCAC Ch. 4 and under the Division's General Permit NCG010000, and any requirements pertaining to wetlands under 15A NCAC 2B .0200 and 15A NCAC 2H .0500.

11. **Noncompliance Notification:**

The Permittee shall report by telephone to a water quality staff member at the Asheville Regional Office, telephone number (828) 296-4500, as soon as possible, but in no case more than 24 hours or on the next working day, following the occurrence or first knowledge of the occurrence of either of the following:

a. Any process unit failure, due to known or unknown reasons, that renders the facility incapable of adequate wastewater transport, such as mechanical or electrical failures of pumps, line blockage or breakage, etc.; or

b. Any failure of a pumping station or sewer line resulting in a by-pass directly to receiving waters without treatment of all or any portion of the influent to such station or facility.

Voice mail messages or faxed information is permissible but this shall not be considered as the initial verbal report. Overflows and spills occurring outside normal business hours may also be reported to the Division of Emergency Management at telephone number (800) 858-0368 or (919) 733-3300. Persons reporting any of the above occurrences shall file a spill report by completing Part I of Form CS-SSO (or the most current Division approved form), within five days following first knowledge of the occurrence. This report shall outline the actions taken or proposed to ensure that the problem does not recur. Per Condition I(2), Part II of Form CS-SSO (or the most current Division approved form) can also be completed to show that the SSO was beyond control.

Permit issued this the 29th day of July, 2011

NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

Roger C. Edwards

for Coleen H. Sullins, Director
Division of Water Quality
By Authority of the Environmental Management Commission

Permit Number WQ0035486

ENGINEERING CERTIFICATION – POST CONSTRUCTION

System Description:

permission is hereby granted to Haywood County for the construction and operation of approximately 1,212 linear feet of 2-inch force main and pump station with duplex pumps with on-site audible and visual high water alarms, as part of the Francis Farm Leachate Pump Station project, and the discharge of collected landfill leachate wastewater into the Town of Waynesville existing sewerage system.

Complete and submit this form to the Asheville regional office with the following:

- One copy of the project record drawings (plan & profile views of sewer lines) of the wastewater collection system extension
- supporting design calculations (selected pumps, system curve, operating point, available storage if portable generator(s) or storage greater than longest past three year outage reliability option selected) for any pump stations permitted as part of this project
- Changes to the project should be clearly identified on the record drawings or in written summary form. Permit modifications are required for any changes resulting in non-compliance with this permit, regulations or minimum design criteria.

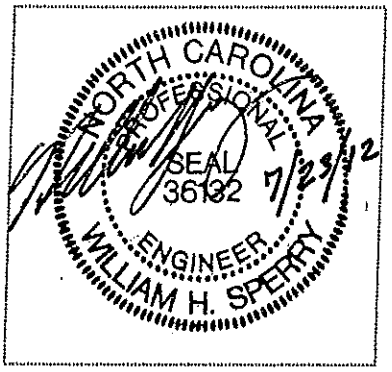
This project shall not be considered complete nor allowed to operate until this Engineer's Certification and all required supporting documentation have been received by the Division. **Therefore, it is highly recommended that this certification be sent in a manner that provides proof of receipt by the Division.**

ENGINEER'S CERTIFICATION

☐ Partial ☒ Final

I, William H. Sperry, as a duly registered Professional Engineer in the State of North Carolina, having been authorized to observe (☒ periodically, ☐ weekly, ☐ full time) the construction of the above referenced project for the Permittee hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance of this permit; 15A NCAC 2T; the Division of Water Quality's (Division) Gravity Sewer Minimum Design Criteria adopted February 12, 1996 as applicable; the Division's Minimum Design Criteria for the Fast-Track Permitting of Pump Stations and Force Mains adopted June 1, 2000 as applicable; and other supporting materials.

North Carolina Professional Engineer's seal, signature, and date:



SEND THIS FORM & SUPPORTING DOCUMENTATION WITH REQUIRED ATTACHMENTS TO THE FOLLOWING ADDRESS

ROGER C. EDWARDS
SURFACE WATER PROTECTION SUPERVISOR
ASHEVILLE REGIONAL OFFICE
2090 US HIGHWAY 70
SWANNANOA, NC 28778

The Permittee is responsible for tracking all partial certifications up until a final certification is received. Any wastewater flow made tributary to the wastewater collection system extension prior to completion of this Engineer's Certification shall be considered a violation of the permit and shall subject the Permittee to appropriate enforcement actions.

Francis Farm Landfill
Haywood County, North Carolina

Permit No. WQ0035486

The Francis Farm Landfill pump station is a packaged unit with dual pumps specified to operate at 30 gpm at 23 feet TDH. The pumps as installed operate at ±32 gpm at ±23 feet TDH or ±30 gpm at ±25.8 feet TDH. A copy of the applicable pump curve is attached to this project description. Also attached is data on the pumps. The pumps are controlled to operate as alternating pumps under normal conditions. If needed to handle the flow the pumps will operate as "lead on" then "lag on". The pump station is equipped with an auto-dialer and both audible and visual alarm systems should the pumps fail to operate and the level of liquid in the wet well continues to rise.

The package pump station receives its flow from six (6) down-hole variable speed piston pumps specifically designed to remove leachate from water logged landfill gas wells. The pumps utilized on this project are capable of varying the pump rate from a low of approximately 1/2 gallon per minute to a maximum of approximately 3.3 gallons per minute. During the initial week of operation the pumps will be set at the maximum pump rate to remove the accumulated water in the wells and the surrounding waste mass. After approximately a week of operation the pump rate will be dialed back to approximately 1/2 to 1 gallon per minute as the recharge rate for solid waste is generally very slow. The intent is to keep the wells relatively clear of liquid to enhance the flow of methane gas to the collection and combustion system. Once the initial liquid is removed the anticipated flow rate to the pump station should be in the range of 3 – 6 gallons per minute. A knockout pot for collection condensate from the landfill gas collection lines also discharges into the package pump station. The pump in this tank is also a down-hole variable speed piston pump with the same capacity and operating characteristics as the aforementioned pumps except that it is operated with liquid level transducers to control when it runs.

The pump station, the knockout pot pump and the down-hole variable speed piston pumps operate off the same single electrical feed from Haywood EMC. The electrical power comes into the main disconnect located on a power control panel rack located in the vicinity of the pump station. From the main disconnect the power runs through a double-throw switch panel to allow the use of stand-by generator power should the need arise. From there the pump station, the down-hole piston pumps and the flare system feed through designated control panels. A unique feature of this system is that in the event of a system power failure at the site then all systems go down simultaneously and the flow to the pump station ceases except for the flow left in the pipes at the time the power ceased. When the power is restored, the pumping systems will restart automatically. Should the need arise, the entire system is equipped with a power connect feed for a standby generator. Operators are on site daily to monitor the operation of the flare system, the engine/generator system and the operation of the pump station.

The pump station is a 48" diameter unit that is 12'-6" in total vertical height with a capacity of approximately 94 gallons of liquid per vertical foot. Basically this package pump station has storage capacity in excess of approximately 640 gallons to 752 gallons that could be utilized in the case of an emergency or power outage.

McGill ASSOCIATES
Engineering • Planning • Finance
McGill Associates, P.A. P.O. Box 2259, Asheville, NC 28802
55 Broad Street, Asheville, NC 28801 828-252-0575 Fax 828-252-2518

PROJECT: Francis Farm Landfill, Haywood Cty.
PROJECT NO.: 09.00721
DESCRIPTION: Permit No. WQ0035486
CALCULATED BY: WHS CHECKED BY:
DATE: 1/30/12 SHEET NO. 1 OF 1

Pisgah Pump Station - 48" Diameter - *94 gallons / vertical foot.

Controlling Elevation for the liquid Level would be the elevation of the electrical coupling @ elevation 2693.0 (21"-30" below Top of pump station) → See Copy of cut-sheet from pump station submittal.

Lowest approximate elevation of Liquid retained in the pump station will be elevation 2685.0 (pump-off elevation) The highest normal level of Liquid in the pump station should be approximately elevation 2686.2 when the lead pump should switch on.

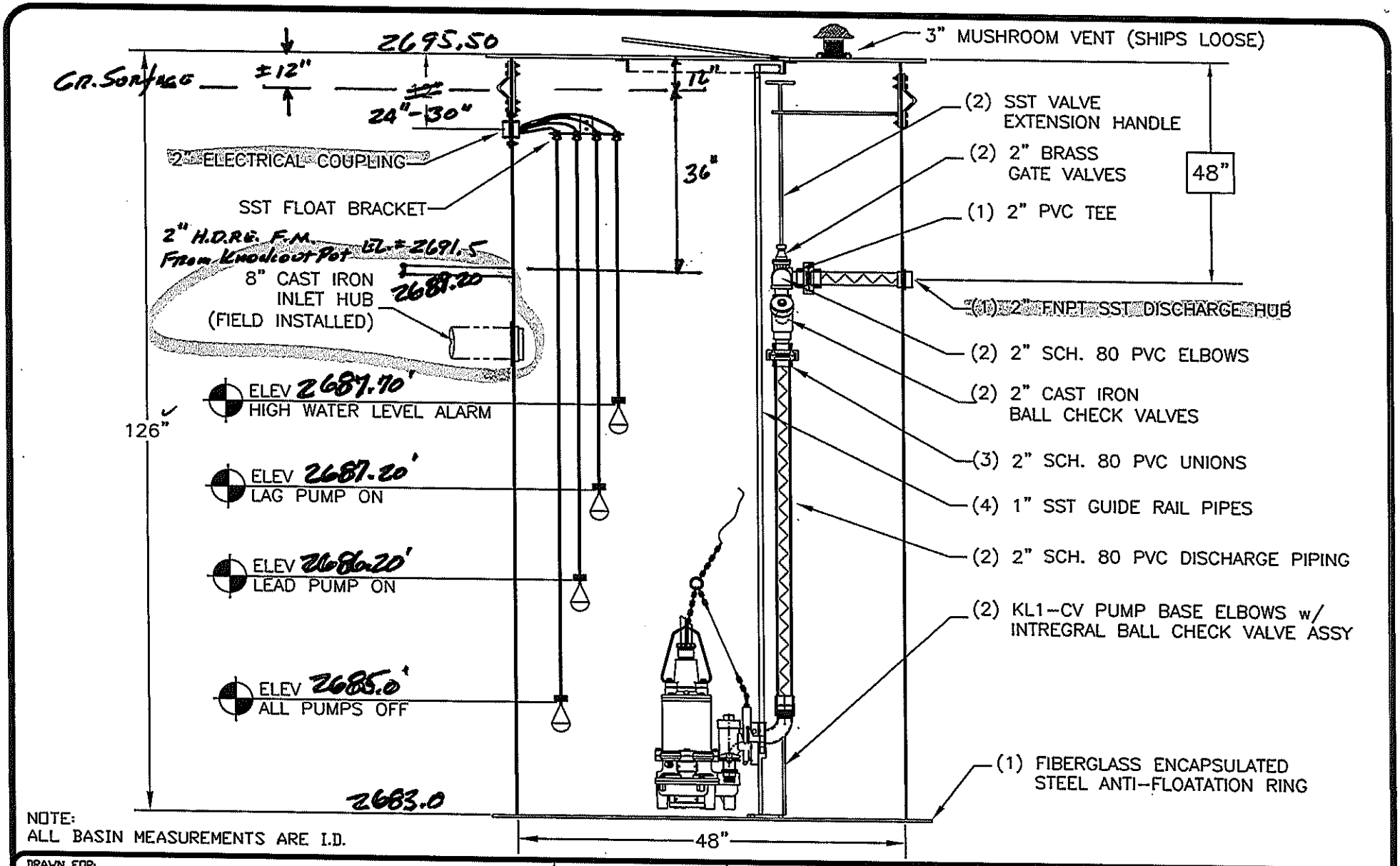
Storage available between the electrical coupling (elevation 2693.0) and the Lead pump on elevation (elevation 2686.2) is 639.2 gallons.

Elev. Electrical Coupling: 2693.0
Elev. Lead pump on: 2686.2
6.8 V.F @ 94 gal./V.F = *639.2 gal

Storage available between the electrical coupling (elev. 2693.0) and the pump off elevation (elev. 2685.0) is

Elev. Electrical Coupling: 2693.0
Elev. Pump Off: 2685.0
8.0 V.F @ 94 gal/V.F = ± 752.0 gal.

Therefore the volume of storage capacity could vary between approximately ±640 gallons to ±752 gallons depending on the Level of the liquid at the time the power to the system went down.



NOTE:
ALL BASIN MEASUREMENTS ARE I.D.

DRAWN FOR: FRANCIS FARM LANDFILL – PHASE 2B	PO# --- QUOTE # ---	DISCONNECTS: KEEN KL1-CV PUMPS: KEEN KG2-23	SHEET 1 OF 2	Revision 0
JOB REFERENCE / Notes: PACKAGE LEACHATE GRINDER PUMP STATION	BASIN DESCRIPTION: 48" X 126" DUPLEX FIBERGLASS BASIN COVER DESCRIPTION: 1/4" ALUMINUM DIAMOND-PLATED COVER	DRAWN BY: SMH / DATE: 6/06/2011 CHECKED BY: SMH / DATE CHECKED: 7/22/2011	CAROLINA PUMPWORKS Engineered Pumping & Process Equipment phone: 828-692-4511 - fax: 828-692-4501 www.cpwllc.com	

CPW
CAROLINA PUMPWORKS, LLC

172 Highlands Square Dr, Suite 313
Hendersonville, NC 28792
Cell: (803) 917-9798
Phone: (828) 692-4511
Fax: (828) 692-4501
E-mail: shale@cpwllc.com

July 23, 2011

To: Payne, McGinn & Cummins, Inc. **From:** Scott Hale

Attn: Rick Galway, P.E. **Re:** Package Submersible Leachate Pumping Station for Francis Farm Landfill – Phase 2B – Haywood County

PACKAGE SUBMERSIBLE LEACHATE PUMP STATION

2 ea Keen Pump Model KG2-23 Submersible Solids Handling Sewage Grinder Pump Of Heavy-Duty Cast Iron Construction, Direct Coupled To A Totally Encapsulated, Submersible Motor To Include the Following Items of Construction:

- 2-HP, 3450 RPM, 460-Volt, 3-Phase, Class F, High Torque Submersible Motor
- Double Mechanical Shaft Seals – Silicon Carbide Upper & Lower Seal Faces
- Motor Winding Over-Temperature Sensors
- Two-Probe Seal Fail Sensors Detects Moisture Intrusion Inside Motor Housing
- Stainless Steel Pump Lifting Bail Assembly
- 30-ft Dual Power & Control Cables

1 ea **48" Diameter X 126" Deep** Duplex Factory-Built Fiberglass Wet-Well System to Arrive Onsite with the Following Components Pre-Plumbed and Factory Installed:

- 2" NPT Cast Iron Base Elbows for Pump Lift-Out Guide Rail System
- Cast Iron Pump Sealing Flanges w/ Rail Guide Plates & Integral Ball Check Valve Assemblies
- 2" Sch. 80 PVC Discharge Piping, Elbows & Unions As Required
- 2" Brass Isolation Gate Valves w/ Stainless Steel Valve Extension Handles
- 2" FNPT Stainless Steel Discharge Hub – Located 48" Down From Top of Basin
- 1" Stainless Steel Guide Rails
- 3/16" Stainless Steel Lifting Chain Assemblies for Removing Pumps
- Stainless Steel Float Switch Mounting Bracket
- Aluminium Skid-Proof Cover w/ Hinged Access Door, Hold-Open Arm, & Lockable Latch
- 8" Cast Iron Inlet Hub *(inlet hub ships loose for field installation by contractor)*

1 ea Duplex 2-HP Pump Control Panel for **460-Volt, 3-Phase** Incoming Power To Include the Following:

- NEMA 4X Fiberglass Enclosure w/ Aluminium Dead Front Inner Door & Lockable Latch
- UL 508 Listed & Labeled
- Lightning Arrestor
- Power Distribution, Neutral & Grounding Blocks
- Phase & Voltage Monitor
- 460V/120V Control Power Transformer, 2kVA with Primary & Secondary Fusing
- Individual Pump Circuit Breakers
- Control Power Circuit Breaker
- IEC Rated Motor Starters w/ Adjustable Overloads
- Hand-Off-Auto Switches
- Pump Run Indicator Lights
- Elapsed Time Meters *(non-resettable type)*
- Duplex Float Switch Relay Logic *(pump off, lead pump, lag pump, & high water alarm)*
- Seal Failure & Motor Over-Temperature Alarms w/ Indicator Lights
- Flashing Alarm Light
- Audible Alarm Horn w/ Silence Pushbutton
- Auxiliary Contacts for Telephone Alarm Dialer

CONTINUED

CPW
CAROLINA PUMPWORKS, LLC

172 Highlands Square Dr, Suite 313
Hendersonville, NC 28792
Cell: (803) 917-9798
Phone: (828) 692-4511
Fax: (828) 692-4501
E-mail: shale@cpwllc.com

1 ea 4-Channel Automatic Telephone Alarm Dialer w/ 12-Volt Battery Back-Up To Be Mounted, Wired and Tested Inside Pump Control Panel. *(Telephone line and connection services provided by others)*

4 ea Liquid Level Float Switches, Internally Weighted & 30-ft. Control Cables

1 ea Flomotion Systems Isomag Model MS2500-T50-A6A4B - 2" Flanged Electromagnetic Flow Meter and Shall Include the Following Items of Construction:
- 304SS, PTFE Lined Flow Tube
- 150# ANSI Flanges
- Hastelloy C Flow and Grounding Electrodes

1 ea Flomotion Systems Isomag Model ML110-B0B1B1A0 Converter / Transmitter and Shall Include the Following Items of Construction:
- Two Line Alphanumeric Display
- Internal 3 Position Keypad
- Programmable 4-20mA & (2) Selectable Frequency, Scaled Pulse or Alarm Outputs
- Bi-Directional Flow Capability
- 90-265 VAC Power Input
- Corrosion Resistant Non-Metallic NEMA 4X Enclosure w/ Remote Sensor Mount

1 ea 100-ft. – Electrode and Coil Interconnect Cable

2 ea Sets of Recommended Spare Parts Provided for Each Submersible Grinder Pump

1 ea Day Start-Up Service, Equipment Testing & Operator Training – 1-Day, 1-Trip

1 ea Prepaid Freight to Jobsite – Equipment Off-Loading By Others

NOTES:

1. Our proposal only includes the components quoted herein.
2. Taxes are not included and any applicable taxes will be added to the final invoice.
3. The above pricing includes pre-paid freight to the jobsite via a commercial LTL freight carrier.
4. Equipment off-loading and/or installation services are provided by others.
5. Piping, valves, and/or any miscellaneous fittings external to the fiberglass basin provided by others.
6. Flow meter vault, access cover, piping, valves, fittings, wiring, and/or installation of meter by others.
7. Generator, transfer switch, generator receptacle, and/or generator plug are provided by others.
8. Main service disconnect, meter base, area lighting, and/or signage are provided by others.
9. Conduit, miscellaneous fittings, Kellum grips, and/or field wiring connections provided by others.
10. Flow meter vault, access cover, piping, valves, fittings, wiring, and/or installation by others.
11. Equipment delivered in **4 weeks** after receiving approved submittals.

All prices are F.O.B. factory, full freight allowed to jobsite where accessible by commercial carrier. Prices do not include any applicable taxes. Warranty and sales conditions are per manufacturers and Carolina Pumpworks standard terms and conditions. Payment terms are Net 30 days. A 1.5% per month finance charge will be applied to any past due invoices. Partial billing will be made on partial shipments. Payment terms are independent of and not contingent upon third party contracts or commitments, unless Carolina Pumpworks specifically agrees to terms in writing.

We thank you for your interest in our equipment and look forward to being of service to you in the near future.

Features and Benefits

1.Triple Sealed Cable Entrance
Stainless steel strain relief cord grip with compression grommet protects outer cord jacket. Epoxy filled inner cord cap with individually soldered wires provide anti-wicking moisture protection to the motor even if power cable is cut or damaged.

2. Modular Pump Design
Commonality of parts across the Keen product line minimizes the amount of parts required for servicing. Heavy duty ASTM A48, Class 30 cast iron components.

3. Strong Motor
Powerful high torque motor for reliable pump operation.
208 / 230 volt, 1-phase
208 / 230 / 460 volt, 3-phase
Pressed stator securely holds motor and efficiently transfers heat. Class F insulation with overload protection in oil filled chamber for cool operation and long motor life.

4. 3- Bearing Support
Motor / Pump shaft securely held with upper and lower ball bearing plus addition sleeve bearing in lower seal chamber. Long 50,000 hour B-10 bearing life.

5. Double Mechanical Seal Protection
Dual silicon carbide mechanical shaft seals provide twice the moisture protection for the motor. Dual seals are housed in a secondary oil filled seal chamber. Tougher silicon carbide seals better handles sand, grit and abrasive materials.

6. Moisture Detection
Seal leak probe signals alarm in control panel for scheduled maintenance.

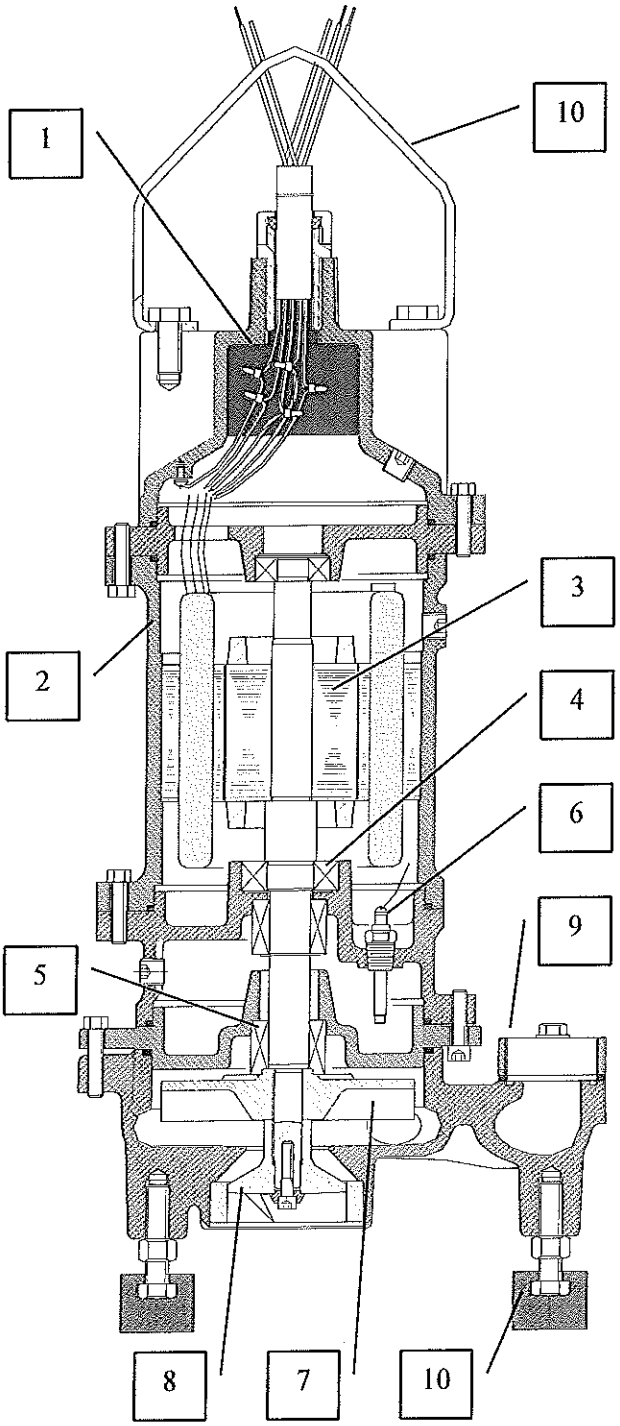
7. Non-Overloading Hydraulic Design
The recessed centrifugal impeller allows 100% performance curve operation from shut-off to maximum flow without damage to the pump or system. The recessed vortex impeller is out of the passageway of fluid flow, eliminating concerns of blockage or wear.

8. Proven Grinder Assembly
Hardened (Rockwell 56-60) stainless steel grinder assembly has 30+ years proven field experience. The reversible grinder ring and grinder impeller effectively reduces solids into a fine slurry, easily passable in a piping system without concerns of clogging. Highly efficient 16,600 cuts per second.

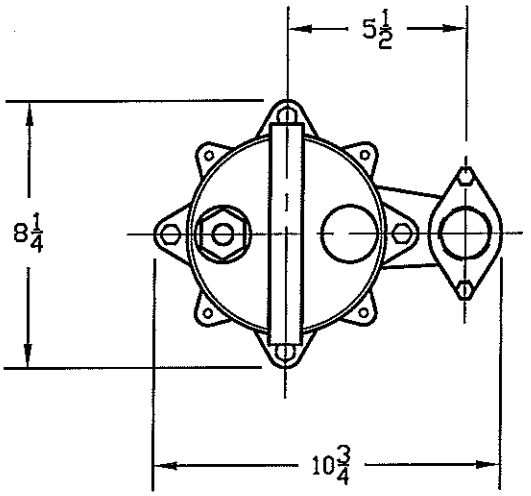
9. Easy Piping Connection
Removable 1-1/4" NPT connection flange for simple and easy connection to discharge piping.

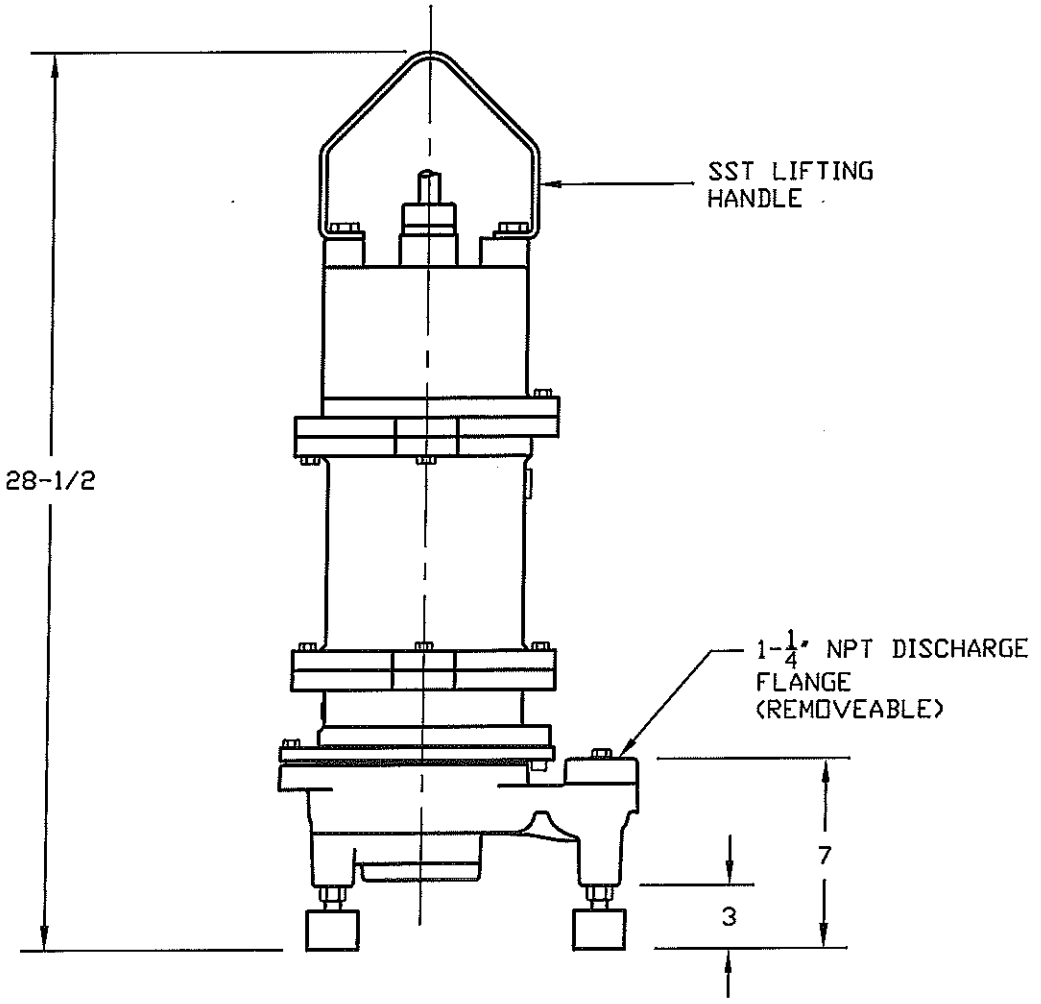
10. Accessories Included
Stainless steel lifting handle and anti-vibration rubber mounting feet are included with the pump.

2 HP Grinder Pump
Dual Seal
KG2-21 & 23



ISO 9001
CERTIFIED PUMP





KEEN PUMP COMPANY
KEEN PUMP CO.
471 EAST STATE ROUTE 250 E.
ASHLAND, OHIO 44805
PHONE: 419-207-9400
FAX: 419-207-8031

TITLE			
KG2 2HP GRINDER PUMP OUTLINE			
SCALE: NTS		DWG. #: KN-16	REV.: -
DWG. BY: F. YUHASZ	DATE: 9/25/08		

Keen Pump

2 HP Grinder Pumps KG2-21 & 23

Performance Specifications

Pump Model – Pump shall be of the centrifugal type, KG2-21 & 23, with an integrally built-in grinder unit and submersible type motor. The grinder unit shall be capable of macerating all material in normal domestic and commercial sewage, including reasonable amounts of foreign objects such as sanitary napkins, disposable diapers, thin rubber, small wood, plastic and the like to a fine slurry that will easily pass through the pump and 1-1/4" NPT discharge.

Operating Conditions – The pump shall have a capacity of 30 GPM at a total head of 23 feet, and shall use a motor rated at 2 HP and 3450 RPM.

Pump Impeller – Ductile Iron threaded on a stainless steel shaft. The impeller shall be of the recessed vortex type to provide an unobstructed passage through the volute for the ground solids.

Grinder Construction – Both grinder impeller and shredding ring shall be of 440C stainless steel hardened to 56-60 Rockwell C. The grinder assembly shall consist of a grinder impeller and shredding ring mounted directly below the volute passage. The grinder impeller is threaded to a stainless steel shaft, locked with a screw and washer. The shredding ring shall be pressed into the cast iron volute for easy removal. All grinding of solids shall be from the action of the grinder impeller against the shredding ring. There shall be 16,600 cuts / second.

Seals – Type 21, dual mechanical seal construction mounted in tandem, shall protect the motor. Primary seal shall be silicon / carbide. Secondary seal shall be silicon / carbide. The seal face shall be lapped to a flatness of one light band. An electrode shall be mounted in the seal chamber to detect water entering the chamber through the lower seal. Water in the chamber shall cause a red light to turn on at the control box. This signal shall not stop the motor, but shall act as a warning only, indicating service is required.

Motor – The pump motor shall be of the submersible type, rated 2 HP, 3450 RPM. The motor shall be for 60 Hz, either 208,230, 460 volt, single or three phase operation. Single-phase motors shall be capacitor start, capacitor run type for high starting torque. Start & run capacitors, and electronic relay for operating the motor will be found in the control box. Major motor operating temperature must not exceed Class B ratings.

The stator winding shall be of the open type with Class F insulation. Winding housing shall be filled with clean, high dielectric oil that lubricates bearings and seals, transferring heat from windings and rotor to the outer cast housing. Air-filled motors, which do not have the superior heat dissipating capabilities of oil-filled motors, shall not be considered equal.

The motor shall have two heavy-duty ball bearings and one sleeve bearing to support the pump shaft, taking radial and thrust loadings. Ball bearings shall be designed for a minimum 50,000 hours B-10 life. The stator shall be pressed into the motor housing. The common motor pump and grinder shaft shall be of 416 SST, threaded to take the pump and grinder impeller.

Single-phase motors shall have automatic reset overload protection attached to the top end of the motor windings to stop the motor if the motor winding temperature reaches 130 degrees C. The high temperature shut-off will cause the pump to cease operation, should a control failure cause the pump to run in a dry wet well. The overload shall automatically reset when the motor cools to a safe operating temperature. Three phase motors contain temperature sensors with (2) wires for attachment to the control panel.

Power Cord – The motor power cord shall be 12 Ga. SOW/SJOWA or SOOW. The cable jacket shall be sealed at the motor entrance by means of a rubber compression washer and compression nut. An epoxy filled cord cap shall seal the outer cable jacket and individual leads to prevent water from entering the motor housing. Individual conductor strands shall be soldered within.

PUMP SPECIFICATIONS

DISCHARGE..... 1-1/4" NPT, Vertical
LIQUID TEMPERATURE..... 120 degrees F (Continuous)
140 degrees F. (Intermittent)

MOTOR HOUSING..... Cast Iron, ASTM A-48, Class 30
CORD CAP..... Cast Iron, ASTM A-48, Class 30
VOLUTE..... Cast Iron, ASTM A-48, Class 30
SEAL PLATE.....Cast Iron, ASTM A-48, Class 30

IMPELLER..... Ductile Iron, ASTM A-48, Class 35B
12 vane, Vortex with Pump-out Vanes, Dynamically Balanced

SHREDDING RING..... Hardened 440C Stainless Steel
56-60 Rockwell C
GRINDER IMPELLER..... Hardened 440C Stainless Steel
56-60 Rockwell C

SHAFT..... 416 Stainless Steel

SHAFT SEAL..... Mechanical

	Main (Motor)	Secondary(Pump)
	Carbide – Rotating Face	Carbide – Rotating Face
	Silicon– Stationary Face	Silicon – Stationary Face

Buna-N - Elastomer
300 Series Stainless Steel - Hardware

BEARING (UPPER)..... Single Row, Ball, Oil Lubricated
BEARING (LOWER)..... Single Row, Ball, Oil Lubricated

HARDWARE..... 300 Series Stainless Steel
O-RINGS..... Buna-N

CORD..... 12 AWG, Type SJOW or SOOW
30' Length Standard. Other Lengths Available.

CORD ENTRY..... Triple Sealed Design
Compression Grommet – Outer Jacket Seal
Epoxy Potted – Inner Conductor Seal
Butt Connector – Inner Wire Strand Wicking Blockage

MOTOR (SINGLE PHASE)..... 2 HP, 3450 RPM, 60 Hz
Dual voltage, 200 / 230 volts
Includes Overload Protection in the Motor.
Oil Filled, Class F
Capacitor Start / Capacitor Run

	Start Capacitor	Run Capacitor
KG2-115 K(H)G2-21C	..... 200 mfd, 125 VAC	70 mfd, 250 VAC
K(H)G2-21	.... 150 mfd, 250 VAC	30 mfd, 370 VAC
KHHG2(H)-21	.... 300 mfd, 250 VAC	30 mfd, 370 VAC

MOTOR (THREE PHASE)..... 2 HP, 3450 RPM, 60 Hz
Tri-voltage, 200 / 230 / 460 volts
On-Winding temperature sensor, requires temperature sensor circuitry in control panel
Oil Filled, Class F

OPTIONAL EQUIPMENT..... Seal Materials
Additional Cable Lengths
Impeller Trims

Pump Data Sheet - Keen Pump

Company: Carolina Pumpworks, LLC
Name: Scott M. Hale
Date: 7/23/2011

KEEN PUMP

Pump:

Size: KG2-21, KG2-23

Type: Grinder
Synch speed: 3600 rpm

Speed: 3450 rpm
Dia: 3.75 in

Curve:

Impeller:

Specific Speeds:

Ns: ---
Nss: ---

Dimensions:

Suction: ---
Discharge: 1.25 in

Pump Limits:

Temperature: ---
Pressure: ---
Sphere size: ---

Power: ---
Eye area: ---

Search Criteria:

Flow: 30 US gpm

Head: 23 ft

Fluid:

Water
Density: 62.25 lb/ft³
Viscosity: 1.105 cP

Temperature: 60 °F
Vapor pressure: 0.2563 psi a
Atm pressure: 14.7 psi a

NPSHa: ---

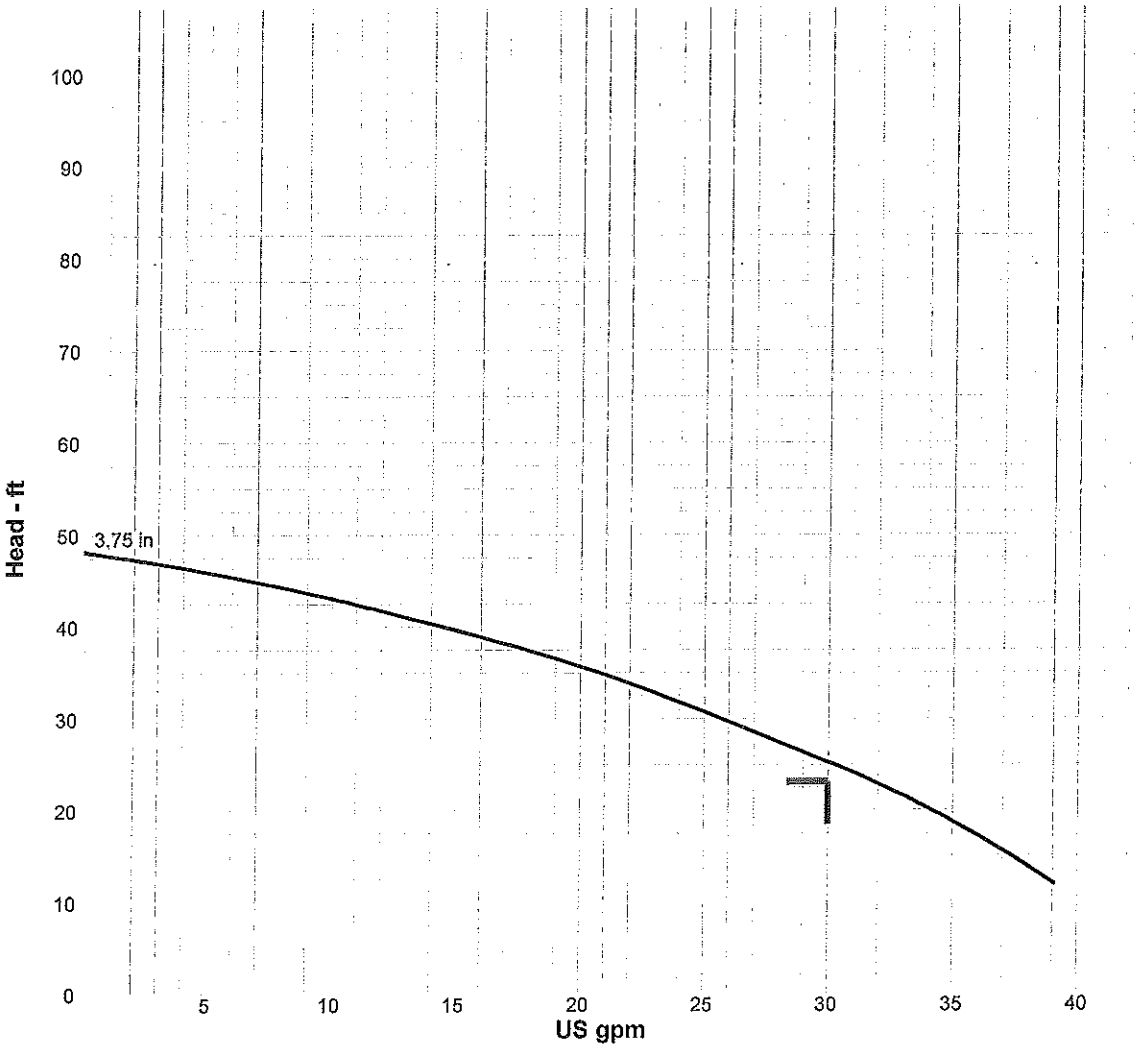
Motor:

Standard: NEMA
Enclosure: TEFC

Size: 2 hp
Speed: 3600
Frame: 145T

Sizing criteria: Max Power on Design Curve

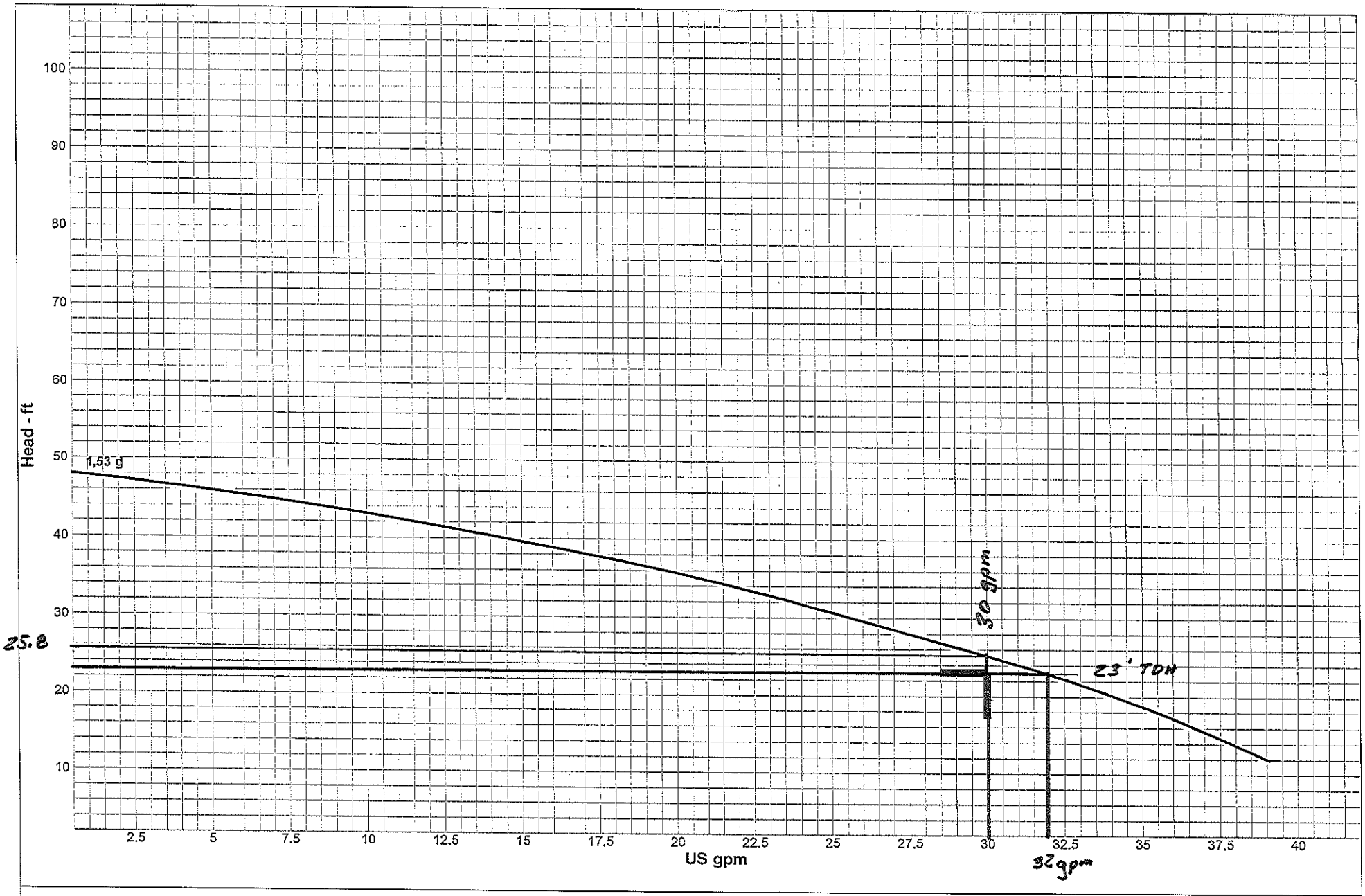
---- Data Point ----	
Flow:	30 US gpm
Head:	25.1 ft
Eff:	n/a
Power:	2 hp
NPSHr:	n/a
---- Design Curve ----	
Shutoff head:	48.2 ft
Shutoff dP:	20.8 psi
Min flow:	---
BEP:	--- %
NOL power:	2 hp @ 2.5 US gpm
-- Max Curve --	
Max power:	2 hp @ 2.5 US gpm



Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
36	3450	17	---	2	---
30	3450	25.1	---	2	---
24	3450	31.6	---	2	---
18	3450	37.1	---	2	---
12	3450	41.7	---	2	---

Selected from catalog: Keen.60, Vers Nov 2009



Company: Carolina Pumpworks, LLC
Name: Scott M. Hale
7/23/2011

Keen Pump Company
Catalog: Keen.60, Vers Nov 2009
Grinder - 3600
Design Point: 30 US gpm, 23 ft

Size: KG2-21, KG2- 23
Speed: 3450 rpm
Dia: 3.75 in

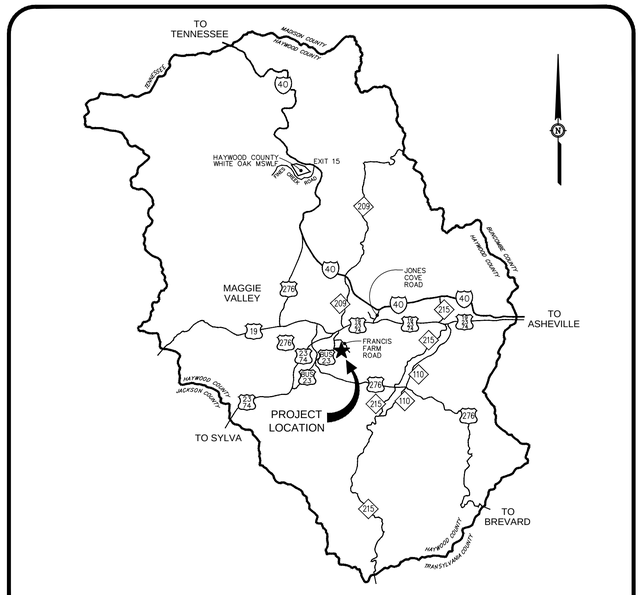
KEEN PUMP

FRANCIS FARM LANDFILL
LANDFILL GAS COLLECTION & COMBUSTION SYSTEM
PHASES 1 - 3
HAYWOOD COUNTY

HAYWOOD COUNTY, NORTH CAROLINA

HAYWOOD COUNTY

COUNTY MANAGER : MR. MARTY STAMEY
SOLID WASTE DIRECTOR : MR. STEPHEN KING



VICINITY MAP NOT TO SCALE

RECORD DRAWING

This Drawing has been modified to reflect changes made during construction based upon information provided by the Contractor and construction observations made by the Owner's Authorized Representative.

By _____ Date 7/23/12

NORTH CAROLINA PROFESSIONAL SEAL 36132 ENGINEER WILLIAM H. SPERRY

SCHEDULE OF DRAWINGS

McGill ASSOCIATES
ENGINEERING·PLANNING·FINANCE
55 BROAD STREET ASHEVILLE, NC 28801 PH. (828) 252-0575 FIRM LICENSE # C-0459

GENERAL NOTES

1. ALL CONSTRUCTION OUTSIDE RIGHTS–OF–WAY SHALL TAKE PLACE WITHIN THE PERMANENT AND TEMPORARY ACCESS EASEMENTS SHOWN.
2. CONTRACTOR SHALL REPAIR ALL DISTURBED AREAS TO EQUAL OR BETTER CONDITION THAN THE ORIGINAL SITE, OR AS NOTED.
3. LOCATIONS OF EXISTING UTILITIES AS SHOWN ARE APPROXIMATE ONLY. EXACT LOCATIONS ARE TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR. AT LEAST THREE DAYS PRIOR TO CONSTRUCTION, CONTRACTOR MUST NOTIFY EXISTING UTILITY OWNERS. CALL BEFORE YOU DIG. NORTH CAROLINA ONE CALL (1–800–632–4949).
4. ALL WORK NEAR AND AROUND WATERWAYS MUST CONFORM TO THE RULES OF THE STATE OF NORTH CAROLINA.
5. CONTRACTOR MUST PROVIDE EROSION CONTROL DEVICES TO CONTROL RUNOFF FROM THE CONSTRUCTION SITE. CONTRACTOR WILL BE RESPONSIBLE FOR ANY FINES THAT MAY BE LEVIED DUE TO POLLUTION CREATED DURING CONSTRUCTION.
6. CONTRACTOR SHALL FOLLOW ALL FEDERAL, STATE AND LOCAL HEALTH AND SAFETY REGULATIONS PERTAINING TO CONSTRUCTION OPERATIONS.
7. WATER LINES SHALL HAVE 3'–0" MINIMUM COVER UNLESS OTHERWISE SHOWN ON THE DRAWINGS.
8. WATER AND SEWER LINES SHALL HAVE A MINIMUM 10' HORIZONTAL SEPARATION OR A MINIMUM 18" VERTICAL SEPARATION WITH THE WATER OVER SEWER, OR BOTH WATER AND SEWER LINES SHALL BE DUCTILE IRON PIPE 10' EITHER SIDE OF THE CROSSING.
9. WATER AND STORM SEWER LINES SHALL HAVE A MINIMUM 12" VERTICAL SEPARATION.
10. SEE PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION.
11. LEGAL DESCRIPTIONS FOR PROPOSED EASEMENTS BY OTHERS.
12. CONTRACTOR SHALL NOTIFY THE PROPER LOCAL AUTHORITIES 24 HOURS PRIOR TO ANY ROAD BEING CLOSED FOR CONSTRUCTION, INCLUDING BUT NOT LIMITED TO LOCAL NEWSPAPER, RADIO STATION, FIRE DEPARTMENT, COUNTY SHERIFF'S DEPARTMENT, AMBULANCE, AND COUNTY EMERGENCY AGENCY. ALL TRAFFIC CONTROL SHALL CONFORM TO THE REQUIREMENTS OF THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION.
13. CONTRACTOR SHALL NOTIFY THE ENGINEER AFTER EXISTING BURIED UTILITIES HAVE BEEN LOCATED AND 24 HOURS PRIOR TO CONSTRUCTION.
14. ALL FENCE DAMAGED DURING CONSTRUCTION SHALL BE REPLACED WITH LIKE MATERIALS IN A WORKMANLIKE MANNER AND IN ACCORDANCE WITH STANDARD FENCE CONSTRUCTION PRACTICES AT THE CONTRACTOR'S EXPENSE.
15. CONTRACTOR SHALL FIELD LOCATE ALL BURIED TELEPHONE LINE IN CONFLICT WITH CONSTRUCTION. WHERE NECESSARY, EXISTING BURIED TELEPHONE LINE SHALL BE TEMPORARILY MOVED DURING CONSTRUCTION AND RE–LAID AT NO ADDITIONAL COST TO THE OWNER.
16. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING ROADS DURING CONSTRUCTION AND SHALL REPAIR ROADS PER REQUIREMENTS OF THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION. NO OPEN CUTS OF EXISTING ROADS SHALL BE ALLOWED EXCEPT WHERE INDICATED ON THE DRAWINGS OR WHERE SPECIFIC PERMISSION IS GRANTED BY THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION. SAND OR A SIMILAR MATERIAL APPROVED BY THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION SHALL BE PLACED ON THE ROAD TO AID IN THE CLEAN UP AFTER CONSTRUCTION. A MINIMUM OF 2" OF SAND SHALL BE PLACED ON THE ROAD PRIOR TO STOCKPILING SPOIL MATERIAL ON THE ROAD SURFACE TO FACILITATE CLEANUP.

GENERAL CONSTRUCTION NOTES

REVISION DATE - JUNE 16, 2009

1. FINISH GRADE TOLERANCES SHALL BE AS NOTED IN THE SPECIFICATIONS. THE ENGINEER MAY MAKE GRADE CHANGES AS REQUIRED IN THE FIELD WITHOUT EFFECTING THE BID PRICE.
2. UNLESS OTHERWISE STATED, ALL FILL AREAS SHALL BE CONSTRUCTED IN LAYERS OF 8" MAXIMUM THICKNESS, WITH WATER ADDED OR SOIL CONDITIONED TO THE OPTIMUM MOISTURE CONTENT AS DETERMINED BY THE ENGINEER AND COMPACTED WITH A SHEEP'S FOOT ROLLER TO A COMPACTION EQUAL TO OR GREATER THAN 95% (100% IN THE TOP 2' OF THE SUB GRADE BELOW ROADWAYS AND PARKING LOTS) OF THE DENSITY OBTAINED BY COMPACTING A SAMPLE OF THE MATERIAL IN ACCORDANCE WITH THE STANDARD PROCTOR METHOD OF MOISTURE–DENSITY RELATIONSHIP TEST, ASTM D698 OR AASHTO–99 UNLESS SPECIFIED IN OTHER SPECIFICATIONS.
3. ENTIRE AREA TO BE GRADED SHALL BE CLEARED AND GRUBBED. NO FILL SHALL BE PLACED ON ANY AREA NOT CLEARED AND GRUBBED.
4. ALL SOIL EROSION CONTROL MEASURES REQUIRED BY THE GRADING PLAN SHALL BE PERFORMED PRIOR TO GRADING, CLEARING OR GRUBBING. ALL EROSION CONTROL DEVICES SUCH AS SILT FENCES, ETC., SHALL BE MAINTAINED IN WORKABLE CONDITION FOR THE LIFE OF THE PROJECT AND SHALL BE REMOVED AT THE COMPLETION OF THE PROJECT ONLY ON THE ENGINEER'S APPROVAL. PAYMENT SHALL BE CONSIDERED INCIDENTAL TO WORK ITEMS LISTED IN BID SCHEDULE AND BID PRICES PROVIDED. LUMP SUM BID PRICE. IF DURING THE LIFE OF THE PROJECT, A STORM CAUSES SOIL EROSION WHICH CHANGES FINISH GRADES OR CREATES "GULLIES" AND "WASHED AREAS", THESE SHALL BE REPAIRED AT NO EXTRA COST, AND ALL SILT WASHED OFF OF THE PROJECT SITE ONTO ADJACENT PROPERTY SHALL BE REMOVED AS DIRECTED BY THE ENGINEER AT NO EXTRA COST. THE CONTRACTOR SHALL ADHERE TO ANY APPROVED EROSION CONTROL PLANS WHETHER INDICATED IN THE CONSTRUCTION PLANS OR UNDER SEPARATE COVER.
5. DISPOSABLE MATERIAL
   A. CLEARING AND GRUBBING WASTES SHALL BE REMOVED FROM THE SITE AND PROPERLY DISPOSED OF BY THE CONTRACTOR AT HIS EXPENSE, UNLESS SPECIFIED OTHERWISE.
   B. SOLID WASTES TO BE REMOVED, SUCH AS SIDEWALKS, CURBS, PAVEMENT, ETC., MAY BE PLACED IN SPECIFIC DISPOSAL AREAS ONLY WHEN DELINEATED ON THE PLANS OR OTHERWISE REMOVED FROM THE SITE AS REQUIRED BY THE SPECIFICATIONS. THE CONTRACTOR SHALL MAINTAIN SPECIFIED COMPACTION REQUIREMENTS IN THESE AREAS. WHEN DISPOSAL SITES ARE NOT PROVIDED, THE CONTRACTOR SHALL REMOVE THIS WASTE FROM THE SITE AND PROPERLY DISPOSE OF IT AT HIS EXPENSE.
   C. ABANDONED UTILITIES SUCH AS CULVERTS, WATER PIPE, HYDRANTS, CASTINGS, PIPE APPURTENANCES, UTILITY POLES, ETC., SHALL BE THE PROPERTY OF THE SPECIFIC UTILITY AGENCY, OR COMPANY HAVING JURISDICTION. BEFORE THE CONTRACTOR CAN REMOVE, DESTROY, SALVAGE, REUSE, SELL OR STORE FOR HIS OWN USE ANY ABANDONED UTILITY, HE MUST PRESENT TO THE OWNER WRITTEN PERMISSION FROM THE UTILITY INVOLVED.
6. IN THE EVENT EXCESSIVE GROUNDWATER OR SPRINGS ARE ENCOUNTERED WITHIN THE LIMITS OF CONSTRUCTION, THE CONTRACTOR SHALL INSTALL NECESSARY UNDER DRAINS AND STONE AS DIRECTED BY THE ENGINEER.
7. THE CONTRACTOR IS RESPONSIBLE FOR THE COORDINATION OF ADJUSTMENT OF ALL UTILITY SURFACE ACCESSES WHETHER HE PERFORMS THE WORK OR A UTILITY COMPANY PERFORMS THE WORK.
8. THE CONTRACTOR SHALL CONTROL ALL "DUST" BY PERIODIC WATERING AND SHALL PROVIDE ACCESS AT ALL TIMES FOR PROPERTY OWNERS WITHIN THE PROJECT AREA AND FOR EMERGENCY VEHICLES. ALL OPEN DITCHES AND HAZARDOUS AREAS SHALL BE CLEARLY MARKED IN ACCORDANCE WITH THE SPECIFICATIONS.
9. ALL AREAS WHERE THERE IS EXPOSED DIRT SHALL BE SEEDED, FERTILIZED AND MULCHED ACCORDING TO THE SPECIFICATIONS. THE FINISHED SURFACE SHALL BE TO GRADE AND SMOOTH, FREE OF ALL ROCKS LARGER THAN 3", EQUIPMENT TRACKS, DIRT CLODS, BUMPS, RIDGES AND GOUGES PRIOR TO SEEDING; THE SURFACE SHALL BE LOOSENED TO A DEPTH OF 4"–6" BEFORE SEED. THE CONTRACTOR SHALL NOT PROCEED WITH SEEDING OPERATIONS WITHOUT FIRST OBTAINING THE ENGINEER'S APPROVAL OF THE GRADED SURFACE. ALL SEEDING SHALL BE PERFORMED BY A MECHANICAL "HYDRO–SEEDER". HAND SEEDING SHALL BE AUTHORIZED ON AN AREA BY AREA APPROVAL BY THE ENGINEER. DISTURBED AREAS SHOULD THEN BE MATTED WITH SHORT–TERM PHOTODEGRADABLE EROSION CONTROL MATTING AS SHOWN ON THE PLANS OR IF REQUIRED TO ESTABLISH VEGETATION.
10. WHERE SPECIFIED, RCP STORM DRAIN PIPE SHALL BE REINFORCED CONCRETE PIPE (RCP) CONFORMING TO AASHTO M–170, AS CONTAINED IN NCDOT STANDARD SPECIFICATION 1032–9 FOR WALL "B" TYPE.

    WHERE SPECIFIED, HDPE STORM DRAIN PIPE SHALL BE HIGH DENSITY POLYETHYLENE (HDPE). SMOOTH WALL INTERIOR, WITH WATER TIGHT JOINTS, BACKFILLED WITH # 57 WASHED STONE UP TO MIN. 6" OVER THE TOP OF THE PIPE. HDPE PIPE SHALL BE "HANCOR BLUE SEAL" OR APPROVED EQUAL.

    WHERE SPECIFIED, CORRUGATED METAL STORM DRAIN PIPE (CMP) SHALL BE ALUMINIZED TYPE 2 CORRUGATED STEEL MANUFACTURED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO M–36. THE PIPE SHALL BE MANUFACTURED FROM ALUMINIZED STEEL TYPE 2 MATERIAL CONFORMING TO THE REQUIREMENTS OF AASHTO M–274. ALL PIPE SHALL BE FURNISHED WITH REROLLED ENDS AND SHALL BE JOINED WITH HUGGER BANDS. THE USE OF DIMPLE BANDS WILL NOT BE ALLOWED. PIPE THROUGH 24" DIAMETER SHALL BE 16 GAUGE, PIPE THROUGH 42" DIAMETER SHALL BE 14 GAUGE, PIPE THROUGH 54" DIAMETER SHALL BE 12 GAUGE.
11. CONTRACTOR SHALL VERIFY ALL ELEVATIONS BEFORE INSTALLATION OF FACILITIES.
12. CATCH BASINS CAST–IN–PLACE SHALL CONFORM TO THE REQUIREMENTS OF NCDOT STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES (LATEST EDITION) ARTICLES 840–1 THROUGH 840–3. CURB INLET CATCH BASIN SHALL CONFORM TO NCDOT STANDARD DETAILS 840.02 THROUGH 840.04. DROP INLETS SHALL CONFORM TO STANDARD DETAIL 840.14. JUNCTION BOXES SHALL CONFORM TO STANDARD DETAIL 840.31.
13. CURB INLET FRAME, GRATE AND HOOD SHALL BE NEENAH R–3233D, PRODUCTS BY DEWEY BROS., U.S. FOUNDRY OR EQUAL. DROP INLET FRAME AND GRATE SHALL BE NEENAH R–3339A OR EQUAL. FIELD INLET COVER SHALL CONFORM TO NCDOT STANDARD DETAIL 840.04, OPENING FACING UPSTREAM.
14. CONCRETE AND MASONRY FOR SITE WORK ELEMENTS SHALL MEET THE REQUIREMENTS OF APPROPRIATE SECTION OF NCDOT STANDARD SPECIFICATIONS FOR ROAD AND STRUCTURES (LATEST EDITION). CONCRETE SHALL BE CLASS A OR B, 4000 PSI MINIMUM, MEETING THE REQUIREMENTS OF SECTION 1000, CONSTRUCTED IN ACCORDANCE WITH SECTION 825. MASONRY SHALL MEET THE REQUIREMENTS OF SECTION 1040, CONSTRUCTED IN ACCORDANCE WITH SECTION 830 AND/OR 834.
15. TOPS OF PROPOSED FRAMES AND GRATES SHALL BE FLUSH WITH FINISHED GRADE.
16. PRE–CAST CONCRETE BOXES ARE ACCEPTABLE ALTERNATIVES FOR PROPOSED CATCH BASINS.

NORTH CAROLINA LAND QUALITY SECTION
EROSION CONTROL NOTES

REVISION DATE - NOVEMBER 24, 2008

GENERAL: ALL EROSION CONTROL MEASURES ARE TO BE PERFORMED IN STRICT ACCORDANCE WITH REQUIREMENTS OF THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES, DIVISION OF LAND RESOURCES, LAND QUALITY SECTION. THE FOLLOWING CONSTRUCTION SEQUENCE SHALL BE COMPLIED WITH FOR ALL WORK.

1. – THE GRADING WORK ASSOCIATED WITH THE CAP REPAIR OF THE FRANCIS FARM LANDFILL IS COVERED UNDER THE REQUIREMENTS OF THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES, SOLID WASTE SECTION. THE SOURCE OF BORROW MATERIALS FOR THE PROJECT MUST HAVE THE APPROPRIATE EROSION CONTROL PERMITS IN PLACE. IF THE CONTRACTOR CHOOSES TO UTILIZE SOILS FROM THE HAYWOOD COUNTY WHITE OAK LANDFILL, EXISTING EROSION CONTROL PERMITS ARE IN PLACE AND WILL BE PROVIDED TO THE CONTRACTOR.
2. – INSTALL ALL EROSION CONTROL MEASURES AS REQUIRED BY THE PLANS AND THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES, DIVISION OF LAND RESOURCES, LAND QUALITY SECTION.
3. – NO WORK SHALL BE PERFORMED IN STREAM FROM OCTOBER 15 TO APRIL 15 (TO ACCOMMODATE COE AND DWQ RECOMMENDATIONS CONCERNING WORK IN TROUT WATERS).
4. – CONTRACTOR IS TO PLACE PERMANENT STAKES MARKING CLEARLY THE 25' BUFFER FOR STREAMS WHERE SHOWN ON THE PLANS AND THE MARKERS ARE TO BE VISIBLE AT ALL TIMES DURING CONSTRUCTION.
5. – CONSTRUCTION SHALL BE LIMITED TO 2000' OF CONTIGUOUS ROAD CORRIDOR UNTIL ALL CUTS, FILLS, AND DITCHES ARE STABILIZED FOR THAT 2000' SECTION. UPON STABILIZATION OF THAT SECTION ANOTHER 2000' SECTION CAN BE CONSTRUCTED AND STABILIZED.
6. – PROCEED WITH GRADING, CLEARING AND GRUBBING. NOTE: NO OFF SITE DISPOSAL OF MATERIAL IS ALLOWED UNLESS THE DISPOSAL SITE HAS AN APPROVED EROSION CONTROL PLAN.
7. – SEED AND PLACE EROSION CONTROL MATTING ON ALL CUT AND FILL SLOPES THAT ARE NOT ROCK IMMEDIATELY UPON COMPLETION OF SLOPE STABILIZATION.
8. – ALL TEMPORARY STREAM AND CREEK CROSSINGS FOR EQUIPMENT DURING CONSTRUCTION SHALL BE MADE USING TEMPORARY BRIDGES. NO STREAM BANK OR STREAM BED DISTURBANCE SHALL BE ALLOWED FOR EQUIPMENT CROSSINGS.
9. – SEED AND MULCH DENUDED AREA WITHIN 15 DAYS AFTER FINISHED GRADE IS ESTABLISHED. SEED AND SOIL AMENDMENTS SHALL BE PLACED ON A PREPARED SEEDBED AT THE FOLLOWING RATES PER ACRE. STRAW MULCH SHALL BE TACKED WITH TACKING AGENT APPLIED BY HYDROSEEDER.

LIME	4,000 LBS
FERTILIZER (10–10–10)	1,000 LBS
KY–31 FESCUE	100 LBS
STRAW MULCH	60–80 BALES
FOR SUMMER SEEDING ADD TO THE ABOVE:	
GERMAN MILLET	40 LBS
SMALL–STEMMED SUDAN GRASS	50 LBS
FOR WINTER SEEDING ADD TO THE ABOVE:	
RYE GRAIN	120 LBS

IF HYDROSEEDING, WOOD CELLULOSE MAY BE USED IN ADDITION TO STRAW MULCH AT THE RATE OF 1,000 LBS PER ACRE.

ALL SEEDING SHALL BE MAINTAINED, WATERED ETC.., UNTIL A PERMANENT VEGETATIVE GROUND COVER IS ESTABLISHED OVER ALL DISTURBED AREAS.

FOR ALL SLOPES 2:1 OR STEEPER ADD TO THE ABOVE:

PURE LIVE SEED SWITCHGRASS	4 LBS
BROWNTOP MILLET	8 LBS
GRAIN SORGHUM	2 LBS

ALL SLOPES 3:1 OR STEEPER SHALL BE COVERED BY EROSION CONTROL MATTING.

NATIVE SEEDING:

THE CORRECT SEEDBED pH IS 5.5 TO 6.5.

APPLY ZERO NITROGEN AT PLANTING.

INCORPORATE SOIL AMENDMENTS INTO TOPSOIL/ROOT ZONE BEFORE SEEDING.

FIRM SEEDBED BEFORE SEEDING (TRAVEL WITH DOZER CLEATS).

SEEDING DEPTH FOR ALL NATIVE SSP. (EXCEPT E.GAMAGRASS) NEED TO BE 1/4" – 1/2". GREATER DEPTHS CAUSE HIGH SEED MORTALITY.

SPECIALIZED SEEDING IMPLEMENTS ARE REQUIRED. SEED MIXES AND RATES TO MATCH SEEDER USED. A NO–TILL, DROP SEEDER OR BROADCASTER WITH PRECISION METERING TO CONTROL SMALL SEED FLOW AND PICKER WHEEL AGITATORS TO HANDLE FLUFFY SEED ARE BEST SUITED FOR NATIVE SEED.

NATIVE PLANT SEEDING MIX FOR STREAM OR RIVERBANK STABILIZATION

SEEDING FOR STREAM OR RIVERBANK STABILIZATION SHALL BE A MIXTURE OF NATIVE GRASSES, PLANTS AND TREES. NATIVE PLANT MIX SHALL INCLUDE THE FOLLOWING:

GRASSES – BIG BLUESTEM, INDIAN GRASS, LITTLE BLUESTEM, SWITCHGRASS	5 LBS/ACRE EACH
AUGUST THRU MAY – GREENRYE	25 LBS/ACRE EACH
MAY 1 THRU AUGUST – MILLET	25 LBS/ACRE EACH

TREES – SILKY DOGWOOD (CORNUS AMONUM), SILKY WILLOW (SALIX SERICEA), HAZEL ALDER (ALMUS SERRULATA) AND ELDERBERRY (SAMBUEUS CANADENSIS)

NATIVE PLANT MIX VARIATIONS SHALL BE APPROVED BY ENGINEER.

NOTE: NO FERTILIZER SHALL BE USED WITHIN 10' OF TOP OF STREAM OR RIVER BANK.

10. – MAINTAIN SOIL EROSION CONTROL MEASURES UNTIL PERMANENT GROUND COVER IS ESTABLISHED.
11. – REMOVE SOIL EROSION CONTROL MEASURES AND STABILIZE THESE AREAS.

EXISTING CONDITIONS LEGEND

TEL PED	TELEPHONE PEDESTAL
ELEC PED	ELECTRIC PEDESTAL
CATV PED	CABLE TV PEDESTAL
	SIGN
	UNDERGROUND CABLE TV SIGN
	UNDERGROUND FIBER OPTIC CABLE SIGN
	UNDERGROUND TELEPHONE CABLE SIGN
	UNDERGROUND GAS LINE SIGN
	UNDERGROUND ELECTRIC LINE SIGN
LP	LIGHT POLE
PP	UTILITY POLE
	GUY WIRE ANCHOR
MH	MANHOLE
SSMH	SANITARY SEWER MANHOLE
SDMH	STORM DRAIN MANHOLE
COMMH	COMMUNICATION MANHOLE
ELMH	ELECTRICAL MANHOLE
J.B.	JUNCTION BOX
SPIGOT	SPIGOT/YARD HYDRANT
C.O.	SEWER CLEAN–OUT
E.SS	ELECTRIC SERVICE STUB–OUT
G.SS	GAS SERVICE STUB–OUT
CB	CATCH BASIN
CI	CURB INLET
WM	WATER METER
FH	FIRE HYDRANT
WV	WATER VALVE
BLOW OFF VALVE	BLOW OFF VALVE
G/M	GAS METER
G/V	GAS VALVE
ICV	IRRIGATION CONTROL VALVE
PIV	POST INDICATOR VALVE
E.JUNC	ELECTRIC JUNCTION BOX OR OUTLET

△	CALCULATED POINT
○IPS	1/2" REBAR SET WITH CAP
⊠	CONCRETE MONUMENT
CM–R/W	RIGHT–OF–WAY MONUMENT
DOT MON	D.O.T. CONTROL POINT
●RBF	REBAR FOUND
⊕PK NL	PK NAIL FOUND / SET
SPINDLE	SPINDLE FOUND / SET
CPHUB	HUB & TACK SET
CP/NL	CONTROL POINT NAIL SET / FOUND
CP/NL GPS	CONTROL POINT/NAIL SET GPS
CP/TEMP	CONTROL POINT TEMPORARY MARK
STAKE	STAKE FOUND
40	INTERSTATE HIGHWAY
66	U.S. HIGHWAY
FFE ELEVATION	FINISHED FLOOR ELEVATION
MW	MONITORING WELL
PZ	PIEZOMETER
⊗	LANDFILL GAS MONITORING PROBE
●	SURFACE WATER SAMPLING LOCATION
	LANDFILL GAS VENT
	LANDFILL GAS COLLECTION WELLHEAD
W	POTABLE WATER WELL
MB	MAILBOX OR PAPER BOX
PB	POSTAL DROP BOX
SAT DISH	SATELLITE DISH
YARD ORNAMENT	STATUE, BIRD BATHS, ETC.
	TREES
	SHURBS / BUSHES

	CULVERT
	FENCE
	SILT FENCE
	GUARD RAIL
	APPROXIMATE LOCATION OF EXISTING SEWER LINES
	APPROXIMATE LOCATION OF EXISTING WATER LINES
	APPROXIMATE LOCATION OF EXISTING GAS LINES
	TOP & TOE LINES
	DITCH LINES
	APPROXIMATE LOCATION OF UNDERGROUND CABLE TV LINE
	APPROXIMATE LOCATION OF OVERHEAD CABLE TV LINE
	APPROXIMATE LOCATION OF UNDERGROUND FIBER OPTIC CABLE LINE
	APPROXIMATE LOCATION OF UNDERGROUND ELECTRIC LINE
	APPROXIMATE LOCATION OF OVERHEAD ELECTRIC LINE
	APPROXIMATE LOCATION OF UNDERGROUND TELEPHONE LINES
	APPROXIMATE LOCATION OF OVERHEAD TELEPHONE LINES
	RIGHT–OF–WAY
	TREELINE
	SHRUBLINE
	PROPERTY LINE NOT SURVEYED
	ROCKLINE
	STREAM LINE
	CENTERLINE ROADS
	CENTERLINE OTHER THAN ROADS
	SWAMPLINE/WETLANDS

IPS	IRON PIN SET
RBF	REBAR FOUND
OTIPF	OPEN TOP IRON PIN FOUND
CTIPF	CRIMPED TOP IRON PIN FOUND
CMU	CONCRETE MASONRY UNIT
R/W	RIGHT OF WAY
℄	CENTERLINE
C	CURVE (SEE CURVE TABLE)
POB	POINT OF BEGINNING
CP	CALCULATED POINT
PB	PLAT BOOK
DB	DEED BOOK
L	LINE (SEE LINE TABLE)
BLDG	BUILDING
CIP	CAST IRON PIPE
CMP	CORRUGATED METAL PIPE
CONC	CONCRETE
CMU	CONCRETE MASONRY UNIT
CPP	CORRUGATED PLASTIC PIPE
DIP	DUCTILE IRON PIPE
E&T	ELECTRIC & TELEPHONE
FOC	FIBER OPTIC CABLE
GIP	GALVANIZED IRON PIPE
O/H	OVERHEAD
RCP	REINFORCED CONCRETE PIPE
U/G	UNDERGROUND
VCP	VITRIFIED CLAY PIPE
PVC	POLYVINYL CHLORIDE PIPE
FFE	FINISHED FLOOR ELEVATION
PG	PAGE
REF	REFERENCE
DOT	DEPARTMENT OF TRANSPORTATION
NGS	NATIONAL GEODETIC SYRVEY
NCSP	NORTH CAROLINA STATE PLANE

RECORD DRAWING

This Drawing has been modified to reflect changes made during construction based upon information provided by the Contractor and construction observations made by the Owner's Authorized Representative.

By _____ Date 7/23/12

NORTH CAROLINA PROFESSIONAL SEAL 36132 ENGINEER WILLIAM H. SPERRY

811 Know what's **below.** **Call** before you dig.
N.C. One–Call Center
Dial 811 or 1-800-632-4949

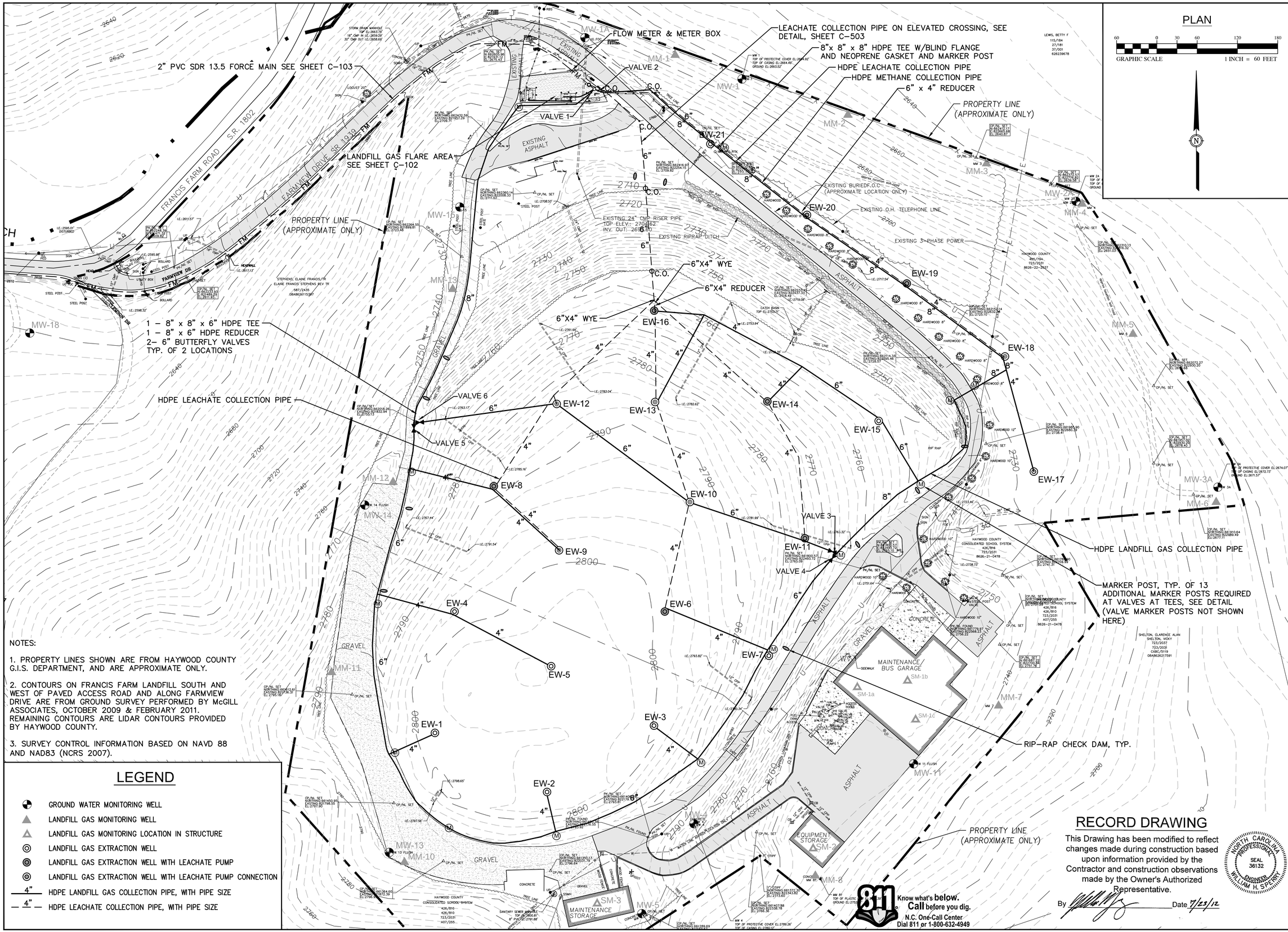
McGill ASSOCIATES
ENGINEERING·PLANNING·FINANCE
55 BROAD STREET ASHEVILLE, NC 28801 PH (828) 252-0575 FIRM LICENSE # C-0459

FRANCIS FARM LANDFILL
LANDFILL GAS COLLECTION & COMBUSTION SYSTEM
PHASES 1 - 3
HAYWOOD COUNTY
HAYWOOD COUNTY, NORTH CAROLINA

JOB NO.: 09.00721
DATE: APRIL, 2012
DESIGNED BY: WHS
CADD BY: KS
DESIGN REVIEW: ____
CONST. REVIEW: ____
FILE NAME: RD 09.00721-G-001-Cover-Sheet.dwg

GENERAL NOTES AND LEGENDS

SHEET
G-002



NOTES:

1. PROPERTY LINES SHOWN ARE FROM HAYWOOD COUNTY G.I.S. DEPARTMENT, AND ARE APPROXIMATE ONLY.

2. CONTOURS ON FRANCIS FARM LANDFILL SOUTH AND WEST OF PAVED ACCESS ROAD AND ALONG FARMVIEW DRIVE ARE FROM GROUND SURVEY PERFORMED BY McGILL ASSOCIATES, OCTOBER 2009 & FEBRUARY 2011. REMAINING CONTOURS ARE LIDAR CONTOURS PROVIDED BY HAYWOOD COUNTY.

3. SURVEY CONTROL INFORMATION BASED ON NAVD 88 AND NAD83 (NCRS 2007).

LEGEND

- GROUND WATER MONITORING WELL
- LANDFILL GAS MONITORING WELL
- LANDFILL GAS MONITORING LOCATION IN STRUCTURE
- LANDFILL GAS EXTRACTION WELL
- LANDFILL GAS EXTRACTION WELL WITH LEACHATE PUMP
- LANDFILL GAS EXTRACTION WELL WITH LEACHATE PUMP CONNECTION
- 4" HDPE LANDFILL GAS COLLECTION PIPE, WITH PIPE SIZE
- 4" HDPE LEACHATE COLLECTION PIPE, WITH PIPE SIZE

RECORD DRAWING

This Drawing has been modified to reflect changes made during construction based upon information provided by the Contractor and construction observations made by the Owner's Authorized Representative.

By _____ Date 7/23/12

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 36132 WILLIAM H. SPERRY

811 Know what's below. Call before you dig. N.C. One-Call Center Dial 811 or 1-800-632-4949

McGill ASSOCIATES
ENGINEERING·PLANNING·FINANCE
55 BROAD STREET ASHEVILLE, NC 28801 PH: (828) 252-0575 FIRM LICENSE # C-0459

FRANCIS FARM LANDFILL
LANDFILL GAS COLLECTION & COMBUSTION SYSTEM
PHASES 1-3

HAYWOOD COUNTY

HAYWOOD COUNTY, NORTH CAROLINA

JOB NO.: 09.00721
DATE: APRIL, 2012
DESIGNED BY: WHS
CADD BY: KS
DESIGN REVIEW: ____
CONST. REVIEW: ____
FILE NAME: RD-09.00721-C-101-Landfill Gas Collection System.dwg

LANDFILL GAS COLLECTION SYSTEM

SHEET C-101

Q:\2009\09.00721\Design\Solid Waste\Drawings\Record Drawings\RD-09.00721-C-101-Landfill Gas Collection System.dwg 7/23/2012 1:28 PM KELLY

PLAN

GRAPHIC SCALE 10 0 5 10 20 30 — 1 INCH = 10 FEET

STORM DRAIN MANHOLE
TOP EL: 2675.41'
24" CMP IN I.E.: 2668.52'
24" CMP OUT I.E.: 2668.45'

OVERHEAD ELECTRICAL SERVICE

PROPERTY LINE (APPROXIMATE ONLY)

2" PVC SDR 13.5 FORCE MAIN SEE SHEET C-103 FOR ADDITIONAL INFORMATION

UNDERGROUND FIBER OPTIC LINE (APPROXIMATE ONLY)
CONTRACTOR MUST CONFIRM LOCATION

FLOW METER & METER BOX

MW-1A

CATCH BASIN
TOP EL: 2680.03
10" CPP I.E. IN: 2678.51'
10" DIP I.E. OUT: 2678.02'

10" DIP

CB

STORM DRAIN MANHOLE
TOP EL: 2688.18'
24" CMP IN I.E.: 2681.24'
24" CMP OUT I.E.: 2681.12'

SDMH

20' DBL-SWING GATE

4' DIAMETER DUPLEX PUMP STATION
SEE SHEET C-504 FOR DETAILS

JUNCTION BOX

CONDENSATE PUMP CONTROL PANEL

4' DIAMETER KNOCKOUT POT, WITH PUMP AND F.M.,
2-8" BUTTERFLY VALVES AT INLETS TO K.O. POT

8" x 8" WYE WITH 2-8" x 6" REDUCERS

UTILITY POLE

UNDERGROUND ELECTRICAL SERVICE TO
GENERATOR SET PANEL
SEE ELECTRICAL DRAWINGS FOR DETAILS

EXISTING ASPHALT

EXISTING GRASS

10" CPP

GRAVEL SURFACING

6' CHAIN LINK FENCE
INSTALL 1 - 20' DBL-SWING GATE
INSTALL 1 - 4' SNGL-SWING GATE

4' SINGLE-SWING GATE

FLARE CONTROLS

FLANGE
TYP. OF 2

FF EL.: 2693.7

G

GENERATOR ELECTRICAL CONTROL PANEL

14' x 17' CONCRETE GENERATOR PAD WITH GENERATOR PLATFORM
2" BALL VALVE AND BLIND FLANGE

FFE: 2693.2

4" ELBOW, 4" x 2" REDUCER
W/1 - 2" BALL VALVE AND BLIND FLANGE
W/BACKUP RING

BOLLARD, TYP.

22' x 10' CONCRETE LFG FLARE PAD

ELECTRICAL EQUIPMENT RACK

UNDERGROUND ELECTRICAL SERVICE TO
FLARE AND PUMPS

HDPE LANDFILL GAS COLLECTION PIPE

HDPE LEACHATE COLLECTION PIPE

HDPE LANDFILL GAS COLLECTION PIPE

4" HDPE TEE W/BLIND FLANGE W/NEOPRENE GASKET,
TAPPED 1" (AT INVERT OF 4")W/1" BALL VALVE
SLOPE 4" HDPE AT 1% MIN. SLOPE TO 1" VALVE

SKID-MOUNTED LANDFILL GAS FLARE PACKAGE

24" CMP

BRICK WALL

TREE LINE

Know what's below. Call before you dig.
N.C. One-Call Center
Dial 811 or 1-800-632-4949

RECORD DRAWING

This Drawing has been modified to reflect changes made during construction based upon information provided by the Contractor and construction observations made by the Owner's Authorized Representative.

By _____ Date 7/23/12

NORTH CAROLINA PROFESSIONAL SEAL 36132 ENGINEER WILLIAM H. SPEARY

McGill ASSOCIATES
ENGINEERING·PLANNING·FINANCE
55 BROAD STREET ASHEVILLE, NC 28801 PH: (828) 252-0575 FIRM LICENSE # C-0459

FRANCIS FARM LANDFILL
LANDFILL GAS COLLECTION & COMBUSTION SYSTEM
PHASES 1-3

HAYWOOD COUNTY

HAYWOOD COUNTY, NORTH CAROLINA

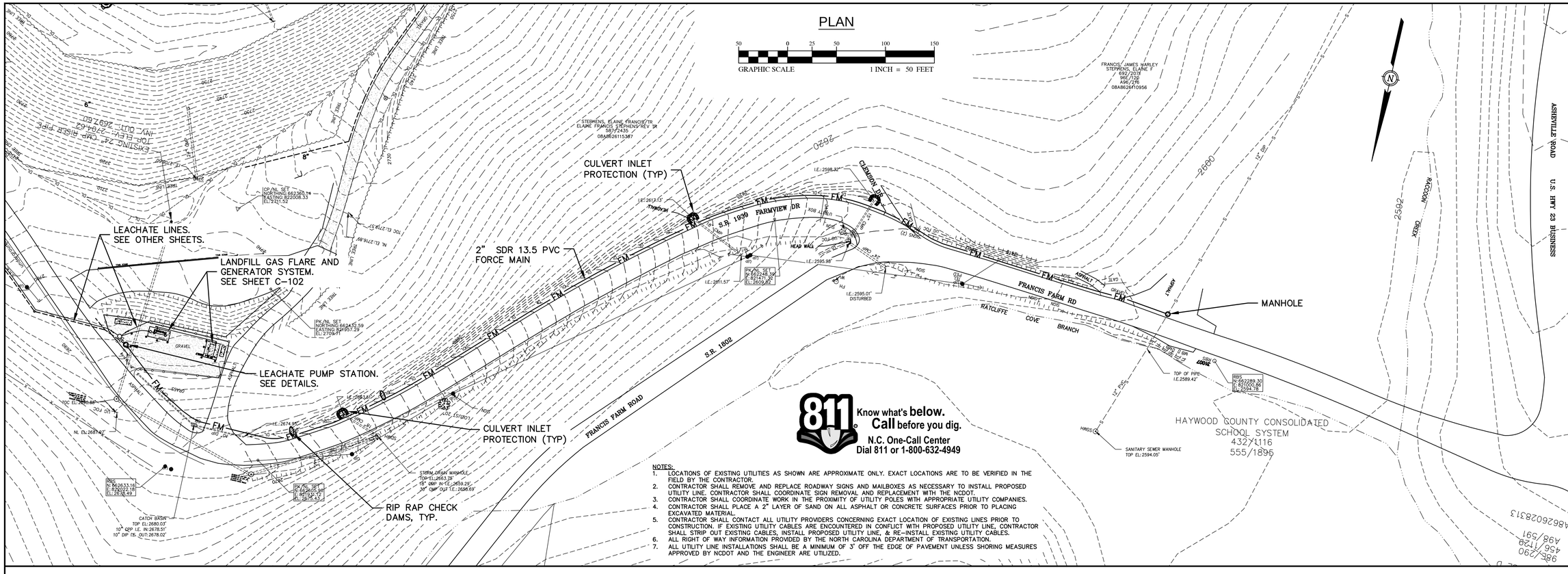
JOB NO.: 09.00721
DATE: APRIL, 2011
DESIGNED BY: WHS
CADD BY: KS
DESIGN REVIEW: ____
CONST. REVIEW: ____
FILE NAME: RD-09.00721-C-102-Flare Area Site Plan.dwg

FLARE AREA SITE PLAN

SHEET
C-102

PLAN

GRAPHIC SCALE 50 0 25 50 100 150 — 1 INCH = 50 FEET

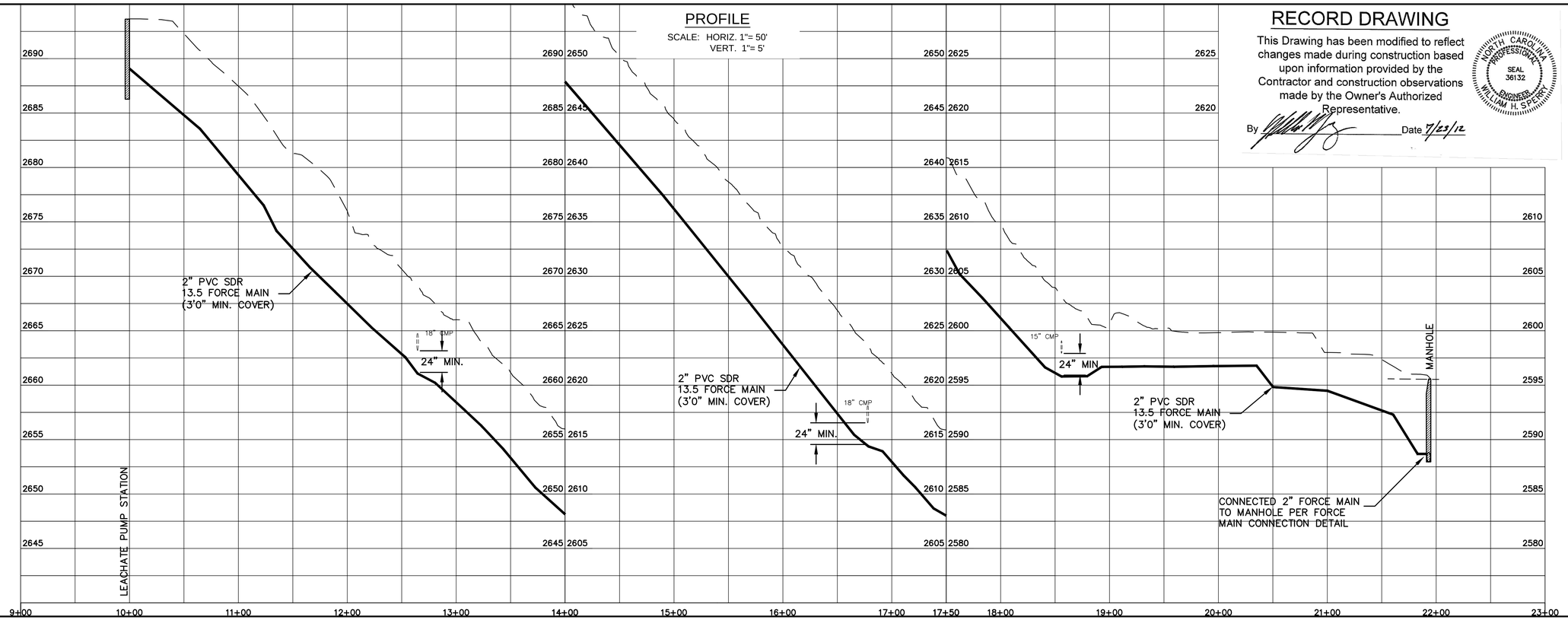


811 Know what's below. Call before you dig.
N.C. One-Call Center
Dial 811 or 1-800-632-4949

NOTES:
1. LOCATIONS OF EXISTING UTILITIES AS SHOWN ARE APPROXIMATE ONLY. EXACT LOCATIONS ARE TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR.
2. CONTRACTOR SHALL REMOVE AND REPLACE ROADWAY SIGNS AND MAILBOXES AS NECESSARY TO INSTALL PROPOSED UTILITY LINE. CONTRACTOR SHALL COORDINATE SIGN REMOVAL AND REPLACEMENT WITH THE NCDOT.
3. CONTRACTOR SHALL COORDINATE WORK IN THE PROXIMITY OF UTILITY POLES WITH APPROPRIATE UTILITY COMPANIES.
4. CONTRACTOR SHALL PLACE A 2" LAYER OF SAND ON ALL ASPHALT OR CONCRETE SURFACES PRIOR TO PLACING EXCAVATED MATERIAL.
5. CONTRACTOR SHALL CONTACT ALL UTILITY PROVIDERS CONCERNING EXACT LOCATION OF EXISTING LINES PRIOR TO CONSTRUCTION. IF EXISTING UTILITY CABLES ARE ENCOUNTERED IN CONFLICT WITH PROPOSED UTILITY LINE, CONTRACTOR SHALL STRIP OUT EXISTING CABLES, INSTALL PROPOSED UTILITY LINE, & RE-INSTALL EXISTING UTILITY CABLES.
6. ALL RIGHT OF WAY INFORMATION PROVIDED BY THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION.
7. ALL UTILITY LINE INSTALLATIONS SHALL BE A MINIMUM OF 3' OFF THE EDGE OF PAVEMENT UNLESS SHORING MEASURES APPROVED BY NCDOT AND THE ENGINEER ARE UTILIZED.

PROFILE

SCALE: HORIZ. 1"= 50'
VERT. 1"= 5'



RECORD DRAWING

This Drawing has been modified to reflect changes made during construction based upon information provided by the Contractor and construction observations made by the Owner's Authorized Representative.

By _____ Date 7/23/12

NORTH CAROLINA PROFESSIONAL SEAL 36132 ENGINEER WILLIAM H. SPERRY

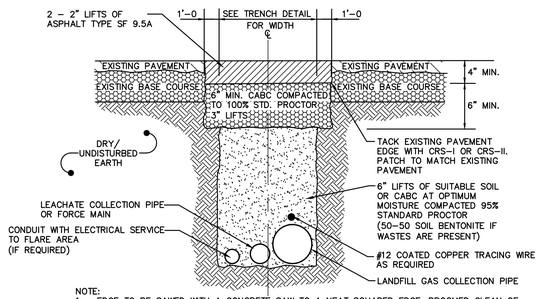
McGill ASSOCIATES
ENGINEERING·PLANNING·FINANCE
55 BROAD STREET ASHEVILLE, NC 28801 PH (828) 252-0575 FIRM LICENSE # C-0459

FRANCIS FARM LANDFILL
LANDFILL GAS COLLECTION & COMBUSTION SYSTEM
PHASES 1-3
HAYWOOD COUNTY
HAYWOOD COUNTY, NORTH CAROLINA

JOB NO.: 09.00721
DATE: APRIL, 2012
DESIGNED BY: VW
CADD BY: VW
DESIGN REVIEW: ____
CONST. REVIEW: ____
FILE NAME: RECORD/C-103-Leachate Pump Station And Force Main.dwg

LEACHATE PUMP STATION AND FORCE MAIN

SHEET
C-103

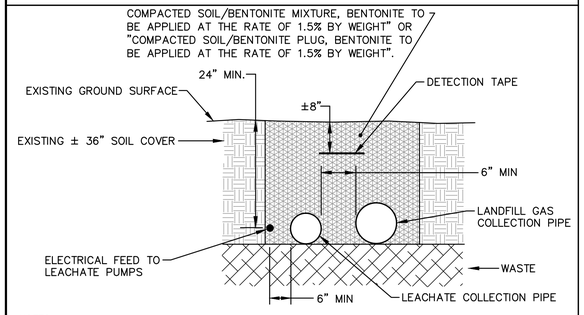


NOTE:
1. EDGE TO BE SAWED WITH A CONCRETE SAW TO A NEAT SQUARED EDGE. BROOMED CLEAN OF DUST BEFORE TACK COAT IS APPLIED.
2. EDGES TO BE TACKED WITH EMULSIFIED ASPHALT TACK CRS–I OR CRS–II.

ASPHALT DRIVE REPAIR

NOT TO SCALE

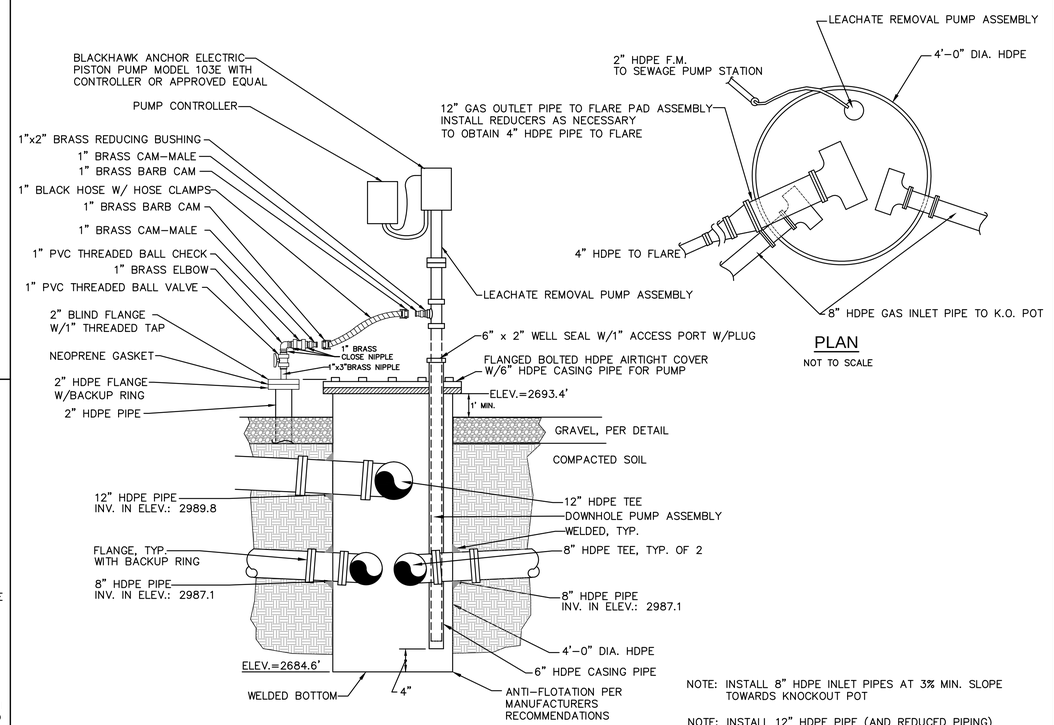
REVISION DATE - NOVEMBER 3, 2008



NOTES:
1. CONSTRUCTION OF TRENCHES SHALL COMPLY WITH ALL FEDERAL, STATE AND LOCAL SAFETY AND HEALTH REGULATIONS WHICH HAVE JURISDICTION AT THE PROJECT SITE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO BE FAMILIAR WITH THE APPLICABLE REGULATIONS AND FOLLOW THEM ACCORDINGLY.

LANDFILL GAS COLLECTION PIPE / LEACHATE COLLECTION PIPE TRENCH DETAIL

NOT TO SCALE



PREFABRICATED HDPE KNOCKOUT POT

NOT TO SCALE

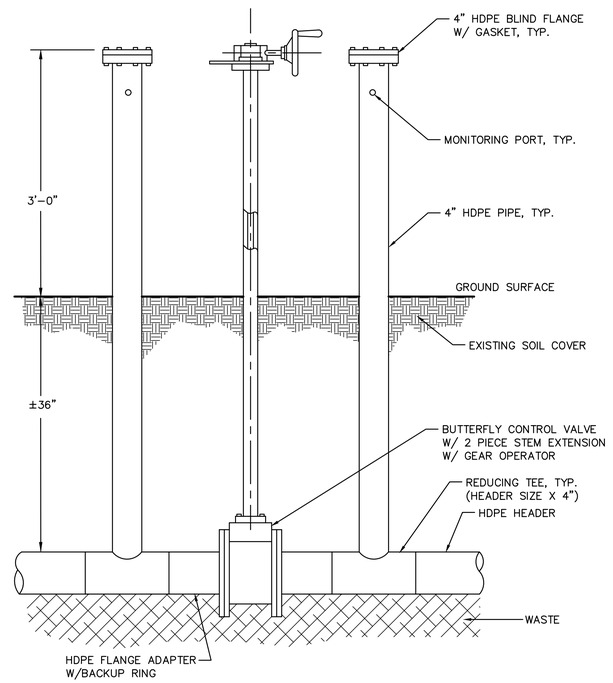
PLAN

NOT TO SCALE

NOTE: INSTALL 8" HDPE INLET PIPES AT 3% MIN. SLOPE TOWARDS KNOCKOUT POT

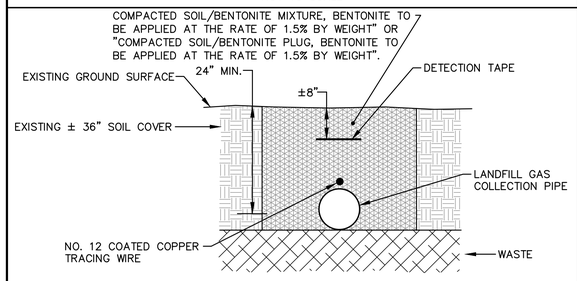
NOTE: INSTALL 12" HDPE PIPE (AND REDUCED PIPING) AT 1.5% MIN. SLOPE TOWARDS KNOCKOUT POT

NOTE: MAINTAIN 2' MIN. COVER OVER INLET AND OUTLET PIPING IN FLARE SITE AREA



BUTTERFLY VALVE WITH 2-PIECE STEM EXTENSION AND MONITORING PORTS

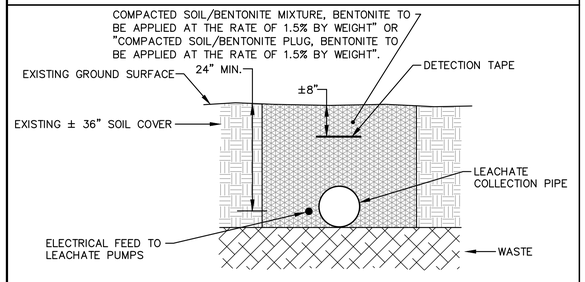
NOT TO SCALE



NOTES:
1. CONSTRUCTION OF TRENCHES SHALL COMPLY WITH ALL FEDERAL, STATE AND LOCAL SAFETY AND HEALTH REGULATIONS WHICH HAVE JURISDICTION AT THE PROJECT SITE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO BE FAMILIAR WITH THE APPLICABLE REGULATIONS AND FOLLOW THEM ACCORDINGLY.

LANDFILL GAS COLLECTION PIPE TRENCH DETAIL

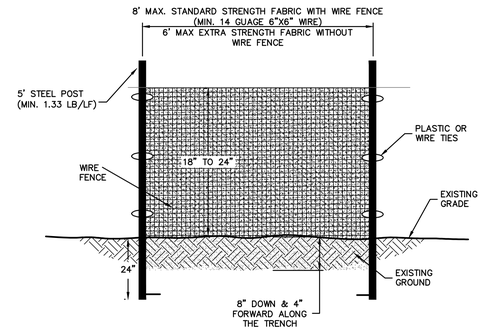
NOT TO SCALE



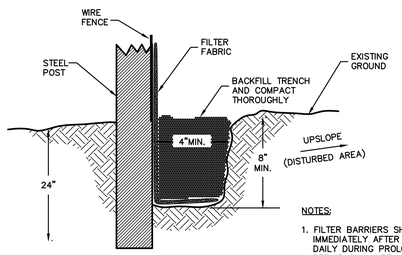
NOTES:
1. CONSTRUCTION OF TRENCHES SHALL COMPLY WITH ALL FEDERAL, STATE AND LOCAL SAFETY AND HEALTH REGULATIONS WHICH HAVE JURISDICTION AT THE PROJECT SITE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO BE FAMILIAR WITH THE APPLICABLE REGULATIONS AND FOLLOW THEM ACCORDINGLY.

LEACHATE COLLECTION PIPE TRENCH DETAIL

NOT TO SCALE



SECTION VIEW

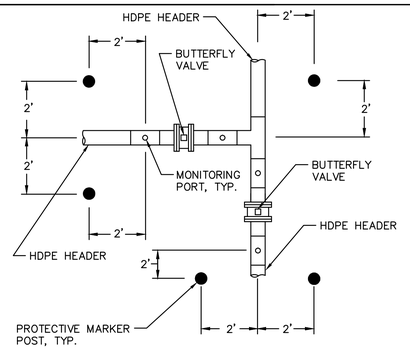


NOTES:
1. FILTER BARRIERS SHALL BE INSPECTED IMMEDIATELY AFTER EACH RAINFALL AND DAILY DURING PROLONGED RAINFALL. REPAIR SHALL BE MADE AS NECESSARY.
2. FABRIC SHALL BE REPLACED PROMPTLY IF FOUND TO BE IN DISREPAIR.
3. SEDIMENT DEPOSITS SHALL BE REMOVED AFTER EACH STORM EVENT AND WHEN DEPOSITS REACH APPROXIMATELY 1/3 HEIGHT OF BARRIER.
4. REFERENCE NCDENR LAND QUALITY SECTION DESIGN MANUAL: 6.62.

SLOPE	SLOPE LENGTH(FT)	MAXIMUM AREA(SQFT)
<2%	100	10,000
2 TO 5%	75	7,500
5 TO 10%	50	5,000
10 TO 20%	25	2,500
>20%	15	1,500

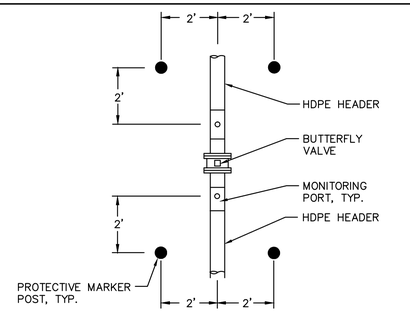
SEDIMENTATION/SILT FENCE

REVISION DATE - NOVEMBER 3, 2008



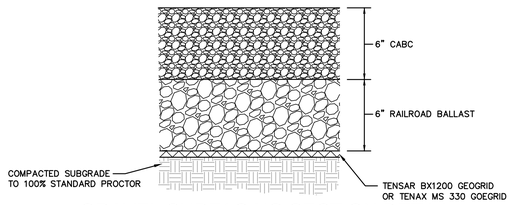
PROTECTIVE MARKER POST LOCATION AT TYPICAL TEES

NOT TO SCALE



PROTECTIVE MARKER POST LOCATION IN LINE

NOT TO SCALE



GRAVEL SURFACING SECTION DETAIL

NOT TO SCALE

RECORD DRAWING

This Drawing has been modified to reflect changes made during construction based upon information provided by the Contractor and construction observations made by the Owner's Authorized Representative.

By _____ Date 11/23/12

NORTH CAROLINA PROFESSIONAL SEAL 36132 ENGINEER WILLIAM H. SPERRY

McGill Associates
ENGINEERING·PLANNING·FINANCE
55 BROAD STREET ASHEVILLE, NC 28801 PH (828) 252-0575 FIRM LICENSE # C-0459

FRANCIS FARM LANDFILL
LANDFILL GAS COLLECTION & COMBUSTION SYSTEM
PHASES 1 - 3

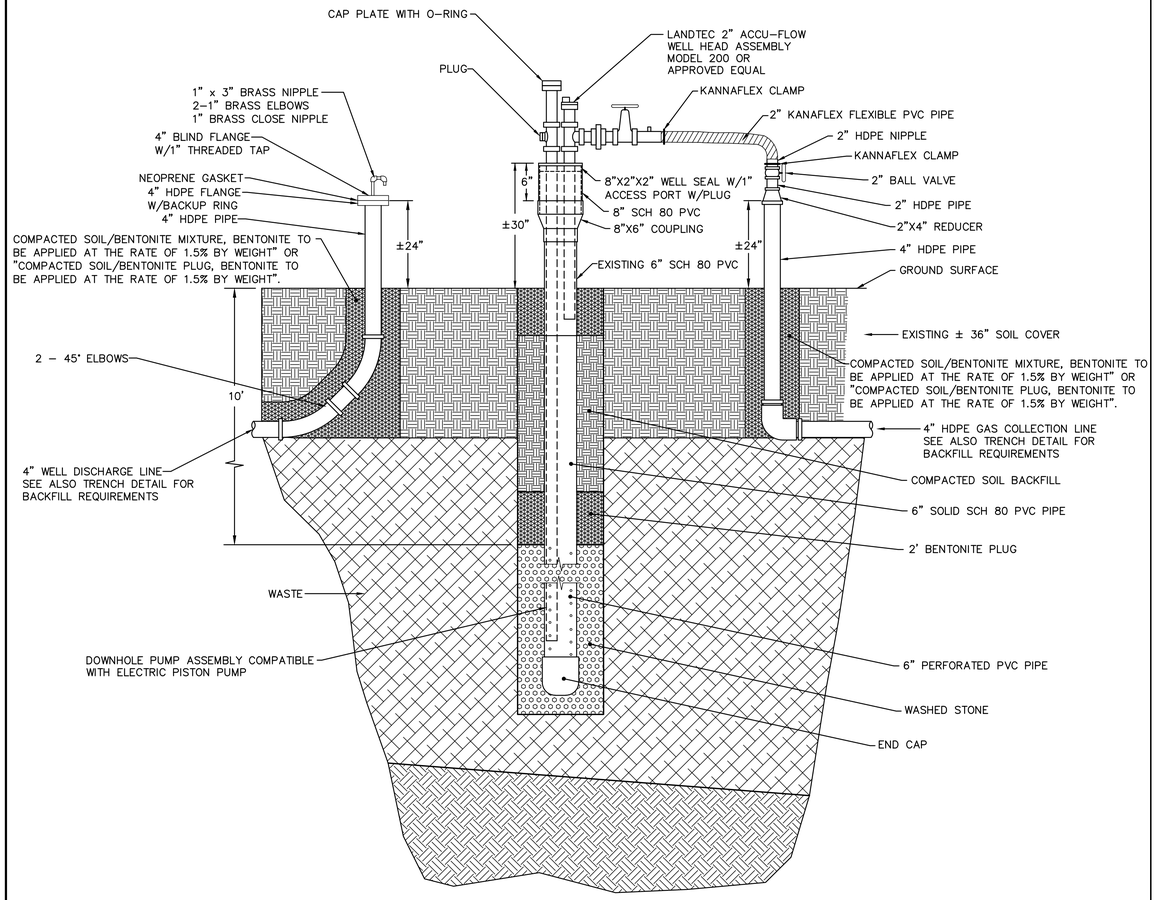
HAYWOOD COUNTY

HAYWOOD COUNTY, NORTH CAROLINA

JOB NO.: 09.00721
DATE: APRIL, 2012
DESIGNED BY: WHS
CADD BY: KS
DESIGN REVIEW: ____
CONST. REVIEW: ____
FILE NAME: I:\09\09.00721\Design\Solid Waste\Drawings\Record Drawings\RD 09.00721-C-501-C-505-Miscellaneous-Details.dwg

MISCELLANEOUS DETAILS

SHEET
C-501

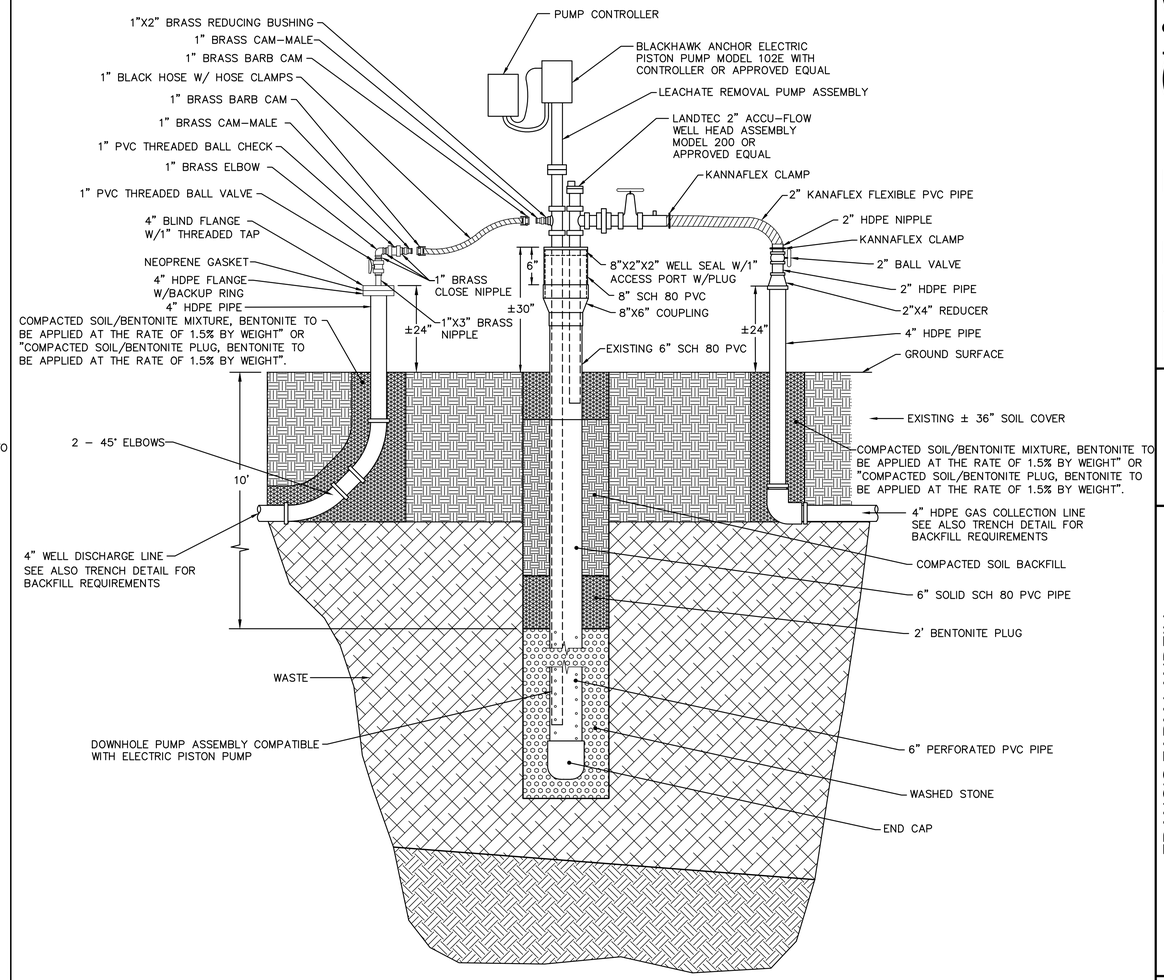


NOTE: SEE EXISTING EXTRACTION WELL INFORMATION ON SHEET C-503 TO DETERMINE DEPTHS OF DE-WATERING EQUIPMENT

LANDFILL GAS EXTRACTION WELL W/ CONNECTION FOR FUTURE LEACHATE PUMP

EW WELL NUMBERS: 9,10,12,13,18&20

NOT TO SCALE

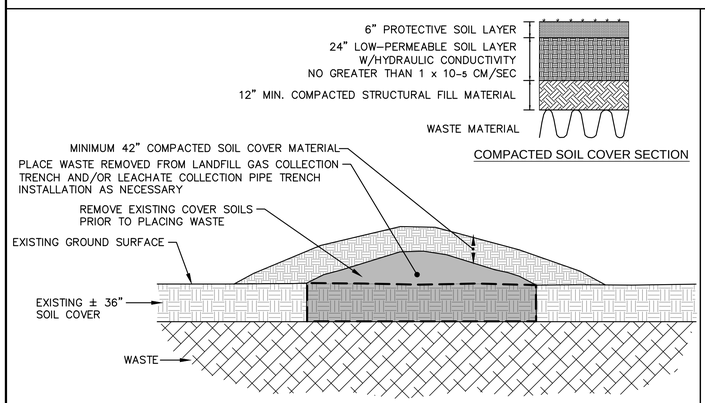


NOTE: SEE EXISTING EXTRACTION WELL INFORMATION ON SHEET C-503 TO DETERMINE DEPTHS OF DE-WATERING EQUIPMENT

LANDFILL GAS EXTRACTION WELL W/ LEACHATE PUMP

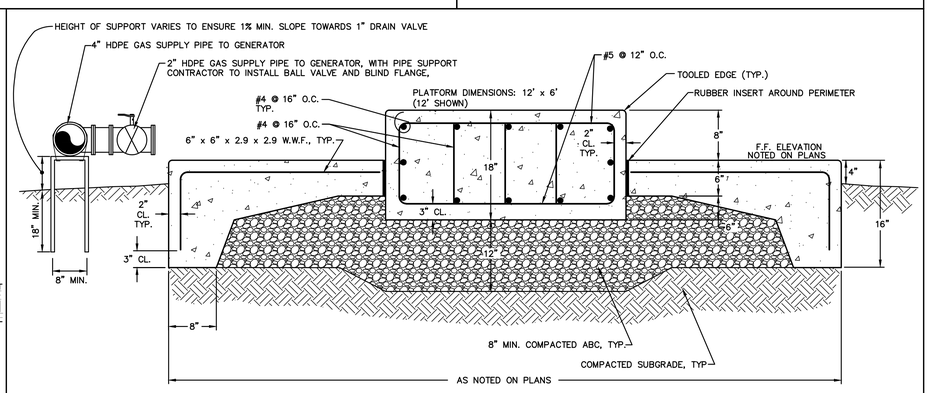
EW WELL NUMBERS: 6,8,11,14,16&19

NOT TO SCALE



CAP REPAIR AND WASTE FILL COVER DETAIL

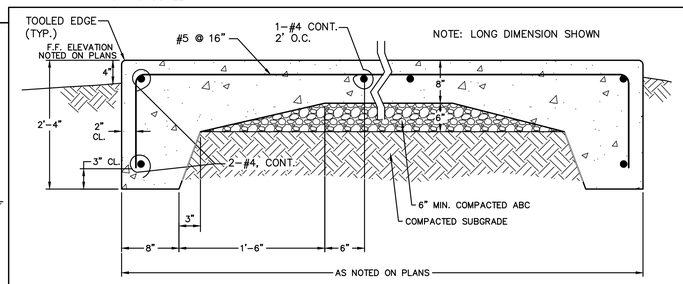
NOT TO SCALE



PIPE SUPPORT NOTES:
1. SUPPORTS AT 4' MAX. SPACING AND AT TEES, BENDS AND ENDS OF PIPE.
2. SUPPORT MATERIAL MUST BE APPROVED BY ENGINEER.
3. SECURELY INSTALL PIPE STRAP AT SUPPORTS, STRAP MATERIAL SHALL BE NON-CORRODABLE MATERIAL.

GENERATOR PAD DETAIL

NOT TO SCALE



CONCRETE LFG FLARE PAD DETAIL

NOT TO SCALE

RECORD DRAWING

This Drawing has been modified to reflect changes made during construction based upon information provided by the Contractor and construction observations made by the Owner's Authorized Representative.

By _____ Date 7/23/12

NORTH CAROLINA PROFESSIONAL SEAL 36132 ENGINEER WILLIAM H. SPERRY

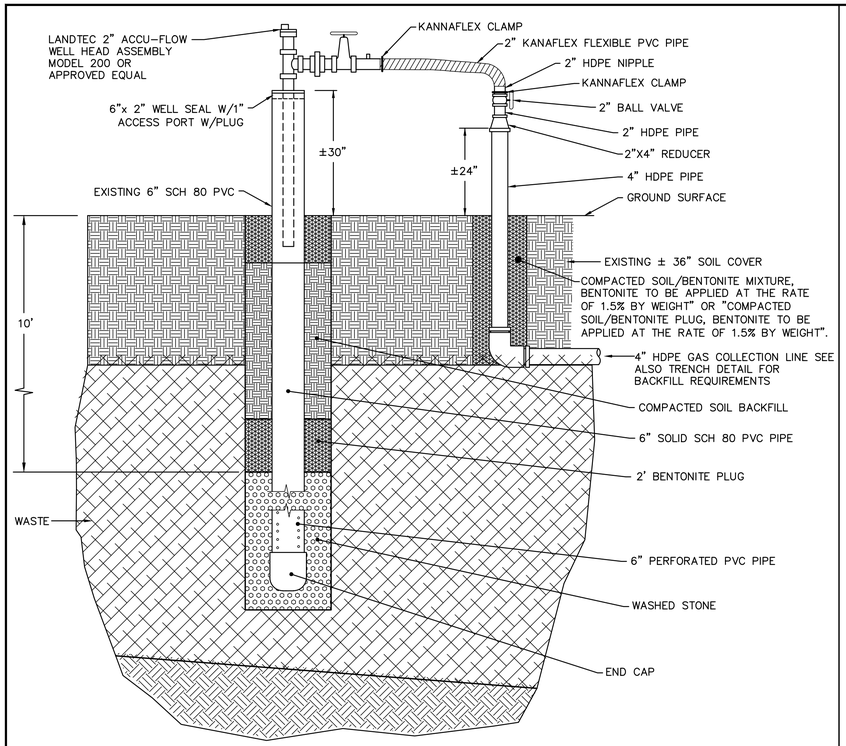
McGill Associates
ENGINEERING·PLANNING·FINANCE
55 BROAD STREET ASHEVILLE, NC 28801 PH (828) 252-0575 FIRM LICENSE # C-0459

FRANCIS FARM LANDFILL
LANDFILL GAS COLLECTION & COMBUSTION SYSTEM
PHASES 1 - 3
HAYWOOD COUNTY
HAYWOOD COUNTY, NORTH CAROLINA

JOB NO.: 09.00721
DATE: APRIL, 2012
DESIGNED BY: WHS
CADD BY: KS
DESIGN REVIEW: _____
CONST. REVIEW: _____
FILE NAME: R:\09\09.00721\C-505\Miscellaneous Details.dwg

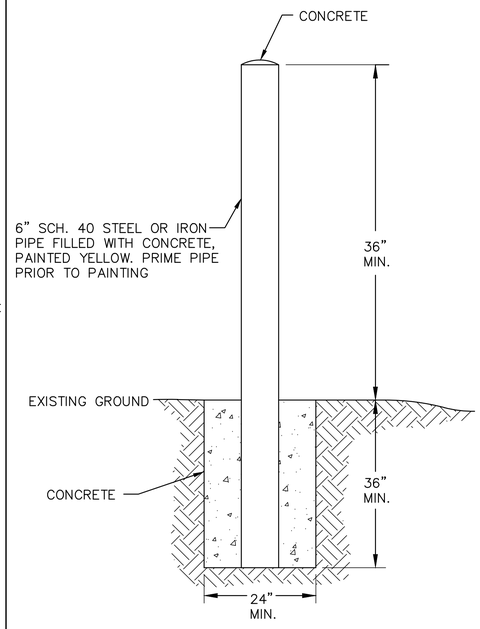
MISCELLANEOUS DETAILS

SHEET
C-502



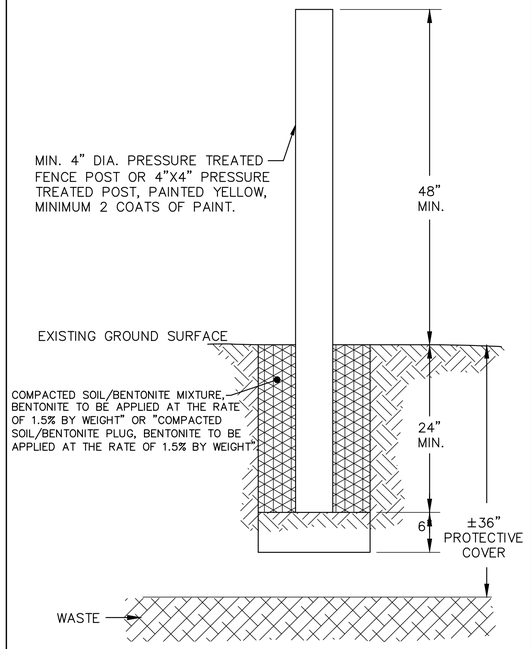
LANDFILL GAS EXTRACTION WELL

EW WELL NUMBERS: 1,2,3,4,5,7,15,17&21
NOT TO SCALE



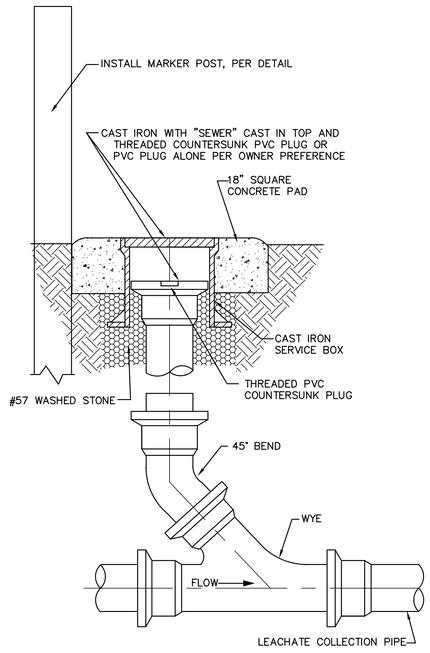
BOLLARD DETAIL

NOT TO SCALE



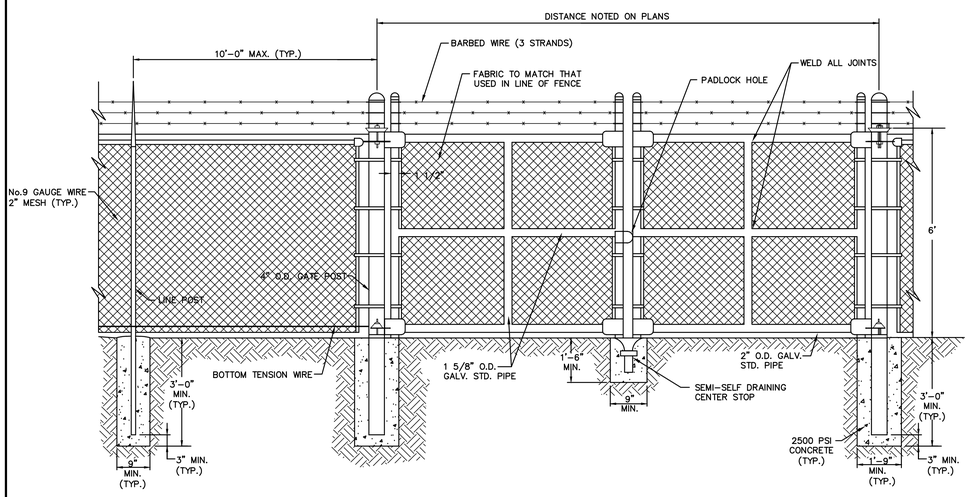
PROTECTIVE MARKER POST DETAIL

NOT TO SCALE



CLEANOUT DETAIL

REVISION DATE – NOVEMBER 3, 2008



NOTE: THE LOCATION OF THE CHAIN LINK FENCING SHALL BE VERIFIED IN THE FIELD AND MUST BE APPROVED BY THE OWNER.

CHAIN LINK FENCE AND DOUBLE GATE DETAIL

NOT TO SCALE

LANDFILL GAS EXTRACTION WELLS
FITTED WITH LEACHATE REMOVAL PUMPS AND DOWN-HOLE PUMP ASSEMBLY

Well No.	Northing	Easting	Top of Casing Elevation	Approximate Ground Surface Elevation	Drilled Well Depth (From Gr. Surface) (Vert Ft)	Bottom of Well Elevation	Screen Depth (BGS - Ft)	Screen Elevation
EW-6	661,736.17	822,202.22	2801.41	2799.33	56	2743	10 – 56	2789 – 2743
EW-8	661,922.84	821,947.50	2791.01	2789.07	50	2739	10 – 50	2779 – 2739
EW-11	661,845.22	822,410.81	2777.83	2775.81	50	2726	10 – 50	2766 – 2726
EW-14	662,049.11	822,354.97	2771.01	2769.05	49	2720	10 – 49	2759 – 2720
EW-16	662,184.21	822,186.41	2766.32	2764.27	50	2714	10 – 50	2754 – 2714
EW-19	662,224.72	822,562.62	2723.86	2721.92	45	2677	10 – 45	2712 – 2677

LANDFILL GAS EXTRACTION WELLS
FITTED FOR FUTURE LEACHATE REMOVAL PUMPS

Well No.	Northing	Easting	Top of Casing Elevation	Approximate Ground Surface Elevation	Drilled Well Depth (From Gr. Surface) (Vert Ft)	Bottom of Well Elevation	Screen Depth (Below Ground Surface) (Vert Ft)	Screen Elevation
EW-9	661,827.34	822,044.64	2801.52	2799.37	52	2747	10 – 52	2789 – 2747
EW-10	661,899.24	822,239.54	2796.45	2794.41	66	2728	10 – 66	2784 – 2728
EW-12	662,045.34	822,041.19	2787.56	2785.66	45	2741	10 – 45	2776 – 2741
EW-13	662,048.23	822,187.69	2787.65	2785.99	60	2726	10 – 60	2776 – 2726
EW-18	662,116.02	822,708.85	2728.07	2726.18	45	2681	10 – 45	2716 – 2681
EW-20	662,326.82	822,413.92	2718.25	2716.33	35	2681	10 – 35	2706 – 2681

LANDFILL GAS EXTRACTION WELLS
LANDFILL GAS EXTRACTION ONLY

Well No.	Northing	Easting	Top of Casing Elevation	Approximate Ground Surface Elevation	Drilled Well Depth (From Gr. Surface) (Vert Ft)	Bottom of Well Elevation	Screen Depth (Below Ground Surface) (Vert Ft)	Screen Elevation
EW-1	661,555.49	821,859.83	2803.72	2801.56	30	2772	10 – 30	2792 – 2772
EW-2	661,467.47	822,026.74	2805.52	2803.23	30	2773	10 – 30	2793 – 2773
EW-3	661,566.28	822,186.05	2802.37	2800.45	40	2760	10 – 40	2790 – 2760
EW-4	661,736.12	821,889.02	2799.96	2798.07	40	2758	10 – 40	2788 – 2758
EW-5	661,654.72	822,032.92	2807.22	2805.08	40	2765	10 – 40	2795 – 2765
EW-7	661,670.35	822,357.16	2782.66	2780.55	30	2751	10 – 30	2771 – 2751
EW-15	662,020.00	822,520.81	2756.87	2755.11	31	2724	10 – 31	2745 – 2724
EW-17	661,944.57	822,751.82	2731.57	2729.67	25	2705	10 – 25	2720 – 2705
EW-21	662,432.43	822,270.03	2713.00	2710.32	30	2680	10 – 30	2700 – 2680

NOTE: EXISTING INFORMATION FOR LFG EXTRACTION WELLS PROVIDED TO ASSIST WITH DETERMINING DEPTHS OF DE-WATERING SYSTEM, PER THE DETAILS ON SHEET C-502

EXISTING EXTRACTION WELL INFORMATION

RECORD DRAWING

This Drawing has been modified to reflect changes made during construction based upon information provided by the Contractor and construction observations made by the Owner's Authorized Representative.

By _____ Date 11/23/12

NORTH CAROLINA PROFESSIONAL SEAL 36132 ENGINEER WILLIAM H. SPERRY

McGill Associates
ENGINEERING·PLANNING·FINANCE
55 BROAD STREET ASHEVILLE, NC 28801 PH (828) 252-0575 FIRM LICENSE # C-0459

FRANCIS FARMS LANDFILL
LANDFILL GAS COLLECTION & COMBUSTION SYSTEM
PHASES 1 - 3
HAYWOOD COUNTY
HAYWOOD COUNTY, NORTH CAROLINA

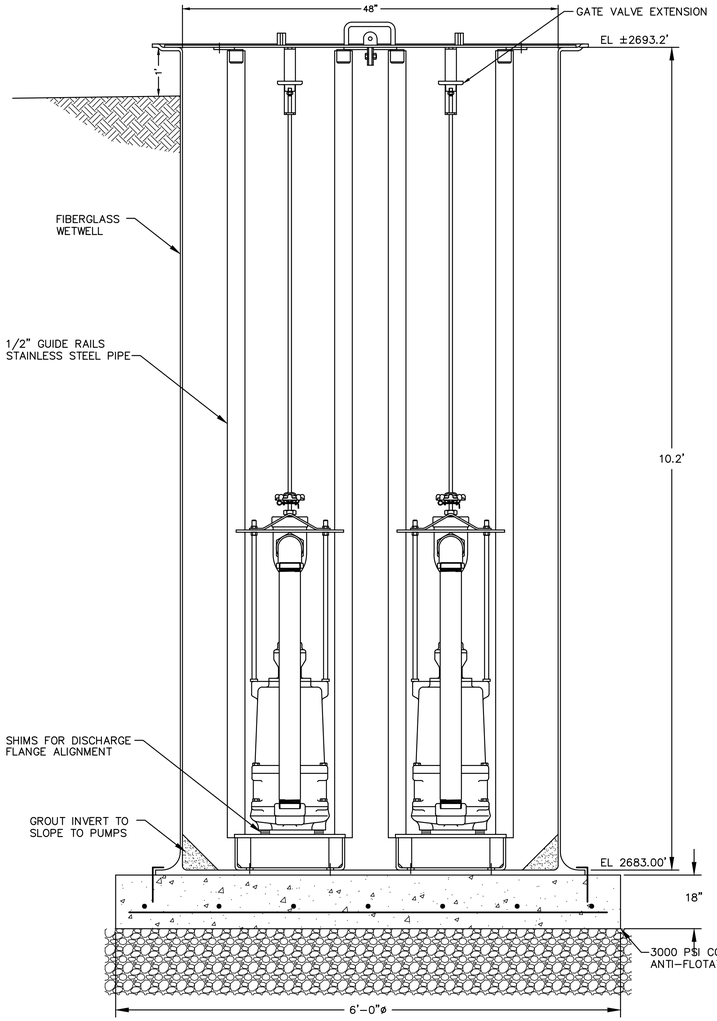
JOB NO.: 09.00721
DATE: APRIL, 2012
DESIGNED BY: WHS
CADD BY: KS
DESIGN REVIEW: ____
CONST. REVIEW: ____
FILE NAME: H:\09\09.00721\Design\Solid Waste\Drawings\Miscellaneous Details.dwg

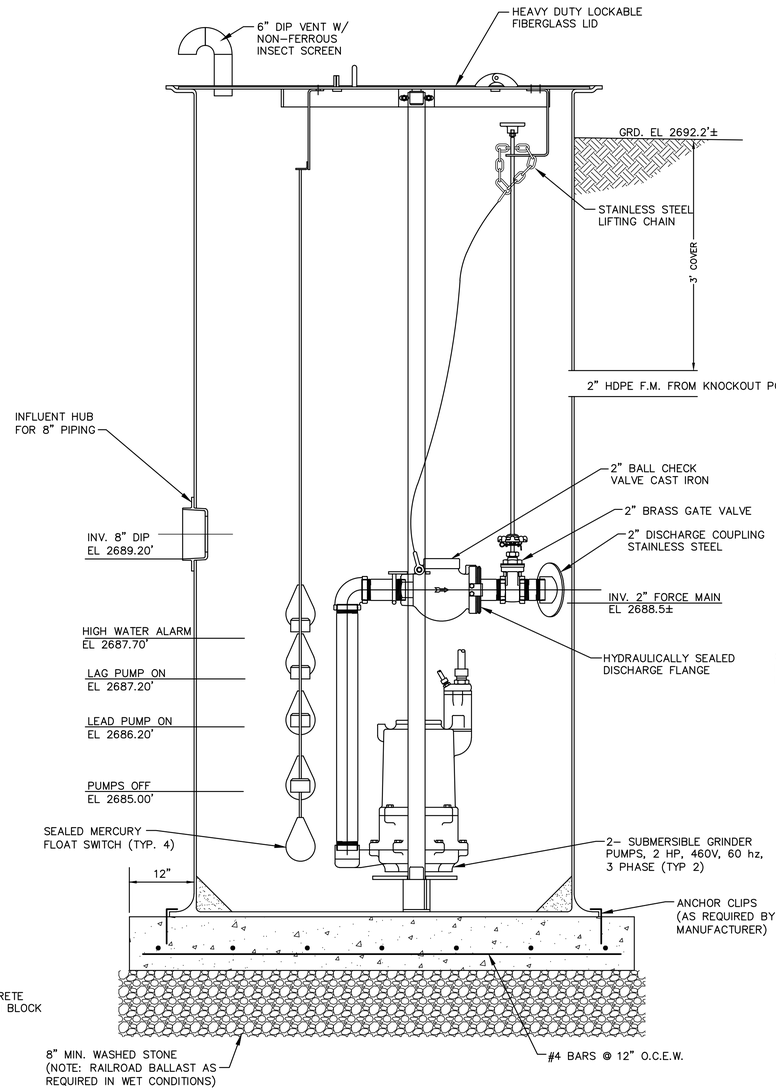
MISCELLANEOUS DETAILS

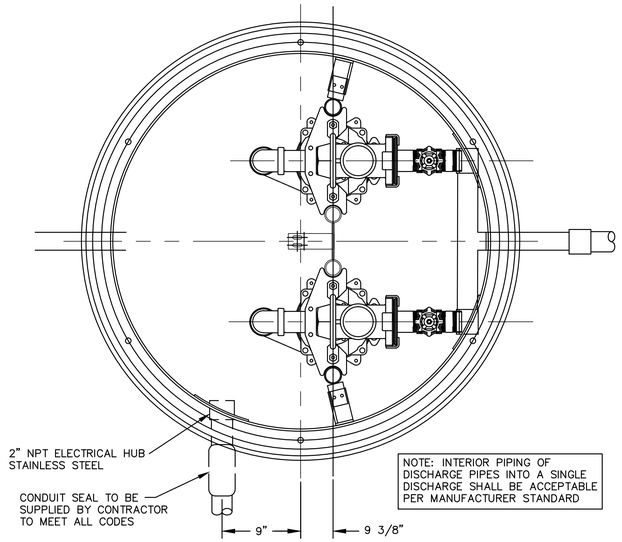
SHEET
C-503

O:\2009\09.00721\Design\Solid Waste\Drawings\Record Drawings\RD 09.00721-C-501-C-505-Miscellaneous-Details.dwg 7/23/2012 1:20 PM KELLY

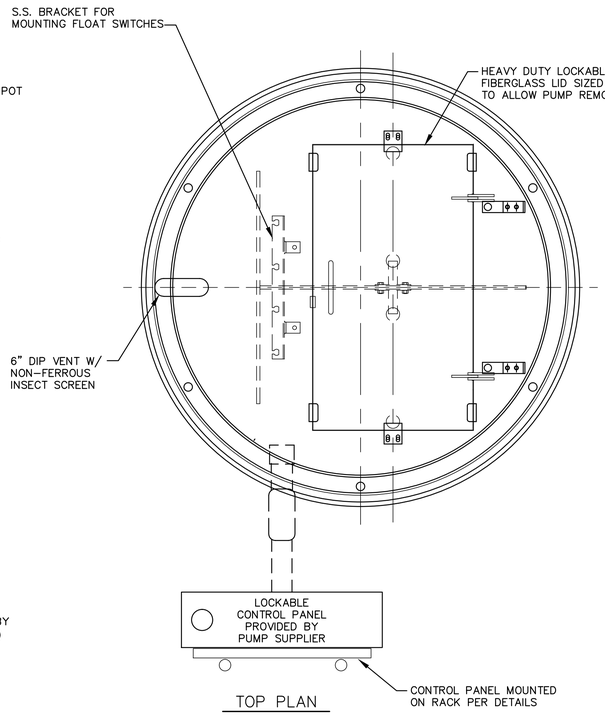
NOTE: PUMP CONTROL PANEL WITH WARNING LIGHT FURNISHED BY PUMP STATION SUPPLIER.
PUMP CONTROL PANEL INCLUDES CONNECTION FOR EMERGENCY PORTABLE GENERATOR.
SEE ELECTRICAL DRAWINGS FOR DETAILS.







PLAN



TOP PLAN

PACKAGE LEACHAGE PUMP STATION

REVISION DATE - MARCH, 2011

RECORD DRAWING

This Drawing has been modified to reflect changes made during construction based upon information provided by the Contractor and construction observations made by the Owner's Authorized Representative.

By _____ Date 7/23/12

NORTH CAROLINA PROFESSIONAL SEAL 36132 ENGINEER WILLIAM H. SPERRY

McGill Associates
ENGINEERING·PLANNING·FINANCE
55 BROAD STREET ASHEVILLE, NC 28801 PH (828) 252-0575 FIRM LICENSE # C-0459

FRANCIS FARM LANDFILL
LANDFILL GAS COLLECTION & COMBUSTION SYSTEM
PHASES 1 - 3
HAYWOOD COUNTY
HAYWOOD COUNTY, NORTH CAROLINA

JOB NO.: 09.00721
DATE: APRIL, 2012
DESIGNED BY: WHS
CADD BY: KS
DESIGN REVIEW: ____
CONST. REVIEW: ____
FILE NAME: RD\2009\09.00721\Design\Solid Waste\Drawings\Record Drawings\RD 09.00721-C-501-C-505-Miscellaneous Details.dwg

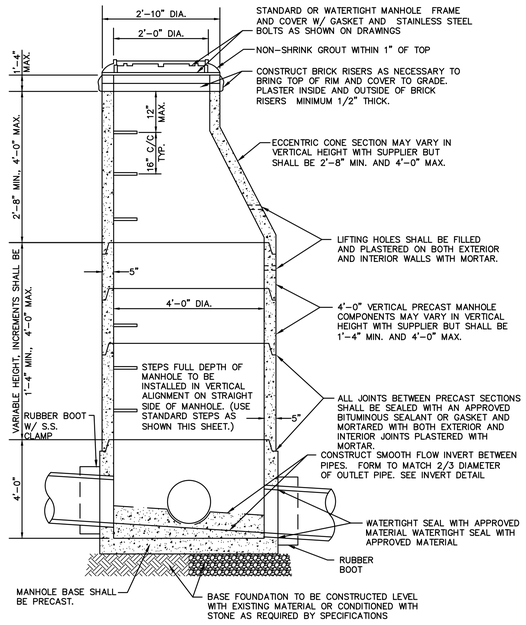
MISCELLANEOUS DETAILS

SHEET
C-504

GENERAL SEWER NOTES

REVISION DATE - NOVEMBER 19, 2010

1. ALL CONSTRUCTION OUTSIDE RIGHTS-OF-WAY SHALL TAKE PLACE WITHIN THE PERMANENT AND TEMPORARY ACCESS EASEMENTS SHOWN.
2. CONTRACTOR SHALL REPAIR ALL DISTURBED AREAS TO EQUAL OR BETTER CONDITION THAN THE ORIGINAL SITE, OR AS NOTED.
3. LOCATIONS OF EXISTING UTILITIES AS SHOWN ARE APPROXIMATE ONLY. EXACT LOCATIONS ARE TO BE VERIFIED IN THE FIELD BY THE CONTRACTOR. AT LEAST THREE DAYS PRIOR TO CONSTRUCTION, CONTRACTOR MUST NOTIFY EXISTING UTILITY OWNERS. CALL 811 BEFORE YOU DIG.
4. ALL WORK NEAR AND AROUND WATERWAYS MUST CONFORM TO THE RULES OF THE STATE OF NORTH CAROLINA.
5. CONTRACTOR MUST PROVIDE EROSION CONTROL DEVICES TO CONTROL RUNOFF FROM THE CONSTRUCTION SITE. CONTRACTOR WILL BE RESPONSIBLE FOR ANY FINES THAT MAY BE LEVIED DUE TO POLLUTION CREATED DURING CONSTRUCTION.
6. CONTRACTOR SHALL FOLLOW ALL FEDERAL, STATE AND LOCAL HEALTH AND SAFETY REGULATIONS PERTAINING TO CONSTRUCTION OPERATIONS.
7. SEWER FORCE MAINS AND WATER LINES SHALL HAVE 3'-0" MINIMUM COVER UNLESS OTHERWISE SHOWN ON THE DRAWINGS.
8. WATER AND SEWER LINES SHALL HAVE A MINIMUM 10' HORIZONTAL SEPARATION OR A MINIMUM 18" VERTICAL SEPARATION WITH THE WATER OVER SEWER, OR BOTH WATER AND SEWER LINES SHALL BE DUCTILE IRON PIPE 10' EITHER SIDE OF THE CROSSING.
9. SEWER AND STORM SEWER LINES SHALL HAVE A MINIMUM 12" VERTICAL SEPARATION.
10. SEE PROJECT SPECIFICATIONS FOR ADDITIONAL INFORMATION.
11. UNLESS OTHERWISE NOTED, ALL BURIED PIPE SHALL BE INSTALLED WITH PUSH-ON JOINTS AND EXPOSED PIPING SHALL BE FLANGED JOINT.
12. LEGAL DESCRIPTIONS FOR PROPOSED EASEMENTS BY OTHERS.
13. SITE TOPOGRAPHIC AND BOUNDARY SURVEY PROVIDED BY SURVEYOR NOTED ON PLANS.
14. CONTRACTOR SHALL NOTIFY THE PROPER LOCAL AUTHORITIES 24 HOURS PRIOR TO ANY ROAD BEING CLOSED FOR CONSTRUCTION, INCLUDING BUT NOT LIMITED TO LOCAL NEWSPAPER, RADIO STATION, FIRE DEPARTMENT, COUNTY SHERIFF'S DEPARTMENT, AMBULANCE, AND COUNTY EMERGENCY AGENCY. ALL TRAFFIC CONTROL SHALL CONFORM TO THE REQUIREMENTS OF THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION.
15. CONTRACTOR SHALL NOTIFY THE ENGINEER AFTER EXISTING BURIED UTILITIES HAVE BEEN LOCATED AND 24 HOURS PRIOR TO CONSTRUCTION.
16. LOCATIONS SHOWN FOR SANITARY SEWER SERVICES ARE ASSUMED. COORDINATE LOCATIONS OF ALL PROPOSED SEWER SERVICE CONNECTIONS WITH PROPERTY OWNER PRIOR TO CONSTRUCTION.
17. CONTRACTOR SHALL FIELD VERIFY ALL PROPOSED MANHOLE TOP ELEVATIONS AND EXISTING MANHOLE INVERTS PRIOR TO CONSTRUCTION AND NOTIFY ENGINEER OF ANY DISCREPANCIES. CONTRACTOR SHALL ADJUST ALL PROPOSED SEWER STRUCTURES TO MATCH FINISHED PAVEMENT ELEVATIONS. COSTS OF RAISING STRUCTURES SHALL BE CONSIDERED INCIDENTAL TO OTHER WORK ON THE PROJECT.
18. MANHOLES AND CASTINGS SHALL MEET THE REQUIREMENTS OF OWNER AS WELL AS THE PROJECT SPECIFICATIONS.
19. 4" SANITARY SEWER SERVICE LINES SHALL BE INSTALLED AT 2.0% MINIMUM SLOPE AND SHALL BE DUCTILE IRON IN PAVED AREAS.
20. ALL FENCE DAMAGED DURING CONSTRUCTION SHALL BE REPLACED WITH LIKE MATERIALS IN A WORKMANLIKE MANNER AND IN ACCORDANCE WITH STANDARD FENCE CONSTRUCTION PRACTICES AT THE CONTRACTOR'S EXPENSE.
21. CONTRACTOR SHALL FIELD LOCATE ALL BURIED TELEPHONE LINE IN CONFLICT WITH THE PROPOSED UTILITY LINE. WHERE NECESSARY, EXISTING BURIED TELEPHONE LINE SHALL BE TEMPORARILY MOVED DURING CONSTRUCTION OF THE PROPOSED UTILITY LINE AND RE-LAID AT NO ADDITIONAL COST TO THE OWNER.
22. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING ROADS DURING CONSTRUCTION AND SHALL REPAIR ROADS PER REQUIREMENTS OF THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION. NO OPEN CUTS OF EXISTING ROADS SHALL BE ALLOWED EXCEPT WHERE INDICATED ON THE DRAWINGS OR WHERE SPECIFIC PERMISSION IS GRANTED BY THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION. SAND OR A SIMILAR MATERIAL APPROVED BY THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION SHALL BE PLACED ON THE ROAD TO AID IN THE CLEAN UP AFTER CONSTRUCTION. A MINIMUM OF 2" OF SAND SHALL BE PLACED ON THE ROAD PRIOR TO STOCKPILING SPOIL MATERIAL ON THE ROAD SURFACE TO FACILITATE CLEANUP.



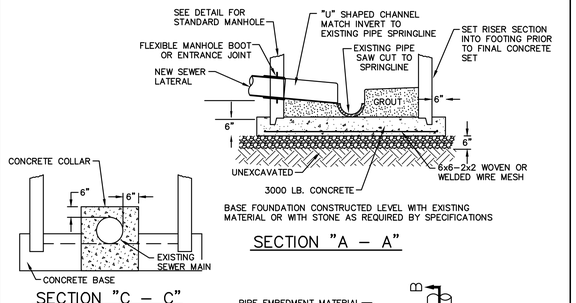
ELEVATION VIEW

PRECAST MANHOLE NOTES:

1. ALL PRECAST MANHOLE COMPONENTS SHALL MEET REQUIREMENTS OF ASTM C-478, LATEST REVISION.
2. ALL MANHOLES SHALL BE CONSTRUCTED PLUMB
3. ALL MANHOLE GRADES SHOWN ON THE PLANS ARE FOR THE INVERT OF THE MANHOLE CENTER.
4. IF MANHOLE IS SET IN LOCATION OF HIGH WATER TABLE OR UNDERGROUND WATER IS ENCOUNTERED, THE CONTRACTOR SHALL INSTALL UNDERDRAINS AND STONE AS DIRECTED IN THE FIELD BY THE ENGINEER.
5. STEPS SHALL BE INSTALLED ON STRAIGHT SIDE OF MANHOLE.

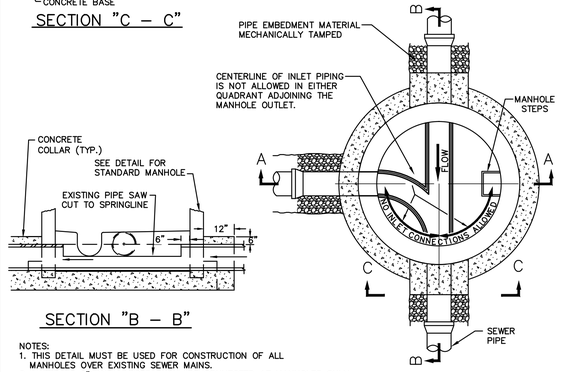
PRECAST CONCRETE MANHOLE

REVISION DATE - NOVEMBER 3, 2008



SECTION "A – A"

SECTION "C – C"



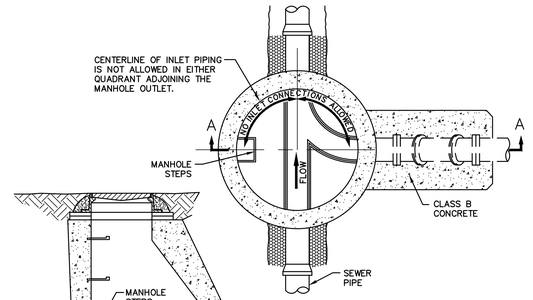
SECTION "B – B"

SECTIONAL PLAN

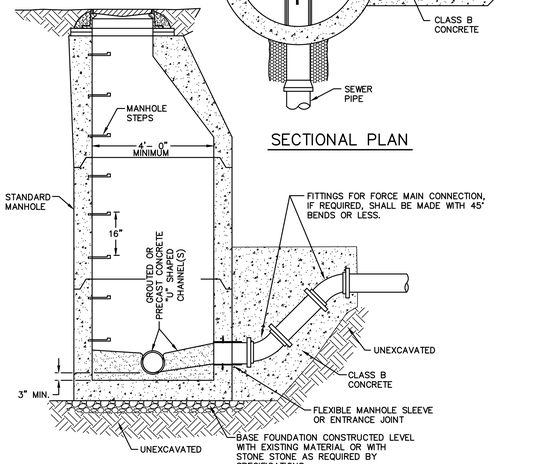
NOTES:
1. THIS DETAIL MUST BE USED FOR CONSTRUCTION OF ALL MANHOLES OVER EXISTING SEWER MAINS.
2. LATERALS 6" AND LARGER SHALL BE CONNECTED AT MANHOLES ONLY.
3. FLOW SHALL BE MAINTAINED DURING CONSTRUCTION.
4. MANHOLE BASE SHALL BE CAST IN PLACE.

NEW MANHOLE CONSTRUCTED OVER EXISTING SEWER PIPE

REVISION DATE - NOVEMBER 3, 2008



SECTIONAL PLAN

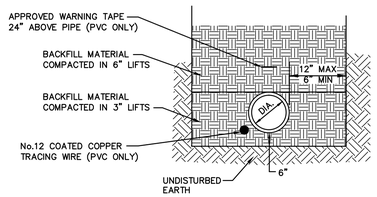


NOTE: IF FORCE MAIN CONNECTION IS MADE TO EXISTING MANHOLE, INVERT FOR FORCE MAIN SHALL BE CONSTRUCTED ON TOP OF EXISTING INVERT BENCH

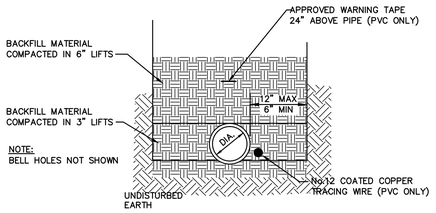
SECTION A-A

FORCE MAIN CONNECTION

REVISION DATE - NOVEMBER 3, 2008



OVERCUT EXCAVATION



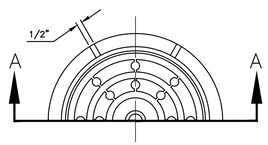
STANDARD EXCAVATION

NOTES:
1. CONSTRUCTION OF TRENCHES SHALL COMPLY WITH ALL FEDERAL, STATE AND LOCAL SAFETY AND HEALTH REGULATIONS WHICH HAVE JURISDICTION AT THE PROJECT SITE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO BE FAMILIAR WITH THE APPLICABLE REGULATIONS AND FOLLOW THEM ACCORDINGLY.

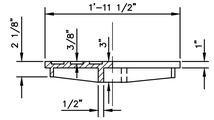
TYPICAL TRENCHING DETAILS

SEWER FORCE MAIN

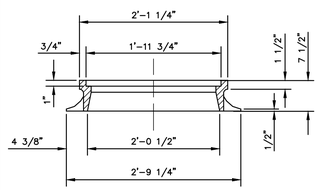
REVISION DATE - NOVEMBER 3, 2008



HALF PLAN OF MANHOLE RING & COVER



SECTION A-A MANHOLE COVER

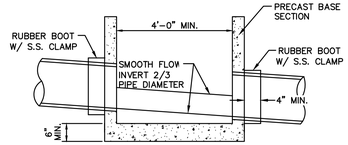


SECTION A-A MANHOLE RING

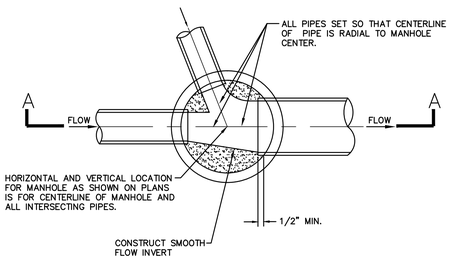
NOTE: TRAFFIC BEARING RING AND COVER. MINIMUM WEIGHT 315 POUNDS

MANHOLE RING & COVER

REVISION DATE - NOVEMBER 3, 2008



SECTION A-A

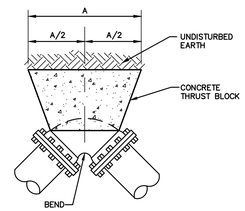


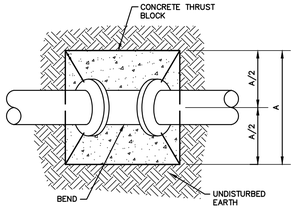
PLAN

NOTE: MANHOLES ON PLANS NOTED AS HIGH VELOCITY MANHOLES SHALL RECEIVE TWO COATS OF SIKAGARD 62, HIGH-BUILD, EPOXY RESIN COATING OR APPROVED EQUAL ON INVERT CHANNEL.

MANHOLE INVERTS

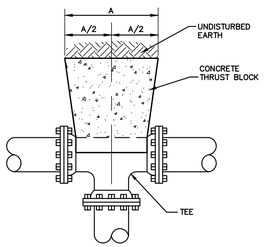
REVISION DATE - NOVEMBER 3, 2008

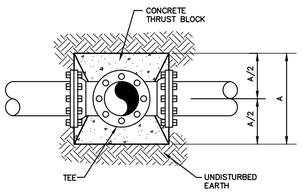




TYPICAL THRUST BLOCKS FOR BENDS

REVISION DATE - NOVEMBER 3, 2008





TYPICAL THRUST BLOCKS FOR TEES

REVISION DATE - NOVEMBER 3, 2008

NOTES:
1. FITTING JOINTS SHALL NOT BE POURED IN CONCRETE OR HAVE CONCRETE SPILLED ON THE BOLTS OR NUTS. THE FITTING SHALL BE WRAPPED IN A LAYER OF POLYETHYLENE PLASTIC PRIOR TO POURING THE THRUST BLOCK.
2. ROD AND EYE BOLT DIAMETER SHALL BE A MINIMUM OF 3/4" AND SHALL MATCH THE SIZE OF THE BOLT PROVIDED WITH THE FITTING.
3. CONTRACTOR SHALL REPLACE FITTING BOLTS WITH THREADED ROD FOR 1/2 OF THE BOLTS SUPPLIED WITH EACH FITTING. RODS SHALL BE EQUALLY SPACED.

SIZE	TYPE					
	11-1/4° BEND	22-1/2° BEND	45° BEND	90° BEND	TEE	PLUG
2-6	12	12	12	16	16	14

THRUST BLOCK DIMENSION "A"

REVISION DATE -NOVEMBER 3, 2008

RECORD DRAWING

This Drawing has been modified to reflect changes made during construction based upon information provided by the Contractor and construction observations made by the Owner's Authorized Representative.

By _____ Date 7/23/12

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 36132 WILLIAM H. SPERRY

McGill Associates
ENGINEERING·PLANNING·FINANCE
55 BROAD STREET ASHEVILLE, NC 28801 PH. (828) 252-0575 FIRM LICENSE # C-0459

FRANCIS FARM LANDFILL
LANDFILL GAS COLLECTION & COMBUSTION SYSTEM
PHASES 1 - 3
HAYWOOD COUNTY
HAYWOOD COUNTY, NORTH CAROLINA

JOB NO.: 09.00721
DATE: APRIL, 2011
DESIGNED BY: WHS
CADD BY: KS
DESIGN REVIEW: ____
CONST. REVIEW: ____
FILE NAME: Q:\2009\09.00721\Design\Solid Waste\Drawings\Record Drawings\RD 09.00721-C-505-Miscellaneous Details.dwg

MISCELLANEOUS DETAILS

SHEET
C-505

Q:\2009\09.00721\Design\Solid Waste\Drawings\Record Drawings\RD 09.00721-C-501-C-505-Miscellaneous Details.dwg 7/23/2012 1:20 PM KELLY

LIGHTING MOUNTING AS NOTED

SYMBOL	DESCRIPTION
	CEILING MOUNTED FLUORESCENT FIXTURE; LETTER INSIDE OR BESIDE DENOTES FIXTURE TYPE
	CEILING MOUNTED FLUORESCENT LIGHTING FIXTURE, WIRED FOR NORMAL/STANDBY POWER OPERATION; LETTER INSIDE OR BESIDE FIXTURE DENOTES FIXTURE TYPE
	WALL MOUNTED FLUORESCENT FIXTURE
	CEILING MOUNTED INCANDESCENT OR H.I.D. FIXTURE
	WALL MOUNTED INCANDESCENT OR H.I.D. FIXTURE
	POLE STANDARD LIGHT FIXTURE UNIT – SINGLE ARM
	POLE STANDARD LIGHT FIXTURE UNIT – DOUBLE ARM
	POLE LANTERN TYPE LIGHT FIXTURE UNIT
	EXIT SIGN
	EXIT SIGN (DOUBLE FACE)
	EXIT SIGN WITH DIRECTIONAL ARROW
	EMERGENCY BATTERY PACK UNIT
	REMOTE HEAD FOR EMERGENCY BATTERY PACK UNIT

SWITCHING

SYMBOL	MOUNTING	DESCRIPTION
S	48"AFF	SWITCH, SINGLE POLE
S_2	48"AFF	SWITCH, DPDT
S_3	48"AFF	SWITCH, 3–WAY
S_4	48"AFF	SWITCH, 4–WAY
S_{DM}	48"AFF	SWITCH, DIMMER
S_P	48"AFF	SWITCH WITH PILOT LIGHT
S_M	48"AFF	SWITCH, MANUAL MOTOR STARTER, RATING AND THERMAL OVERLOADS TO MATCH MOTOR NAME PLATE DATA
S_{MI}	48"AFF	SWITCH, MANUAL MOTOR STARTER WITH IVORY, ILLUMINATED HANDLE
S_{MP}	48"AFF	SWITCH, MANUAL MOTOR STARTER WITH PILOT LIGHT
S_F	48"AFF	MANUAL MOTOR STARTER SWITCH FRACTIONAL HORSEPOWER
	AS NOTED	PHOTOELECTRIC CONTROL
R1	48"AFF	LIGHTING CONTACTOR (R1 – DESIGNATION)
LC–1		LIGHTING CONTACTOR REMOTE PUSH–BUTTON "ON–OFF" CONTROL (LC–1 – REPRESENTS LIGHTING CONTACTOR BEING CONTROLLED)
DS	AS NOTED	DOOR SWITCH
MC	AS NOTED	MOTION CONTROL
M	CEILING	MOTION SENSOR
OS	CEILING	OCCUPATION SENSOR

INTRUSION ALARM SYSTEM

SYMBOL	MOUNTING	DESCRIPTION
D	AS NOTED	INTRUSION ALARM MAGNETIC DOOR CONTACTS
K	48"AFF	INTRUSION ALARM KEY PAD
M	AS NOTED	INTRUSION ALARM MOTION DETECTOR
D EXP	AS NOTED	INTRUSION ALARM MAGNETIC DOOR CONTACTS, EXPLOSION PROOF
	AS NOTED	INTRUSION ALARM BELL
IACP	48"AFF	INTRUSION ALARM CONTROL PANEL

TELECOMMUNICATION

SYMBOL	MOUNTING	DESCRIPTION
AD	AS NOTED	AUTO DIALER
#	36"AFF	PHONE PORT (# = NUMBER OF VOICE PORTS)
#	36"AFF	DATA PORT (# = NUMBER OF DATA PORTS)
# #	36"AFF	COMBINATION DATA/PHONE PORT (# = NUMBER OF DATA PORTS/VOICE PORTS)
#	FLOOR	PHONE PORT– FLOOR BOX–FLUSH (# = NUMBER OF DATA PORTS/VOICE PORTS)

HVAC

SYMBOL	MOUNTING	DESCRIPTION
M	AS NOTED	MOTOR OPERATED DAMPER
	AS NOTED	UNIT HEATER
T	48"AFF	THERMOSTAT; FURNISHED AND INSTALLED UNDER DIVISION 15 WIRED UNDER DIVISION 16

POWER

SYMBOL	MOUNTING	DESCRIPTION
WP C	36"AFF	DUPLEX RECEPTACLE, 20A RATED FOOTNOTE DELINEATES SPECIFIC DEVICE (C – DENOTES MOUNTED 6" ABOVE COUNTERTOP; WP – REQUIREMENT – SEE ABBREVIATIONS)
	36"AFF	SPECIAL PURPOSE OUTLET (SIZE INDICATED ON PLANS)
	36"AFF	SINGLE RECEPTACLE, 20A RATED
	36"AFF	DUPLEX RECEPTACLE–FLUSH–WITH GROUND FAULT CIRCUIT INTERRUPTER
	36"AFF	DOUBLE DUPLEX RECEPTACLE, 20A RATED
	18"AFF	DUPLEX RECEPTACLE–FLUSH – SURGE–PROTECTIVE DEVICE (SPD)
	FLOOR	DUPLEX RECEPTACLE– FLOOR BOX–FLUSH
SPD	FLOOR	DUPLEX RECEPTACLE– FLOOR BOX–FLUSH – SURGE–PROTECTIVE DEVICE (SPD)
SPD	FLOOR	COMBINATION DUPLEX RECEPTACLE (SPD)/VOICE OUTLET PORT– (# DESIGNATES NUMBER OF VOICE PORTS) – FLOOR BOX–FLUSH
MSE	48"AFF	COMBINATION DISCONNECT SWITCH/MOTOR STARTER (MSE – DESIGNATION)
	AS NOTED	MOTOR (HORSEPOWER INDICATED ON PLANS)
	AS NOTED	JUNCTION BOX
T–1		TRANSFORMER (T–1 – DESIGNATION)
CM	AS NOTED	CIRCUIT MONITOR
VR 2	AS NOTED	VOLTAGE REGULATOR
SPD	AS NOTED	SURGE–PROTECTIVE DEVICE
	48"AFF	EMERGENCY POWER SHUT–OFF SWITCH
H	48"AFF	LOCKABLE ON–OFF–AUTO SELECTOR SWITCH W/RED INDICATOR LIGHT
DSA	48"AFF	DISCONNECT SWITCH (DSA – DESIGNATION)
480V 50KVA 120V		TRANSFORMER (480V – PRIMARY VOLTAGE; 50KVA – SIZE; 120V – SECONDARY VOLTAGES)
		SHIELDED ISOLATION TYPE TRANSFORMER

PANELBOARDS

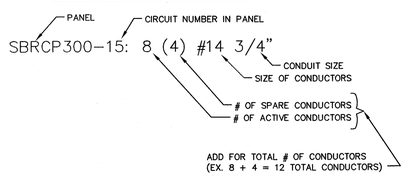
SYMBOL	MOUNTING	DESCRIPTION
	TOP BREAKER 6'–0"AFF	NEW PANELBOARD – SURFACE MOUNTED
	TOP BREAKER 6'–0"AFF	NEW PANELBOARD – FLUSH MOUNTED
	---	EXISTING PANELBOARD – SURFACE MOUNTED
	---	EXISTING PANELBOARD – FLUSH MOUNTED

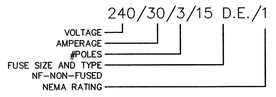
TYPICAL ANNOTATION

1	DRAWING KEYNOTE
1	DEMOLITION KEYNOTE
1	REVISION TAG
	REVISION CLOUD
AAA ###	INSTRUMENTATION TAG
CGMDP–701	PROCESS EQUIPMENT TAG
SF HW1	HVAC EQUIPMENT TAG
4X	AREA NEMA DESIGNATION TAG

PROCESS & INSTRUMENTATION LEGEND

CIRCUIT TAG DESCRIPTIONS:





NOTES:
1. INSTALL ALL FUSES SO THAT LABELS ARE RIGHT–SIDE UP AND FACING OUTWARD.
2. INSTALL OXIDATION INHIBITING COMPOUND SUCH AS PENETROX IN ALL FUSE CLIPS OF SAFETY SWITCHES LOCATED OUTDOORS OR IN WET ENVIRONMENTS.

SAFETY SWITCH DESIGNATOR
NOT TO SCALE

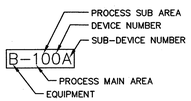
CONDUIT FEEDERS AND BRANCH CIRCUITS

SYMBOL	DESCRIPTION
E E	OVERHEAD ELECTRIC SERVICE
PE PE	OVERHEAD PRIMARY ELECTRIC SERVICE
SE SE	OVERHEAD SECONDARY ELECTRIC SERVICE
T T	OVERHEAD TELEPHONE SERVICE
FO FO	OVERHEAD FIBER OPTIC
CTV CTV	OVERHEAD TELEVISION SERVICE
	CONDUIT – EMBEDDED IN FLOOR OR EARTH
EU	UNDERGROUND ELECTRIC SERVICE
PEU	UNDERGROUND PRIMARY ELECTRIC SERVICE
SEU	UNDERGROUND SECONDARY ELECTRIC SERVICE
TU	UNDERGROUND TELEPHONE SERVICE
FOU	UNDERGROUND FIBER OPTIC
CTVU	UNDERGROUND TELEVISION SERVICE
	CONDUIT – IN WALL, CEILING OR EXPOSED
XX XX	CONDUIT WITH IDENTIFIER
	CONDUIT TURNED UP
	CONDUIT TURNED DOWN
	CONDUIT CAPPED
	BRANCH CIRCUIT WIRING
	CIRCUIT HOME RUN
1	IN–LINE HOME RUN (1 – CIRCUIT NUMBER)
E E	EMERGENCY ONLY CIRCUIT
NE NE	NORMAL EMERGENCY CIRCUIT
	DEVICES ON SAME CIRCUIT, SEPARATELY CONTROLLED
F2	ELECTRIC FEEDER LEGEND INDICATION

FIRE ALARM SYSTEM

SYMBOL	MOUNTING U.O.N.	DESCRIPTION
FACP	48"AFF	FIRE ALARM CONTROL PANEL
FAA	AS NOTED	FIRE ALARM ANNUNCIATOR
A	AS NOTED	FIRE ALARM AUDIBLE/VISIBLE SIGNAL WALL MOUNTED AT 6'–8" A.F.F. OR 6" BELOW CEILING; WHICHEVER IS LOWER
F	48"AFF	FIRE ALARM MANUAL PULL STATION
S	CEILING	FIRE ALARM SMOKE DETECTOR
H	CEILING	FIRE ALARM HEAT DETECTOR, FIXED TYPE
A EXP	AS NOTED	FIRE ALARM AUDIBLE ALARM, EXPLOSION PROOF WALL MOUNTED AT 6'–8" A.F.F. OR 6" BELOW CEILING; WHICHEVER IS LOWER
V EXP	AS NOTED	FIRE ALARM VISIBLE ALARM, EXPLOSION PROOF, WALL MOUNTED AT 6'–8" A.F.F. OR 6" BELOW CEILING; WHICHEVER IS LOWER
F EXP	48"AFF	FIRE ALARM MANUAL PULL STATION, EXPLOSION PROOF
H EXP	CEILING	FIRE ALARM HEAT DETECTOR, FIXED TYPE, EXPLOSION PROOF
TS	48"AFF	FIRE SUPPRESSION SYSTEM TAMPER SWITCH
FS	48"AFF	FIRE SUPPRESSION SYSTEM FLOW SWITCH
PS	48"AFF	FIRE SUPPRESSION SYSTEM PRESSURE SWITCH

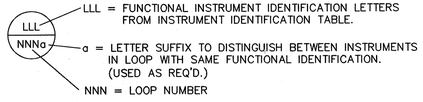
PROCESS EQUIPMENT TAGGING



EQUIPMENT:

AC	AIR COMPRESSOR	MX	MIXER
B	BLOWER	P	PUMP
C	COMMINUTOR	S	SAMPLER
CFD	CHEMICAL FEEDER	SC	SCREEN
CP	CONTROL PANEL	SV	SOLENOID VALVE
D	DECANTER	T	TANK
DPC	DEFINITE PURPOSE CONTACTOR	V	VALVE
G	GRINDER	ZS	POSITION SWITCH

INSTRUMENT & FUNCTION TAGGING



ABBREVIATIONS

A OR AMP	AMPERE	GFCI	GROUND FAULT CIRCUIT INTERRUPTER	NPT	NOMINAL PIPE THREADS
A.C.	ALTERNATING CURRENT	GND. or GRD.	GROUND	OE	OVERHEAD ELECTRIC
AF	FRAME AMPERE	H.I.D.	HIGH INTENSITY DISCHARGE	P	# OF POLES IN CIRCUIT BREAKER
A.F.F.	ABOVE FINISHED FLOOR	HP	HORSEPOWER	PH or ø	PHASE
A.F.G.	ABOVE FINISHED GRADE	H.P.S.	HIGH PRESSURE SODIUM	PM	POWER MONITOR
A.I.C.	AMPERE INTERRUPTING CURRENT	HSPS	HIGH SERVICE PUMP STATION	PMT	PAD MOUNTED TRANSFORMER
AS	AMMETER SELECTOR SWITCH	HVAC	HEAT–VENT–AIR CONDITIONING	PNL	PANEL
AT	TRIP AMPERE	I.G.	ISOLATED GROUND	PSI	POUNDS PER SQUARE INCH
A.T.S.	AUTOMATIC TRANSFER SWITCH	I.D.	INNER DIAMETER	PT	POTENTIAL TRANSFORMER
AUTO	AUTOMATIC	IMC	INTERMEDIATE METAL CONDUIT	PVC	POLYVINYL CHLORIDE
AWG	AMERICAN WIRE GAUGE	IND.	INDUSTRIAL	QTY.	QUANTITY
B.F.G.	BELOW FINISHED GRADE	JB	JUNCTION BOX	RGS	RIGID GALVANIZED STEEL
BLDG.	BUILDING	J.I.C.	JOINT INDUSTRIAL COUNCIL	RVSS	REDUCED VOLTAGE SOLID STATE
C	COUNTERTOP RECEPTACLE	KA	KILOAMPERE	SC	SURGE CAPACITOR
C. or COND.	CONDUIT	KCMIL	1000 CIRCULAR MILS	SCC	SYSTEM CONTROL CENTER
CB	CIRCUIT BREAKER	KV	KILOVOLT	SER	SERVICE ENTRANCE RATED
CKT	CIRCUIT	KVA	KILOVOLT AMPERE	SM	SUB–METER
CP	CONTROL PANEL	KW	KILOWATT	SP	SPARE
CPT	CONTROL PANEL TRANSFORMER	LA	LIGHTNING ARRESTOR	SPD	SURGE–PROTECTIVE DEVICE
CR	CONTROL RELAY	LC	LIGHTING CONTACTOR	S.S.	STAINLESS STEEL
DESIG	DESIGNATION	LTG	LIGHTING	SWBD	SWITCHBOARD
DIA.	DIAMETER	MAX	MAXIMUM	TBA	TO BE ABANDONED
DIV.	DIVISION	MCB	MAIN CIRCUIT BREAKER	TBR	TO BE REMOVED
DPDT	DOUBLE POLE, DOUBLE THROW	mA	MILI–AMP	TCC	TELECOMMUNICATIONS CLOSET
DS	DISCONNECT SWITCH	MC	MANUFACTURER'S CABLE	TDC	TELECOMMUNICATIONS DISTRIBUTION CLOSET
E.C.	ELECTRICAL CONTRACTOR	MCC	MOTOR CONTROL CENTER	TYP.	TYPICAL
EHH	ELECTRIC HANDHOLE	MFR	MANUFACTURER	UE	UNDERGROUND ELECTRIC
EMH	ELECTRIC MANHOLE	MIN.	MINIMUM	UH	UNIT HEATER
EP	EXPLOSION PROOF	M.L.O.	MAIN LUG ONLY	UL	UNDERWRITERS LABORATORY
E.T.R.	EXISTING TO REMAIN	M.O.D.	MOTOR OPERATED DAMPER	U.O.N.	UNLESS OTHERWISE NOTED
EUH	ELECTRIC UNIT HEATER	MS	MOTOR STARTER	UE	UNDERGROUND ELECTRIC
E.W.	EACH WAY	MTD.	MOUNTED	UT	UNDERGROUND TELEPHONE
EX	EXAMPLE	N/A	NOT APPLICABLE	UV	ULTRAVIOLET
EXH	EXHAUST FAN	N.C.	NORMALLY CLOSED	V	VOLT
FU	FUSE	NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION	VAC	VOLTS ALTERNATING CIRCUIT
FRE	FIBERGLASS REINFORCED EPOXY			VS	VOLTMETER SELECTOR SWITCH
G.C.	GENERAL CONTRACTOR	NID	NETWORK INTERFACE DEVICE (4 POSITION)	W	WIRE
GEN	GENERATOR	N.O.	NORMALLY OPEN	WP	WEATHERPROOF
		No.	NUMBER	XFMR	TRANSFORMER

DUCTBANK SYMBOL KEY

NOTE: REFER TO DUCTBANK SCHEDULE & PLANS FOR EXACT NUMBER & SIZE OF CONDUITS.

GENERAL NOTES:

A. DRAWINGS ARE DIAGRAMMATIC IN NATURE, CONTRACTOR SHALL VERIFY DIMENSIONS PRIOR TO INSTALLATION CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER DIVISION TRADES TO PROVIDE A COMPLETE AND OPERABLE SYSTEM. LOCATE FIXTURES, DEVICES, ETC. IN ORDER TO AVOID INTERFERENCES.
B. ALL WORK SHALL BE PERFORMED AS REQUIRED BY APPLICABLE SECTION OF THE NATIONAL ELECTRICAL CODE, LATEST EDITION, AND ALL GOVERNING LOCAL CODES, LAWS, AND/OR REGULATIONS.
C. SYSTEM AND EQUIPMENT GROUNDING CONTINUITY SHALL BE ASSURED AS REQUIRED BY APPLICABLE SECTIONS OF THE NATIONAL ELECTRICAL CODE.
D. ALL WIRING SHALL BE TYPE "THHN–THWN" U.O.N.; MINIMUM WIRING SHALL BE #12 (POWER WIRE). ALL WIRE SHALL BE COPPER. MINIMUM CONDUIT SIZE FOR METALLIC CONDUIT TO BE 3/4" AND 1" FOR PVC.
E. ALL CIRCUIT PROTECTIVE DEVICES SHALL HAVE THE REQUIRED RATING INTERRUPTING CAPACITY EQUAL TO OR GREATER THAN THE AVAILABLE SHORT–CIRCUIT CURRENT AT ITS SUPPLY TERMINAL; MINIMUM INTERRUPTING CAPACITY. SHALL BE 10,000 AMPS, SYMMETRICAL A.I.C. FOR 120/208V SYSTEMS AND 14,000 AMPS, SYMMETRICAL A.I.C. FOR 277/480V SYSTEMS. REFER TO PANEL SCHEDULES FOR A.I.C. RATINGS.
F. ALL OUTDOOR EXPOSED CONDUIT TO BE PVC COATED RGS. TRANSITION FROM UNDERGROUND TO EXPOSED SHALL BE PVC COATED RGS.
G. ALL UNDERGROUND CONDUITS TO BE SCHEDULE 40 PVC UNLESS OTHERWISE INDICATED. ALL CONDUITS SHALL INCLUDE A NYLON PULL CORD.

INSTRUMENT IDENTIFICATION TABLE

ISA–S5.1–1984

LETTER	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS (2)		ALARM		
B	BURNER, COMBUSTION			CLOSE, STOP, DECREASE (1)	OFF (1)
C				CONTROL	
D		DIFFERENTIAL		OPEN, START, INCREASE (1)	
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		ENABLED (1)
F	FLOW RATE	RATIO (FRACTION)			FAIL (1)
G			GLASS, VIEWING DEVICE		
H	HAND				HIGH (OPENED)
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW (CLOSED)
M	MOTOR, MOTION (1)	MOMENTARY		MOTOR (1)	MIDDLE OR INTERMEDIATE
N					ON OR OPERATE (1)
O			ORIFICE, RESTRICTION		OVERLOAD (1)
P	PRESSURE, VACUUM		POINT (TEST) CONNECTION	PUMP (1)	
Q	QUANTITY (2)	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD		
S	SPEED, FREQUENCY	SAFETY OR SOLENOID		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE (2)		MULTIFUNCTION (2)	MULTIFUNCTION (2)	MULTIFUNCTION (2)
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL		
X	UNCLASSIFIED, (2)		UNCLASSIFIED (2)	UNCLASSIFIED (2)	UNCLASSIFIED (2)
Y	EVENT, STATE, PRESENCE			RELAY, COMPUTE, CONVERT	
Z	POSITION, DIMENSION			DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

(1) USER'S CHOICE
(2) WHEN USED, SYMBOL OR SIGNAL LINE IS INDICATED.

RECORD DRAWING

This Drawing has been modified to reflect changes made during construction based upon information provided by the Contractor and construction observations made by the Owner's Authorized Representative.

By Phillip A. Fisher Date 7-23-12

NORTH CAROLINA PROFESSIONAL SEAL 18684 ENGINEER PHILLIP A. FISHER

McGill Associates
ENGINEERING·PLANNING·FINANCE
55 BROAD STREET ASHEVILLE, NC 28801 PH. (828) 252-0575 FIRM LICENSE # C-0459

FRANCIS FARM LANDFILL
LANDFILL GAS COLLECTION & COMBUSTION SYSTEM
PHASES 1 - 3

HAYWOOD COUNTY
HAYWOOD COUNTY, NORTH CAROLINA

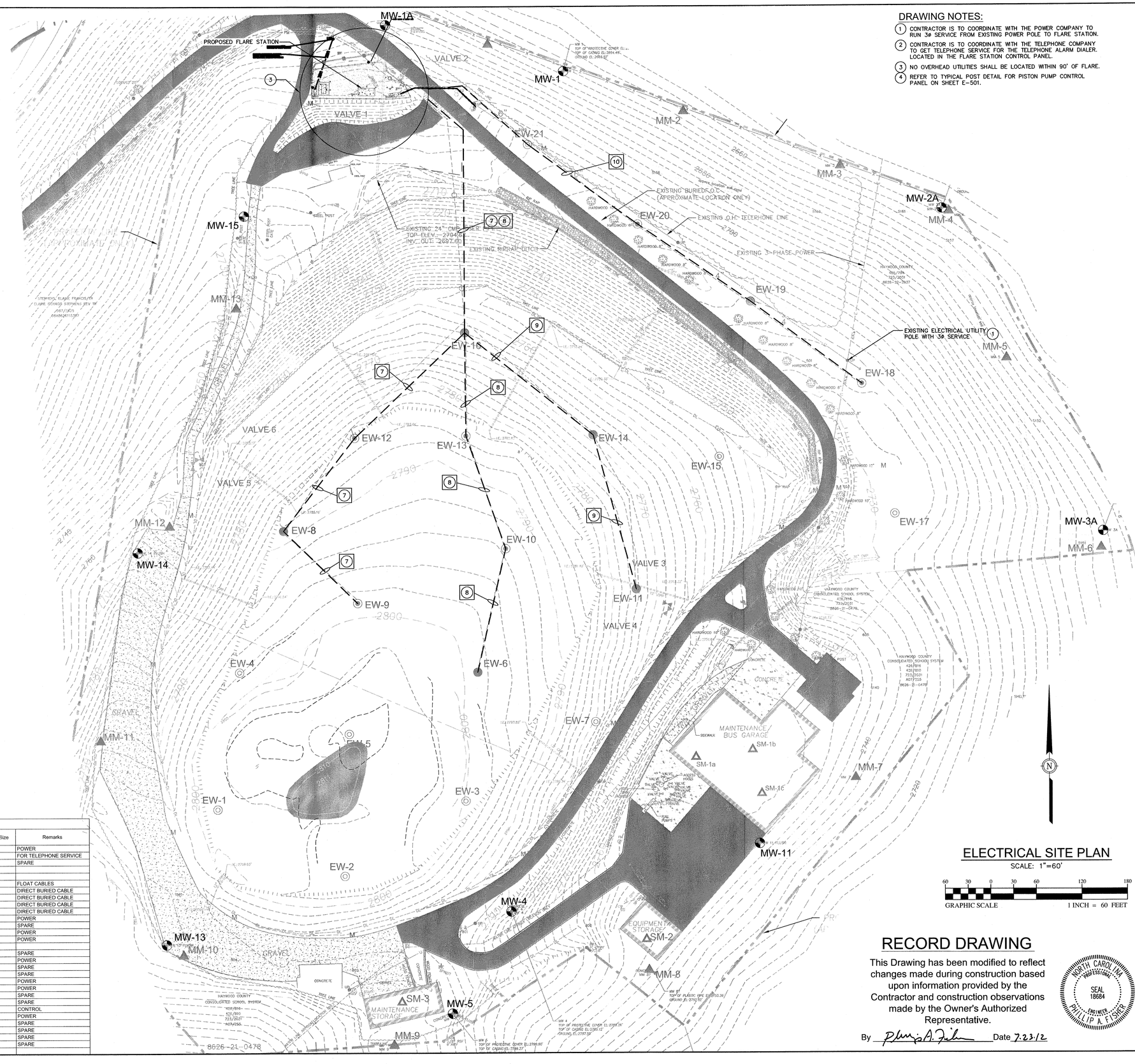
JOB NO.: 09.00721
DATE: NOVEMBER 2009
DESIGNED BY: DLG
CADD BY: SAR
DESIGN REVIEW: PAF
CONST. REVIEW: ___
FILE NAME: RD - 09.00721-E-001.dwg

ELECTRICAL LEGEND, NOTES, SCHEDULES, AND ABBREVIATIONS

SHEET
E-001

DRAWING NOTES:

1. CONTRACTOR IS TO COORDINATE WITH THE POWER COMPANY TO RUN 3ø SERVICE FROM EXISTING POWER POLE TO FLARE STATION.
2. CONTRACTOR IS TO COORDINATE WITH THE TELEPHONE COMPANY TO GET TELEPHONE SERVICE FOR THE TELEPHONE ALARM DIALER. LOCATED IN THE FLARE STATION CONTROL PANEL.
3. NO OVERHEAD UTILITIES SHALL BE LOCATED WITHIN 90' OF FLARE.
4. REFER TO TYPICAL POST DETAIL FOR PISTON PUMP CONTROL PANEL ON SHEET E-501.



ELECTRICAL SITE PLAN

SCALE: 1"=60'

GRAPHIC SCALE — 60 30 0 30 60 120 180 — 1 INCH = 60 FEET

RECORD DRAWING

This Drawing has been modified to reflect changes made during construction based upon information provided by the Contractor and construction observations made by the Owner's Authorized Representative.

By Phillip A. Fisher Date 7.23.12

NORTH CAROLINA PROFESSIONAL SEAL 18684 ENGINEER PHILLIP A. FISHER

Ductbank Conduit Schedule

Conduit Tag No.	From	To	Conduit/Wiring Legend No.	Conduit Size	Remarks
1	SERVICE POLE	METERBASE	REFER TO ONE-LINE	2"	POWER
2	SERVICE POLE	METERBASE	CONDUIT ONLY	2"	FOR TELEPHONE SERVICE
3	SERVICE POLE	TELEPHONE INTERFACE	CONDUIT ONLY	2"	SPARE
4	PSCP	PUMP #1	PSCP-1	2"	
5	PSCP	PUMP #2	PSCP-2	2"	
6	PSCP	WETWELL	PSCP-3,4,5,6	4-1"	FLOAT CABLES
7	PANEL M	EW-12, EW-9, EW-8	M-7, 9, 11	N/A	DIRECT BURIED CABLE
8	PANEL M	EW-16, EW-13, EW-10, EW-6	M-8, 10 ,12	N/A	DIRECT BURIED CABLE
9	EW-16	EW-14, EW-11	M-8, 10 ,12	N/A	DIRECT BURIED CABLE
10	PANEL M	EW-21, EW-20, EW-19, EW-18	M-13, 15, 17	N/A	DIRECT BURIED CABLE
11	PANEL LP	FUTURE GENERATOR NO. 1	LP-1,3	1"	POWER
12	PANEL LP	FUTURE GENERATOR NO. 1	CONDUIT ONLY	1"	SPARE
13	CONDENSATE PUMP CONTROL PANEL	KNOCKOUT POT	3-#10&1-#10 GND	1"	POWER
14	PANEL M	FLARE STATION CONTROL PANEL	M-1,3,5	1"	POWER
15	TELEPHONE INTERFACE	FLARE STATION CONTROL PANEL	CAT 3	1"	
16	EQUIPMENT RACK	FLARE STATION CONTROL PANEL	CONDUIT ONLY	1"	SPARE
17	UTILITY POLE FOR GENERATORS	GENERATOR EQUIPMENT RACK	SEE ONE LINE	3"	POWER
18	UTILITY POLE FOR GENERATORS	GENERATOR EQUIPMENT RACK	CONDUIT ONLY	3"	SPARE
19	FLARE STATION CONTROL PANEL	GENERATOR EQUIPMENT RACK	CONDUIT ONLY	2"	SPARE
20	PANEL LP	AREA LUMINAIRE	LP-4	3/4"	POWER
21	PANEL LP	AREA LUMINAIRE	LP-4	3/4"	POWER
22	GENERATOR EQUIPMENT RACK	FUTURE GENERATOR NO. 1	CONDUIT ONLY	3"	SPARE
23	GENERATOR EQUIPMENT RACK	FUTURE GENERATOR NO. 1	CONDUIT ONLY	3-1"	SPARE
24	PUMP STATION CONTROL PANEL	FLOW METER	PSCP-7	3/4"	CONTROL
25	PANEL LP	FLOW METER	LP-6	3/4"	POWER
26	ELECTRICAL EQUIPMENT RACK	FUTURE GENERATOR NO. 2	CONDUIT ONLY	3"	SPARE
27	GENERATOR EQUIPMENT RACK	FUTURE GENERATOR NO. 2	CONDUIT ONLY	3"	SPARE
28	GENERATOR EQUIPMENT RACK	FUTURE GENERATOR NO. 2	CONDUIT ONLY	3-1"	SPARE
29	ELECTRICAL EQUIPMENT RACK	FUTURE GENERATOR NO. 2	CONDUIT ONLY	3-1"	SPARE

McGill ASSOCIATES
ENGINEERING·PLANNING·FINANCE
55 BROAD STREET ASHEVILLE, NC 28801 PH. (828) 252-0575 FIRM LICENSE # C-0459

FRANCIS FARM LANDFILL
LANDFILL GAS COLLECTION & COMBUSTION SYSTEM
PHASES 1 - 3

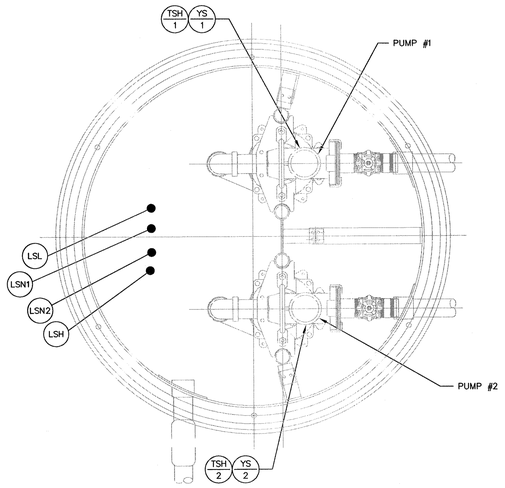
HAYWOOD COUNTY

HAYWOOD COUNTY, NORTH CAROLINA

JOB NO.: 09.00721
DATE: NOVEMBER 2009
DESIGNED BY: DLG
CADD BY: SAR
DESIGN REVIEW: PAF
CONST. REVIEW: ____
FILE NAME: RD - 09.00721-E-101.dwg

ELECTRICAL SITE PLAN

SHEET
E-101

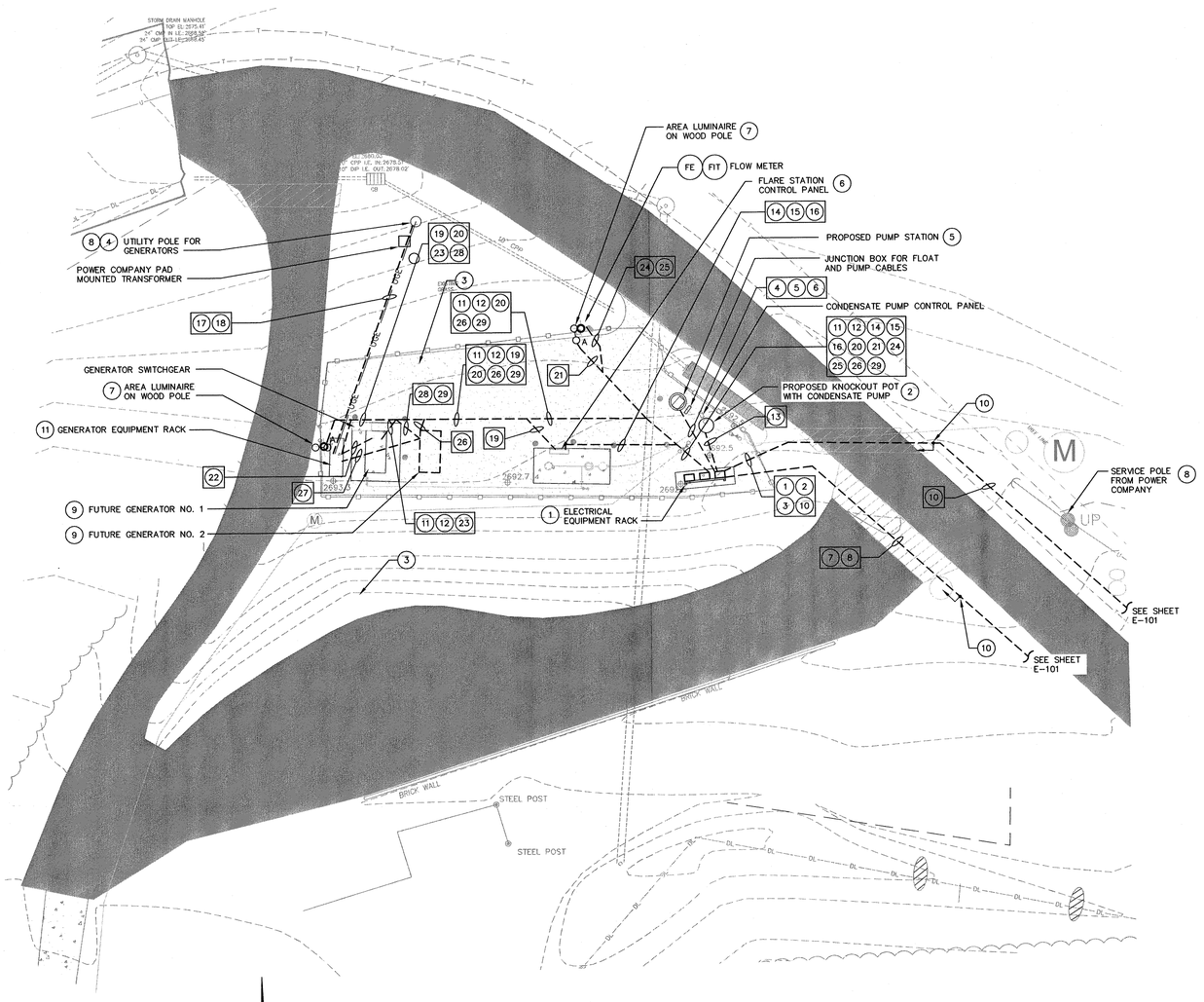


PUMP STATION PLAN VIEW

NOT TO SCALE

DRAWING NOTES:

1. FOR EQUIPMENT ORIENTATION REFER TO ELECTRICAL EQUIPMENT RACK DETAIL ON SHEET E-501.
2. REFER TO TYPICAL POST DETAIL FOR PISTON PUMP CONTROL PANEL ON SHEET E-501.
3. CONTRACTOR TO COORDINATE THE REMOVAL OF EXISTING UTILITY POLES.
4. CONTRACTOR TO COORDINATE WITH THE POWER COMPANY FOR THE INSTALLATION OF THE UTILITY POLE FOR THE GENERATORS, AS WELL AS, CONNECTING THE GENERATOR CONDUCTORS WITH THE POWER COMPANY CONDUCTORS.
5. SEE PUMP STATION PLAN VIEW ON THIS SHEET.
6. CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION OF ALL THE NECESSARY FIELD WIRING AND RACEWAYS FOR PROPER INSTALLATION OF THE PACKAGED FLARE SYSTEM.
7. SEE LIGHTING POLE DETAIL ON SHEET E-501.
8. CONTRACTOR TO STUB CONDUIT ABOVE THE GROUND AT THE SERVICE POLE AND UTILITY POLE FOR GENERATORS. CONTRACTOR TO PROVIDE AN ADEQUATE AMOUNT OF EXCESS WIRE FOR POWER COMPANY TO RUN THE WIRE UP EACH POLES AND CONNECT THE WIRE WITH THE SERVICE DROP.
9. THE EXACT LOCATIONS OF CONDUIT AND CABLE TERMINATIONS FOR RACEWAYS TERMINATING AT FUTURE GENERATOR WILL BE PROVIDED TO THE CONTRACTOR DURING CONSTRUCTION.
10. PROVIDE 2" CONDUIT SLEEVE FROM POINT INDICATED TO PANEL "M" FOR WELL PUMP CABLES.
11. PROVIDE RACK CONSTRUCTION SIMILAR TO THAT INDICATED FOR THE ELECTRICAL EQUIPMENT RACK. REFER TO DETAIL ON SHEET E-501. IN ADDITION TO EQUIPMENT INDICATED ON THE LANDFILL GAS GENERATOR POWER ONE-LINE, PROVIDE 72" OF CONTINUOUS HORIZONTAL SPACE ON RACK FOR FUTURE EQUIPMENT.
12. PROVIDE #2 COPPER WIRE TO BOND BETWEEN THE GROUNDING ELECTRODE CONDUCTORS FOR THE ELECTRICAL SERVICES FOR THE FLARE STATION AND THE LANDFILL GAS GENERATOR, AS WELL AS, THE STRUCTURAL METAL IN THE FLARE STATION PAD, ALL ELECTRICAL EQUIPMENT RACKS AND CONCRETE PADS, AND THE GENERATOR PAD.



FLARE PAD SITE PLAN

SCALE: 1"=20'

GRAPHIC SCALE 20 10 0 10 20 40 60

1 INCH = 20 FEET

RECORD DRAWING

This Drawing has been modified to reflect changes made during construction based upon information provided by the Contractor and construction observations made by the Owner's Authorized Representative.

By Philip A. Fisher Date 7.23.12

NORTH CAROLINA PROFESSIONAL SEAL 18684 ENGINEER PHILIP A. FISHER

McGILL ASSOCIATES
ENGINEERING-PLANNING-FINANCE
55 BROAD STREET ASHEVILLE, NC 28801 PH: (828) 252-0575 FIRM LICENSE # C-0459

FRANCIS FARM LANDFILL
LANDFILL GAS COLLECTION & COMBUSTION SYSTEM
PHASES 1 - 3

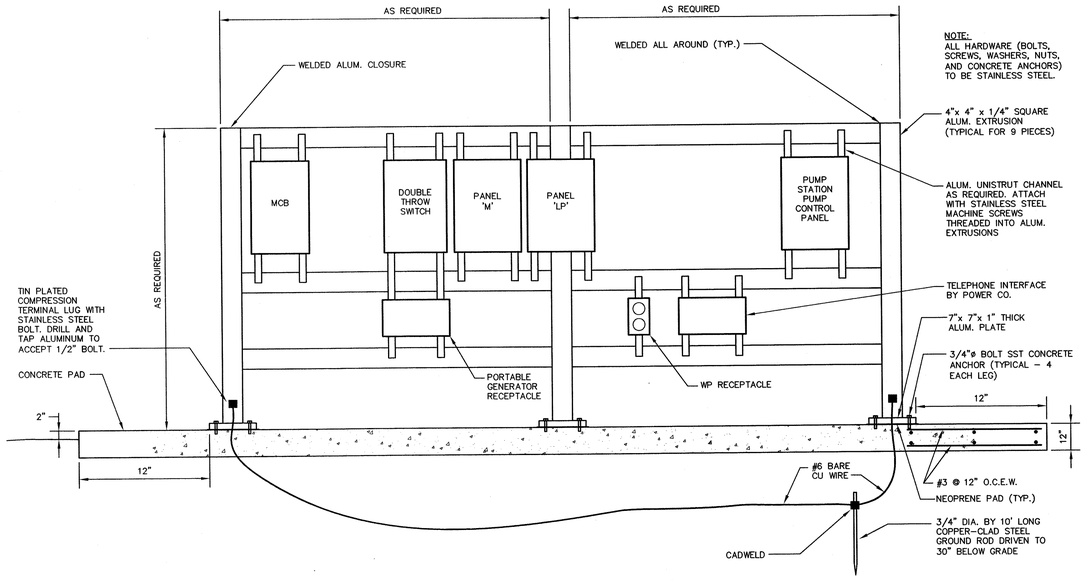
HAYWOOD COUNTY

HAYWOOD COUNTY, NORTH CAROLINA

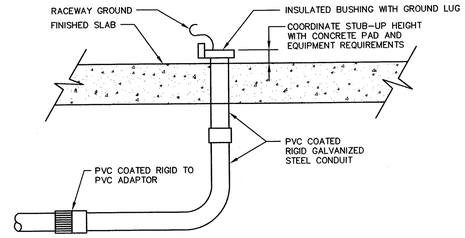
JOB NO.: 09.00721
DATE: NOVEMBER 2009
DESIGNED BY: DLG
CADD BY: SAR
DESIGN REVIEW: PAF
CONST. REVIEW: ____
FILE NAME: RD - 09.00721-E-102.dwg

FLARE PAD PLANS

SHEET
E-102

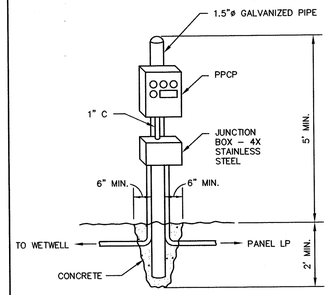


ELECTRICAL EQUIPMENT RACK DETAIL
NOT TO SCALE

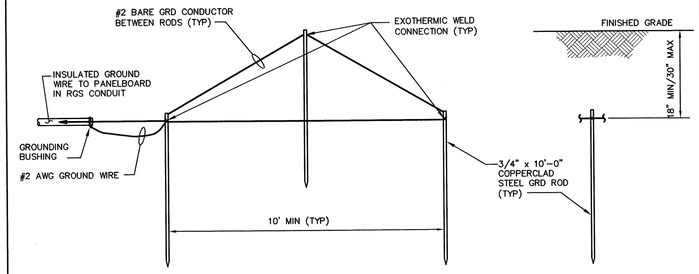


NOTES TO SPECIFIER:
1. THIS DETAIL APPLIES TO ALL UNDERGROUND CONDUITS WHERE PVC IS UTILIZED. PVC SHALL NOT BE EXTENDED ABOVE GRADE UNLESS SPECIFICALLY APPROVED.

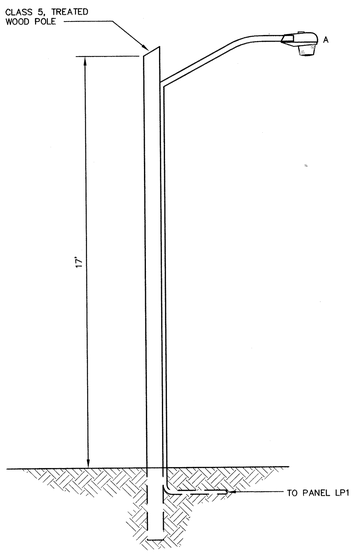
TYPICAL CONDUIT STUB-UP
NOT TO SCALE



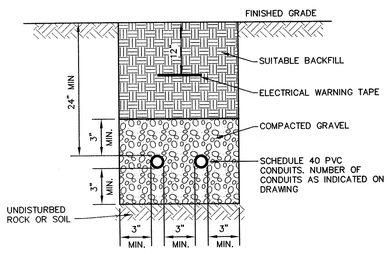
TYPICAL POST DETAIL FOR PISTION PUMP CONTROL PANEL
NOT TO SCALE



GROUNDING COUNTERPOISE DETAIL
NOT TO SCALE



LIGHTING POLE DETAIL
NOT TO SCALE



NOTES:
1. CONTRACTOR TO RESTORE SITE TO EXISTING CONDITION.

TYPICAL SITE ELECTRICAL TRENCH DETAIL
NOT TO SCALE

RECORD DRAWING

This Drawing has been modified to reflect changes made during construction based upon information provided by the Contractor and construction observations made by the Owner's Authorized Representative.

By _____ Date 7.23.12

NORTH CAROLINA PROFESSIONAL SEAL 18684 ENGINEER PHILLIP A. FISHER

McGill Associates
ENGINEERING-PLANNING-FINANCE
55 BROAD STREET ASHEVILLE, NC 28801 PH: (828) 252-0575 FIRM LICENSE # C-0459

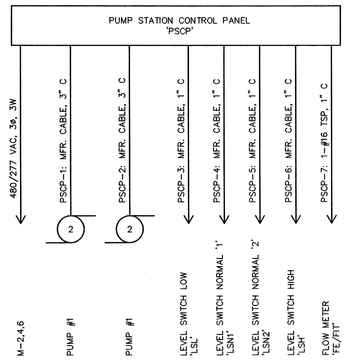
FRANCIS FARM LANDFILL
LANDFILL GAS COLLECTION & COMBUSTION SYSTEM
PHASES 1 - 3
HAYWOOD COUNTY
HAYWOOD COUNTY, NORTH CAROLINA

JOB NO.: 09.00721
DATE: NOVEMBER 2009
DESIGNED BY: DLG
CADD BY: SAR
DESIGN REVIEW: PAF
CONST. REVIEW: ____
FILE NAME: RD - 09.00721-E-501.dwg

ELECTRICAL DETAILS

SHEET
E-501

Q:\2009\09.00721\Design\Electrical\Drawings\RD - 09.00721-E-501.dwg 4/12/2012 10:23 AM SONJA ROBERTS



PUMP STATION CONTROL PANEL ONE-LINE

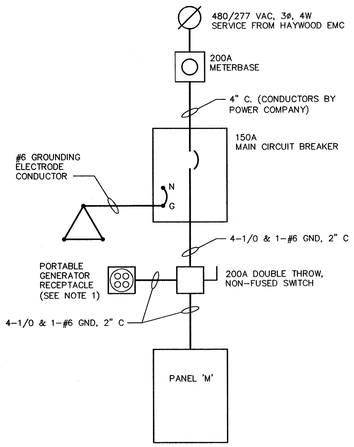
NOT TO SCALE

PANEL LP — MOUNTING SURFACE — LOCATION ELECTRICAL RACK — BUS AMP 100A — PHASE 1 — NEMA TYPE 4X — MIN. A.I.C. 10,000 — WIRE 3 — MAIN BREAKER 60A — VOLTAGE 120/240

NOTE PROVIDE WITH INTEGRAL 10 KVA TRANSFORMER

CKT	DESCRIPTION	BREAKER AMP	BREAKER POLES	LOAD (KW) A	LOAD (KW) B	WIRE NO	WIRE SIZE	GND. SIZE	COND SIZE	COND SIZE	GND. SIZE	WIRE SIZE	WIRE NO	LOAD (KW) A	LOAD (KW) B	BREAKER POLES	BREAKER AMP	DESCRIPTION	CKT
1	GENERATOR HEATER	20	1	1.2		2	12	12	3/4	3/4	12	12	2	0.18		1	20	RACK RECPTACLES	2
3	GEN. BATTERY CHARGER	20	1		0.6	2	12	12	3/4	3/4	12	12	2		0.37	1	20	AREA LIGHTING	4
5	SPARE	20	1	-						3/4	12	12	2	0.2		1	20	FE/FIT	6
7	SPARE	20	1		-										-	1	20	SPARE	8
9	SPARE	20	1	-												1	20	SPARE	10
	SUB-TOTAL LOAD KW			1.2	0.6									SUB-TOTAL LOAD KW					
														TOTAL LOAD KW					

SUB-TOTAL LOAD KW			15.1	15.1	15.1					SUB-TOTAL LOAD KW	3.32	3.32	2.33					
										TOTAL LOAD KW	18.5	18.5	17.5					



NOTES:
1. PROVIDE A 200A, 480 VAC, 3ø, 4W, PIN AND SLEEVE PORTABLE GENERATOR RECEPTACLE WITH REVERSE POLARITY.

POWER ONE-LINE

NOT TO SCALE

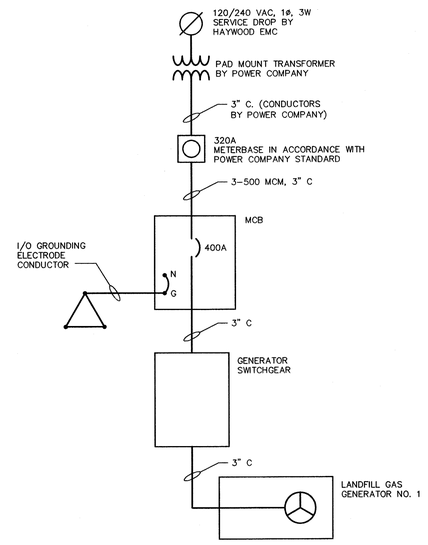
PANEL M — MOUNTING SURFACE — LOCATION FLARE STATION SITE — BUS AMP 225A — PHASE 3 — NEMA TYPE 3R — MIN. A.I.C. 10,000 — WIRE 4 — MAIN BREAKER 150A — VOLTAGE 480V

NOTE PROVIDE PANELBOARD WITH INTEGRAL SPD.

CKT	DESCRIPTION	BREAKER AMP	BREAKER POLES	LOAD (KW) A	LOAD (KW) B	LOAD (KW) C	WIRE NO	WIRE SIZE	GND. SIZE	COND SIZE	COND SIZE	GND. SIZE	WIRE SIZE	WIRE NO	LOAD (KW) A	LOAD (KW) B	LOAD (KW) C	BREAKER POLES	BREAKER AMP	DESCRIPTION	CKT
1	FLARE STATION CONTROL PANEL	60	3	8.87			3	4	8	1	1	10	10	3	1.77			3	30	PUMP STATION CONTROL PANEL	2
3					8.87											1.77					4
5						8.87											1.77				6
7	WELL PUMPS 8, 9, 12	30	3	1.4			3	6	6	2	2	6	6		-			3	30	SPARE	8
9					1.4											-					10
11						1.4											-				12
13	WELL PUMPS 18,19,20,21	30	3	2.44			3	10	10	1	1	10	10	3	0.55			3	20	CONDENSATE REMOVAL PUMP	14
15					2.44											0.55					16
17						2.44											0.55				18
19	WELL PUMPS 6,10,11,13,14,16	30	3	2.44			3	10	10	3/4	3/4	10	10	3	1			2	30	PANEL LP	20
21					2.44											1					22
23						2.44															24
25																					26
27																					28
29																					30
	SUB-TOTAL LOAD KW			15.1	15.1	15.1					SUB-TOTAL LOAD KW				3.32	3.32	2.33				
											TOTAL LOAD KW				18.5	18.5	17.5				

LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER AND CATALOG NO.	MOUNTING	VOLTAGE	LAMPS	BALLASTS/ FIXTURE	WATTS/ FIXTURE
A	AREA LUMINAIRE WITH CUTOFF OPTICS UL LISTED FOR USE IN WET LOCATIONS IES DISTRIBUTION TYPE III	GE M2AC 15 S COOPER HPRC FL 3 150 HUBBELL RM SERIES	WOOD POLE (SEE DETAIL ON E-501)	120V	(1) 150W HPS	1	185



LANDFILL GAS GENERATOR POWER ONE-LINE

NOT TO SCALE

RECORD DRAWING

This Drawing has been modified to reflect changes made during construction based upon information provided by the Contractor and construction observations made by the Owner's Authorized Representative.

By _____ Date 7.23.12

NORTH CAROLINA PROFESSIONAL SEAL 18684 ENGINEER PHILIP A. FISHER

McGILL ASSOCIATES
ENGINEERING·PLANNING·FINANCE
55 BROAD STREET ASHEVILLE, NC 28801 PH. (828) 252-0575 FIRM LICENSE # C-0459

FRANCIS FARM LANDFILL
LANDFILL GAS COLLECTION & COMBUSTION SYSTEM
PHASES 1 - 3
HAYWOOD COUNTY
HAYWOOD COUNTY, NORTH CAROLINA

JOB NO.: 09.00721
DATE: NOVEMBER 2009
DESIGNED BY: DLG
CADD BY: SAR
DESIGN REVIEW: PAF
CONST. REVIEW: _____
FILE NAME: RD - 09.00721-E-601.dwg

SCHEDULES AND ONE-LINES

SHEET
E-601