November 18, 2011

Mr. Frank Bowman
Environmental Engineer
Virginia Department of Environmental Quality
Blue Ridge Regional Office
7750 Timberlake Road
Lynchburg, VA 24502

RECEIVED
NOV 21 2011
DEQ – BRRO

Re: VPA Permit No. VPA 03005
Nutri-Blend, Inc.
Cumberland County, VA

Dear Frank:

On behalf of Nutri-Blend, Inc. I am submitting the O&M Manual for the storage and stabilization activities at the Salem Church Road facility in Cumberland County. Nutri-Blend apparently will have a contract starting in January, 2012 with New York City to lime stabilize 200-500 wet tons per week. This sludge is partially treated in an anaerobic digester, but does not meet the 15 day holding time.

The procedures we will use for lime stabilization were provided in detail in the VPA permit applications. We plan no deviation from the approved permit.

Since the process is already approved in the existing permit, we ask that you approve the O&M Manual ASAP. We would have submitted it earlier except that NYC had to review the facilities and procedures before releasing the contract. Their personnel were on site Nov. 17, 2011, and found everything in order. In fact, they said it was the best maintained facility of any of their current or past contractors.

Thank you for your past work on this project and I look forward to a favorable response to this request.

Very truly yours,

Roger F. Hatcher

Roger F. Hatcher, PhD.

RECEIVED
NOV 21 2011
DEQ – BRRO

CUMBERLAND COUNTY, VIRGINIA

BIOSOLIDS STORAGE BUILDING

OPERATION AND MAINTENANCE MANUAL
9 VAC25-32-410

Prepared for:

Nutri-Blend, Inc.
2353 Charles City Road
Richmond, VA 23231

Prepared by:

Roger F. Hatcher, PhD
Consultant

July 16, 2007
Revised January 3, 2011
Revised November 15, 2011

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INTRODUCTION AND FACILITY DESCRIPTION 9 VAC-25-32-55-E

The general purpose of this plan is to present the necessary technical guidance and regulatory requirements to facilitate the proper storage of Class B biosolids during periods when it is not acceptable to land apply this material. This plan is a reference document which briefly presents the information necessary to properly manage Class B biosolids in an offsite routine storage facility.

Nutri-Blend uses this facility to supplement temporary storage sites and other wet weather operational measures throughout Virginia. Most of the activity occurs in the winter months of December through February when weather conditions are least favorable for land application. Available row crop permitted sites are managed with local farmers to utilize the stored biosolids for corn production such that biosolids can be applied and incorporated into the soil during the early spring, just prior to planting.

The facility is located 2.7 miles west of Route 45 on State Route 634 (Salem Church Road) in Cumberland County, Virginia. All truck unloading and loading occurs inside a fabric covered steel truss building. Construction plans for the building are presented in Appendix A. The building is set on 7' tall, 12" thick reinforced concrete walls. The floor of the building is 8" thick reinforced concrete. All precipitation is managed by an onsite storm water management system, including gutters on the building, such that no water is added to the stored biosolids. Also, part of the water management system is a foundation drain that surrounds the building and is protected by a berm but does receive very small quantities of ground water. This water is collected in two 3,000 gallon tanks and is land applied in accordance with Nutri-Blend's land application permits.

Biosolids are delivered by truck. The trucks enter the building through the NE door and discharge their load in a designated area. A rubber tire front end

loader manages the biosolids at this point by simply pushing them or lifting onto the pile of accumulating biosolids.

Immediately upon leaving the building through the SE doors, the trucks pass through a wash station that utilizes high pressure sprays to remove biosolids that may be present on the sides, undercarriage, or wheels of the trucks. Diagrams and specifications for this wash station are in Appendix B. The wash water is contained in tanks and is periodically transported offsite to an approved land application site. The front end loader stays inside the building except for major mechanical repairs. It, too, passes through the truck wash when exiting the building.

Community approval for the facility has been obtained from Cumberland County in the form of site rezoning from A-2 to M-2. Attached to the rezoning are 18 proffers which address all of the operational features which may impact the immediate neighbors: odor level, noise levels, operating hours, lighting controls, etc. These proffers are presented in Appendix C to this plan.

TRANSPORT ROUTE

The primary source of biosolids for this storage facility initially is DCWASA. Nutri-Blend does have other municipal contracts which come and go as cities and counties periodically rebid these services. Other potential sources include all of the facilities on Nutri-Blend's land application permits.

The current sources use interstates 95, 295, and Route 288 to arrive at Route 60 in Midlothian, VA. The trucks travel some 38 miles west on Route 60 to the intersection of Route 45 south. The trucks travel some 5.7 miles south on Route 45 to the intersection of Route 634 (Salem Church Road). The trucks travel 2.7 miles west on Route 634 to the entrance of the facility. A "Map Quest" map for DCWASA to the site is shown as Figure 1. A vicinity map is shown in Figure 2.

Sludge for stabilization will come from New York City. The sludge will be transported in specially designed containers with a sealed and locked rear door meeting specifications for transport of biosolids in truck. The containers will be transported to Gladstone, Virginia whereby rail transportation. The containers will be transferred from the flat bed rail cars to specially designed truck frames and transported to the storage building where the contents will be discharged in the area shown in Figure C1.0 of this manual. As required by the VPA Permit, no more sludge will be dumped than can be treated in a 48-hour period.

FIGURE 1

Sorry! When printing directly from the browser your map may be incorrectly cropped. To print the entire map, try clicking the **"Printer-Friendly"** link at the top of your results page.

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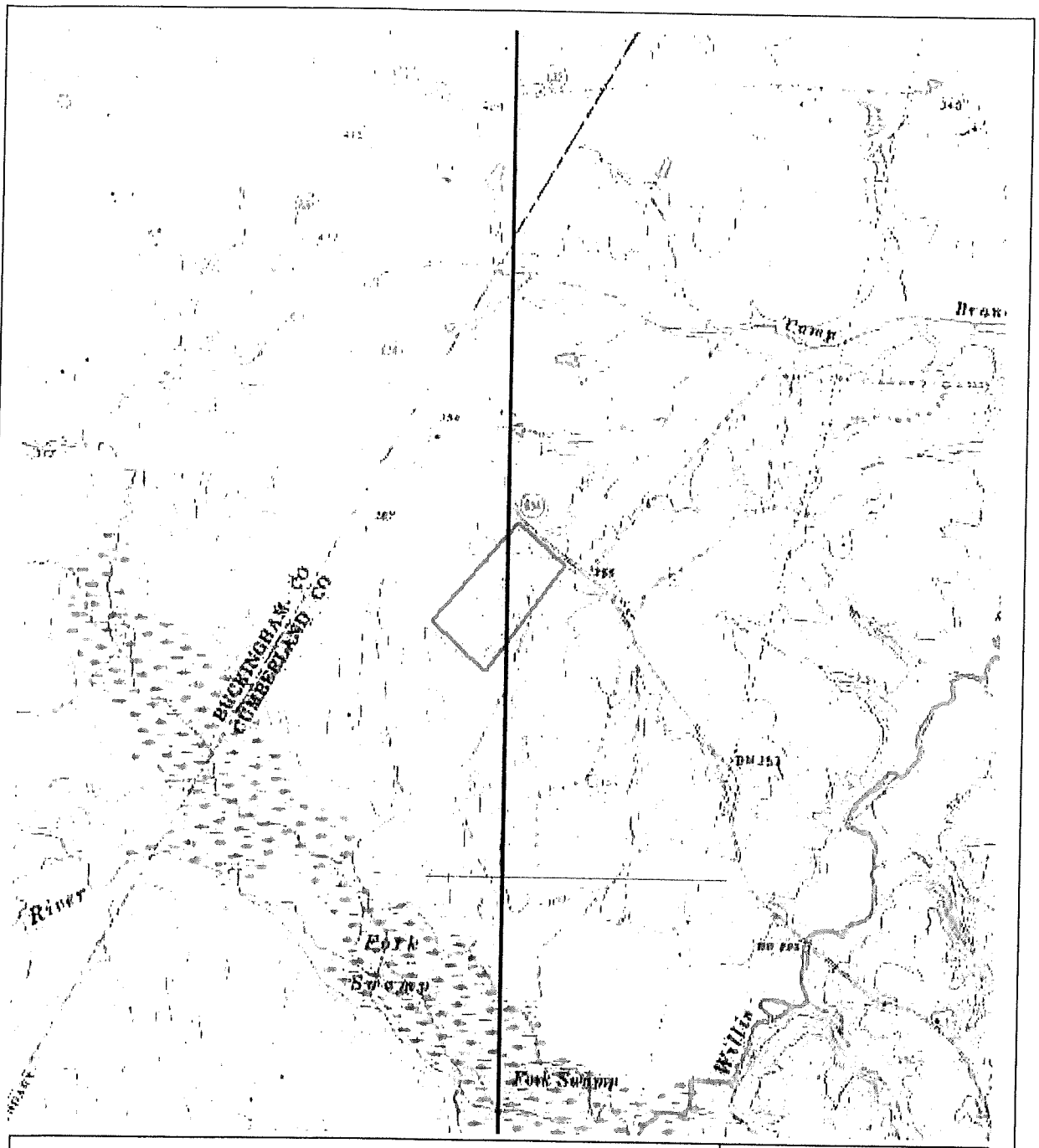
These directions are informational only. No representation is made or warranty given as to their content, road conditions or route usability or expeditiousness. User assumes all risk of use. MapQuest and its suppliers assume no responsibility for any loss or delay resulting from such use.

FIGURE 2



KOONTZ-BRYANT, P.C. A Full Service Civil Consulting Firm	DATE: September 10, 2003 USGS: Willis Mountain & Hillcrest
Cumberland Nutrient Management Company 38 Acres off Route 634 Cumberland County, VA	Latitude: N37° 27' 8.46" Longitude: W78° 22' 30.52" Area: 38± Acres Scale: 1" = 2000'

SPILL EMERGENCY PLAN

Nutri-blend is committed to conducting its work safely. The entire team is trained to ensure that its operations – from loading to transportation to application – are conducted in strict compliance with all federal, state and local safety regulations, and in accordance with its own rules and industry best practices. It is important that each member of Nutri-Blend's team safely return to his or her home after each day of work.

All employees and subcontractors have or will undergo safety training on its vehicles and equipment. Safety to Nutri-Blend is not just another objective, but is embedded in all that they do. As required by EMS, Nutri-Blend maintains emergency preparedness and response procedures to ensure effective response to accidents and emergency situations associated with its biosolids management activities. Situations that may arise can create challenges that are both real and perceived by the general public. In the event of an emergency, we have communications systems built into our crisis management efforts.

1. In the event of a spill, the driver/operator follows protocol and immediately reports the spill to the project superintendent.

2. Project superintendent notifies the appropriate authorities and generator and activate cleanup team. Project superintendent notifies Nutri-Blend President and communications personnel.
   a. Flares are positioned for safety.
   b. Communicates with authorities.
   c. Provide media (if necessary) with communications contacts.

3. Necessary equipment and personnel are mobilized at location of incident.

4. Upon arrival of the cleanup team, site is cleaned according to contingency plan procedures.
   a. Coordinates with local emergency personnel.
   b. Communicates progress of cleanup with President and communications personnel.

5. Biosolids are loaded, the spill area cleaned and the biosolids transported to application area designated in operational plan.

6. Within 10 days of accident or emergency, a post-assessment is conducted to ensure the following:
   a. Emergency procedure worked appropriately.
   b. Communications processes and procedures worked appropriately.
   c. Modify procedure based on lessons learned.
   d. Communicates with all Nutri-Blend personnel to review and train to ensure understanding of emergency procedure modifications.

7. If an accident or emergency does not occur within a 12 month period, the emergency spill control, containment and cleanup plan is reviewed and appropriate modifications made to the program. Nutri-Blend personnel and/or subcontractors are trained to ensure understanding of these emergency procedures and their responsibilities.

STAFFING AND MANIFEST REQUIREMENTS

Nutri-Blend employees or approved sub-contractors staff the facility on days when biosolids are received or shipped. The employees are from Nutri-Blend's office or land application teams.

The site superintendent is responsible for all record keeping, including the manifest that accompanies each load from the generator. A copy of a typical manifest is presented in Appendix D. These records are mailed weekly to Nutri-Blend's Richmond, VA office where they are maintained. Included with the manifest are the date and weight of the shipment, the generator, proof that the biosolids meets at least Class B status and is not a hazardous waste. The other responsibilities of the site Superintendent are:

- Verification of indoor air quality with emphasis on human health and safety
- Operation of the building ventilation system
- Operation of the truck wash
- Record keeping of the stabilization process
- Record keeping of biosolids removed from the facility

The loader operator is in charge of unloading or loading trucks. Before starting loading or unloading activities, he assures that daily maintenance and planned preventative maintenance of all site equipment is accomplished. As necessary, Nutri-Blend may assign other individuals to the facility, in particular when maintenance or repair activities require assistance.

All of the biosolids stored at this facility were originally destined for direct land application on permitted farms. Sludge stabilized to Class B biosolids standards will be treated as the other Class B biosolids stored at the building. Nutri-Blend has several VPA permits for Cumberland and surrounding counties which detail all of the requirements of 9 VAC25-32-670. The fact that the biosolids reside at the storage facility for a few days or weeks is strictly temporary. Although not specified by Section 9 VAC25-32-670, the operation and

maintenance procedure follow minimum requirements for a management practice plan utilizing land application 9 VAC25-32-670.

OPERATIONS

The independently owned essential equipment for this storage facility which is on site and in operating condition at any time the facility is in use for biosolids storage is:

1. Company supplied cell phones for communications
2. An extended boom loader to manage stacking of the biosolids
3. A front end loader of sufficient size to manage 600 tons per day of incoming or outgoing biosolids
4. A truck wash system to remove any biosolids from the sides, undercarriage, and wheels of any truck leaving the storage building
5. Ventilation fans to control atmosphere inside of the building
6. A SSI mixer to blend sludge with lime
7. An on-site laboratory to control the stabilization process

The need for spare parts is identified during the operating history of the facility. This plan is updated as new items are identified. At the start up of this project the minimum parts maintained at the facility include:

1. 1 front end loader (located within 3 hours delivery time to the facility)
2. 1 set of all necessary filters for the truck wash station
3. All of the reagents to conduct the required pH testing

LIME STABILIZATION

Non-stabilized sludge from POTWS will be chemically stabilized by mixing with lime as described in Appendix B of the VPA Application on October 24, 2008. This appendix and Figure C1.0 (facility layout) are included in this document. Since the application was approved and no changes have occurred in the biosolids regulation since the original date, Nutri-Blend assumes VA DEQ has already approved the O&M procedure. The one detail missing is the potential need for an odor control system. Based on the storage operations at the building from November 2007 thru October 2011, we believe no additional control will be required. Nutri-Blend has modified the ventilation system over the course of this period. There has not been a single violation of the facility strict odor limitation in the existing VPA Permit. Also, only one neighbor has complained about odor and only on a very few occasions. The last complaint was May 2010. If odor is a problem, Nutri-Blend will cease stabilization activities until a solution is found. Possible solutions include the timing of the activity, changes in the ventilation system and possibly installation of a fume hood over the mixer. A fan attached to the mixer by duct work will push the vapors through a biofilter.

MAINTENANCE

The following preventive maintenance program is in place when the facility is in operation:

- Communications
  The cell phones are checked daily by the onsite operator for operability. If found to be inoperable, the phone will be repaired or replaced the same day the problem is identified.
- Operating Equipment
  A. The front end loader
     1. Checked daily for operating fluids:
        Coolant
        Oil
        Hydraulic fluid
     2. All lubricating parts are checked according to manufacturer's directions
     3. The following fluids are changed at the noted frequency (The associated filters will be replaced):
        Engine oil – 250 hours
        Hydraulic fluid – 1000 hours or annually
  B. Truck wash station
     1. All filters are checked daily before operating the system
     2. All spray nozzles are visually checked daily while the system is operating. Clogged nozzles are cleaned or replaced as they are found.
     3. The quality of the re-circulating wash water is assessed weekly according to manufacturer's directions.
  C. Fabric cover
     1. Small tears can be patched by the techniques described in Appendix E. The appropriate patch kits are stored on site.

2. Very large tears may require a contractor to replace one or more of the 20 foot wide panels that are attached to the roof truss structures.

ODOR CONTROL

The facility has very strict requirements in the form of a proffer to limit the odor of biosolids to 5 dilutions above background at the facility boundaries (See appendix C).

Nutri-Blend expects that no controls will be required since the biosolids will be dewatered prior to delivery, kept dry once delivered, and the storage activities will primarily occur during the coldest months of the year. The facility has been monitored according to a Cumberland County plan since November 2007. To date, January 1, 2011, there have been no odor violations. Early in the program there were odor complaints by one of the nearby neighbors. In response, Nutri-Blend modified the operation of the ventilation fans by hoods and timing devices. Since the modifications few, if any, complaints have occurred.

SAMPLING 12 VAC 5-585-380

The facility monitors odors and noise, when the facility is in use, to comply with the proffers approved by Cumberland County.

Biosolids quality is guaranteed by the generator to be Class B quality. Nutri-Blend conducts its own sampling of incoming biosolids to verify compliance on a monthly basis in accordance with Table 5 (9VAC25-32-450) and 9VAC25-32-380.

FACILITY CLOSURE 12 VAC 5-585-140 E.

When the facility is no longer permitted for biosolids storage or processing it will be cleaned and returned to service as a warehouse or other use. Cleaning will be accomplished by scraping the visible biosolids reside from the walls and floor of the storage building and storage tank of the truck wash. The residue will be field applied at permitted sites by Nutri-Blend or other licensed contractor. Following removal of the heavy residue, the building truss system, concrete walls, and floor and the components of the truck wash station will be power washed with an appropriate cleaning solution. The collected fluids will be transported offsite to an approved WWTP. After cleaning the trusses, concrete walls, floor, and the truck wash station, will be rinsed with clean water. The rinsate will be sampled for COD, TKN, and total coliforms. When the rinsate achieves COD less than 100, TKN less than 25, and total coliforms less than 100 per 100 ml, the facility will be considered clean and usable for other purposes. All sampling and analyses will be accomplished with SW846 Methods at a state certified laboratory.

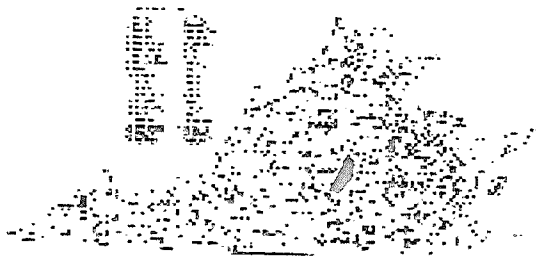
APPENDIX A

BUILDING DESIGN

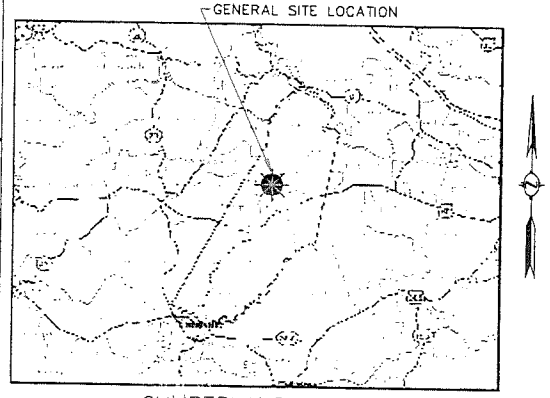
JDS.07.004

6-14-07

PB/PH



CUMBERLAND COUNTY



CUMBERLAND, VIRGINIA

UTM 17 743509E 415328N
(NAD27) USGS CUMBERLAND

NUTRI-BLEND, INC
SLUDGE STORAGE BUILDING
ROUTE 634
CUMBERLAND, VA 23040
CUMBERLAND COUNTY

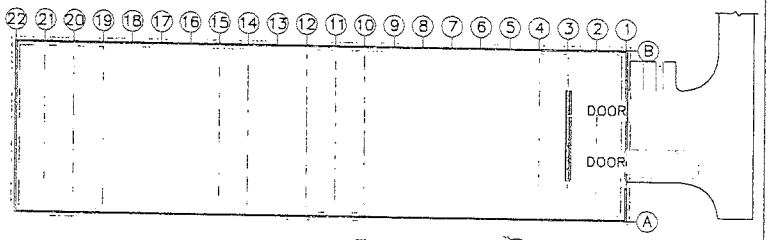
PROJECT NUMBER: JDS.07.004
COVER-ALL TITAN 3 SERIES
BUILDING FOUNDATION DRAWINGS
FOR 120 FT. x 420 FT. BUILDING
JUNE 8, 2007

PREPARED FOR
NUTRI-BLEND COMPANY
2353 CHARLES CITY ROAD
RICHMOND, VIRGINIA &
J.D. SAUER CORP.
EDINBURG, VIRGINIA

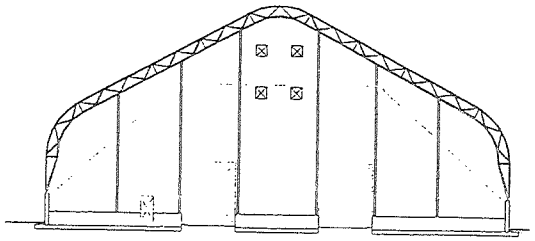
B ISSUED FOR PERMITS & CONSTRUCTION

INDEX OF DRAWINGS

B COVER SHEET
C-1 SITE PLAN
C-2 DUMP ZONE PLAN
B S-1 FOUNDATION PLAN
B S-2 EAST ENDWALL ELEV (LINE 22)
B S-3 WEST ENDWALL ELEV (LINE 1)
B S-4 WALL SECTIONS
B S-5 BASE PL., CORNER, AND WALL DETAILS
S-6 CONCRETE DETAILS
B S-7 SPECIFICATION



KEY PLAN



KEY ELEVATION

BEFORE YOU DIG
CALL THE MISS
UTILITY OF VIRGINIA
800-552-7001
(TOLL FREE)

REVISIONS

BY	REV	DESCRIPTION	DATE	APPROVED
PB/PH	0	ISSUED FOR PERMITS & CONSTRUCTION	6-08-07	MSS
MSS	A	ISSUED FOR CONSTRUCTION	6-14-07	MSS
MSS	B	BUILDING USE GROUP S-2/ conc. specs	7-11-07	MSS

SERVINSKY ENGINEERING
Consulting Structural Engineer
servinskyeng@yahoo.com
280 Douglas Ave
Holland, MI 49424-6515
(616) 738-1281
Fax (616) 738-6281

J.D. SAUER CORP.
166 LONE PINE ROAD
EDINBURG, VA. 22824

COVER SHEET

NUTRI-BLEND SLUDGE

CUMBERLAND, VIRGINIA

DWG NO. JDS.07.004 COVER

NO SCALE

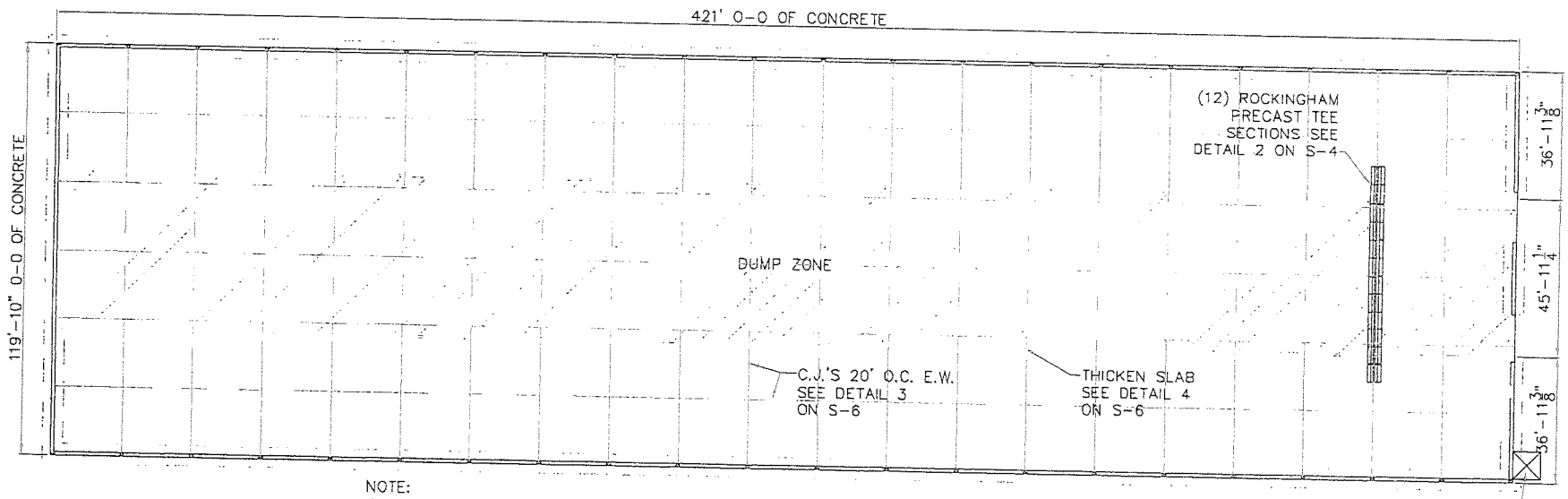
SHEET SIZE B

SHEET NO. COVER SHEET

JDS.07.004

6-08-07

PB/PH



NOTE:
SLAB THICKENS FROM 6" TO 8" @ DUMP ZONE
SEE DETAIL 4 ON S-6

C-2 / 1 DUMP ZONE PLAN
SCALE 1/32" = 1'

REVISIONS				
BY	REV	DESCRIPTION	DATE	APPROVED
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Consulting Structural Engineer
servinskyeng@yahoo.com
260 Douglas Ave
Holland, MI 49424-5515
(616) 738-1281
Fax (616) 738-6281

COVER-ALL BUILDING SYSTEMS

J.D. SAUER CORP.
166 LONE PINE ROAD
EDINBURG, VA. 22824

DUMP ZONE PLAN

NUTRI-BLEND SLUDGE

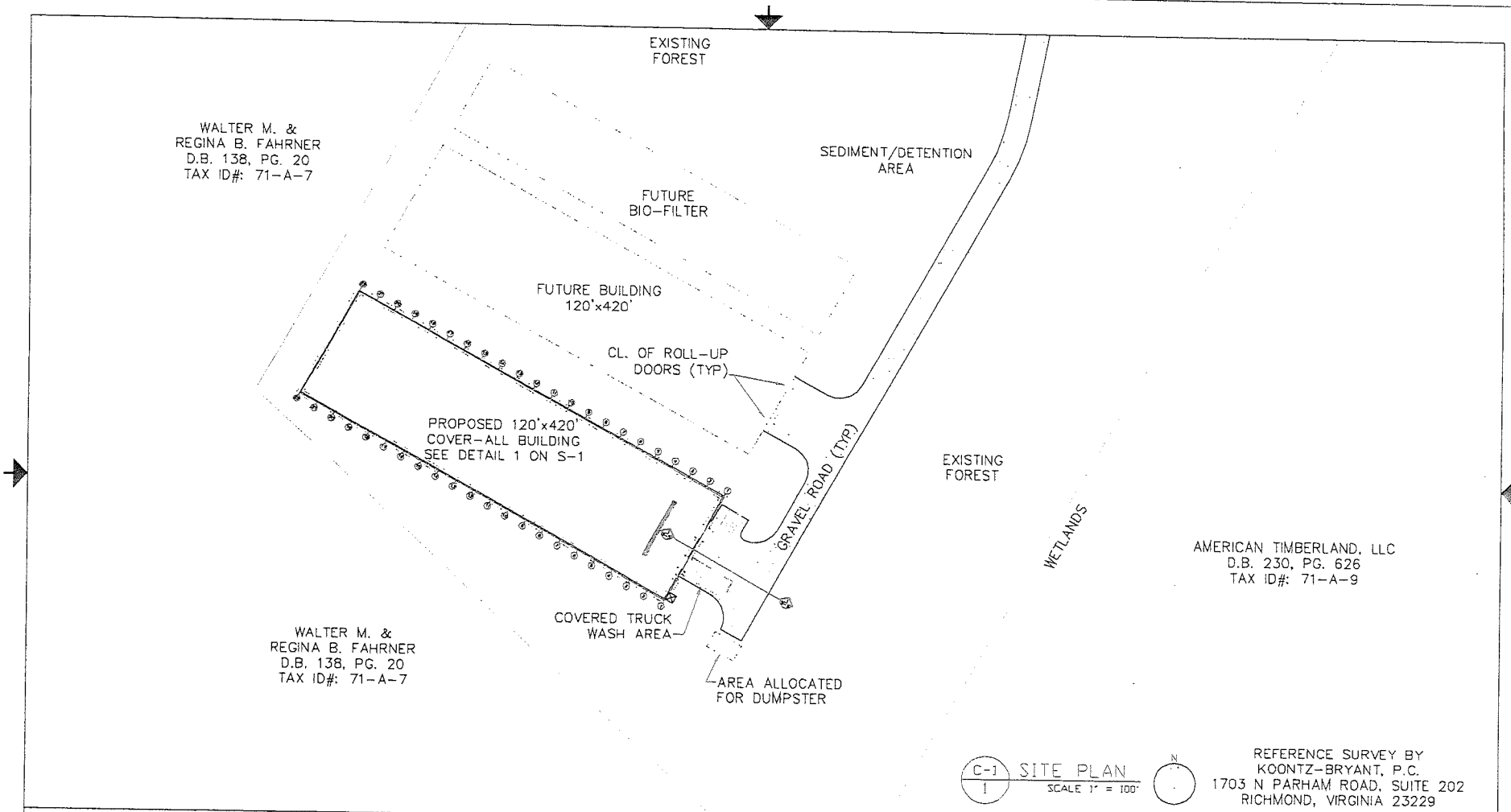
CUMBERLAND, VIRGINIA

DWG NO. JDS.07.004 C-2

SCALE 1/32" = 1'

SHEET SIZE B

SHEET NO. C-2



C-1 / 1 SITE PLAN
SCALE 1" = 100'

REFERENCE SURVEY BY
KOONTZ-BRYANT, P.C.
1703 N PARHAM ROAD, SUITE 202
RICHMOND, VIRGINIA 23229

REVISIONS

BY	REV	DESCRIPTION	DATE	APPROVED
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Fax (616) 738-6281

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EDINBURG, VA. 22824

SITE PLAN

NUTRI-BLEND SLUDGE

CUMBERLAND, VIRGINIA

DWG NO. JDS.07.004 C-1

SCALE 1" = 100'

SHEET SIZE B

SHEET NO. C-1

JDS.07.004

6-08-07

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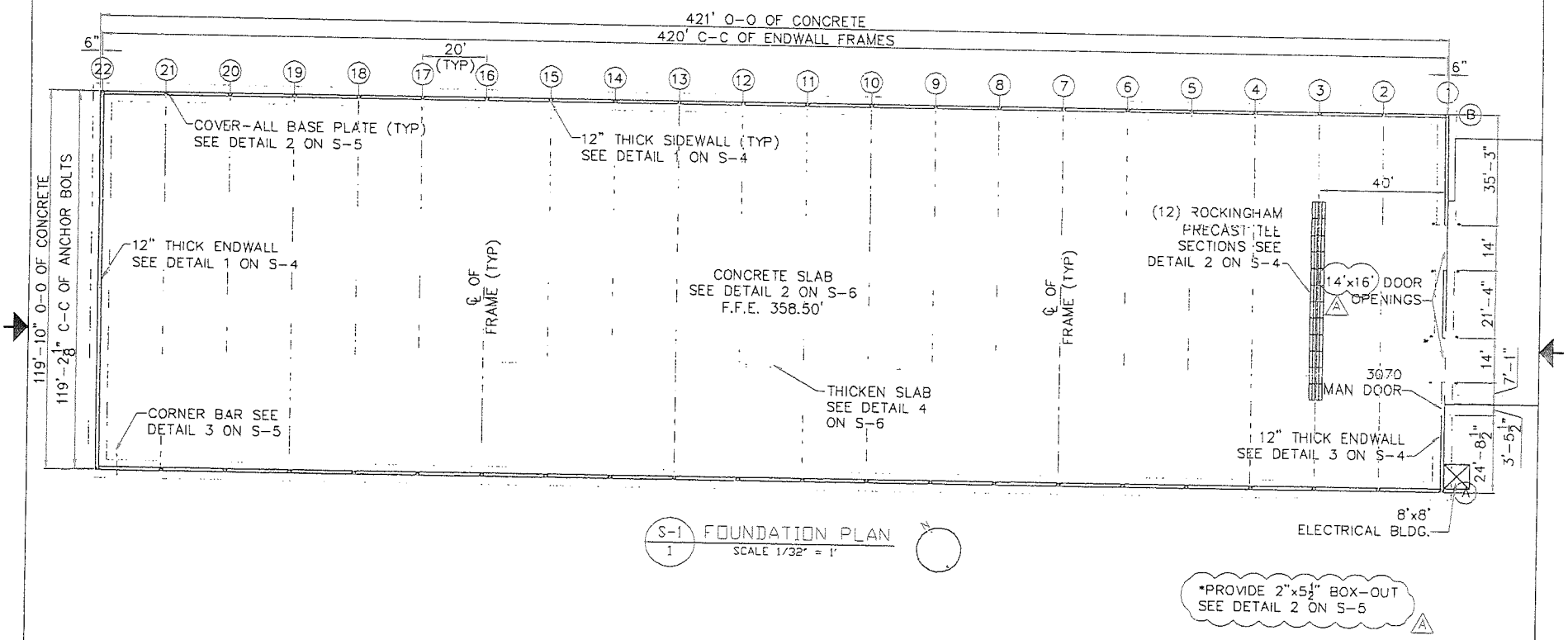

S-1 / 1 FOUNDATION PLAN
SCALE 1/32" = 1'

REVISIONS				
BY	REV	DESCRIPTION	DATE	APPROVED
PB/PH	0	ISSUED FOR PERMITS & CONSTRUCTION	6-08-07	MSS
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MSS	B	BUILDING USE GROUP S-2/ conc. specs	7-11-07	MSS

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Consulting Structural Engineer
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FOUNDATION PLAN

NUTRI-BLEND SLUDGE

CUMBERLAND, VIRGINIA

DWG NO. JDS.07.004 S-1

SCALE 1/32" = 1'

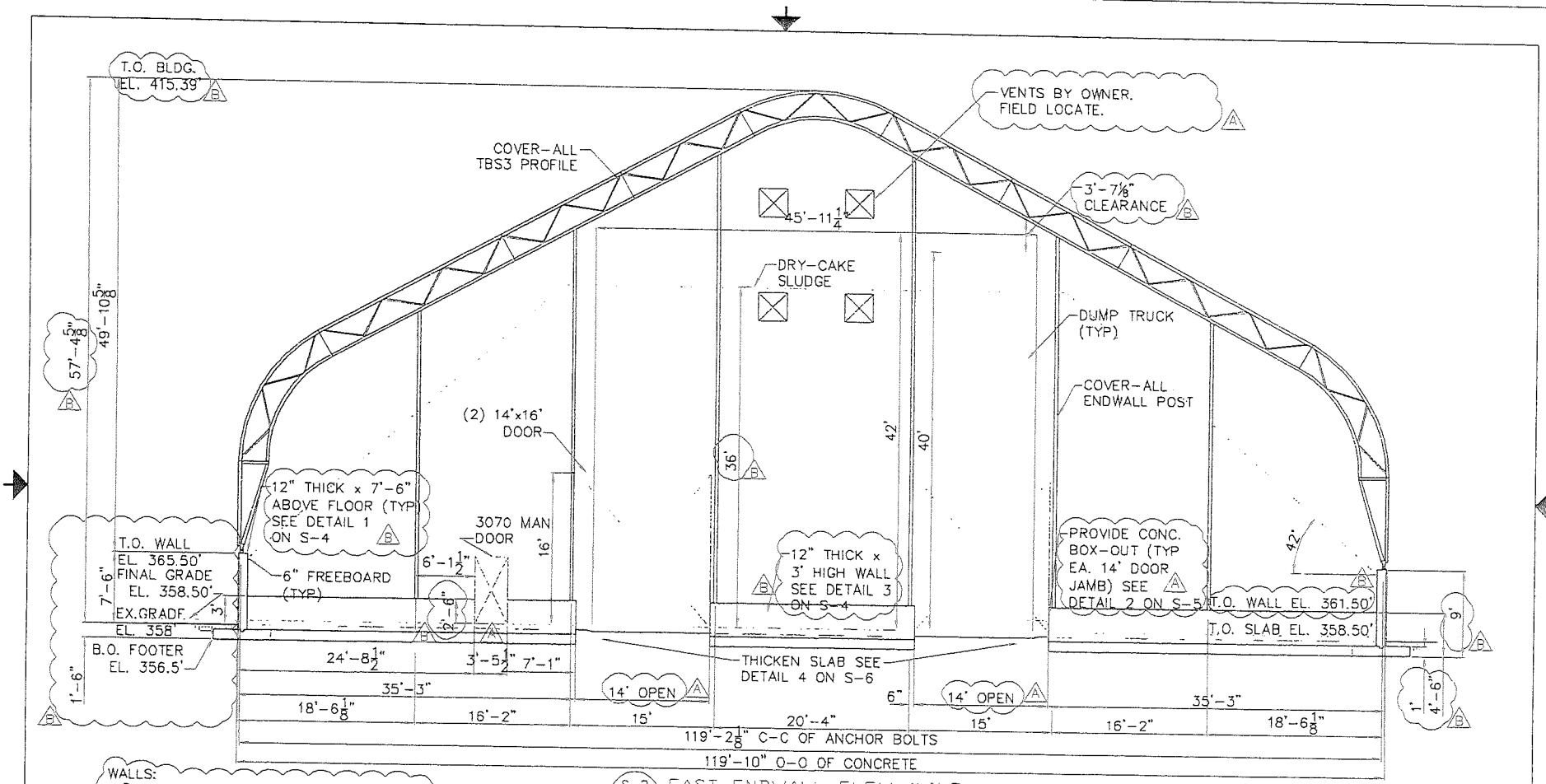
SHEET SIZE B

SHEET NO. S-1

JDS.07.004

6-13-07

PB/PH



S-2 / 1 EAST ENDWALL ELEV (LINE 1)
SCALE 3/32" = 1'

REVISIONS				
BY	REV	DESCRIPTION	DATE	APPROVED
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EAST ENDWALL ELEVATION (LINE 1)

NUTRI-BLEND SLUDGE

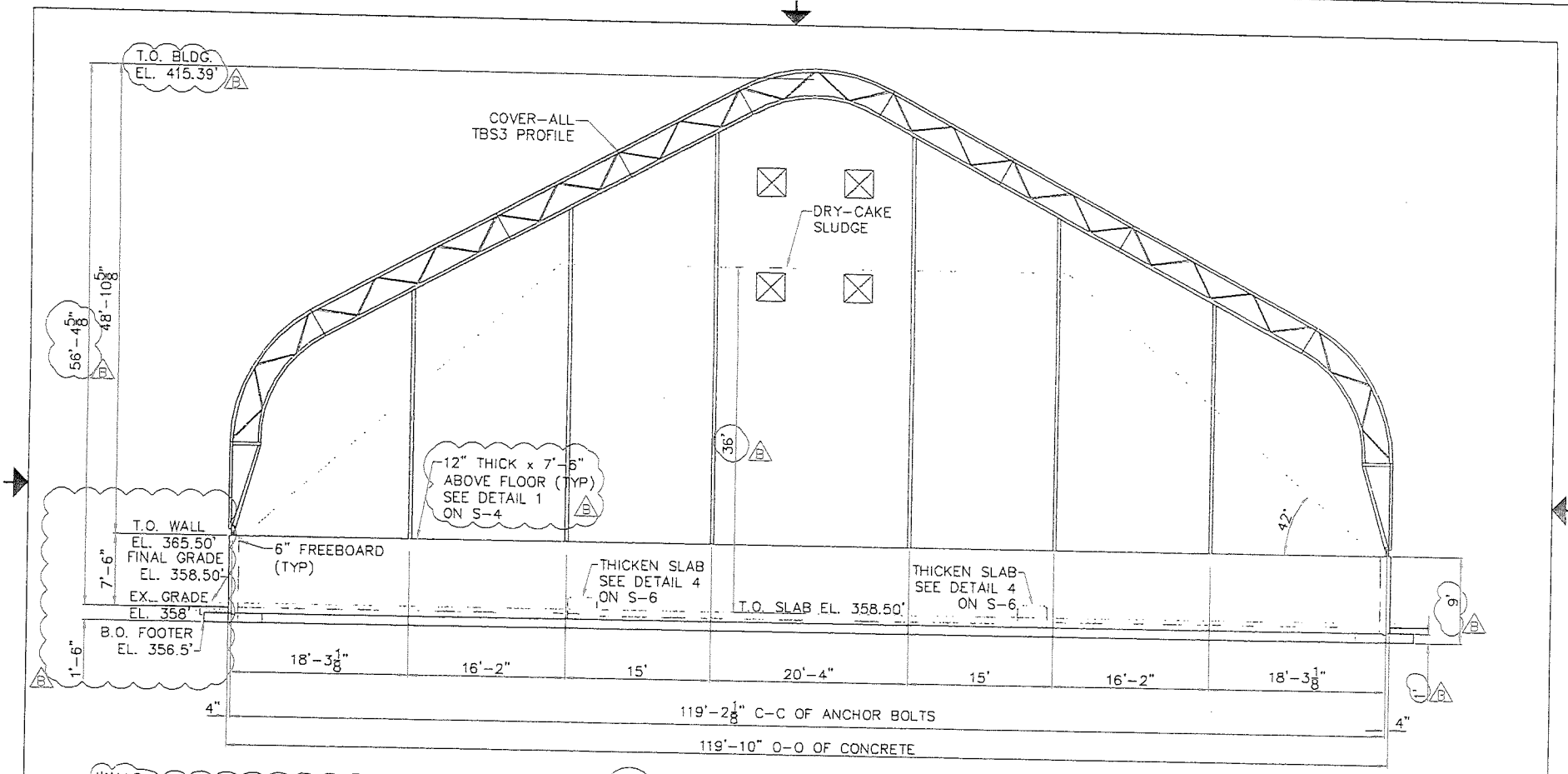
CUMBERLAND, VIRGINIA

DWG NO. JDS.07.004 S-2

SCALE 3/32" = 1'

SHEET SIZE B | SHEET NO. S-2

JDS.07.004 6-13-07 PB/PH



WALLS:
12" THICK FOR 6'-6" WALL ABOVE GRADE.
12" THICK FOR 2' WALL ABOVE GRADE.

S-3 / 1 WEST ENDWALL ELEV (LINE 22)
SCALE 3/32" = 1'

REVISIONS

BY	REV	DESCRIPTION	DATE	APPROVED
PB/PH	0	ISSUED FOR PERMITS & CONSTRUCTION	6-08-07	MSS
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MSS	B	BUILDING USE GROUP S-2/ conc. specs	7-11-07	MSS

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Fax (616) 738-6281

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EDINBURG, VA. 22824

WEST ENDWALL ELEVATION (LINE 22)

NUTRI-BLEND SLUDGE

CUMBERLAND, VIRGINIA

DWG NO. JDS.07.004 S-3

SCALE 3/32" = 1'

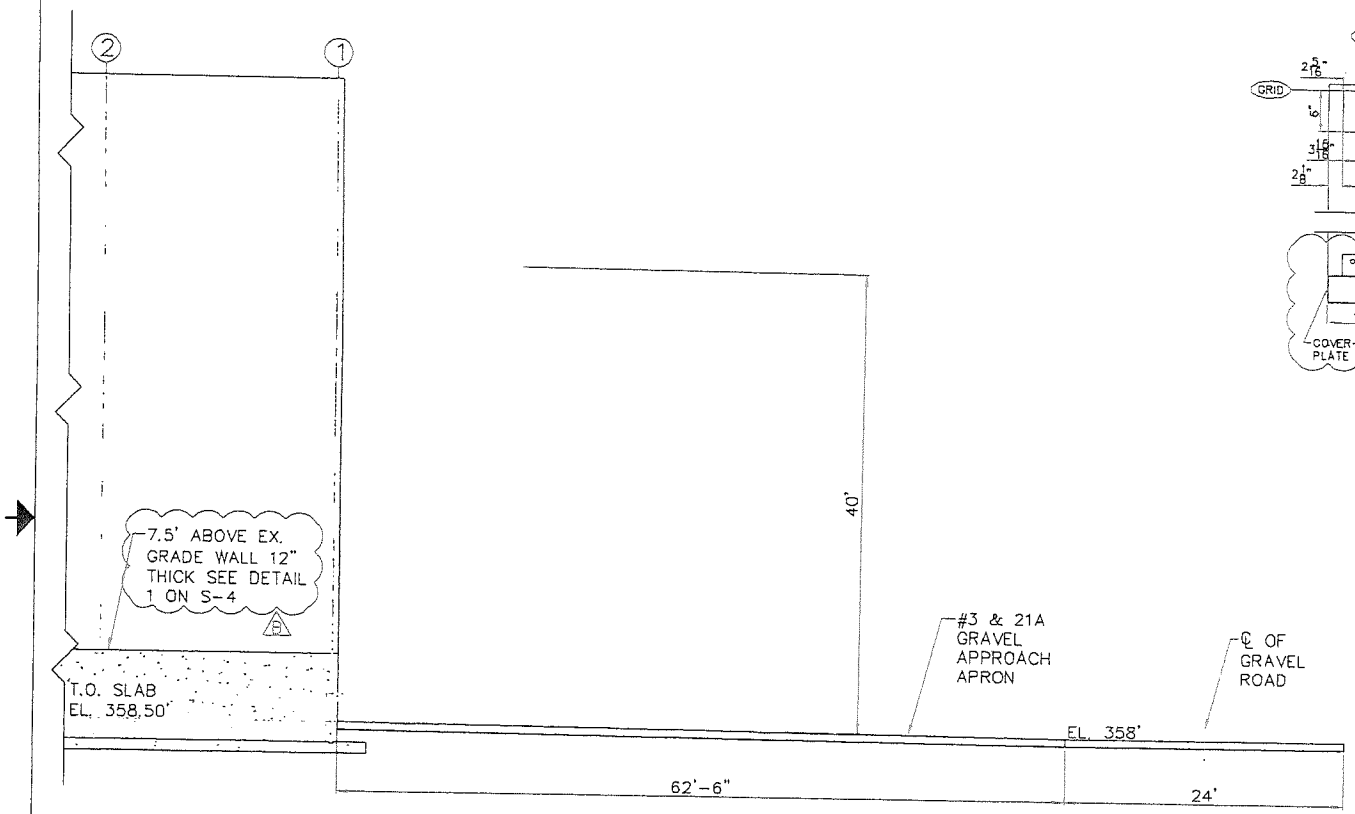
SHEET SIZE B

SHEET NO. S-3

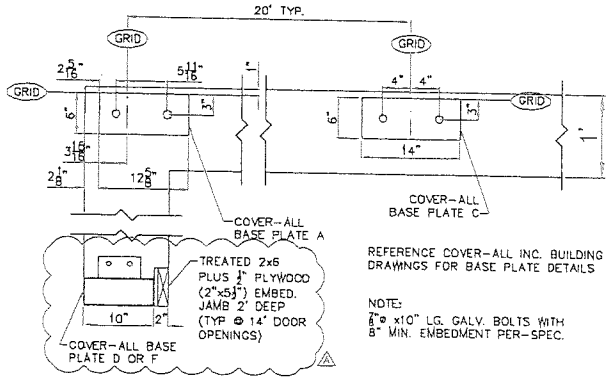
JDS.07.004

6-13-07

PB/PH



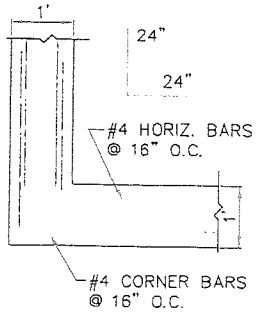
S-5 / 1 SECTION 1-1
SCALE 3/32" = 1'



REFERENCE COVER-ALL INC. BUILDING DRAWINGS FOR BASE PLATE DETAILS

NOTE:
7/8"ø x10" LG. GALV. BOLTS WITH 8" MIN. EMBEDMENT PER-SPEC.

S-5 / 2 BASE PLATE DETAILS
SCALE 1" = 1'



S-5 / 3 CORNER BAR DETAIL
SCALE 1/2" = 1'

REVISIONS				
BY	REV	DESCRIPTION	DATE	APPROVED
PB/PH	0	ISSUED FOR PERMITS & CONSTRUCTION	6-08-07	MSS
MSS	A	ISSUED FOR CONSTRUCTION	6-14-07	MSS
MSS	B	BUILDING USE GROUP S-2/ conc. specs	7-11-07	MSS

SERVINSKY ENGINEERING
Consulting Structural Engineer
servinskyeng@yahoo.com
280 Douglas Ave
Holland, MI 49424-5515
(616) 738-1281
Fax (616) 738-6281

J.D. SAUER CORP.
166 LONE PINE ROAD
EDINBURG, VA. 22824

BASE PL, CORNER, & SECTION DETAILS

NUTRI-BLEND SLUDGE

CUMBERLAND, VIRGINIA

DWG NO. JDS.07.004 S-5

SCALE AS NOTED

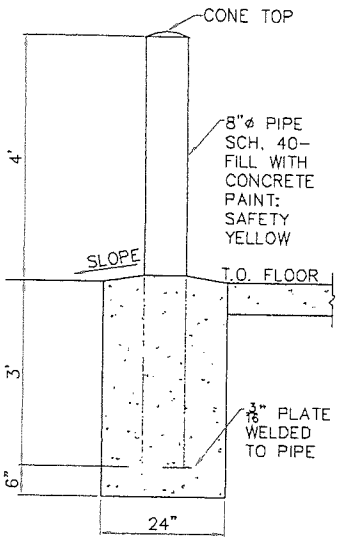
SHEET SIZE B | SHEET NO. S-5

JDS.07.004 6-14-07 PB/PH

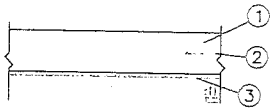
JDS.07.004

6-08-07

PB/PH

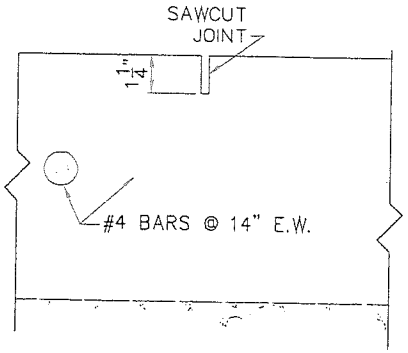


S-6 / 1 BOLLARD DETAIL
SCALE 1/2" = 1'

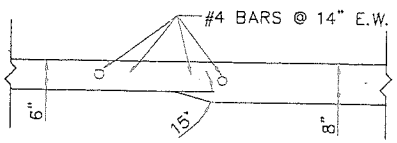


1. 8" OR 6" THICK CONCRETE AS SHOWN ON SHEET C-2
2. #4 BARS @ 14" E.W.
3. 10 MIL. VAPOR BARRIER

S-6 / 2 SLAB DETAIL
SCALE 1/2" = 1'



S-6 / 3 CONTROL JOINT
SCALE 3" = 1'



S-6 / 4 THICKEN SLAB DETAIL
SCALE 1/2" = 1'

REVISIONS				
BY	REV	DESCRIPTION	DATE	APPROVED
PB/PH	0	ISSUED FOR PERMITS & CONSTRUCTION	6-08-07	MSS

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Fax (616) 738-6281

COVER-ALL BUILDING SYSTEMS

J.D. SAUER CORP.
166 LONE PINE ROAD
EDINBURG, VA. 22824

CONCRETE DETAILS

NUTRI-BLEND SLUDGE

CUMBERLAND, VIRGINIA

DWG NO. JDS.07.004 S-6

SCALE AS NOTED

SHEET SIZE B

SHEET NO. S-6

JDS.07.004

6-14-07

PB/PH

SITE LOCATION, BUILDING SIZE, AND OCCUPANCY

Project Location: Route 634 Cumberland, VA
Client Correspondence Address:
Nutri-Blend Company
2353 Charles City Road, Richmond, VA
Building Size: 120' x 420' 50,400 Square feet

Use Group S2- Sludge Storage Low Hazard Storage B

Construction Type V B-Fabric Building NON-FR Fabric

STRUCTURAL DESIGN LOADS

Virginia Uniform Statewide Building Code 2003

Roof Structure and Fabric Covering is per Cover-All Building Systems.

Wind Load-90 mph, Exposure C
Ground Snow Load-25 psf
Stacked Biosolids: 75 pcf, 42 degrees angle of repose
Truck wheel & axle load for HS20 Truck
Seismic Class D, Use Group 1
Short Period Spectral Response Ss=0.35g (35%g)
One Second Spectral Response S1=0.092g (9.2%g)

A. GENERAL REQUIREMENTS

1. All work shall be done per OSHA standards and regulations.
2. Obtain prior approval from Owner when substituting materials or equipment.
3. Work shall conform to all governing codes.
4. Establish locations of underground utilities (provided by others).

B. EARTHWORK AND DRAINAGE

1. Cap off or plug discontinued utilities in excavations and remove from site.
2. Owner to provide positive storm drainage away from foundation and building.
3. Backfill shall be clean, granular backfill compacted per this specification.
4. Compact to 95 percent of maximum dry density per ASTM D-1557 Modified Proctor Density Test.
5. Compact fill in 8 inch lifts.
6. Remove unsuitable clay or materials to firm soil.
7. Surplus or unsuitable material shall be stockpiled by Owner, or offsite if required by Owner.
8. Testing of subgrade shall be by the Contractor.
9. If rock is encountered during excavation, contact Engineer before proceeding with Work.
10. Provide final grading, topsoil, gavel, compaction and seeding as necessary within affected area of bldg.

C. CONCRETE FOOTINGS & WALLS

1. 28 day minimum compressive strength: 3500 psi footings. 4000 psi walls. B
2. Concrete mix shall have a water-cement ratio of 0.47 maximum.
3. Reinforcing Steel-Grade 60 bars.
4. Minimum concrete cover for reinforcing bars shall be as follows: Concrete cast against grade-3 inch min. All other areas-2 inches min.
5. Type C or F fly ash may be used in concrete mix. Maximum fly ash content shall be 20 percent by weight of cement.
6. Submit mix design to Engineer for approval.
7. Place footings a level-prepared compacted sub-base, free of organic material and frost.

D. CONCRETE

1. Submit proposed mix design prepared by an approved testing firm for Concrete.
2. Cement: ASTM C150
3. Aggregate: ASTM Standard C-33.
4. Air entraining admixture: ASTM C-260.
5. Superplasticizers (high range water reducers) ASTM C-494 type F or G.
6. Water Reducers/Retainers C-494, type A/D.
7. Design Data: B
   Compressive Strength 4000 psi walls
   3,500 psi grade beams, footings, piers and slab
   Water/Cement Ratio 0.47 max
   Maximum Aggregate size 3/4 inch
   Air Content 6% ± 2%
   Superplasticizer as needed for workability
8. Production and placement shall be in accordance with ACI 301.
9. Curing: Immediately after placing concrete, clean canvas tarps shall be draped over tops of the wall continuously and completely cover wall sides.
10. Cold Weather Concreting: Heat shall be applied for cold weather concrete. Other methods to prevent freezing shall be used per ACI 306.

10A. Hot weather concreting per ACI 305 preparations, delivery, placement, finishing, bleed-water evaporation, curing, protection of concrete, mixture proportions, and maximum concrete temperature. B

11. Walls shall be formed and poured integral and continuous without cold joints. If a cold joint is necessary, provide key and waterstop at joint.

E. CONCRETE TESTING

Note: Testing shall be required only when requested by and PAID FOR by the Owner. If requested, Contractor shall provide Testing as follows:

1. Obtain 4 test cylinders. Use ASTM C-31 for preparing for compression strength testing. Use ASTM C-31 methods to obtain 1 set of 4 cylinders for each 50 cubic yards of concrete.
2. Break 2 cylinders at 7 days, 1 cylinder at 14 days, and record test results for strength. Determine and verify that sample is on ACI curve for required strength at 28 days.
3. One cylinder shall be kept for a period minimum of 6 months for verification of strength (28 days min). If requested by Owner.

F. PRECAST CONCRETE BARRIER WALLS

1. Submit manufacturers standard detail to Engineer for Approval. Concrete strength and rebar shall be shown in submittals.
2. Approved Suppliers:
   a. Rockingham Precast, Harrisonburg, VA
   b. Keystone Precast, New Holland, PA
3. Tee Panels shall be used with top 4" minimum, 4' minimum with and 5 feet min. length.
4. Bolt bottom flange to concrete slab. Panels are to be removable.

G. ANCHOR BOLTS

1. Anchor Bolts (2) 7/8" diameter, Galvanized Hilti HVA Epoxy anchors x 8 inch min embedment, Endwall posts to be anchored with (2) 5/8" drill-in Hilti Kwik (wedge) anchors, 4" min. embedment.
2. Project bolts 1 1/2 inches max. above concrete with threaded projection.
3. Provide anchors at location shown on drawings. Other anchor types to be submitted for Approval by Engineer.

H. FDN. DESIGN BEARING CAPACITY & SOIL BORINGS

1. Design Bearing Capacity=3500 psf
2. Geotechnical Report and Soil Borings, dated May 2007 by Owner

I. DOORS & TRUCK PROTECTION BOLLARDS

1. As noted on design drawings
2. Place bollards at door jambs as noted.

J. FOUNDATION REACTIONS AT TOP OF WALL (MAX. VALUES PER COVER_ALL BUILDING CO.) (Refer to Cover-All Bldg Drawings-for Loads)

The following loads were provided by the Cover-All Bldg. Contractor. The foundation designer has verified final design loads as provided by Cover-All Inc.

Frame Lines 1 to 22
- 10.6 kips Horizontal (Live)
- 15.7 kips Down (Live)
- 6.6 kips Horizontal (Snow)
- 9.9 kips Down (Snow)
- 3.9 kips Horizontal (Wind)
- 6.5 kips Up (Wind)

Endwall Wind Columns (posts)
- Wind-1.5 kips Horizontal

K. COVER-ALL BUILDING

1. Building specifications are per Cover-All Building Company, under separate submittal.

L. REFERENCE ELEVATIONS

Top of Pavement Slab EL 358.50' FEET
Top of Foundation Wall EL. VARIES SEE PLAN B

Exterior grades and Asphalt Paving EL. Varies

Refer to plans for other reference elevations.

M. SURVEY

Refer to survey information provided by Koontz-Bryant, P.C. 1703 N Parham Road, Suite 202, Richmond, Virginia 23229

N. ASPHALT PAVING

1. None required unless specified and Paid for by the Owner.
2. For paved areas, compacted gravel sub-base using 6 inches minimum of gravel.

These specifications are for foundation and earthwork only. The Contractor(s) are responsible for proper venting, mechanical, plumbing, and electrical requirements of the building.

REVISIONS

BY	REV	DESCRIPTION	DATE	APPROVED
PB/PH	0	ISSUED FOR PERMITS & CONSTRUCTION	6-08-07	MSS
MSS	A	ISSUED FOR CONSTRUCTION	6-14-07	MSS
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Consulting Structural Engineer
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COVER-ALL BUILDING SYSTEMS

J.D. SAUER CORP.
166 LONE PINE ROAD
EDINBURG, VA. 22824

SPECIFICATIONS

NUTRI-BLEND SLUDGE

CUMBERLAND, VIRGINIA

DWG NO. JDS.07.004 S-7

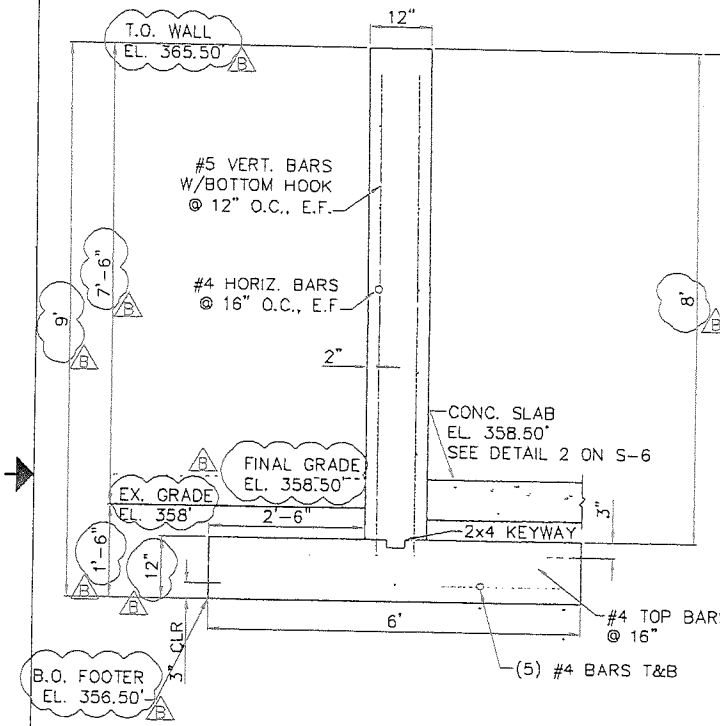
NO SCALE

SHEET SIZE B | SHEET NO. S-7

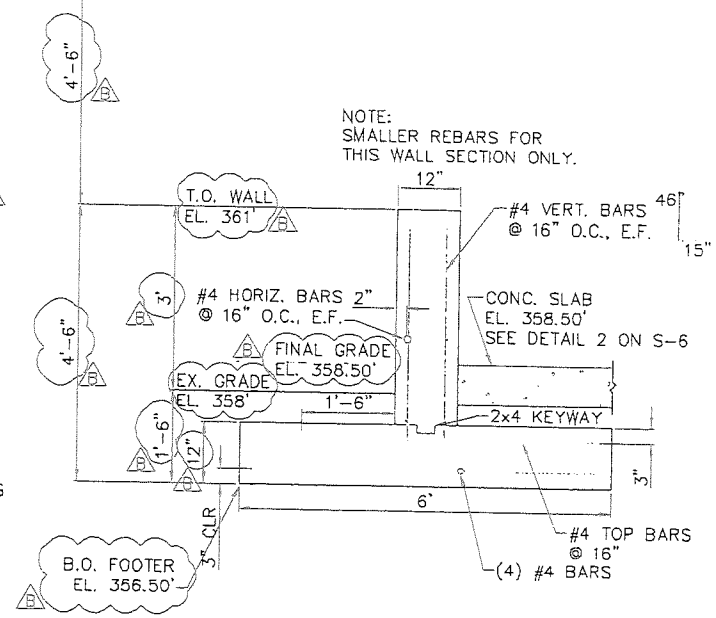
JDS.07.004

6-13-07

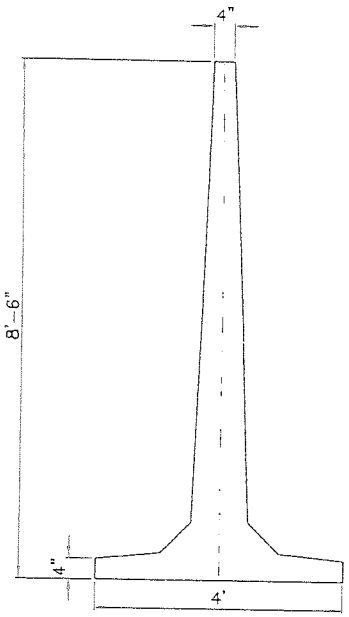
PB/PH



S-4 / 1 6'-6" WALL SECTION
SCALE 1/2" = 1'



S-4 / 3 2' WALL SECTION
SCALE 1/2" = 1'



S-4 / 2 PRECAST TEE
SCALE 1/2" = 1'

REVISIONS				
BY	REV	DESCRIPTION	DATE	APPROVED
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COVER-ALL BUILDING SYSTEMS

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EDINBURG, VA. 22824

WALL SECTIONS

NUTRI-BLEND SLUDGE

CUMBERLAND, VIRGINIA

DWG NO. JDS.07.004 S-4

SCALE 1/2" = 1'

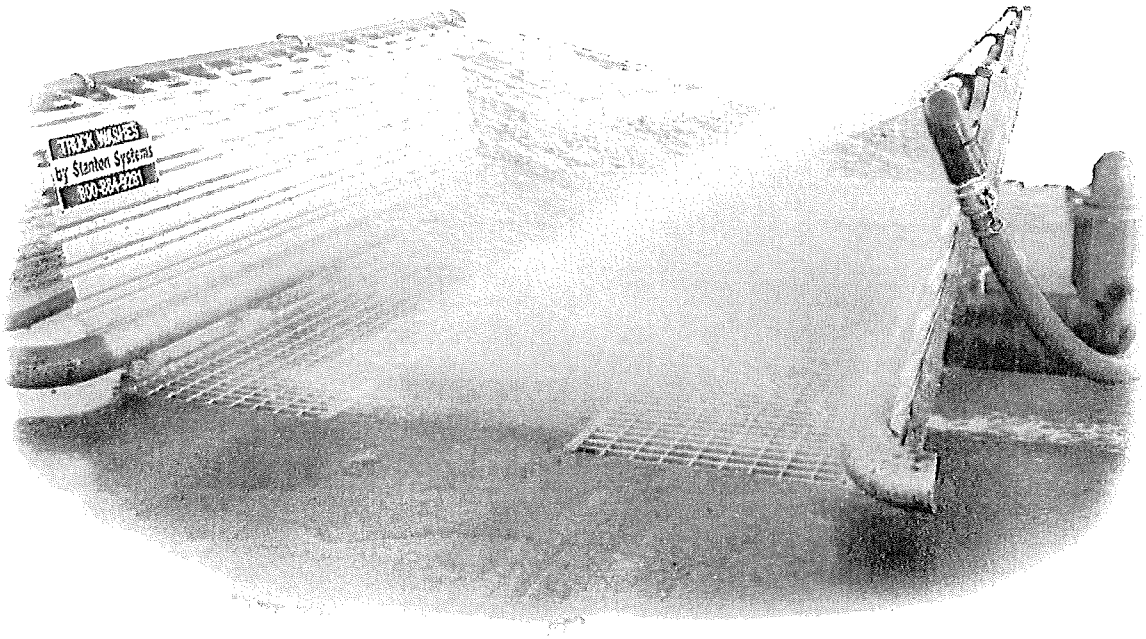
SHEET SIZE B

SHEET NO. S-4

APPENDIX B

WHEEL WASH STATION

STB-30 / STB-75 Portable Tire Wash Installation



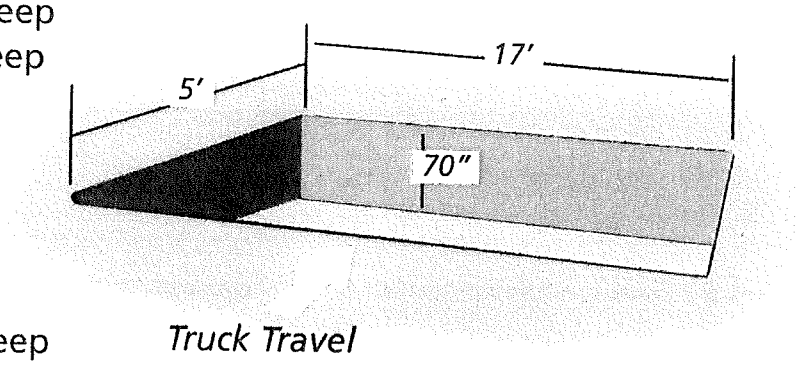
STANTON SYSTEMS

STB 30 and STB 75 Installation

Excavation:
Locate where Tank and Troughs will be laid out on ground.

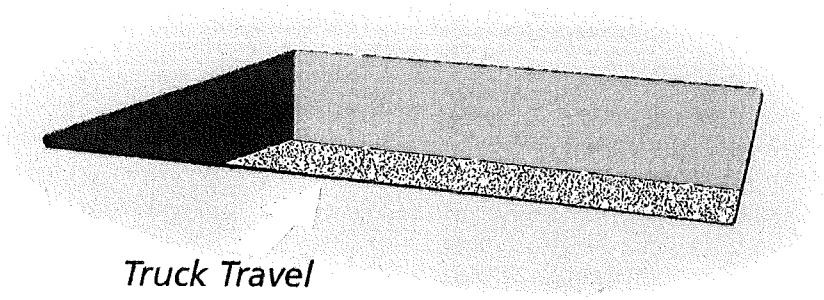
Tank Size

STB 30: 16′ wide x 4′ long 66″ deep
STB 75: 16′ wide x 8′ long 89″ deep



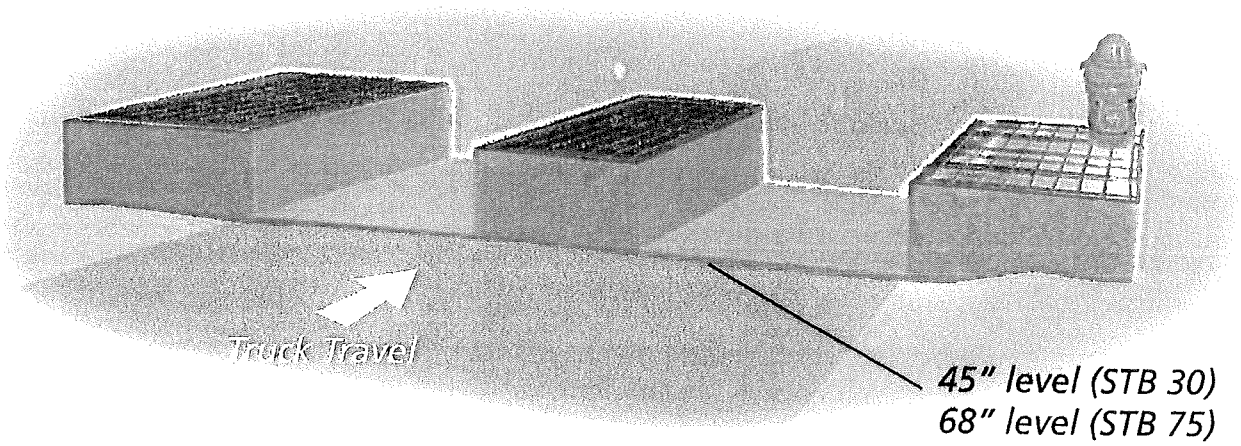
Dimensions of opening

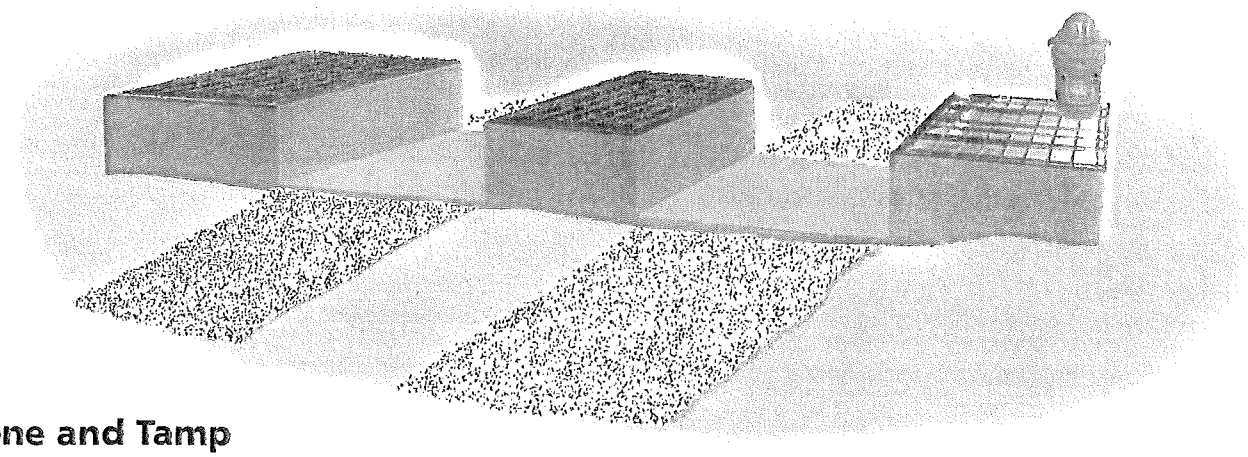
STB 30: 17′ wide x 5′ long 70″ deep
STB 75: 17′ wide x 9′ long x 93″ deep



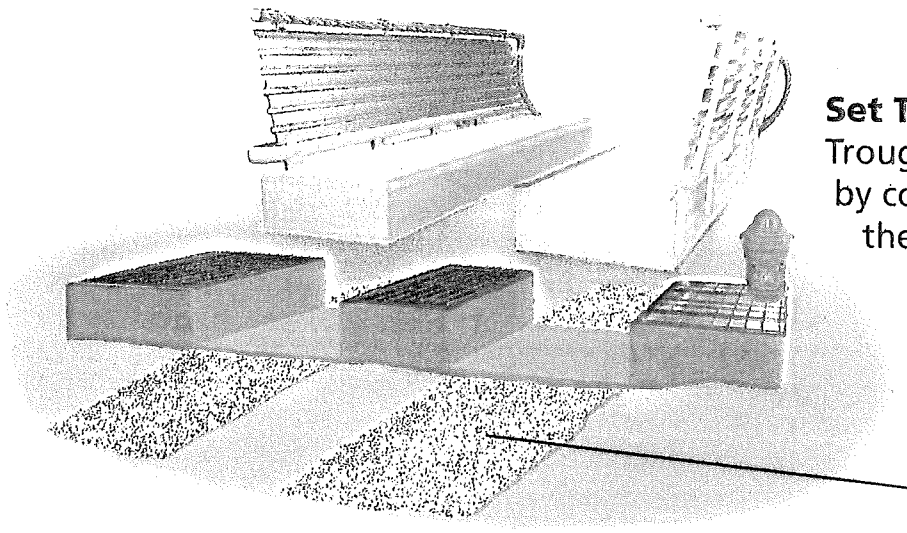
Compact 4″ of stone in excavation.

Lower Tank into opening. Backfill Tank up to the 45″ level (STB 30) or 68″level (STB 75) on tank. Tank level is measured from bottom of tank and is marked at the factory





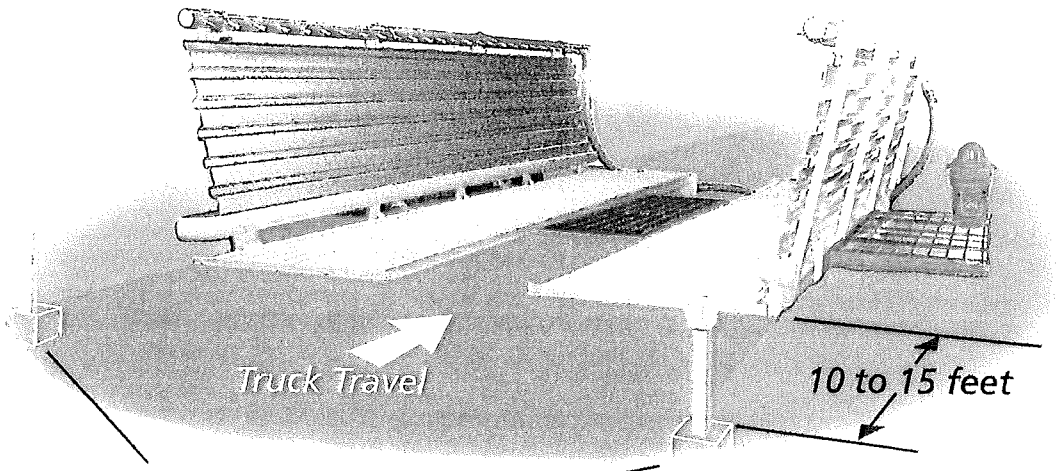
Stone and Tamp
Place 4" of stone under trough area and tamp to between 97% and 98% compaction.



Set Troughs into Tank slots. Troughs should be supported by compacted stone not the tank.

Compacted stone to be 1" higher than tank slot

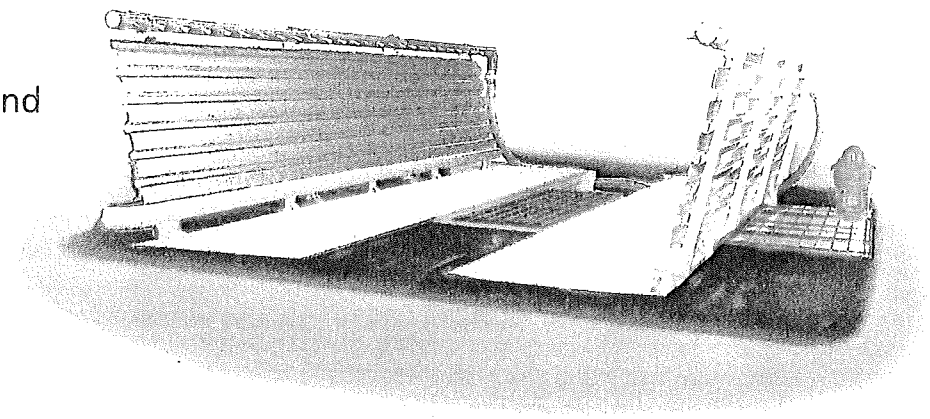
Backfill Troughs
up to 5" below top of Troughs

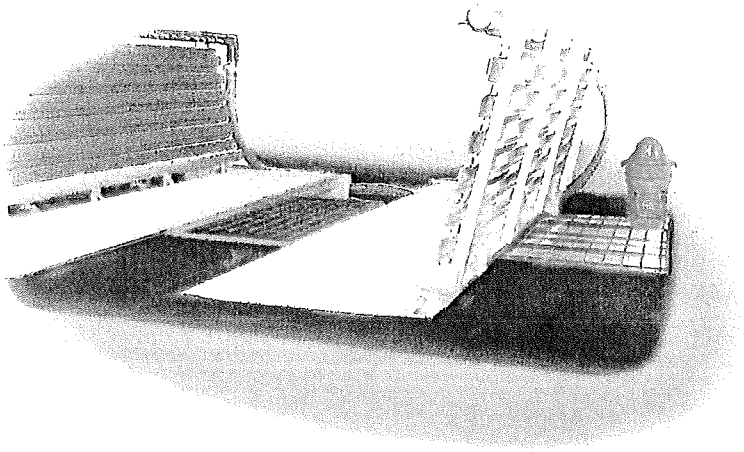


Opti-Eye Sensor

Concrete Block Footers or Portable Opti Pedestals

Place asphalt (Binder course 5") apron around Tank and Troughs 20' long x 20' wide – asphalt should slope back to Troughs

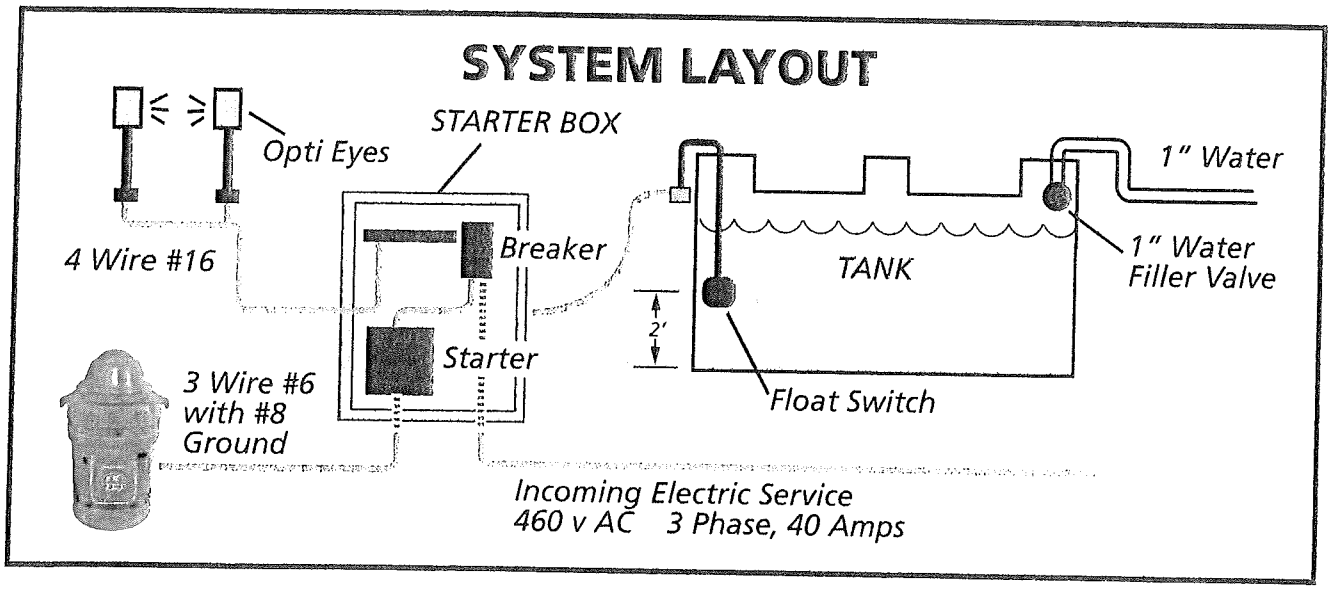




Attach hoses from Side Blasters to Pump outlets in top of Tank

Install water line (1") to water filler valve in top of Tank

Wire Motor to Starter –
wire 3 phase – 460 volts for 30 HP Motor 40 amps F.L.A. into Starter box



Fill Tank with water and start system by driving truck through Opti Eyes.

36 Vincent Circle, Ivyland, PA 18974 • 215-956-9800 • Fax: 215-956-1989 www.tirewash.com

TIRE & UNDERCARRIAGE WASH SYSTEM
PERFORMANCE SPECIFICATION

1.1 GENERAL

A. All provisions of the Contract, including General and Supplementary Conditions apply to the work specified in this contract.

1.2 RELATED WORK

Site work

Concrete or Paving

Mechanical

Electrical

1.3 QUALITY ASSURANCE

1.3.1 The system shall be produced by a manufacturer of established reputation with a minimum of five (5) years experience manufacturing specified equipment in identical applications to this tender. A minimum of 15 references must be supplied to the owner/buyer 10 days prior to bid opening.

1.3.2. Installation: Provide a qualified manufacturer's representative to supervise work related to equipment installation, check out and start-up. This same supervisor must submit 10 references , 10 days prior to bid open .

1.3.3. Training: Provide technical representative to train Owner's maintenance personnel in operation and maintenance of specified equipment. A video DVD of this training session must be made a presented to owner/buyer 14 days after start up date.

SUBMITTALS

Product Data

A. Submit Product Data in accordance with requirements of these specifications.

B. The bidders shall include with their bid packages the items below marked with an (*) asterisk . All aspects of the submitted data below should clearly identify responsibilities of all the trades that required to complete such disciplines of work including the owners/responsibilities if any. A Narrative of the project's aspects must also be submitted 10 days prior to the bid open. Any items below not marked with an asterisk (custom design items) must be submitted 21 days after notice of award or after design approval of owner or owners representative. These custom design items must be approved by owner or owners' representative.

1.4.1. System layout in isometric or 3D view *

1.4.2. Equipment general layout plan view *

1.4.3. Electrical layout with all conduit and wire sized including multi motor full load amp calculation sheet

1.4.4. Equipment Bill of Materials *

1.4.5. Piping in isometric or 3-D view

1.4.6. Concrete work and pit design. Include all engineering calculations (structural, hydraulics)

1.4.7. Mechanical and plumbing layout

1.4.8. UL compliance statement that all designed and manufactured control panels are UL approved.

1.4.9. Provide UL listing card or equivalent document of Nationally Recognized Testing Laboratories from the company building the electrical panel(s) and attach with the electrical drawings indicating that the electrical panels will be built to the required standards

1.4.10. Provide the Owner with Sepias for as-built drawings. 30 Days after start up

1.4.11 Detailed Warranty statement *

1.4.12 A.W.S. Certifications, submit certs that indicate the steel work practices prior to welding and during welding meets all latest AWS standards. Submit latest AWS certs for welders.

1.4.13 A.S.T.M. Certifications, submit industry standard certs for all materials , steel, steel origin, ,

1.4.14 H.I. Hydraulic Institute Certifications, Submit all data and test results including bench test and independent testing agency that all pumps are manufactures to HI standards. Submit also all data showing all water vessels including piping, channels, and closed waterways adhere to all HI standards of design.

1.4.15 A.N.S.I. , N.E.M.A. A.S.S.H.T.O. A.G.A. Submit all data necessary to prove that all standards of pump design, electrical components, traffic bearing surfaces, and galvanizing standards are of a manufactured standard quality of the three listed standards.

This is a performance specification, the owner/buyer and owners representative do not suggest that any equipment supplied must meet any size benchmarks including PSI ratings GPM ratings, etc... It is the suppliers responsibility to provide a system that will meet the performance criteria of this bid.

Manufacturer's Qualifications

1.4.14. The manufacturer of equipment that is bidding in this specification must have a minimum of 15 operating systems of the same design. Manufacturer must submit attached questionnaire 10 days prior to this bid open.

1.4.15 the wash system, high pressure cleaning systems, pumping stations and all electrical controls shall be designed and supplied by one supplier.

1.4.16. Supplier shall have been regularly engaged in the design, manufacturer and supply of the type of equipment specified herein, for a period of not less than five years. All similar items shall be the products of one manufacturer. The equipment offered shall be the latest standard product.

2. **Warranty**

The manufacturer's warranty shall be for Five (5) years from substantial completion against defects in materials, labor and workmanship.

Defects shall include, but not be limited to:

2.1. Design & Operation; as stated in performance criteria

2.2. Parts; Damaged and or missing parts

2.3. Finish; Premature breakdown

3. SCOPE OF WORK

3.1. To furnish a completely automatic, touch less heavy-duty Tire and Undercarriage Wash and water reclamation system. All vehicles stated in performance criteria will use the wash station.

3.2. To prepare all required documentation and engineering work required.

4. WASH SYSTEM PERFORMANCE

4.1. Operation: The vehicle washer shall be actuated by vehicles driven in a fixed path between tire guides at a crawl speed regulated by the Tire Wash system. All washing operations and related water recycling operations shall by automatically activate by the vehicle's presence and movement. The owner /buyer and owners' representative assume no responsibility in regulating truck speed through the wash. It is responsibility of the manufacturer of the Undercarriage & Tire Wash system to remove all dirt from the tires and tire-grooves, wheel wells and undercarriages of the design vehicles stated in the performance criteria and to employ proven devices to regulate the truck speed of the design vehicles.
The system has met the performance criteria when there is no mud on the paved exit of the Tire Wash. If the paved exit has any mud or debris on it, it may be determined by the owner, owners representative and peer bidders that the system has not met the performance criteria.

4.2 The manufacturer is solely responsible for the equipment performance. Should the equipment not perform as expected, including slowing the truck travel down to a necessary speed determined by the manufacturer, the manufacturer shall modify, add and/or alter the equipment supplied at his/her own expense until the system operation has met the performance criteria. The

owner will be in a position to judge whether the altercations will improve the system's performance and can at any time halt the further changes of the manufacturer. Should the performance criteria not be met after the approved changes, the supplier shall remove the system at no cost to the owner, and pay for interim street sweeping contract deemed fair by the owner/buyer. Additionally, the manufacturer must compensate the owner/buyer for any and all cost attributed to failed system's performance as deemed a loss by the owner, and shall pay the owner the cost to install another Undercarriage & Tire Wash system selected by the owner/buyer.

5. WATER RECLAMATION PERFORMANCE

5.1. The water reclamation system shall be capable of reclaiming water from the vehicle washer and process it by means of settling pits and in-line filters.

5.2. The system must be able to continuously supply adequate amount of water for high-pressure pump regardless of traffic volume through the washer.

5.3. Prior to final acceptance of the system by the owner, the supplier shall demonstrate the continuous operating capacity of the reclamation system in relation to the truck wash system by running (on manual override) both the high-pressure wash system and the water reclamation system for a period of 4 hours (without a pause). During the test no manual adjustments or overrides are allowed and no solenoid shall be allowed to fill the reclamation tank with fresh water.

5.4. The equipment manufacturer explicitly assumes the responsibility to design the water reclamation system for the intended purpose and has made himself/herself familiar with all performance requirements prior to bidding.

5.5. A guarantee that the system is built to control odors must remain valid after the final acceptance for the period of three years. Algae build-up in wash water that will results in objectionable odors is not acceptable to the Owner. It is the owner's option to employ chemical disinfection measures if they so desire after the wash system start up. Air compressors used in any tire wash system shall be 2 stage compressor and shall have a capacity of 160 % of the total requirements of the system utilized. The

compressor as well as all components of the wash system shall be 5 years.

6. INTERCONNECTING PIPING

6.1. All field plumbing and mechanical work will be done by others if it is so desired by the owner, including all water utilities up to and connecting to the equipment and interconnecting piping between the pumps and the equipment located in the wash bay. The owner must be able to estimate the cost of such work based on the drawings submitted by the bidder as part of the bid package.

7. ELECTRICAL INTERCONNECTING WIRING

7.1. All field electrical work will be done by others if so desired by the owner, including all electrical services connecting to the equipment panel and interconnecting wiring between the pumps and the equipment located in the wash bay. The owner must be able to estimate the cost of such work based on the drawings submitted by the bidder as part of the bid package.

8. WASH SYSTEM TECHNICAL DESIGN DEMANDS

8.1 Wash System Rolling Surface

8.1.1. The Tire Wash rolling surfaces should be long enough as the manufacturer deems fit to meet the performance criteria of this spec and shall meet a standard of H-20 loading for trucks of 80,000 lbs and H-25 for trucks over 80,000 lbs. The rolling surface material or coatings of, shall be provided as an option to the owner/ buyer to choose their selection, such as painted steel, galvanized steel, or stainless steel. All surface designs and their calculations showing axle loads distribution, concentrated loads calculations, proving H-20 or 25 capability shall be submitted with bid. All design tests' and their accelerated wear calculations must be also submitted with bid. Accelerated test results must show all rolling surfaces must last for 25 years in the washing application of a tire wash system.

8.1.2. The tire wash rolling surface must be designed so that the truck tires are cleaned per the performance criteria. The spray nozzles can be aimed at the tires at any angle the manufacturer deems fit to meet performance criteria. If it is the design of the manufacturer to use perpendicular straight edges (angles or square tubing) as a rolling surface for the tires, a statement

from 3 major truck tire manufacturers must be submitted that illustrates these sharp edges and their continued use of them, causes no harm to the tires that use them as a rolling surface. The statement should also include language that insures the tires' warranty from the tire manufacturer will not be compromised when using straight edge rolling surfaces.

8.1.3.Tire wash nozzle material must be stainless steel and must be capable of being easily replaced due to excessive wear from reclaimed sandy water flows. Nozzles must carry a 5 year warranty.

8.1.4. The system must have as many pumps as the manufacturer deems necessary to meet the performance criteria. It will not be the burden of the owner or the owners representative to suggest what size pumps or how many shall be used.

8.1.5. Bottom and/or Side spray nozzles assemblies shall cover the entire circumference of the rotating tires. The supplier shall show in his drawings that the entire truck tire tread area is completely covered with sprays.

8.1.6. The tire wash system must be equipped on both sides with a tire guard rail. The design must be that of a rail that no damages can be caused to the wash system, or the trucks themselves.

8,2. Side Walls if selected for use by the owner shall be galvanized steel or stainless steel. This bid shall offer them as an option for use by the owner. Side walls height shall be 6 ' high for low pressure systems (30 to 50 psi) and 1 foot higher for every 10 pounds of pressure after 50 psi.

8.3 Pumps

8.3. The pumps shall be the selection of the manufacturer that claims they can meet the performance specification. All pump data including curves shall be submitted at time of bid along with a list and phone numbers of 10 wash system users of the same pumps.

8.3.1. It is the burden of the manufacturer to determine the pump quantity, size, performance, and maker. Pumps when installed shall be easily accessible for system trouble shooting. Systems that employ debris screens below the water surface as their main debris catching screen shall not be utilized even if it has a below the

water surface cleaning mechanism. All debris screens shall be easily accessed from above ground.

9. Electric Motors

9.1 The electric motors shall be of the squirrel cage induction type suitable for across the line starting. Motor shall operate on 230 /460 Volt, 3-phase, 60 cycle and be WP1or TEFC with a 1.15 service factor. 460 volt Motors shall not be used that are immersed in water.

9.2. The motors shall be sized so as not to exceed the nameplate horsepower during operation.

9.3. The wash system manufacturer shall certify that the

motors used with their respective across the line starters or soft starters can provide as many starts per hour as the site will need to wash the demand flow of trucks, including a strong heavy usage per hour in the mornings and at other peak traffic hours.

10. Electric Control Panel and Components

10.1. The Industrial Control Panel shall be manufactured so they meet Underwriters Laboratories, Inc. (UL) standard 508A (Industrial Control Panels). In addition, the panel shall be evaluated for high-capacity short circuit withstand and shall bear the appropriate UL marks including the short circuit withstand value mark as part of the official UL label. The shop assembling the panel must be inspected annually by UL inspectors and shall pass such inspections. Manufacturer is required to submit these inspection report 21 days after award notice.

10.2. The industrial Control Panel shall be designed for operation on a 230/ 460 Volt, 3 phase, 60 Hertz system, with a short circuit capacity of 25,000 amperes RMS Symm. Available at the incoming line terminals of the control panel.

10.3. The Industrial Control Panel shall be designed to meet the requirements of the National Electric Code (NEC) Articles 430 and 670, also the National Fire Protections Association (NFPA) Standard 79 (Industrial Machinery). All components used shall be NEMA standard.

10.4 Electric Panels that are not UL approved are not acceptable.

10.5. The activation switches shall be designed to be activated by all fleet vehicles used by the owner. Each activator shall be pre-

mounted and wired to a watertight junction box equipped with built-in drainage holes.

10.6. All motors over 20 HP must have electronic soft start system.

11. WATER RECLAMATION SYSTEM

11.1 Aeration Systems (OPTIONAL)

11.1.1 Aeration system shall provide air into the trench pit to prevent algae and odor build-up. Aerated water shall be evenly distributed throughout the pit when the wash system is in operation and out of operation.

11.1.2. Aeration system shall use a recirculation pumping, air pumping/injection and dissolved oxygen distribution system.

12 INSTALLATION, START-UP, TRAINING AND SERVICE

12.1. Install equipment in accordance with manufacturers' supplied installation drawings as well as project prints approved by owner and owners' representative.

12.2. Equipment manufacturer shall undertake the commissioning of the system and make all required adjustments to ensure proper operation.

12.3. The equipment manufacturer shall start-up the system. The owner shall have all operating personnel present during the start-up and equipment training. A DVD training video must be made of the start up session and provided to the owner 14 days after the start up.

13 Performance Criteria

13.1. It is the express intent of the owner/buyer to have the manufacturer be fully responsible for all aspects of the provided wash system including but not limited to,

- The horsepower sizing
- Quantity and type of pumps
- Length of wash rack rolling surface
- Rolling surface details of construction
- Technique of spraying tires
- Technique of debris straining
- Speed of the trucks traveling through the wash

13.2 It is the intent of the owner / buyer to request that the manufactured system have all met the most recent standards of manufacturing detailed by the following standards organizations, AWS – AGA- ASTM –ASSHTO –ANSI- NEMA -UL

13.3. The owner/ buyer requires that the provided system successfully remove all amounts of mud and debris from the truck tires within the confines of the wash system. No mud or debris shall be left on the vehicles tires once it emerges from the wash. If there is loosened wet mud on the vehicles undercarriages and vehicles tires after the wash, it will be deemed a failed system and shall be removed. The system after it has been removed shall be replaced with a newly selected system of the owners choice at the manufacturers cost. Manufacturer shall pay for all interim street sweeping cost borne by the buyer.

It is not the intent of the buyer to trial and error with wash systems until it finds one that will suffice. It is suggested that the manufacturer employ a reputable independent testing agency(local to the site) to concur with the manufacturers claims and to provide reports of the systems' quality once it is running.

The test that is required by the owner if the owner requests it, is,

That no visible mud, dried or wet, be present on the exit apron of the tire wash system.

That no visible mud ,wet or dried, be visible on the exit haul road after the wash system of up to 1/4 mile after the wash systems exit.

That no visible mud be found on the truck tires or the undercarriage of the trucks after the wash system.

Any mud or debris found on this haul road after the wash shall be removed prior to it becoming fugitive dust emissions.

A performance bond shall be submitted with the bid in the amount of the submitted bid.

APPENDIX C

PROFFERS

DEED INSTRUMENT
NO. 20090833

Prepared by S & M Properties

REZ 09-01

RECEIVED
4/13/2009

Return to
Zoning Administrator

CUMBERLAND COUNTY, VIRGINIA
STATEMENT OF PROFFER

S & M Properties, LLC, owner (the "Owner") of Tax Map Parcel 71-A-8, (the "Property"), hereby voluntarily proffers to amend the zoning conditions adopted for the Property on February 5, 2003 when it was zoned M-2, Industrial. The development and use of the Property will be subject to the following conditions:

Section 1. Use: The property shall be used only for the manufacture of fertilizer and related supporting activities, including but not limited to product storage.

Section 2. Setback: No part of the improvements, other than ingress and egress and utilities, shall be constructed within 100 feet of the boundary of the property.

Section 3. Buffer: To minimize the visual impact of the facility, the property owner shall not remove the native vegetative buffer within the 100 foot setback. Where the vegetative buffer needs augmentation, such as may occur with natural disasters, pest infestation, vandalism, or cutting by property owner, the owner shall plant loblolly pine tree seedlings, which under normal conditions will reach an average height of 5 feet tall in three years, as close to the inside edge of the buffer as practicable while maintaining enough light for healthy growth of the planted pines. If the trees do not reach an average of five feet by June 1, 2012, evergreen trees of such height will be planted and maintained at the owner's expense. The property owner shall also construct a berm at least five (5) feet high along the northern boundary (Route 634) of the property except at the point of ingress and egress. Such berm shall be planted in grass to prevent erosion. The property owner shall submit a development plan including landscaping and buffering to the County for its review and approval by the Zoning Administrator.

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Section 4. Storm Water Drainage: The property owner shall design and construct the improvements so that storm water runoff from the roads and grounds surrounding the improvements shall drain into a pond or retention basin approved by the Virginia DEQ. The property owner will obtain and maintain a Virginia Pollution Abatement (VPA) permit or equivalent issued by the Virginia Department of Environmental Quality or other applicable state agency. Runoff from roofs of improvements may be collected and maintained separately and will be subject to a National Pollutant Discharge Elimination System (NPDES) permit, if applicable, and may be used for fire suppression.

Section 5. Operations Permit: The property owner shall obtain and maintain a permit for its manufacturing operations from the Virginia Department of Environmental Quality and any other applicable state or federal agency, in accordance with applicable regulations.

Section 6. Compliance with Laws, Rules and Regulations: All operations shall be conducted in compliance with all State, Federal and County laws, rules and regulations and the property owner shall perform all testing and monitoring required by applicable regulation, including, without limitation, regulations of the Virginia Department of Environmental Quality and of the Virginia Department of Health.

Section 7. Noise Control: Noise resulting from the manufacturing operations, defined for purposes of Section 7 to include all aspects of the property owner's work once the plant begins operations, shall not exceed 67 decibels at any property line. Noise readings shall be taken during normal working conditions at least twice monthly on the four sides of the property. The property owner shall consult with the County in determining the location of the monitoring stations. The property owner shall maintain a record of the location of the readings and the results of the readings. In the event of three exceedances in any thirty (30) day period, if the noise is disruptive to an adjacent neighbor, the property owner shall install baffles on all fans and

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similar equipment. In the event of a second series of three (3) exceedances in any thirty (30) day period, the property owner shall place soundproofing on the building. In the event of a third series of three exceedances in any thirty (30) day period, the property owner shall erect sound barriers in accordance with standards of the Virginia Department of Transportation. For purposes of Section 7, an exceedance shall occur when noise at the property line exceeds the standard for longer than sixty (60) continuous seconds. The purpose of this requirement is to exclude such noise as backup beepers required by Occupational Safety and Health Administration (OSHA) on operating equipment. Providing the Zoning Administrator first agrees, the property owner may change the frequency of noise tests.

Section 8. Lighting Controls: Once construction of the facilities is complete, for all uses, the exterior lighting fixtures shall not exceed twenty (20) feet in height above grade level. The exterior lighting fixtures shall be "shoebox" type capable of shielding the light source from direct view. The maximum illumination at the property line will be 0.5 foot candles.

Section 9. Truck Condition: After construction is complete, any truck or loader shall not depart the property before its sides, wheels and under-carriage are free of loosely attached mud or waste materials. Trucks or loaders using the property shall not track or deposit mud or wastes on the public roads. During construction, trucks will comply with all applicable County ordinances. The property owner will take camera-dated photographs of Salem Church Road, both east and west of the facility entrance once per week when the facility is in use. On days on which the truck wash is not operating, the property owner will take camera-dated photographs of Salem Church Road, both east and west of the facility entrance, at the end of each business day. Copies of the photographs will be attached to the odor and noise monitoring data sheets. When no truck has entered the facility to off-load or load biosolids for seven consecutive days or more, photos of the condition of Salem Church Road may be suspended until such time as trucks return to off-load or load biosolids.

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Section 10. Conveyance to the Property: All trucks or vehicles bringing dewatered sludge onto the property shall use truck bodies or containers meeting the applicable standards specified by the regulations of the Virginia Department of Environmental Quality or other applicable state agency.

Section 11. Type of Materials: Any dewatered sludge brought onto the property shall be dewatered prior to leaving the site of origin and shall meet the definitional standard for dewatered materials established by the Virginia Department of Environmental Quality in its Sludge Regulations. All trucks and vehicles bringing materials onto the property shall have a manifest specifying in reasonable detail the source, content and amount of the materials. The property owner will not accept, store or treat hazardous materials or wastes or toxic materials or wastes as defined by the Toxic Substance Control Act, 15 U.S.C. § 2602 et. seq., or by the Resource Conservation and Recovery Act, 42 U.S.C. § 321 et. seq.

Section 12. Odor: Odor at the property boundary resulting from manufacturing, storage or any operations on the property will not exceed five (5) dilutions of threshold as determined by an olfactometer or other field methodology approved by the Virginia Department of Environmental Quality or other applicable state agency. The property owner shall take odor readings during normal working conditions every week at monitoring stations 1, 2, and 3, and twice weekly, at least two days apart, at monitoring stations 4 and 5. The location of the monitoring stations shall be in accordance with the monitoring station map as attached. Odor readings shall be taken by a representative of the property owner who is certified by the equipment manufacturer to utilize the odor reading equipment. The property owner shall maintain a record of the location of the readings and the results of the readings. All biosolids operations – including but not limited to unloading, loading, storage of dewatered sludge and biosolids and manufacturing – shall occur only in enclosures. In the event of three exceedances of the odor standards at the property lines in any thirty (30) day period, the property owner shall cease the operation and/or activity causing the odor until it remedies, through the use of biofilters or other measures as approved by the

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Zoning Administrator in writing prior to the use of such methods, the cause of the exceedances. For the purposes of this Section, the term "operation" shall use the term as defined in Section 17 below and "activity" shall include uses permitted by Section 1 above. Provided the Zoning Administrator agrees, the property owner may change the frequency of odor tests. At the request of the Zoning Administrator, the property owner will investigate and consider implementing new or different standards and testing methodology provided they are not less stringent than the standards specified in Section 12.

Section 13. Inspection and Records: The manufacturing facility and the property shall be available for inspection by County officials or their designees at all times to assure compliance with the proffers and the conditions of the rezoning and to protect the public health, safety and welfare. The County shall further have ready access to inspect all records pertaining to soil samples, water samples or other tests and reports provided to any State or Federal agency or required to be maintained as a condition of the rezoning. On a monthly basis, the property owner will submit a report to the Zoning Administrator, containing all mandated noise, odor, road conditions (as pertaining to truck condition), and the periods in which the truck wash was not in operation in a format approved in writing by the Zoning Administrator.

Section 14. County's Right to Conduct Testing: In addition to the tests required of the property owner at its expense by the Virginia Department of Environmental Quality or other applicable state or federal agency, the County shall have the right at the County's expense to enter upon the property to conduct soil tests, water sample tests, odor tests, noise tests, and/or to install and monitor test wells or to conduct other tests to assure the protection of public health, safety and welfare. In the event that the property owner installs monitoring testing wells, the County shall have access to the wells for its testing purposes. The County shall have the further right to randomly collect samples of the wastes from incoming trucks and processed dewatered sludge from outgoing trucks. In the event that any County performed test demonstrates a violation of the

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applicable standard, the property owner shall reimburse the County for its expenses incurred in conducting the test.

Section 15 Closure Plan: The property owner shall maintain a closure plan as required by applicable regulation of the Virginia Department of Environmental Quality or other state or federal agency.

Section 16 Financial Assurance: The property owner shall maintain pollution insurance coverage in a minimum amount of $1,000,000 on its operations, provided such coverage is reasonably available from the insurance industry, and shall annually furnish a certificate verifying such coverage to the County Administrator. The property owner shall also furnish a $100,000 surety bond or letter of credit drawn on a national or state regulated financial institution conditioned upon its fulfilling all of its requirements under the closure plan. A copy of the bond or letter of credit shall be furnished to the County Administrator. The certificate of insurance and the letter of credit shall be furnished prior to the property owner receiving the first shipment of raw materials and thereafter furnished by January 15 of each succeeding year. The certificate of insurance and the letter of credit shall provide that each may not be cancelled during the calendar year unless replaced by a similar certificate of insurance coverage or letter of credit. The issuing financial institution shall be rated AA or better by a national rating agency.

Section 17. Hours of Operation: The property owner agrees that hours of operation will be limited to 7:00 a.m. to 7:00 p.m., Monday through Saturday, subject to the provisions of this paragraph. The property owner agrees as part of its obligations hereunder to operate the facility in such a manner as to avoid unreasonable traffic congestion involving delivery trucks on public roads. "Delivery trucks" as referenced herein does not include trucks hauling material from the facility to the land application sites. Daily delivery truck traffic on roads within Cumberland County shall be limited as follows:

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a. In-coming and departing biosolids delivery truck traffic shall only utilize Routes 60, 45, and 634 in Cumberland County.

b. Delivery trucks going to and from the facility shall limit the use of Routes 60, 45, and 634 within Cumberland County between:

   i. the hours of 7:00 a.m. and 8:30 a.m., Monday through Friday on days when County schools are in session, to a standard of no more than 4 truck round-trips per hour; and

   ii. the hours of 3:00 p.m. and 4:00 p.m., Monday through Friday on days when County schools are in session, to a standard of no more than 4 truck round-trips per hour.

The times contained herein may be adjusted annually by the mutual agreement of the Property Owners and any of either the Zoning Administrator, County Administrator, or Assistant County Administrator.

"Operation", for purposes of Section 17, will include, without limitation, unloading and loading of materials and product, actual mixing and similar operations of the plant, and shipment out of finished product; "operation" does not include the staging of trucks. The driveway shall not be blocked and trucks shall not park on Salem Church Road or within its right-of-way. Trucks may be staged along the driveway inside the property gate or on other parts of the property within the gate at any time. If events beyond the control of the property owner create an emergency necessitating operations beyond the time limits specified herein, the property owner may, upon approval of any of either the Zoning Administrator, County Administrator, or Assistant County Administrator, conduct such operations. If such approval is oral, it must confirmed in writing within 72 hours.

Section 18. <u>Site and Facility Security:</u> In order to ensure the hours of operation are enforced and to prevent unauthorized vehicular access to the property, a sturdy metal entrance gate shall be provided near the property entrance onto Rt. 634 and off of the Virginia Department of Transportation's right-of-way. Additional gates or cables shall be provided at any location that

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may allow vehicular site access. The entrance gate and any other point of entry shall be locked with a gate or cable when no facility employee or authorized contractor is on site. Prominently displayed at the entrance gate shall be signage that identifies the facility's name, hours of operation, and an emergency contact phone number.

These proffers are being submitted prior to the public hearing held by the Cumberland County Planning Commission scheduled for Monday, April 20, 2009. These proffers have also been submitted prior to the Cumberland County Board of Supervisors public hearing on this request, scheduled to occur on Tuesday, May 12, 2009.

These proffers shall run with the Property and each reference to Owner within these proffers shall include within its meaning, and shall be binding upon, Owner's successor(s) in interest and/or the developer(s) of the Property or any portion of the Property. The improvements proffered herein shall be provided at the time of development of that portion of the Property adjacent to or including the improvement or other proffered requirement, unless otherwise specified herein, and shall be, at a minimum, in compliance with such County, state or federal statutes, rules, regulations or other authority then applicable and in force and effect for such improvements.

S and M Properties, LLC — 4-10-09
Owner of Record—Name (Please Print) — **Date**

John C. Simmons — 4-10-09
Owner of Record—Signature — **Date**

Owner of Record—Name (Please Print) — **Date**

Owner of Record—Signature — **Date**

COMMONWEALTH OF VIRGINIA
CITY/COUNTY of Henrico **, to wit:**

01/13/2011 17:36 FAX 804 492 9224 CUMBERLAND COUNTY 009/010

I, Billy J Milhorn, a Notary Public for the State of Virginia, do certify that John J Simmons whose name is signed to the foregoing Statement of Proffer, bearing date on 10Th day of April, 2009, has acknowledged the same before me.

Given under my hand this 10Th day of April, 2009.

My Commission Expires: My Commission Expires September 30, 2010

Notary Public (Seal)

BILLY MILHORN
NOTARY PUBLIC
Commonwealth of Virginia
Reg. #265386
My Commission Expires

~~MAILED~~/DELIVERED TO:
Zoning Adm.

INSTRUMENT #20090833
RECORDED IN THE CLERK'S OFFICE OF
CUMBERLAND COUNTY ON
JUNE 30, 2009 AT 03:30PM
Carol Ownby
CAROL OWNBY, CLERK
RECORDED BY: CJO

01/13/2011 17:36 FAX 804 492 9224 CUMBERLAND COUNTY 010/010

APPENDIX D

TYPICAL MANIFEST

Mike/Mark
Glenn

Outbound Ticket
3T909

7-13-07

DC WASA - Blue Plains

Account: URBAN SERVICE SYSTEMS
Vehicle: URSS07
Trailer:
Transaction #: 156849
Driver:
Vehicle Type: SINGLE TARE
Source: BUNKER 2
Load Type: RAW SLUDGE-LIMED
Destination: PRINCE EDWARD, VA

	----In----	---Out--
Date	07/13/2007	07/13/2007
Time	02:06	02:55
Scale Op	AUTO	AUTO

	lbs	tons
Gross Wt	79,960	39.98
Tare Wt	31,820	15.91
Net Wt	48,140	24.07

Audit: Auto

5/119.93 [signature]
A108

APPENDIX E

FABRIC COVER REPAIR

COVER-ALL
BUILDING SYSTEMS

Cover-All F.Y.I.

April 22, 2005
Ref. # FYI - 92-R1

DURAWEAVE™
Field Seaming and Welding

Effective: Immediately

We now know that the powdering that appears on our fabric after short term installation is what causes the fabric to refuse to heat weld. IPG, our fabric supplier, has concluded that one of the UV inhibitors was "blooming" out of the fabric. IPG has assured us that the powdering does not affect the durability or UV resistance of the fabric.

Where necessary, wash dirty fabric with soap and water first and allow to dry. Then use a minimum 70% isopropyl alcohol to wipe the weld area and remove the powder and wait 20 minutes before welding. *Drug store rubbing isopropyl alcohol less than 70% does not work.* Some drug and food stores carry 90% isopropyl alcohol. Some specialty paint stores carry it as an epoxy paint thinner. Our in-house testing indicates that using the 90% isopropyl alcohol allows a proper weld.

When welding a patch, wipe the patch with the isopropyl alcohol as well.

Always Use proper safety precautions; gloves, eye protection, and work in a well ventilated area.

If you cannot find a local supplier try contacting the following distributors.

In Western Canada:
Cloverdale Paints
Product Code: C-300
Description : Epoxy Paint Thinner (90% isopropyl alcohol)
Locations: http://www.cloverdalepaint.com/html/locations.html

In Eastern Canada
VWR Canlab International
Product Code: VW3424-2
Description: 1 liter - 70% isopropyl alcohol
Locations: http://www.vwrcanlab.com/about/index.cgi?tmpl=offices_canada

In USA
VWR International
Product Code: VW3424-2
Description: 1 liter - 70% isopropyl alcohol
Locations: http://www.vwrcanlab.com/about/index.cgi?tmpl=offices_us

COVER-ALL BUILDING SYSTEMS

Cover-All F.Y.I.

April 5, 2005
Ref. # FYI - 91-R1

DURAWEAVE™ Structure Patch Tape

Available: April 1 / 05

Intertape Polymer Group (IPG), the manufacturer of our DURAWEAVE™ fabric has just released a new self-adhesive Structure Patch Tape specifically for our fabric. IPG has formulated an acrylic adhesive to bond with the coating on the DURAWEAVE™ fabric giving it superb adhesive properties.

Structure Patch Tape

COATING / COLOUR : FR White only
WEAVE : Clear HDPE tapes, UV stabilized
SIZE : 12" x 50' roll
ADHESIVE : Acrylic pressure sensitive

12" x 50' roll - Structure Patch Tape
CA Order/Item number 952508

Contact STS or Order Processing for pricing information

Application Notes

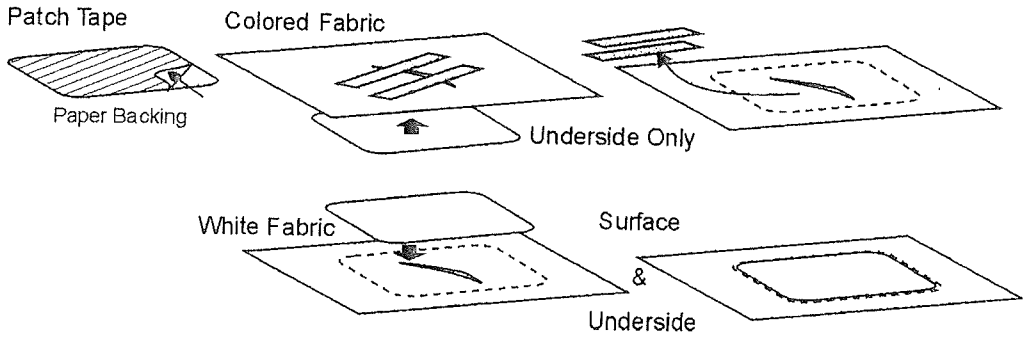
-Patch tape is recommended for sealing holes and small tears in structures. It is not recommended for replacing heat welded or sewn seams or for holding two pieces of fabric together while under tension.

-Patch tape should be applied to clean and dry fabric sandwiching the hole or small tear between two pieces of tape. Soap and water should be sufficient for cleaning; however, wiping with alcohol will help to dry the area and remove oils and grease.

-The area must be as dry as possible and if repair must occur during the colder months warming the structure fabric and patch tape will help it adhere.

-The best adhesion will be achieved if pressure can be applied to the tape by rolling against a hard backing, ie: a piece of plywood.

-This patch tape is meant to be a temporary patch and may need to be replaced during the lifetime of the structure.



APPENDIX F

MIXING AND pH TESTING PROCEDURES

BIOSOLIDS CLASSB LIME STABILIZATION/ALKALINE STABILIZATION PH TESTING PROCEDURES AS OF 11/3/03

For the biosolids/alkaline stabilization projects the first step will be to do bench testing and onsite testing to determine the proper lime dose needed to achieve an initial and then 2-hour pH of 12 and a 24 hour pH of 11.5. The lime dose then will be evaluated on an ongoing basis.

At Nutri-Blend's Cumberland County facility the following shall be implemented:

(1) Biosolids samples will be collected and tested for initial pH results as soon as possible after the first load arrives at the plant. This will ensure that lime and sludge ratios are sufficient to meet a Process to Significantly Reduce Pathogens (PSRP).

(2) Treated sludge will be held in a dedicated bin until the 2-hour and 24-hour pH readings are made.

(3) If the temperature-adjusted initial or two-hour pH readings are below 12, the treated sludge will be returned to the mixer for more lime. **If load does not meet temperature-adjusted two-hour pH of 12, it cannot be land-applied**. Documentation of reprocessing and retesting will be written in the comments section of the pH log.

(4) If the temperature-adjust 24-hour pH reading is below 11.5, the biosolid will be reprocessed through the lime mixer.

(5) If any problems occur with pH meter, there will be a backup unit at all times. Litmus paper verification cannot be used to document PSRP. Do not send trucks to land application site until pH is confirmed. It would be wise to have a backup pH meter as well as spare probes available at all times. The comments section of the pH log will be used to report anything out of the ordinary.

(6) A copy of the **monthly pH logs** and **operations logs** will be delivered to the Nutri-Blend's office no later than two weeks after the end of the month. A copy should also be kept on file where possible at the stabilization location.

(7) The Operations Manager should review the pH logs on a regular basis. The officer will maintain the master file for pH and operations logs. These logs will be retained for at least 5 years to meet the 40 CFR Part 503 recordkeeping requirements and may need to be retained longer based on state or local requirements.

Please keep in mind that this data is used to generate Certification Statements which are signed by Senior management under penalty of law. Only properly stabilized biosolids can be land applied.

All personnel responsible for taking pH readings will be trained on:

a. The procedures above (Note: at the end of this document are important abbreviated instructions which need to be laminated and kept next to the biosolids pH monitoring equipment)
b. How to calibrate and maintain the pH meter and probe
c. How to prepare the sample and take the pH readings
d. How to calculate temperature corrected pH readings
e. How to complete the pH log

CLASS B ALKALINE STABILIZATION OPERATIONS TRAINING INFORMATION
UPDATED NOVEMBER 2003

I. INTRODUCTION

The Federal Standards for the Use or Disposal of Sewage Sludge (40 CFR Part 503) published in the Federal Register on February 19, 1993 (amended 2/25/94), 10/25/95), and 8/14/99) established requirements which affect the alkaline stabilization facilities. The following information and procedures are provided to address 503 compliance relative to operation of alkaline stabilization facilities.

II. DESCRIPTION OF 40 CFR PART 503 MONITORING AND RECORDKKEEPING REQUIREMENTS

The 503 monitoring and recordkeeping requirements are listed below. Specifies on the pH monitoring equipment and pH log sheets are given in Section III.

A. Class B/PSRP Lime Stabilization Pathogen Treatment and Alkaline Addition Vector Attraction Reduction

1. Metals and Nitrogen Series Monitoring

   a. At a minimum, the treated biosolids will be tested for the 503 regulated metals (As, Cd, Cu, Pb, Hg, Mo, Ni, Se, Zn) and the nitrogen series. Frequency of testing is based on the amount of biosolids (metric tons per 365-day period) applied to the land as given in 503.16 Table 1.

   b. The testing must be done using EPA-approved methods in 503.8.

   c. When taking the biosolids sample for metals testing, record the information below on a Synagro chain of custody form provided by the analytical lab who will be doing the tests:

      1) Date and time of sample collection
      2) Sampling location
      3) Sample type
      4) Sample volume
      5) Name of sampler
      6) Type of sample container
      7) Method of preservation, including cooling

2. Lime Stabilization Recordkeeping

   a. Biosolids pH testing is required to ensure that sufficient lime has been added to achieve a pH of 12, after two hours of contact. At a minimum, perform one test per day by sampling the biosolids immediately after they exit the lime stabilization process. Take an initial pH reading of the sample and then a second reading after 2 hours. Exceptions to the once-per-day testing frequency may be granted on a case-by-case basis for small projects.

b. For each measurement or sample taken, record the following using the appropriate pH testing log sheet:
   1) Date, exact place and time of sampling or measurements;
   2) Person(s) who performed the sampling or measurements;
   3) Date analyses were performed;
   4) Person(s) who performed each analysis;
   5) Analytical techniques or methods used; and
   6) Results of such analyses and measurements.

3. Vector Attraction Reduction by Lime Addition Recordkeeping

c. Biosolids pH testing is required to ensure that the pH of the biosolids is raised to 12 or higher by alkaline addition and, without the addition of more alkaline material, it remains at 12 or higher for two hours and then 11.5 or higher for an additional 22 hours. At a minimum, Nutri-Blend will perform one test per day by taking an initial pH reading of the sample, a reading at 2 hours and a reading at 24 hours. The first two readings are already taken when you verified lime stabilization so the only additional reading which must be taken is the reading at 24 hours. The 24-hour reading can be taken at a later time if the facility is not operational (i.e., evenings, weekends or holidays) as long as the reading is taken when the facility is again operational and the delayed reading shows a pH of $\geq$11.5. The date and time of the delayed readings need to be recorded.

d. Record the information in II.A.2.b. above using the appropriate pH testing log sheet.

e. EPA's Guide for Preparing Sewage Sludge for Land Application or Surface Disposal, August 1993, states that the following records should also be kept; however, VAR is still demonstrated without these records through biosolids pH monitoring:
   - Amount (pounds or gallons) of alkaline material added to the biosolids; and
   - Amount of biosolids treated

4. Certification Statements

EPA requires that the preparer of biosolids certify that the biosolids meet the pathogen treatment and vector attraction reduction requirements of the 503 Rule. Certification statements must be signed at a minimum at the frequency in 503.16 Table 1. It is preferred that statements be signed each month the facility is treating biosolids.

The certification statements are signed by the President of Nutri-Blend or his designated staff member. The original signed form will be kept at the Corporate Office with a copy forwarded back to the alkaline stabilization facility for filing on-site. Copies should be provided to the client upon request or as required by our service agreement.

The certification statements must be retained for at least 5 years to meet the Part 503 recordkeeping requirements and may need to be retained longer based on state or local requirements.

5. Records Retention System

The records listed below are to be retained for at least 5 years (state or local agencies may require a longer retention period) in a filing system at one of the following locations: the alkaline stabilization facility or the Corporate Office.

- Biosolids analysis results
- Chain of Custody forms
- pH meter calibration log sheets
- pH testing log sheets
- Alkaline material usage and biosolids quantities treated*
- Biosolids treatment Certification Statements

***If such records are kept.**

III. BIOSOLIDS pH ANALYSIS AND RECORDKEEPING

A. Determining Methodology and Instrumentation Requirements

40 CFR Part 503 does not specify a specific procedure for biosolids pH testing so the same reference cited for analyzing inorganic pollutants was chosen (i.e., Test Methods for Evaluating Solids Waste, Physical/Chemical Methods, EPA Publication SW-846 – most recent updates).

In SW-846 field testing of biosolids for pH can be accomplished with Method 9040B pH ELECTROMETRIC MEASURMENT. This method can be found at http://www.epa.gov/SW-846/9 series.htm
For high solids materials, distilled water may be added to take pH readings.

One brand of pH meter that may be used is the Fisher Accumet benchtop or portable pH meter. The electrode used with the meter will be one with low-sodium-error for pH levels > 10. Nutri-Blend will obtain information at Fisher's website http://www.fisherscientific.com or call their customer service line at 800-766-7000.

B. pH Meter Calibration

Calibration of the pH meter electrode will be done before each daily use. The procedure used will have at least two points of reference that bracket the expected pH of the samples and are approximately three units or more apart. Standard buffers will be used as points of reference. The buffers will be labeled and an expiration date stamped on each bottle. Nutri-Blend will use pH 10 and pH 13 standard buffers to calibrate the meter.

When doing the meter calibration, Nutri-Blend will repeat the testing and, if necessary, make adjustments, until readings of the two buffer solutions are within 0.05 pH units of the buffer solution values. The calibration will be documented. Calibration log sheets are enclosed for meters with Automatic Standardization (no manual adjustment of slope with function selectors) and those with Manual Standardization. Specific calibration procedures for the Fisher Accumet Model 955 Portable pH/mV Temperature Meter are provided later in this document.

C. pH Testing

Once the pH meter is calibrated with standard buffers, adjustments may need to be made for each sample depending on the temperature of the sample. If the temperature differs by more than 2 degrees C from the buffers, adjustments must be made unless the meter has an automatic temperature compensation (ATC) probe.

Specific instructions for pH readings are available in the manufacturer's instruction manuals. At a minimum, each sample will be measured until values differ by <0.1 pH units while the sample is stirred at a constant rate. Follow the manufacturer's instruction manual for procedures on storage of the electrode between samples and when the electrode is not in use. Typically the instructions state that between daily measurements, immerse the electrode in pH 7 buffer solution and when the electrode is not in use, wet the cotton inside the plastic cot with pH 7 buffer solution, then while squeezing the cot, place it over the tip of the probe and slide it on.

D. pH Recordkeeping

For each pH measurement taken, the information listed previously in II.A.2.b. must be recorded. Recordkeeping forms which capture this information are enclosed.

To obtain accurate biosolids pH measurements, the sample will be tested at 25 degrees C (77 degrees F). If the sample is not at 25 degrees C at the time the pH reading is taken, a correction factor formula will be used to correct the pH result. An information sheet which provides the pH temperature correction formula and correction factors at varying temperatures is enclosed. An information sheet on obtaining accurate pH measurements follows this page.

Completed pH testing log forms will be retained (see procedures outlined in II.A.5.).

E. Equipment Maintenance

To ensure accurate pH readings the pH meter and electrode need to be properly maintained per the manufacturer's instructions manual. A list of spare equipment should be available in case of breakdown. The equipment will be used and stored in a detached building where there is minimal airborne contaminants and moisture. The electric equipment room will be used as the laboratory.

ACCURATE pH MEASUREMENT

Occasionally, operators of our lime stabilization and BIO*FIX® facilities are seeing pH results of over 12.5 when testing the finished biosolids product. Such high pH results are a concern for two reasons:

(1) An accurate pH measurement of lime-amended biosolids could not possibly be over 12.5 (further explanation below).

(2) Certain materials, liquids with pH of 2 and lower or 12.5 and greater, are classified as corrosive or hazardous.

Below is an explanation of how false high pH readings can occur, how to control for testing interferences, and how to deal with false high results.

The pH of pure quicklime (CaO) is 12.454. Therefore, it is impossible for a quicklime/biosolids mixture to have a pH above 12.454. There are two likely reasons operators are getting such high pH readings:

(1) Temperature of Sample

Around pH 12.5, the pH meter is very sensitive to temperature due to the inverse solubility of lime. In other words:

High temperatures (above 25 degrees C)	----------false low pH (yield)
Low temperatures (below 25 degrees C)	----------false high pH (yield)

For accuracy, pH must be tested at 25 degrees C (77 degrees F); even a 2 degree C variation can cause a 0.20 or larger error in pH. **An automatic temperature compensating probe is not designed to handle this type of temperature variation. It can only compensate for the difference in conductivity of the probe itself due to temperature, not for the effect sample temperatures have on pH readings. If the sample is not at a 25 degree C at the time the pH reading is taken, the correction formula must be used to correct the pH result.**

(2) Ammonia Release from Sample

As the pH of lime-amended biosolids climbs to around 10, ammonia is released. The ammonia release causes a false high reading. For example, testing your biosolids sample while it is still releasing ammonia could give you a pH of 12.0 initially but a reading of only 11.7 after two hours.

Nutri-Blend will try to control for the influences of temperatures and ammonia by following the procedure outlined below:

(1) Test the biosolids sample when it is at 25 degrees C. High (above 12.5) pH readings suggest samples are too cool. Use the correction formula on the following page to adjust pH if samples are not at 25 degrees C. NOTE: The onsite lab will be equipped with an oven or water bath to keep the samples at 25 degrees C. Also the dilution water necessary for the test will be kept at 25 degrees C.

(2) Before testing pH, allow your sample to "breathe" for 10 to 15 minutes after mixing with lime has begun.

PROCEDURE FOR pH TESTING WITH AUTOMATIC TEMPERATURE COMPENSATING PROBE

Methods:
Calibration – SW-846, Method 9040 B
pH Testing – Instructions – Fisher Accumet Model 955 Portable pH/mV Temperature Meter
(If you are using a different pH Meter please review the manufacturer's manual for that meter and adjust the procedures below accordingly)

Equipment

- Three standard buffer solutions: pH 7, 10 and 13
- Thermometer or Automatic Temperature Compensating (ATC) Probe
- Distilled water
- Clean glass beakers
- Stir stick or magnetic stirring bar
- Plastic gloves (disposable)

1) Check over the meter and make sure all connections are tight. Remove the protective cot from the tip of the electrode.

2) Select buffers for calibration. Ideally the buffer temperatures should be within 10 degrees C of the sample temperature regardless of compensating manually or through ATC probe.

3) Immerse the electrode and the ATC probe into the pH 10 buffer solution.

4) Set FUNCTION selector to degrees C position, and place ON/OFF switch to ON position. Set the slope control full counterclockwise.

5) Allow the electrode system, ATC probe, and buffer solution to reach thermal equilibrium (degrees C going steady), then determine exact pH of buffer solution from table of buffer pH versus temperature (usually found on bottle label).

6) Set FUNCTION selector to pH position, and adjust STANDARDIZE control until digital display indicates determined pH value of buffer solution.

7) Remove electrode and ATC probe from buffer solution and rinse them with distilled water. Dispose of the used distilled water.

8) Immerse electrode and ATC probe into the second buffer solution (i.e. pH 13 buffer).

9) Set the FUNCTION selector to C position. Allow the electrode and ATC probe to reach thermal equilibrium (degrees C reading steady), then determine the exact pH of second buffer from a table of pH versus temperature (usually found bottle label).

10) Set FUNCTION selector to pH position. Adjust the slope controls until digital display indicates determined pH value of the second buffer solution.

11) Remove the electrode and ATC probe from the buffer and rinse them with distilled water. Dispose of the used distilled water.

12) The pH values should be within 0.05 units of the buffer solution values. The pH of each buffer should be taken two to three times.

13) Set FUNCTION selector to degrees C position, and immerse electrode and ATC probe into sample solution. For cake biosolids, a 1:1 mixture of distilled water: biosolids will allow for pH testing. For BIO*FIX PFRP samples, reduce the sample temperature before diluting with distilled water by spreading it out in a thin layer on a clean, dry surface and let it air-cool. As noted in 2) above, ideally the buffer temperature should be within 10 degrees C of the sample temperature. Note that for BIO*FIX PFRP samples, it may be necessary to use a 2:1 mixture of distilled water: BIO*FIX... **Note that thermal equilibrium normally requires about one minute, but will vary depending on the temperature difference between the electrode system and the sample.**

14) Set FUNCTION selector to pH position and read pH value of sample solution as shown on the digital display. This is the sample's temperature-corrected pH value.

15) Remove the electrode and ATC probe from the sample and rinse with distilled water. Dispose of the used distilled water.

16) Steps 14 through 17 should be repeated two to three times for each sample until the pH values are within 0.1 pH units.

17) Cover the sample and place in a secure place.

18) Turn off the meter. Store the electrode with the protective cot on after wetting with pH buffer solution. In between samples, store the electrode in pH 7 buffer solution.

PROCEDURE FOR pH TESTING WITH MANUAL ADJUSTMENT FOR TEMPERATURE

Methods:
Calibration – SW-846, Method 9040 B
pH Testing – Instructions – Fisher Accumet Model 955 Portable pH/mV Temperature Meter
(If you are using a different pH Meter please review the manufacturer's manual for that meter and adjust the procedures below accordingly)

Equipment

- Three standard buffer solutions: pH 7, 10 and 13
- Thermometer
- Distilled water
- Clean glass beakers
- Stir stick or magnetic stirring bar
- Plastic gloves (disposable)

1) Check over the meter and make sure all connections are tight. Remove the protective cot from the tip of the electrode.

2) Select buffers for calibration. Ideally the buffer temperatures should be within 10 degrees C of the sample temperature regardless of compensating manually or through Automatic Temperature Compensating (ATC) probe.

3) Immerse the electrode and the thermometer into the pH 10 buffer solution.

4) Set FUNCTION selector to degrees C position, and place ON/OFF switch to ON position. Set the slope control full counterclockwise.

5) Allow the electrode system, thermometer, and buffer solution to reach thermal equilibrium (thermometer going steady), then adjust TEMPERATURE control until digital display indicates buffer temperatures as read on thermometer.

6) Determine exact pH of buffer solution from table of buffer pH versus temperature (usually found on bottle label).

7) Set FUNCTION selector to pH position, and adjust STANDARDIZE control until digital display indicates determined pH value of buffer solutions.

8) Remove electrode and thermometer from buffer solution and rinse them with distilled water. Dispose of the used distilled water.

9) Immerse electrode and thermometer into the second buffer solution (i.e. pH 13 buffer).

10) Allow the electrode and thermometer to reach thermal equilibrium, then determine the exact pH of second buffer from a table of pH versus temperature (usually found on bottle label).

11) Set the FUNCTION selector to pH position. Adjust the slope controls until digital display indicates determined pH value of the second buffer solution.

12) Remove the electrode and thermometer from the buffer and rinse them with distilled water. Dispose of the used distilled water.

13) The pH values should be within 0.05 units of the buffer solution values. The pH of each buffer should be taken two to three times.

14) Set FUNCTION selector to degrees C position, and immerse electrode and thermometer into sample solution. For cake biosolids, a 1:1 mixture of distilled water: biosolids will allow for pH testing. For BIO*FIX PFRP samples, reduce the sample temperature before diluting with distilled water by spreading it out in a thin layer on a clean, dry surface and let it air-cool. As noted in 2) above, ideally the buffer temperature should be within 10 degrees C of the sample temperature. Note that for BIO*FIX PFRP samples, it may be necessary to use a 2:1 mixture of distilled water: BIO*FIX..

15) Allow the electrode and sample to reach thermal equilibrium then adjust the TEMPERATURE control until the digital display indicates sample temperature as read on the thermometer. **Note that thermal equilibrium normally requires about one minute, but will vary depending on the temperature difference between the electrode system and the sample.**

16) Set FUNCTION selector to pH position and read pH value of sample solution as shown on the digital display. This is the sample's temperature-corrected pH value.

17) Remove the electrode and thermometer from the sample and rinse with distilled water. Dispose of the used distilled water.

18) Steps 14 through 17 should be repeated two to three times for each sample until the pH values are within 0.1 pH units.

19) Cover the sample and place in a secure place.

20) Turn off the meter. Store the electrode in distilled water with the protective cot on after wetting with pH buffer solution. In between samples, store the electrode in pH 7 buffer solution.

BIOSOLIDS CLASS B LIME STABILIZATION/ALKALINE STABILIZATION PH TESTING PROCEDURES AS OF 11/3/03

For biosolids/alkaline stabilization projects the first step is to do bench testing and on-site testing to determine the proper lime dose needed to achieve an initial and then 2-hour pH of 12 and a 24 hour pH of 11.5. The lime dose then needs to be evaluated on an ongoing basis. For projects where loads leave the treatment plant before the 2 hour and 24 hour pH results are available sufficient lime **must** be added to comfortably ensure the above pH criteria will be met.

As of the date of these procedures, the following shall be implemented:

(1) Biosolids samples shall be collected and tested for initial pH results as soon as possible after equipment startup (early in the shift). This will ensure that lime and sludge ratios are sufficient to meet a Process to Significantly Reduce Pathogens (PSRP).

(2) If the temperature-adjusted initial or two-hour pH readings are below 12, **contact your supervisor immediately**. Do not send trucks to land application site until situation is corrected. This may include increasing lime dose and retesting pH. Loads produced prior to adjustments being made must be reprocessed and tested or land filled. **If load does not meet temperature-adjusted two-hour pH of 12, it cannot be land-applied**. Documentation of reprocessing and retesting or land filling must be written in the comments section of the pH log.

(3) If the temperature-adjusted 24-hour pH reading is below 11.5, **contact your supervisor immediately**. Biosolids processed during that time frame **must be** injected or incorporated within 6 hours after being applied in order for vector attraction reduction (VAR) requirements to be fulfilled. Documentation of injection or incorporation must be written in the comments section of the pH log.

(4) If any problems occur with pH meter, **contact your supervisor immediately**. Litmus paper verification cannot be used to document PSRP. Do not send trucks to land application site until pH is confirmed. It would be wise to have a backup pH meter as well as spare probes available at all times. You may also want to investigate using the WWTP's lab as a backup in emergency situations. Please use the comments section of the pH log to report anything out of the ordinary.

(5) A copy of the **monthly pH logs** and **operations logs** should be delivered to the regional and/or project office no later than two weeks after the end of the month. A copy should also be kept on file where possible at the stabilization location.

(6) The Operations Manager should review the pH logs on a regular basis (**weekly at a minimum to ensure adequate compliance**). A Technical Services Manager (TSM) should also review the pH logs when they arrive at the regional or project office. The TSM will maintain the master file for pH and operations logs. These logs need to be retained for at least 5 years to meet the 40 CFR Part 503 recordkeeping requirements and may need to be retained longer based on state or local requirements.

Please keep in mind that we utilize this data to generate Certification Statements which are signed by Senior management under penalty of law. Only properly stabilized biosolids can be land applied.

It is critical all personnel responsible for taking pH readings are trained on:

a. The procedures above (Note: at the end of this document are important abbreviated instructions which need to be laminated and kept next to the biosolids pH monitoring equipment).
b. How to calibrate and maintain the pH meter and probe
c. How to prepare the sample and take the pH readings
d. How to calculate temperature corrected pH readings
e. How to complete the pH log

I. INTRODUCTION

The Federal Standards for the Use or Disposal of Sewage Sludge (40 CFR Part 503) published in the Federal Register on February 19, 1993 (amended 2/25/94, 10/25/95, and 8/14/99) established requirements which affect the alkaline stabilization facilities operated by Synagro Technologies, Inc. (hereinafter Synagro). The following information and procedures are provided to address 503 compliance relative to operation of alkaline stabilization facilities.

Note that Synagro SOP II.A.2. Alkaline Stabilization Facilities 40 CFR Part 503 Rule Compliance Checklist summarizes Synagro's procedures for implementing the 503 requirements at our alkaline stabilization facilities.

II. DESCRIPTION OF 40 CFR PART 503 MONITORING AND RECORDKEEPING REQUIREMENTS

The 503 monitoring and recordkeeping requirements are listed below. Specifics on the pH monitoring equipment and pH log sheets are given in Section III.

A. Class B/PSRP Lime Stabilization Pathogen Treatment and Alkaline Addition Vector Attraction Reduction

1. Metals and Nitrogen Series Monitoring

a. At a minimum, the treated biosolids must be tested for the 503 regulated metals (As, Cd, Cu, Pb, Hg, Mo, Ni, Se, Zn) and the nitrogen series. Frequency of testing is based on the amount of biosolids (metric tons per 365-day period) applied to the land as given in 503.16 Table 1

b. The testing must be done using EPA-approved methods in 503.8.

c. When taking the biosolids sample for metals testing, record the information below by using the Synagro Chain of Custody Form:

1) Date and time of sample collection
2) Sampling location
3) Sample type
4) Sample volume
5) Name of sampler
6) Type of sample container
7) Method of preservation, including cooling

2. Lime Stabilization Recordkeeping

a. Biosolids pH testing is required to ensure that sufficient lime has been added to achieve a pH of 12 after two hours of contact. At a minimum, perform one test per day by sampling the biosolids immediately after they exit the lime stabilization process. Take an initial pH reading of the sample and then a second reading after 2 hours. Exceptions to the once-per-day testing frequency may be granted on a case-by-case basis for small projects.

b. For each measurement or sample taken, record the following using the appropriate pH testing log sheet:
   1) Date, exact place and time of sampling or measurements;
   2) Person(s) who performed the sampling or measurements;
   3) Date analyses were performed;
   4) Person(s) who performed each analysis;
   5) Analytical techniques or methods used; and
   6) Results of such analyses and measurements.

3. Vector Attraction Reduction by Lime Addition Recordkeeping

a. Biosolids pH testing is required to ensure that the pH of the biosolids is raised to 12 or higher by alkaline addition and, without the addition of more alkaline material, it remains at 12 or higher for two hours and then 11.5 or higher for an additional 22 hours. At a minimum, perform one test per day by taking an initial pH reading of the sample, a reading at 2 hours and a reading at 24 hours. The first two readings were already taken when you verified lime stabilization so the only additional reading which must be taken is the reading at 24 hours. The 24-hour reading can be taken at a later time if the facility is not operational (i.e., evenings, weekends or holidays) as long as the reading is taken when the facility is again operational and the delayed reading shows a pH of $\geq$ 11.5. The date and time of the delayed readings need to be recorded.

b. Record the information in II.A.2.b. above using the appropriate pH testing log sheet.

c. EPA's Guide for Preparing Sewage Sludge for Land Application or Surface Disposal, August 1993, states that the following records should also be kept; however, VAR is still demonstrated without these records through biosolids pH monitoring:
   - Amount (pounds or gallons) of alkaline material added to the biosolids; and
   - Amount of biosolids treated

4. Certification Statements

EPA requires that the preparer of biosolids certify that the biosolids meet the pathogen treatment and vector attraction reduction requirements of the 503 Rule. Certification statements must be signed at a minimum at the frequency in 503.16 Table 1. It is preferred that statements be signed each month the facility is treating biosolids.

The certification statements are signed by the Operations Director responsible for the location where the stabilization activities are performed. The original signed form will be kept at the Regional Office or Corporate Office with a copy forwarded back to the alkaline stabilization facility for filing on-site. If the alkaline stabilization facility is a mobile unit, the certification statements can just be kept at the Regional or Corporate Office. Copies should be provided to the client upon request or as required by our service agreement.

The certification statements must be retained for at least five years to meet the Part 503 recordkeeping requirements and may need to be retained longer based on state or local requirements.

5. Records Retention System

The records listed below are to be retained for at least five years (state or local agencies may require a longer retention period) in a filing system at one of the following locations: the alkaline stabilization facility, the project office, the Regional Office or the Corporate Office. For short-term projects (e.g., turnkey events, mobile BIO*FIX operations) and when projects or contracts end, the records need to be forwarded to an appropriate location (i.e., project office or Regional Office or the Corporate Office) for filing for the remainder of the required retention period.

- Biosolids analysis results
- Chain of Custody forms
- pH meter calibration log sheets
- pH testing log sheets
- Alkaline material usage and biosolids quantities treated*
- Biosolids treatment Certification Statements

***If such records are kept.**

III. BIOSOLIDS pH ANALYSIS AND RECORDKEEPING

A. Determining Methodology and Instrumentation Requirements

40 CFR Part 503 does not specify a specific procedure for biosolids pH testing so the same reference cited for analyzing inorganic pollutants was chosen (i.e., Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, EPA Publication SW-846 -- most recent updates).

In SW-846 field testing of biosolids for pH can be accomplished with Method 9040B pH ELECTROMETRIC MEASUREMENT. This method can be found at http://www.epa.gov/SW-846/9_series.htm
For high solids materials, distilled water may be added to take pH readings.

One brand of pH meter that can be used is the Fisher Accumet benchtop or portable pH meter. The electrode used with the meter needs to be one with low-sodium-error for pH levels > 10. You can obtain information at Fisher's website http://www.fisherscientific.com or call their customer service line at 800-766-7000.

Synagro has prepared an in-house video on biosolids pH testing. Please call the Corporate Technical Services Department's Baltimore Office to obtain a copy for viewing.

B. pH Meter Calibration

Calibration of the pH meter electrode must be done before each daily use. The procedure used must have at least two points of reference that bracket the expected pH of the samples and are approximately three units or more apart. Standard buffers should be used as points of reference. The buffers should be labeled and an expiration date stamped on each bottle. Use pH 10 and pH 13 standard buffers to calibrate your meter. One source for these buffer solutions is Fisher Scientific. Their customer service line is 800-766-7000.

When doing the meter calibration repeat the testing and, if necessary, make adjustments, until readings of the two buffer solutions are within 0.05 pH units of the buffer solution values. The calibration must be documented. Calibration log sheets are enclosed for meters with Automatic Standardization (no manual adjustment of slope with function selectors) and those with Manual Standardization. Specific calibration procedures for the Fisher Accumet Model 955 Portable pH/mV Temperature Meter are provided later in this document.

C. pH Testing

Once the pH meter is calibrated with standard buffers, adjustments may need to be made for each sample depending on the temperature of the sample. If the temperature differs by more than 2 degrees C from the buffers, adjustments must be made unless the meter has an automatic temperature compensation (ATC) probe.

Specific instructions for pH readings are available in the manufacturer's instruction manuals. At a minimum, each sample must be measured until values differ by <0.1

pH units while the sample is stirred at a constant rate. Follow the manufacturer's instruction manual for procedures on storage of the electrode between samples and when the electrode is not in use. Typically the instructions state that between daily measurements, immerse the electrode in pH 7 buffer solution and when the electrode is not in use, wet the cotton inside the plastic cot with pH 7 buffer solution, then while squeezing the cot, place it over the tip of the probe and slide it on.

Instructions for taking pH readings using the Fisher Accumet Model 955 Portable pH/mV Temperature Meter with Automatic Temperature Compensation Probe and this meter with Manual Adjustment for Temperature are enclosed.

D. pH Recordkeeping

For each pH measurement taken, the information listed previously in II.A.2.b. must be recorded. Recordkeeping forms which capture this information are enclosed.

To obtain accurate biosolids pH measurements, the sample must be tested at 25 degrees C (77 degrees F). If the sample is not at 25 degrees C at the time the pH reading is taken, a correction factor formula must be used to correct the pH result. An information sheet which provides the pH temperature correction formula and correction factors at varying temperatures is enclosed. An information sheet on obtaining accurate pH measurements follows this page.

Completed pH testing log forms need to be retained (see procedures outlined in II.A.5.).

E. Equipment Maintenance

To ensure accurate pH readings the pH meter and electrode need to be properly maintained per the manufacturer's instructions manual. A set of spare equipment should be available in case of breakdown. The equipment should be used and stored in an area where there is minimal airborne contaminants and moisture.

ACCURATE pH MEASUREMENT

Occasionally, operators of our lime stabilization and BIO*FIX® facilities are seeing pH results of over 12.5 when testing the finished biosolids product. Such high pH results are a concern for two reasons:

(1) An accurate pH measurement of lime-amended biosolids could not possibly be over 12.5 (further explanation below).

(2) Certain materials, liquids with pH of 2 and lower or 12.5 and greater, are classified as corrosive or hazardous.

Below is an explanation of how false high pH readings can occur, how to control for testing interferences, and how to deal with false high results.

The pH of pure quicklime (CaO) is 12.454. Therefore, it is impossible for a quicklime/biosolids mixture to have a pH above 12.454. There are two likely reasons operators are getting such high pH readings:

(1) Temperature of Sample

Around pH 12.5, the pH meter is very sensitive to temperature due to the inverse solubility of lime. In other words:

High temperatures (above 25 degrees C) ---------- false low pH (yield)

Low temperatures (below 25 degrees C) ---------- false high pH (yield)

For accuracy, pH must be tested at 25 degrees C (77degrees F); even a 2 degrees C variation can cause a 0.20 or larger error in pH. **An automatic temperature compensating probe is not designed to handle this type of temperature variation. It can only compensate for the difference in conductivity of the probe itself due to temperature, not for the effect sample temperatures have on pH readings. If the sample is not at 25 degrees C at the time the pH reading is taken, the correction formula must be used to correct the pH result.**

(2) Ammonia Release from Sample

As the pH of lime-amended biosolids climbs to around 10, ammonia is released. The ammonia release causes a false high reading. For example, testing your biosolids sample while it is still releasing ammonia could give you a pH of 12.0 initially but a reading of only 11.7 after two hours.

To try to control for the influences of temperatures and ammonia, please follow the procedure outlined below:

(1) Test your biosolids sample when it is at 25 degrees C. High (above 12.5) pH readings suggest samples are too cool. Use the correction formula on the following page to adjust pH if samples are not at 25 degrees C.

(2) Before testing pH, allow your sample to "breathe" for 10 to 15 minutes after mixing with lime has begun.

PROCEDURE FOR pH TESTING WITH AUTOMATIC TEMPERATURE COMPENSATING PROBE

Methods:
Calibration - SW-846, Method 9040 B
pH Testing - Instructions - Fisher Accumet Model 955 Portable pH/mV Temperature Meter
(If you are using a different pH Meter please review the manufacturer's manual for that meter and adjust the procedures below accordingly)

Equipment:

- Three standard buffer solutions: pH 7, 10, and 13
- Thermometer or Automatic Temperature Compensating (ATC) Probe
- Distilled water
- Clean glass beakers
- Stir stick or magnetic stirring bar
- Plastic gloves (disposable)

1) Check over the meter and make sure all connections are tight. Remove the protective cot from the tip of the electrode.

2) Select buffers for calibration. Ideally the buffer temperatures should be within 10 degrees C of the sample temperature regardless of compensating manually or through ATC probe.

3) Immerse the electrode and the ATC probe into the pH 10 buffer solution.

4) Set FUNCTION selector to degrees C position, and place ON/OFF switch to ON position. Set the slope control full counterclockwise.

5) Allow the electrode system, ATC probe, and buffer solution to reach thermal equilibrium (degrees C going steady), then determine exact pH of buffer solution from table of buffer pH versus temperature (usually found on bottle label).

6) Set FUNCTION selector to pH position, and adjust STANDARDIZE control until digital display indicates determined pH value of buffer solution.

7) Remove electrode and ATC probe from buffer solution and rinse them with distilled water. Dispose of the used distilled water.

8) Immerse electrode and ATC probe into the second buffer solution (i.e. pH 13 buffer).

9) Set the FUNCTION selector to C position. Allow the electrode and ATC probe to reach thermal equilibrium (degrees C reading steady), then determine the exact pH of second buffer from a table of pH versus temperature (usually found on bottle label).

10) Set FUNCTION selector to pH position. Adjust the slope controls until digital display indicates determined pH value of the second buffer solution.

11) Remove the electrode and ATC probe from the buffer and rinse them with distilled water. Dispose of the used distilled water.

12) The pH values should be within 0.05 units of the buffer solution values. The pH of each buffer should be taken two to three times.

13) Set FUNCTION selector to degrees C position, and immerse electrode and ATC probe into sample solution. For cake biosolids, a 1:1 mixture of distilled water: biosolids will allow for pH testing. For BIO*FIX PFRP samples, reduce the sample temperature before diluting with distilled water by spreading it out in a thin layer on a clean, dry surface and let it air-cool. As noted in 2) above, ideally the buffer temperature should be within 10 degrees C of the sample temperature. Note that for BIO*FIX PFRP samples, it may be necessary to use a 2:1 mixture of distilled water: BIO*FIX. **Note that thermal equilibrium normally requires about one minute, but will vary depending on the temperature difference between the electrode system and the sample.**

14) Set FUNCTION selector to pH position and read pH value of sample solution as shown on the digital display. This is the sample's temperature-corrected pH value.

15) Remove the electrode and ATC probe from the sample and rinse with distilled water. Dispose of the used distilled water.

16) Steps 14 through 17 should be repeated two to three times for each sample until the pH values are within 0.1 pH units.

17) Cover the sample and place in a secure place.

18) Turn off the meter. Store the electrode with the protective cot on after wetting with pH 7 buffer solution. In between samples, store the electrode in pH 7 buffer solution.

PROCEDURE FOR pH TESTING WITH MANUAL ADJUSTMENT FOR TEMPERATURE

Methods:
Calibration - SW-846, Method 9040 B
pH Testing - Instructions - Fisher Accumet Model 955 Portable pH/mV Temperature Meter **(If you are using a different pH meter please review the manufacturer's manual for that meter and adjust the procedures below accordingly)**

Equipment:

- Three standard buffer solutions: pH 7, 10, and 13
- Thermometer
- Distilled water
- Clean glass beakers
- Stir stick or magnetic stirring bar
- Plastic gloves (disposable)

1) Check over the meter and make sure all connections are tight. Remove the protective cot from the tip of the electrode.

2) Select buffers for calibration. Ideally the buffer temperatures should be within 10 degrees C of the sample temperature regardless of compensating manually or through Automatic Temperature Compensating (ATC) probe.

3) Immerse the electrode and the thermometer into the pH 10 buffer solution.

4) Set FUNCTION selector to degrees C position, and place ON/OFF switch to ON position. Set the slope control full counterclockwise.

5) Allow the electrode system, thermometer, and buffer solution to reach thermal equilibrium (thermometer going steady), then adjust TEMPERATURE control until digital display indicates buffer temperature as read on thermometer.

6) Determine exact pH of buffer solution from table of buffer pH versus temperature (usually found on bottle label).

7) Set FUNCTION selector to pH position, and adjust STANDARDIZE control until digital display indicates determined pH value of buffer solution
8) Remove electrode and thermometer from buffer solution and rinse them with distilled water. Dispose of the used distilled water.

9) Immerse electrode and thermometer into second buffer solution (i.e. pH 13 buffer).

10) Allow the electrode and thermometer to reach thermal equilibrium, then determine the exact pH of second buffer from a table of pH versus temperature (usually found on bottle label).

11) Set FUNCTION selector to pH position. Adjust the slope controls until digital display indicates determined pH value of the second buffer solution.

12) Remove the electrode and thermometer from the buffer and rinse them with distilled water. Dispose of the used distilled water.

13) The pH values should be within 0.05 units of the buffer solution values. The pH of each buffer should be taken two to three times.

14) Set the FUNCTION selector to degrees C position, and immerse electrode and thermometer into sample solution. For cake biosolids, a 1:1 mixture of distilled water: biosolids will allow for pH testing. For BIO*FIX[7] PFRP samples, reduce the sample temperature before diluting with distilled water by spreading it out in a thin layer on a clean, dry surface and let it air-cool. As noted in 2) above, ideally the buffer temperature should be within 10 degrees C of the sample temperature. Note that for BIO*FIX[7] PFRP samples, it may be necessary to use a 2:1 mixture of distilled water: BIO*FIX[7].

15) Allow the electrode and sample to reach thermal equilibrium then adjust the TEMPERATURE control until the digital display indicates sample temperature as read on the thermometer. **Note that thermal equilibrium normally requires about one minute, but will vary depending on the temperature difference between the electrode system and the sample.**

16) Set FUNCTION selector to pH position, and read pH value of sample solution as shown on the digital display. This is the sample=s temperature-corrected pH value.

17) Remove the electrode and thermometer from the sample and rinse with distilled water. Dispose of the used distilled water.

18) Steps 14 through 17 should be repeated two to three times for each sample until the pH values are within 0.1 pH units.

19) Cover the sample and place in a secure place.

20) Turn off the meter. Store the electrode in distilled water with the protective cot on after wetting with pH 7 buffer solution. In between samples, store electrode in pH 7 buffer solution.

pH CALIBRATION SHEET FOR METER WITH AUTOMATIC STANDARDIZATION
(no manual adjustment of slope function)
Standard Method, SW-846, Method 9040B, pH Electrometric Measurement

MONTH/YEAR:_____ PROJECT: _____

Date	Time	Initials	Standard Solutions		Temp. of pH 10 Std. Sol. (C)	Temp of pH 13 Std. Sol. (C)	% Slope	Comments/ Maintenance
			10.0	13.0				
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
11.								
12.								
13.								
14.								
15.								
16.								
17.								
18.								
19.								
20.								
21.								
22.								
23.								
24.								
25.								
26.								
27.								
28.								
29.								
30.								
31.								

pH CALIBRATION SHEET FOR METER WITH MANUAL STANDARDIZATION
(manual adjustment of slope with function selectors)
Standard Method, SW-846, Method 9040B, pH Electrometric Measurement

MONTH/YEAR:_____ PROJECT:_____

Date	Time	Initials	Standard Solutions		Temp. of pH 10 Std. Sol. (C)	Temp. of pH 13 Std. Sol. (C)	Comments/Maintenance
			10.0	13.0			
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							
16.							
17.							
18.							
19.							
20.							
21.							
22.							
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24.							
25.							
26.							
27.							
28.							
29.							
30.							
31.							

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CLASS B/PSRP pH SHEET

Using a pH Meter with Two-Point Standardization and Automatic Temperature Compensation (ATC) Probe

Analysis Method: SW-846 Method 9040B, pH Electrometric Measurement

MONTH/YEAR:_____ FACILITY/LOCATION:_____

SAMPLING LOCATION:_____

Date	Sample Time	Sampler Initials	pH Testing							Analyst Initials		
			Start Time	Start pH/ Temp C	Adjusted Start pH*	2-Hr.: pH/ Temp C	Adjusted 2-Hr pH*	24-Hr pH**/ Temp C	Adjusted 24-Hr pH*	Start	2 Hrs	24 Hrs

* Equivalent pH value at 25 degrees C; Correction Factor (CF) = 0.03 pH units x (degrees C Temperature measurement – 25 degrees C); Equivalent pH = pH +/- the CF.

** If the reading is not done 24 hours after the Start Time, note the time (and date if not performed the day following the initial sample date) the reading was taken.

Comments:_____

pH TEMPERATURE CORRECTION FORMULA AND CORRECTION FACTORS AT VARYING TEMPERATURES FROM THE STANDARD (25 degrees C)

Formula:
Correction Factor (CF) = 0.03 pH units x (degrees C Temperature Measurement – 25 degrees C)
Actual pH = Measured pH +/- the Correction Factor

Sample Calculation (Sample Temperature = 21 degrees C; pH Meter Reading = 12.304):
CF = 0.03 x (21-25); CF = 0.03 x -4; CF = - 0.12
Actual (Corrected pH) = 12.304 - 0.12 = 12.184

Correction Factors:

Sample Temp C	Correction Factor	Sample Temp C	Correction Factor
40	Plus 0.45	24	Minus 0.03
39	Plus 0.42	23	Minus 0.06
38	Plus 0.39	22	Minus 0.09
37	Plus 0.36	21	Minus 0.12
36	Plus 0.33	20	Minus 0.15
35	Plus 0.30	19	Minus 0.18
34	Plus 0.27	18	Minus 0.21
33	Plus 0.24	17	Minus 0.24
32	Plus 0.21	16	Minus 0.27
31	Plus 0.18	15	Minus 0.30
30	Plus 0.15	14	Minus 0.33
29	Plus 0.12	13	Minus 0.36
28	Plus 0.09	12	Minus 0.39
27	Plus 0.06	11	Minus 0.42
26	Plus 0.03	10	Minus 0.45
25	0.00		

Note: If you are taking sample temperature readings to the tenth of a degree you need to either use the formula to calculate the temperature adjusted pH or adjust the correction factors in the chart above by .003 for each 0.1 degree C change from the sample temperatures listed above. For example if the sample temp. is 20.5 C the correction factor is 5 x .003 or a change 0.015 from the 20 degrees C listing in the chart. Therefore the correction for 20.5 C is 0.15 - .015 = Minus 0.135

REMINDER:

If initial or 2-hour pH readings are below 12, **CONTACT SUPERVISOR IMMEDIATELY.** Do not send truck to land application site until situation is corrected.

If 24-hour pH reading is below 11.5, **CONTACT SUPERVISOR IMMEDIATELY.** Biosolids **must be** injected or incorporated at the field.

If any problems occur with the pH meter, **CONTACT SUPERVISOR IMMEDIATELY.** Litmus paper verification cannot be used to document PSRP. Do not send truck to land application site until pH is confirmed.