



January 21, 2015

Mr. Richard Tedder
Solid Waste Section
Florida Department of Environmental Protection
2600 Blaire Stone Road, MS 4565
Tallahassee, Florida 32399

RE: Notification of Bio-Solids Composting Pilot Study
Southeast County Landfill, Hillsborough County, Florida
FDEP Permit No. 35435-022-SO/01

Dear Mr. Tedder,

On behalf of the Hillsborough County Public Utilities Department, Solid Waste Management Division (SWMD), HDR Engineering, Inc. (HDR) is pleased to submit this notification to the Florida Department of Environmental Protection (FDEP) regarding conducting a Bio-Solids Composting Pilot Study (pilot study) at the Southeast County Landfill (SCLF). The pilot study is scheduled to begin in February of 2015 and will be conducted over a six month period.

Background

Currently, domestic waste residuals (activated sludge), generated from the County's Wastewater Treatment Facility (WTF) at Falkenburg Road, is disposed of at various other facilities throughout the County. It is the SWMD's intent to utilize the sludge as the active ingredient in the bio-solid composting process when mixed with mulched yard trash. Once the composite has met FDEP 62-640 regulatory standards for Class AA compost and other analytical parameters, the intent is to reuse or sell the compost.

The ultimate goal of the of the SWMD is to conduct the bio-solid composting pilot study at the SCLF in order to reduce the amount of sludge currently being landfilled, and provide a beneficial reuse of this material, and to determine the feasibility of a full scale composting operations. The SWMD has contracted with Kessler Consulting, Inc. (Kessler) to plan and oversee the bio-solid composting pilot study. A copy of Kessler's Operations Plan, submitted to FDEP Southwest District (Steve Thompson and Vicki McGucken) on January 9, 2015, and is included as Attachment 1 to this letter for your reference.

Purpose and Objective of Pilot Study

The purpose of the pilot study is to evaluate the feasibility of a full-scale composting operation. The pilot study will be used to determine the operating equipment requirements, review alternate composting methods (active vs. static), review mixture ratios, and evaluate the finished product in order to determine possible end uses.



Pilot Study Design

The SCLF facility was chosen for the pilot study due to the available space, distance from nearby residences (to minimize potential for possible offsite odor migration - should that occur SWMD will immediately determine the source and control the odors), and the ability to collect and treat runoff (leachate) from the bio-solids. In addition, the SCLF has on-site truck scales and heavy equipment available to assist with the pilot study operations and reporting. HDR has prepared design drawings to construct the pilot study area based upon the operational requirements established by Kessler. Copies of the HDR design drawings are included as Attachment 2 to this letter.

The pilot study will utilize about 4-acres within the top Sections 7, 8, and 9 of the Capacity Expansion Area (CEA). This includes approximately 2-acres for the active composting area, 0.5-acre for storage of bulk material (yard waste), 0.5-acre for storage and screening of the final product, and 1-acre for access by truck and other equipment during composting operations. The active composting area will be graded to drain at a two percent slope to minimize ponding of stormwater in the composting windrows. A drainage berm, approximately 2 feet high, located along the west and south sides of the active composting area will channel stormwater and contain the runoff generated from the active composting study area. A sump at the low point of the drainage berm, will allow percolation of runoff back into the landfill waste mound and ultimately into the SCLF leachate collection system.

Operations

During the composting phase of the process, specific measures are incorporated to control odors and vectors. The operation of the pilot study, to be overseen by Kessler, includes the following:

- Incoming processed Yard Trash will be stockpiled near the active composting area prior to the addition of bio-solids. A stockpile of yard trash will be on-site at all times to mix with bio-solids. Biosolids will be thoroughly mixed with processed yard trash to provide the proper conditions for composting, including carbon to nitrogen ratio, moisture content and porosity. Once mixed with yard trash, the compost pile will be covered with additional yard trash to reduce the chance of odor.
- The windrows will be about 16-feet wide by 8-feet tall and 100-feet long. It is estimated that there will be 14 windrows on the active composite area pad.
- The ratio of yard trash to bio-solids will be 3 (YT):1 (Bio-Solids) by volume. Kessler estimates the daily placement of approximately 150 cubic yards of yard waste to 50 cubic yards of bio-solids.
- Windrow temperatures will be monitored and the windrows turned in conformance with regulatory requirements as outlined in the Kessler Operations Plan. The operations (ratio of materials, turning, temperature, etc.) will vary depending on the composting method utilized, as discussed, as discussed in Kessler's Operations Plan.



January 21, 2015

- After the material has been turned and composting considered complete, samples of the material will be analyzed in conformance with FDEP 62-640 regulations and moved to the Curing Stockpiled in the Curing, Screening, and Storage Area where the compost will further cure, stabilize and be screened to produce finished compost. Runoff from this area will also be collected in the sump adjacent to the Active Composite Area.
- A mechanical screen will be set up near the finished stockpiled product. Once, the composting material has met the requirements for concentration of pathogens, salmonella, metals and other applicable parameters, it will be screened and trucked off site to County owned land for reuse as part of this pilot study. Further uses or markets will be evaluated at the end of the study.

It is important to note that during this limited Pilot Study, all leachate will be contained and collected in the SCLF leachate collection system. Collected leachate is sent to an onsite Leachate Collection Treatment Plant. The placement of bio-solids and yard trash will remain within the limits of the landfill and the end product will not be removed from the landfill area until laboratory test results show the compost has met all FDEP requirements. As such, the proposed pilot study will not impact current operations, will continue to comply with the requirements as set forth in the SCLF's Operating Permit, and will not adversely impact the environment. The SWMD will provide the FDEP with a summary report at the conclusion of the pilot study. In addition, pending the results of the pilot study, should the SWMD wish to construct and operate a full-scale bio-solids processing facility, a permit modification will be submitted to the FDEP.

The SWMD plans on beginning the pilot study in February 2015, Please call me at (813) 528-1846 if you have any questions, require clarifications, and/or require additional information relating to the pilot study

Sincerely,

HDR, INC.

For

Richard A. Siemering
Florida Waste Operations Manager

cc. Steve Morgan, FDEP
Kimberly Byer, Hillsborough County
Larry Ruiz, Hillsborough County
Ron Cope, EPC

Attachments

Attachment 1

Operations Plan by Kessler



January 22, 2015

Via electronic transmittal

Steve Thompson and Vicki McGucken
FDEP Southwest District
13051 N. Telecom Parkway
Temple Terrace, FL 33637

Re: Hillsborough County Biosolids Composting Pilot Project
KCI Project No.: 175-00

Dear Steve and Vicki:

Since our last correspondence, Hillsborough County has identified an alternative site to pursue the composting pilot. The alternative site will allow for a change in scale of the proposed pilot in what is considered a more controlled environment. The purpose of this letter is to describe the modified pilot the County intends to pursue following FDEP's review and approval to proceed.

Please note: this is a revised letter that incorporates additional information and revisions to address FDEP comments received on January 16th in response to our January 9th letter.

I. Location

The proposed biosolids composting project will operate for six months and will be conducted at Hillsborough County's Southeast County Landfill located at 15960 County Road 672 Lithia, FL 33547. The landfill's Solid Waste Operating Permit number is 35435-022-SO/01, issued 11/7/2013. Figure 1 shows the proposed location for the pilot project on an inactive lined area of Section 9 of the Capacity Expansion Area (CEA) of the landfill. This area is covered with 18 inches of compacted interim cover material. The site is located within the landfill's leachate collection system; therefore any leachate originating from the pilot will be collected and treated as part of the landfill's standard leachate collection protocol.

II. Facility Design, Equipment and Initial Training

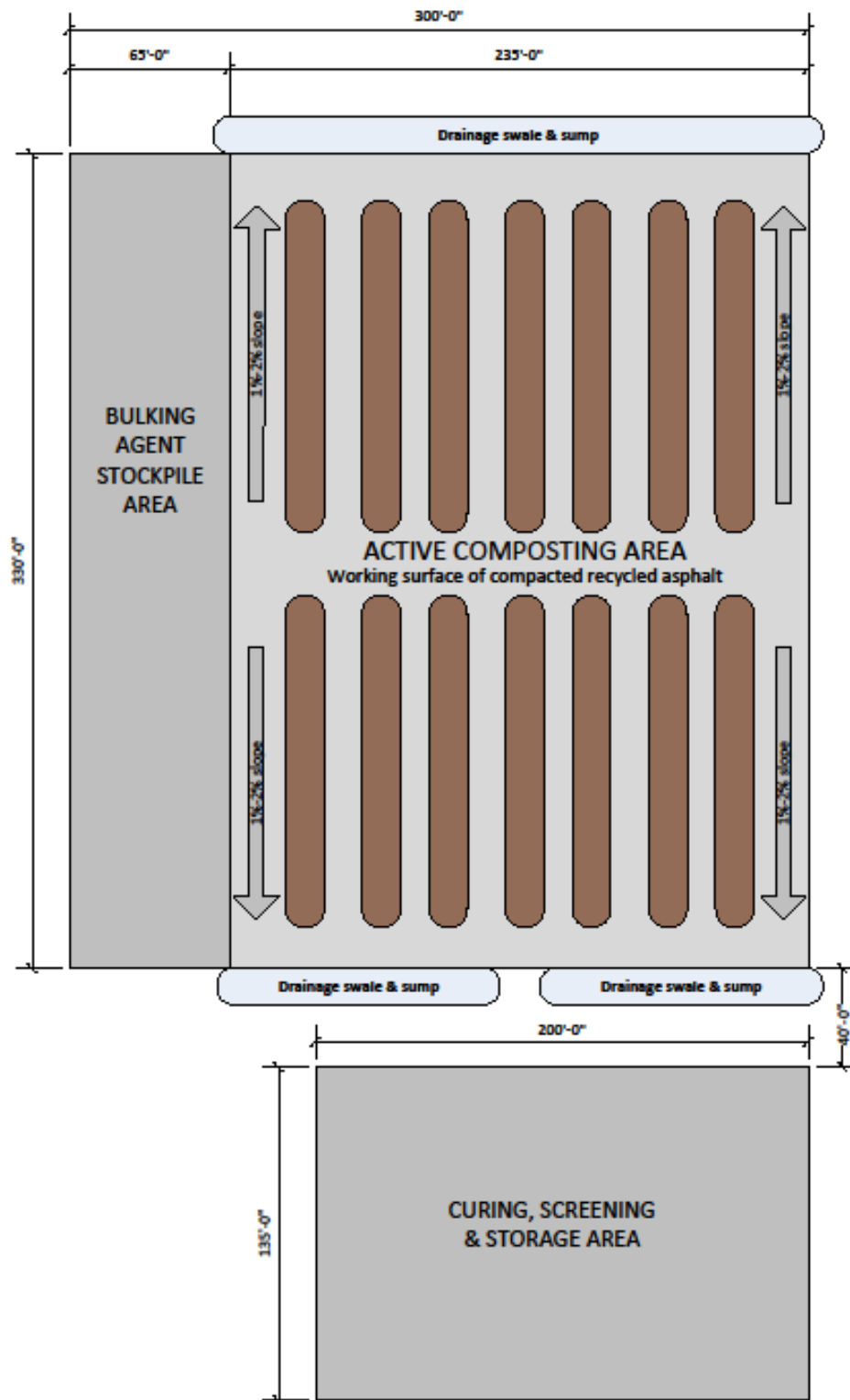
Figure 2 shows a general site plan for the proposed project. Receiving of biosolids, mixing, windrow construction and active composting will occur on a compost pad constructed of compacted recycled asphalt. The active compost pad will have a 1% - 2% slope to direct precipitation and leachate towards swales and a dry well (sump) that will drains into the underlying Subtitle D landfill cell.

The biosolids composting pilot will handle waste activated sludge generated by the County's Falkenburg Road Advanced Wastewater Treatment Facility (AWWTF) located at 102 N. Falkenburg Rd. The AWWTF produces approximately 55.6 dry tons per week. The pilot will utilize ground yard waste from the County's FDEP registered YT processing facilities as the bulking agent for composting.

Figure 1: Proposed Location of Biosolids Composting Pilot at Southeast County Landfill



Figure 2: Conceptual Site Plan for Composting Pilot at Southeast County Landfill



The pilot facility will receive and compost four weeks of biosolids to initiate the project (Batch 1). Once Batch 1 has completed active composting and moved to curing piles, the facility will again receive and initiate composting another four weeks of biosolids (Batch 2).

Ground yard waste to be used for bulking agent will be stored directly adjacent to the active composting area. The curing, screening and storage area will also be located near the active composting area. The working surface for the bulking agent stockpile and curing, screening and storage areas will be the in-place interim landfill cover material. Both of these areas will also be constructed so that any precipitation run-off will be directed towards swales and sumps that drains into the underlying Subtitle D landfill cell,

Hillsborough County has, or will secure, the basic equipment necessary to operate the project: including a compost windrow turner and bucket loader for materials handling, compost thermometer with 4 ft. stem, monitoring forms, rotary trommel screen, etc. While it will not be needed on a regular basis, the County will have a water truck available if necessary to ensure proper moisture conditions in the compost windrows.

Prior to starting the pilot, KCI will train County staff responsible for managing and operating the composting pilot in all phases of biosolids composting.

III. Materials Receiving, Mixing, and Windrow Construction

KCI will oversee County staff during initial operations to provide guidance and training. County will be responsible for all materials handling and operations. The County will ensure that sufficient volumes of prepared yard waste are available at the composting site each day prior to receiving biosolids. Biosolids receiving, mixing and windrow construction will occur on the recycled asphalt active composting pad. Prior to receiving incoming biosolids, site staff will utilize a front-end loader to construct a receiving pad for biosolids, which consists of a 12-inch base layer of bulking agent in the location where the windrow is to be constructed for that day's biosolids. Additional bulking agent will be used to build up a berm on the end and two sides to contain biosolids. Biosolids will be discharged directly onto this pad, and immediately covered with additional bulking agent to equal an approximate 3:1 volumetric ratio of bulking agent to biosolids. Staff will promptly utilize a front-end loader or windrow turner to mix the biosolids and bulking agent thoroughly and shape the mixture into uniform windrow dimensions approximately 8 feet high, 16 feet wide and 100 feet long. Windrows will be oriented with the slope in order to promote drainage of precipitation and leachate away from windrows.

IV. Active Composting and Curing

KCI will work collaboratively with Hillsborough County during the active composting phase of the project to ensure operations conform to good operational procedures. Two composting methods will be performed during the pilot.

- **Turned windrows (TW):** managed to meet FDEP time, temperature and turning standards for disinfection, namely 15 consecutive days at 55°C (131°F) with 5 turnings. A few days after the average temperature meets 55°C, the windrow will be turned and temperature monitored the following day to ensure it is at least 55°C. The windrow will be turned on subsequent days and

temperatures monitored to meet FDEP disinfection standards. The County will provide daily monitoring and recording of windrow temperatures.

- **Modified Static Aerobic Piles (MSAP):** managed to meet FDEP time and temperature standards for disinfection used at existing permitted MSAP biosolids facilities in Florida, namely 15 consecutive days at 55°C (131°F). Windrows will be turned for the first time after the initial 30 to 45 days. Following a further 14 days of composting the windrow is turned a second time. The County will provide daily monitoring and recording of windrow temperatures.

KCI will provide temperature monitoring forms as well as forms for tracking labor and equipment utilization. KCI will be on-site regularly during the pilot to assess composting progress, equipment and labor utilization, provide diagnostic assistance to ensure proper composting. Windrow temperatures will be monitored daily by County personnel, and by KCI personnel during weekly visits. Temperature monitoring will begin approximately 10 feet from the end of a windrow, and be repeated each 100 feet, or fraction thereof. Temperatures will be monitored at a depth of 36 inches into the windrow. All temperature records will be inspected and reviewed by KCI during each visit. KCI personnel will also accompany County personnel on-site to direct windrow mixing and turning activities.

All windrows shall remain on the Active Composting Area for approximately 30 to 45 days and until FDEP time and temperature standards are achieved. If a windrow does not achieve the standards, the material will be disposed at the active area of the landfill. At the end of active composting, each windrow shall be broken down, moved to the adjacent Curing, Screening, and Storage Area, thoroughly mixed and formed into large windrows, and allowed to cure and mature for a minimum 30 days.

V. Odor

Odor emanating from the pilot windrows will be assessed utilizing a portable OdaLog hydrogen sulfide (H₂S) monitor. In order to isolate compost odors from other potential sources, a 3-foot piece of galvanized stove pipe will be placed on top of a windrow and allowed to acclimate so that air inside the pipe is representative of convective air emanating from the windrow. The H₂S monitor will be suspended inside the pipe and set to record concentrations throughout active composting.

Odor will also be assessed qualitatively when performing daily windrow temperature measurement. If the trials are judged to be generating significant odor then odor intensity and character will be qualitatively characterized and noted.

VI. Compost Analysis

Finished compost will be sampled and analyzed in conformance with FDEP 62-640 regulations for Class AA compost. Once the first batch of compost has completed active composting and curing, and on a monthly basis thereafter for the remainder of the pilot project, County staff will collect composite samples of compost for laboratory analysis to ensure compliance with Part 503 and Florida regulatory requirements for Class AA compost certification. The pathogen reduction standards for Class AA

compost to be achieved by the pilot are:

- Time and temperature:
 - TW composting: 15 consecutive days at 55°C (131°F) with 5 turnings.
 - MSAP composting: 15 consecutive days at 55°C (131°F).
- Fecal coliform < 1,000 MPN/gram TS
- Salmonella < 3 MPN/4 gram TS

The vector attraction reduction standard to be achieved will be:

- Maintaining an aerobic composting process at greater than 40°C for 14 days or longer.

The metals standards for Class AA compost to be achieved by the pilot are shown in Table 1.

Table 1: Metal and Other Parameter Standards

<i>Parameter</i>	<i>Ceiling Concentrations (Single Sample)</i>	<i>Class AA Parameter Concentrations</i>
Arsenic	75 mg/kg dw	41 mg/kg dw
Cadmium	85 mg/kg dw	39 mg/kg dw
Copper	4,300 mg/kg dw	1,500 mg/kg dw
Lead	840 mg/kg dw	300 mg/kg dw
Mercury	57 mg/kg dw	17 mg/kg dw
Molybdenum	75 mg/kg dw	Not applicable
Nickel	420 mg/kg dw	420 mg/kg dw
Selenium	100 mg/kg dw	100 mg/kg dw
Zinc	7,500 mg/kg dw	2,800 mg/kg dw
Total Nitrogen (TKN)	(Report only) % dw	(Report only) % dw
Total Phosphorus	(Report only) % dw	(Report only) % dw
Total Potassium	(Report only) % dw	(Report only) % dw
pH	(Report only) standard units	(Report only) standard units
Total Solids	(Report only) %	(Report only) %

VII. Distribution and Use

Once the County has determined that finished compost meets FDEP Class AA standards for distribution and use, it plans to utilize compost at a limited number of locations all of which have limited public access:

- A portion of the Southeast County landfill property (approximately 900 acres) that is leased for sod farming.

- The University of Florida's Gulf Coast Research and Education Center (located near the Southeast County landfill) for research purposes.
- A limited number of other County-owned property with limited public access, subject to FDEP approval, to be coordinated through the County Economic Development Department to evaluate applicability and end product demand, identify future end users, and support future market development efforts for the finished product.

VIII. Record Keeping and Reporting

The County shall provide FDEP with a monthly report regarding the quantities of biosolids received, composted, and distributed. Also the County staff will report the results of compost analyses conducted during the month. The County will retain records from the pilot regarding the quantities of biosolids received, composted, and distributed and records of all compost analyses conducted for five years after completion of the pilot in accordance with state and federal requirements. The County will also retain records of compost use including amounts and application locations for five years.

If you require additional information or wish to discuss any aspects of the proposed pilot, please let me know.

Sincerely,

Kessler Consulting, Inc.

Peter Engel
Project Manager

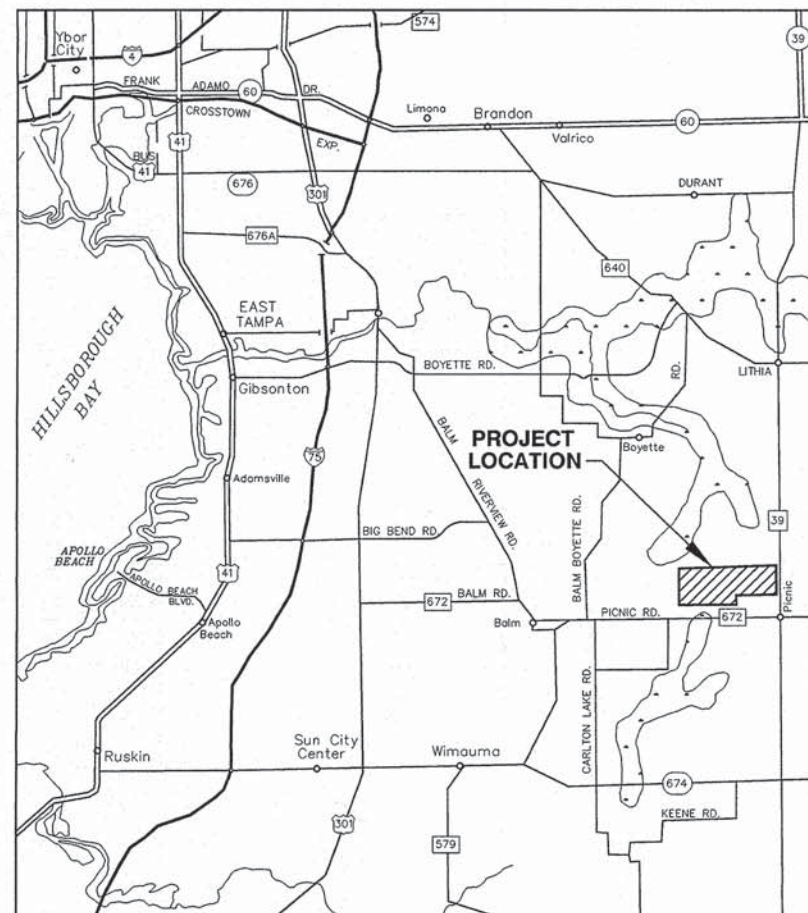
xc: Kimberly Byer, Hillsborough County
Beth Schinella, Hillsborough County

Attachment 2

Site Preparation Drawings



BOARD OF COUNTY COMMISSIONERS:
KEVIN BECKNER
VICTOR CRIST
KEN HAGAN
AL HIGGINBOTHAM
LES MILLER
SANDRA MURMAN
STACY WHITE



0 1 2 3 4 5
SCALE IN MILES
SITE VICINITY MAP



Contract Drawings For

Biosolids Composting Pilot Study

Site Preparation

Southeast County Landfill
Hillsborough County, Florida

Issued For Construction
March 2015

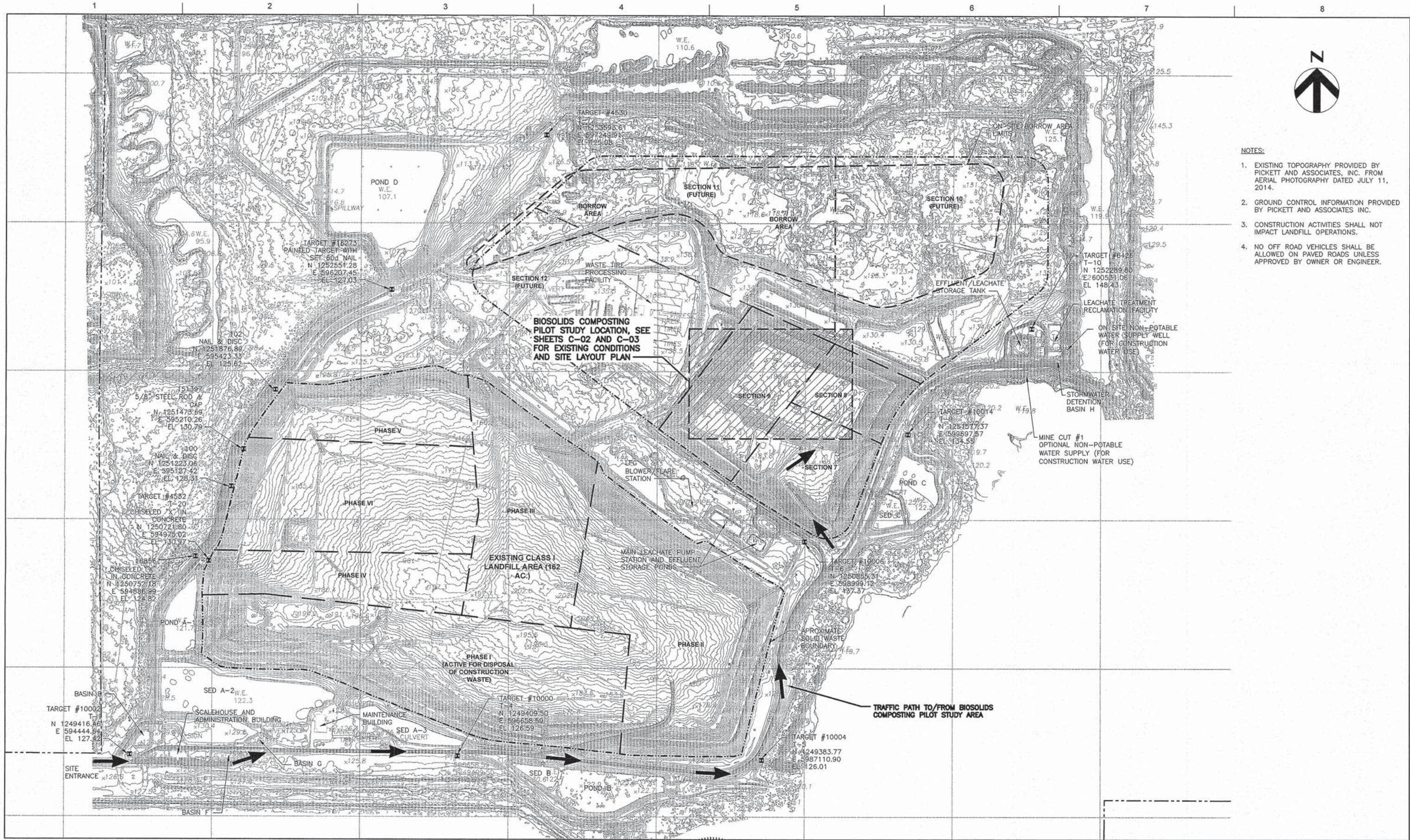
INDEX OF DRAWINGS

G-01	COVER SHEET
G-02	GENERAL NOTES AND LEGEND
C-01	OVERALL SITE PLAN
C-02	EXISTING CONDITIONS
C-03	SITE LAYOUT PLAN
C-04	OPERATIONS SITE PLAN
C-05	SECTIONS
C-06	DETAILS



ROBERT B. CURTIS, P.E.
LICENSE NO. 73758
HDR CA# 4213

1/21/15



NOTES:

1. EXISTING TOPOGRAPHY PROVIDED BY PICKETT AND ASSOCIATES, INC. FROM AERIAL PHOTOGRAPHY DATED JULY 11, 2014.
2. GROUND CONTROL INFORMATION PROVIDED BY PICKETT AND ASSOCIATES INC.
3. CONSTRUCTION ACTIVITIES SHALL NOT IMPACT LANDFILL OPERATIONS.
4. NO OFF ROAD VEHICLES SHALL BE ALLOWED ON PAVED ROADS UNLESS APPROVED BY OWNER OR ENGINEER.

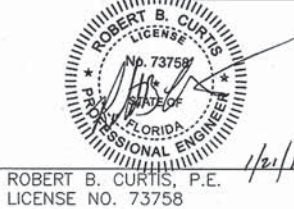
OVERALL SITE PLAN



HDR Engineering, Inc.
5428 Bay Center Drive
Suite 400
Tampa, FL 33609-3444
HDR CA# 4213

A	MARCH 2015	ISSUED FOR CONSTRUCTION
ISSUE	DATE	DESCRIPTION

PROJECT MANAGER	R. SIEMERING
REVIEWED BY	C. RESTREPO
CIVIL DESIGN BY	R. CURTIS
DRAWN BY	B. JOHNSON
PROJECT NUMBER	0100-243250-001

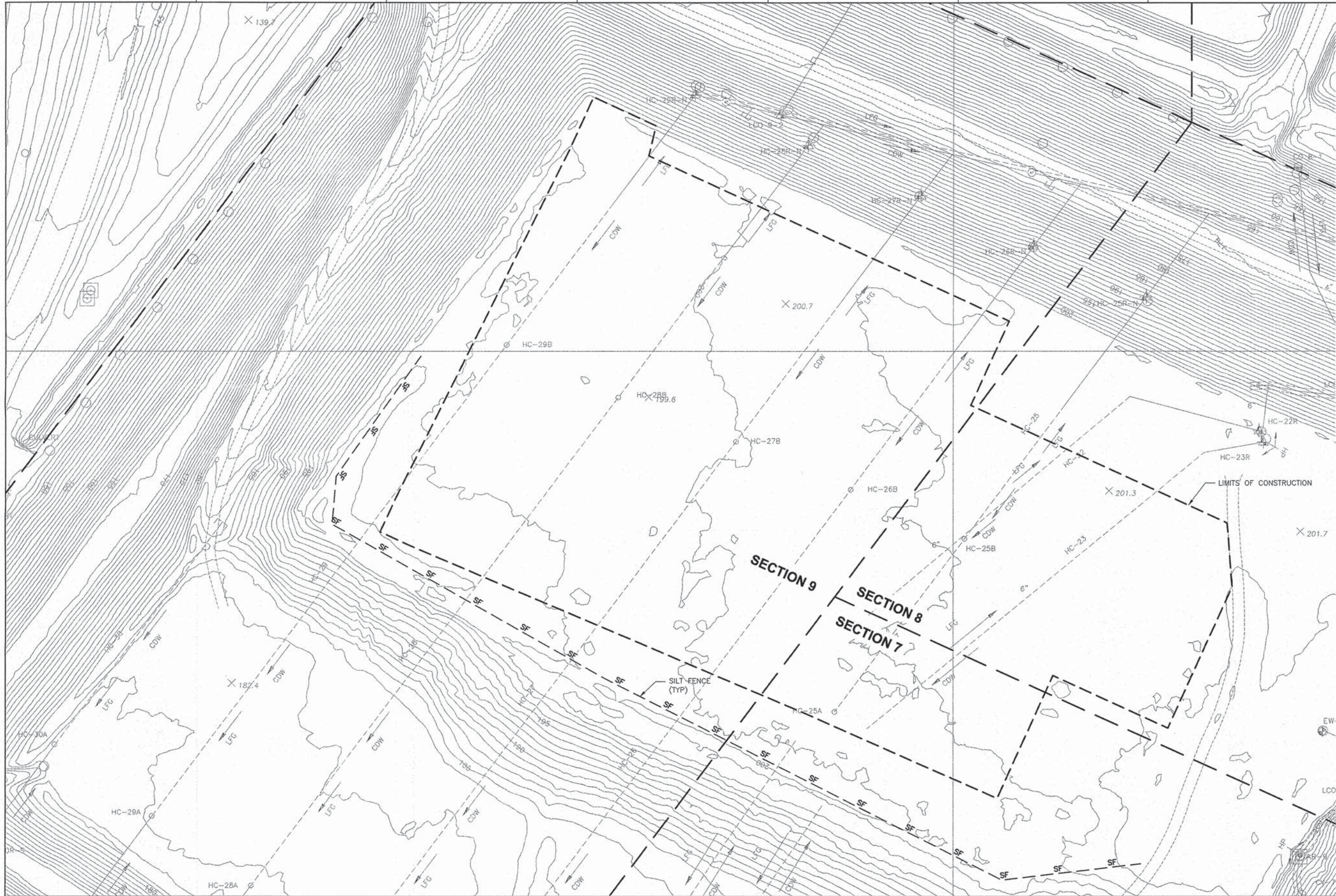


BIOSOLIDS COMPOSTING
PILOT STUDY
SITE PREPARATION



FILENAME C-02.DWG
SCALE 1"=500'

SHEET
C-01



NOTES:

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4. NO OFF ROAD VEHICLES SHALL BE ALLOWED ON PAVED ROADS UNLESS APPROVED BY OWNER OR ENGINEER.
5. LFG PIPING SHOWN FOR REFERENCE. PIPING AND VAVLES DEPTH GREATER THAN 5 FEET BELOW GRADES SHOWN.



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DRAWN BY	B. JOHNSON
PROJECT NUMBER	0100-243250-001



ROBERT B. CURTIS, P.E.
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1/21/15



BIOSOLIDS COMPOSTING
PILOT STUDY
SITE PREPARATION

EXISTING CONDITIONS



FILENAME C-02.DWG
SCALE 1"=40'

SHEET

C-02



NOTES:

1. EXISTING TOPOGRAPHY PROVIDED BY PICKETT AND ASSOCIATES, INC. FROM AERIAL PHOTOGRAPHY DATED JULY 11, 2014.
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3. CONSTRUCTION ACTIVITIES SHALL NOT IMPACT LANDFILL OPERATIONS.
4. NO OFF ROAD VEHICLES SHALL BE ALLOWED ON PAVED ROADS UNLESS APPROVED BY OWNER OR ENGINEER.
5. ENHANCE EXISTING BERM NORTH OF WORK AREA WITH SOIL AS NEEDED TO MAINTAIN A MINIMUM TOP OF BERM ELEVATION OF 201.0 (FT).

SITE LAYOUT COORDINATE POINTS TABLE

#	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	1252010.70	599018.05	201.54	GRADE
2	1252058.54	598913.47	203.80	GRADE HP
3	1252147.98	598717.96	199.50	GRADE
4	1251934.28	598620.20	199.50	GRADE
5	1251844.84	598815.71	203.80	GRADE HP
6	1251797.00	598920.29	201.50	GRADE
7	1251737.89	598893.25	200.88	GRADE
8	1251875.17	598593.16	198.95	GRADE

PROJECT MANAGER R. SIEMERING
REVIEWED BY C. RESTREPO
CIVIL DESIGN BY R. CURTIS
DRAWN BY B. JOHNSON

PROJECT NUMBER 0100-243250-001

ROBERT B. CURTIS, P.E.
LICENSE NO. 73758
1/22/15



**BIOSOLIDS COMPOSTING
PILOT STUDY
SITE PREPARATION**

SITE LAYOUT PLAN

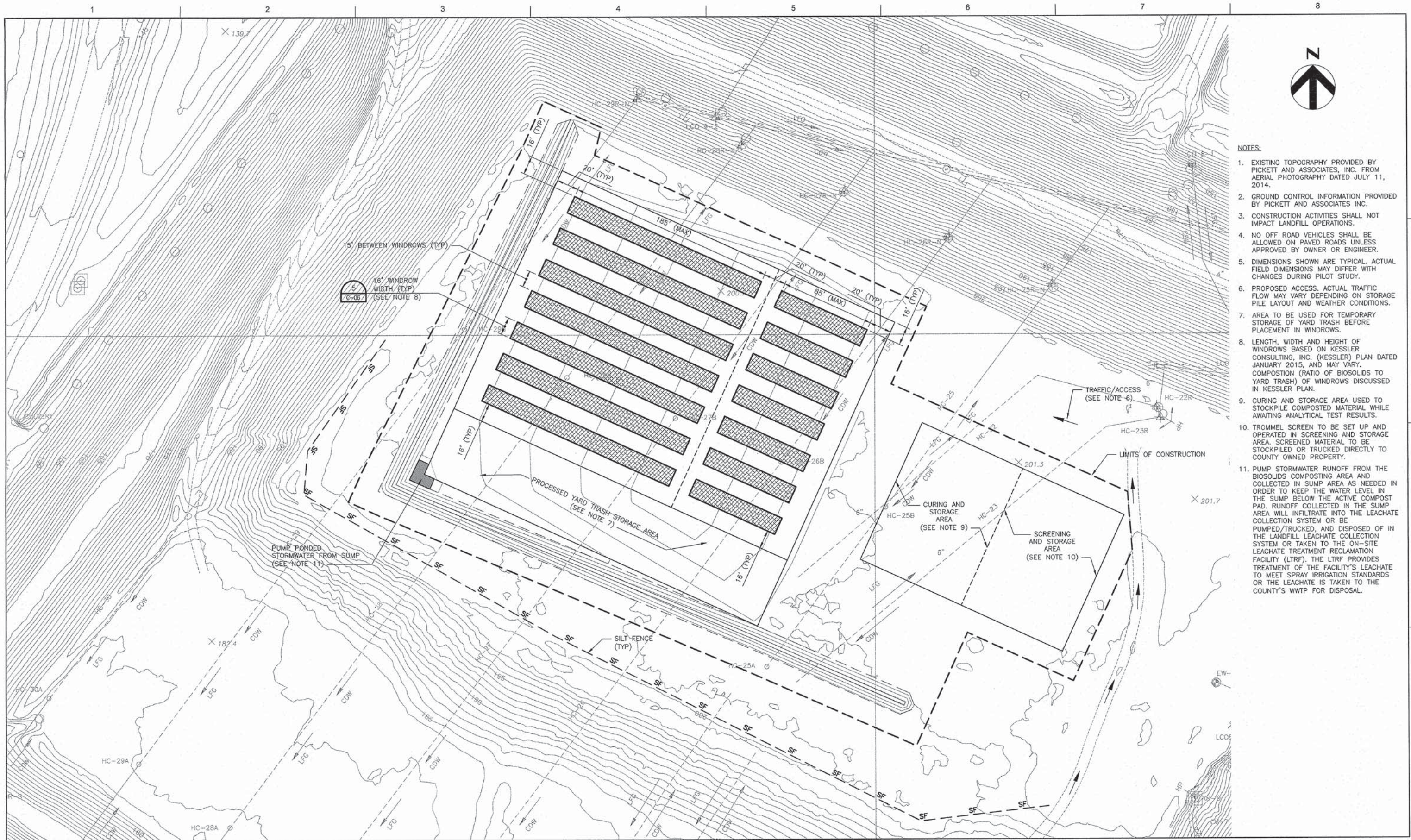
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SCALE 1"=40'

SHEET
C-03



HDR Engineering, Inc.
5426 Bay Center Drive
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Tampa, FL 33609-3444
HDR CA# 4213

A MARCH 2015 ISSUED FOR CONSTRUCTION
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- NOTES:
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 2. GROUND CONTROL INFORMATION PROVIDED BY PICKETT AND ASSOCIATES INC.
 3. CONSTRUCTION ACTIVITIES SHALL NOT IMPACT LANDFILL OPERATIONS.
 4. NO OFF ROAD VEHICLES SHALL BE ALLOWED ON PAVED ROADS UNLESS APPROVED BY OWNER OR ENGINEER.
 5. DIMENSIONS SHOWN ARE TYPICAL. ACTUAL FIELD DIMENSIONS MAY DIFFER WITH CHANGES DURING PILOT STUDY.
 6. PROPOSED ACCESS. ACTUAL TRAFFIC FLOW MAY VARY DEPENDING ON STORAGE PILE LAYOUT AND WEATHER CONDITIONS.
 7. AREA TO BE USED FOR TEMPORARY STORAGE OF YARD TRASH BEFORE PLACEMENT IN WINDROWS.
 8. LENGTH, WIDTH AND HEIGHT OF WINDROWS BASED ON KESSLER CONSULTING, INC. (KESSLER) PLAN DATED JANUARY 2015, AND MAY VARY. COMPOSITION (RATIO OF BIOSOLIDS TO YARD TRASH) OF WINDROWS DISCUSSED IN KESSLER PLAN.
 9. CURING AND STORAGE AREA USED TO STOCKPILE COMPOSTED MATERIAL WHILE AWAITING ANALYTICAL TEST RESULTS.
 10. TROMMEL SCREEN TO BE SET UP AND OPERATED IN SCREENING AND STORAGE AREA. SCREENED MATERIAL TO BE STOCKPILED OR TRUCKED DIRECTLY TO COUNTY OWNED PROPERTY.
 11. PUMP STORMWATER RUNOFF FROM THE BIOSOLIDS COMPOSTING AREA AND COLLECTED IN SUMP AREA AS NEEDED IN ORDER TO KEEP THE WATER LEVEL IN THE SUMP BELOW THE ACTIVE COMPOST PAD. RUNOFF COLLECTED IN THE SUMP AREA WILL INFILTRATE INTO THE LEACHATE COLLECTION SYSTEM OR BE PUMPED/TRUCKED, AND DISPOSED OF IN THE LANDFILL LEACHATE COLLECTION SYSTEM OR TAKEN TO THE ON-SITE LEACHATE TREATMENT RECLAMATION FACILITY (LTRF). THE LTRF PROVIDES TREATMENT OF THE FACILITY'S LEACHATE TO MEET SPRAY IRRIGATION STANDARDS OR THE LEACHATE IS TAKEN TO THE COUNTY'S WWTP FOR DISPOSAL.



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PROFESSIONAL ENGINEER
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1/21/15
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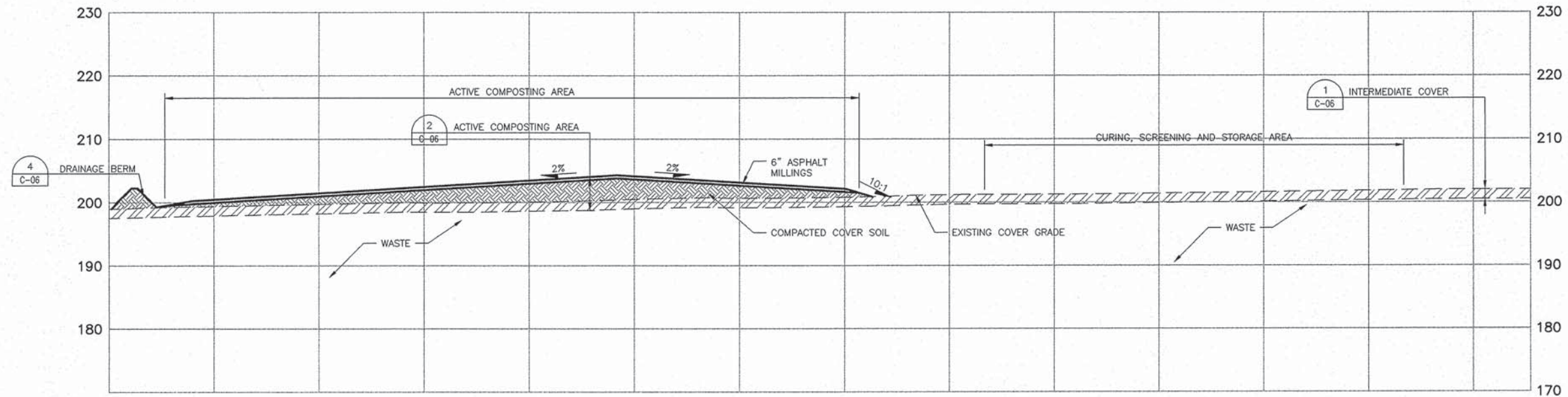
BIOSOLIDS COMPOSTING
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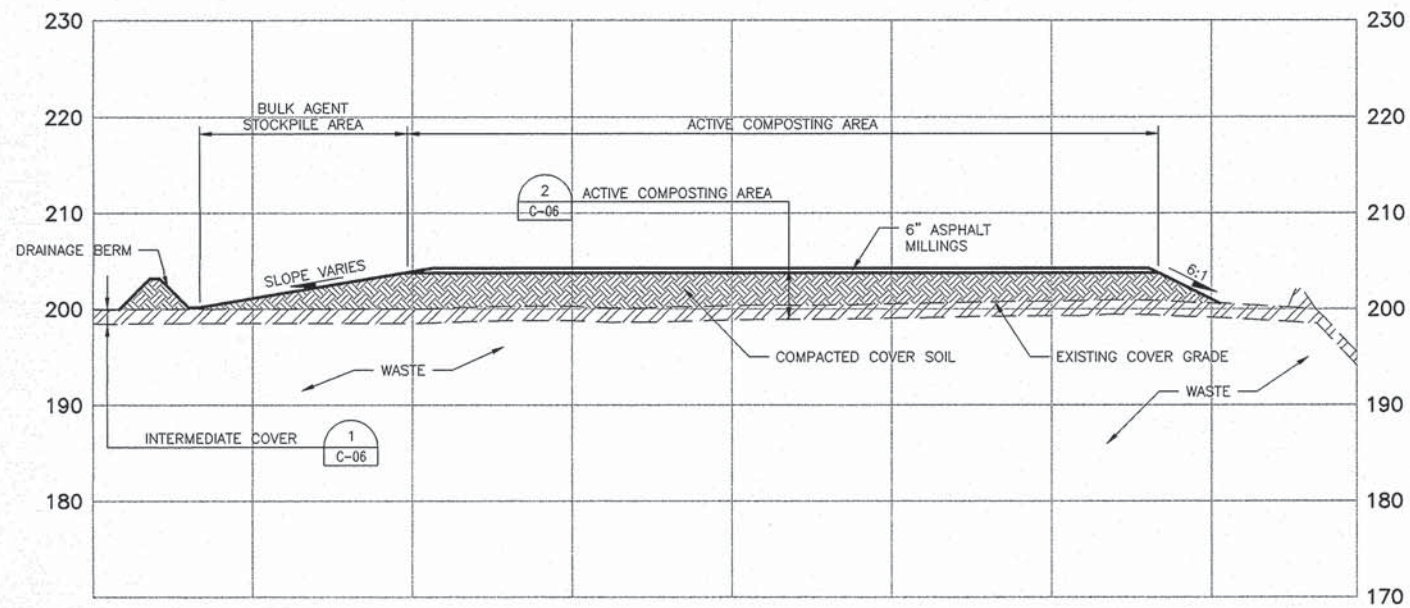


FILENAME C-04.DWG
SCALE 1"=40'

SHEET
C-04



NOTES:
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ROBERT B. CURTIS, P.E.
LICENSE NO. 73758
1/21/15



BIOSOLIDS COMPOSTING
PILOT STUDY
SITE PREPARATION



FILENAME: C-05.DWG
SCALE: AS SHOWN

SHEET
C-05

CONSTRUCTION SPECIFICATIONS

1.1 SOILS/GEOTECHNICAL

- A. THE OWNER WILL PROVIDE FOR THE ON-SITE SERVICES OF A COA INSPECTOR TO SELECTIVELY TEST MATERIALS AND MONITOR COMPLIANCE WITH THE REQUIREMENTS OF THESE SPECIFICATIONS.
- B. THE CONTRACTOR WILL AFFORD THESE REPRESENTATIVES ACCESS TO THE JOB SITE FOR THE PERFORMANCE OF THEIR DUTIES.
- C. THE CONTRACTOR SHALL GIVE MINIMUM OF 24-HOUR ADVANCE NOTICE TO ENGINEER WHEN READY FOR COMPACTION OR SUBGRADE TESTING AND INSPECTION.

1.2 MATERIALS

- A. COVER SOIL: MATERIALS (ONLY) PROVIDED BY OWNER AND SHOULD BE FREE OF DELETERIOUS MATERIAL (STICKS, ROOTS, WASTE, ETC.) AND ROCK FRAGMENTS, BOULDERS, OR COBBLES GREATER THAN 1/2 INCHES IN SIZE. SOILS SHALL BE OBTAINED FROM THE EXCAVATION OF CLEAN SOILS FROM THE DESIGNATED ON-SITE BORROW AREA.
- B. MILLINGS: PROVIDED BY OTHERS SHOULD BE RECYCLED ASPHALT PAVEMENT (RAP) MILLED OR CRUSHED WITH AT LEAST 97% PASSING THE 3-1/2" SIEVE AND GRADED UNIFORMLY DOWN TO DUST. TO BE PROVIDED BY OWNER.
- C. TIRE CHIPS: MATERIALS (ONLY) SHALL BE PROVIDED BY OWNER.
- D. ALL HANDLING (EXCAVATION, HAULING, STOCKPILING, ETC.) WILL BE COMPLETED BY THE CONTRACTOR.

1.3 SITE EXCAVATION, STOCKPILING, BACKFILLING, COMPACTION, AND GRADING

- A. THE WORK INCLUDES ALL OPERATIONS IN CONNECTION WITH EXCAVATION, BORROW, BACKFILLING, CONSTRUCTION OF COVER SOIL AND MILLING LAYERS, ROUGH GRADING, AND DISPOSAL OF EXCESS MATERIALS IN CONNECTION WITH THE PREPARATION OF THE SITE(S) FOR CONSTRUCTION OF THE WORK.
- B. EXCAVATION AND GRADING: PERFORM AS REQUIRED BY THE CONTRACT DRAWINGS.
1. CONTRACT DRAWINGS MAY INDICATE BOTH EXISTING GRADE AND FINISHED GRADE REQUIRED FOR CONSTRUCTION OF PROJECT.
- a. STAKE ALL UNITS, STRUCTURES, PIPING, ROADS, AND ESTABLISH THEIR ELEVATIONS.
- b. PERFORM OTHER LAYOUT WORK REQUIRED.
- c. REPLACE PERMANENT SURVEY MARKERS TO ORIGINAL LOCATION IF DISTURBED OR DESTROYED.
2. PREPARATION OF GROUND SURFACE FOR COVER SOIL LAYER:
- a. BEFORE COVER SOIL LAYER IS PLACED, REMOVE VEGETATION AND UNSUITABLE SOILS.
- b. EXISTING VEGETATION AND CLEAN SOIL STRIPPED FROM THE EXISTING INTERMEDIATE COVER WILL BE STOCKPILED FOR REUSE. IF THE SOD/SOIL CONTAINS CLASS I WASTE OR APPEARS TO CONTAIN LEACHATE, THE MATERIAL MUST BE HANDLED AS EXCAVATED WASTE MATERIAL AND TAKEN TO THE ACTIVE WASTE FILLING AREA.
- c. STOCKPILED CLEAN SOD/SOIL MAY BE TESTED AND IF IT IS APPROVED BY THE ENGINEER AND MEETS THE REQUIREMENTS FOR COVER SOIL, THE MATERIAL MAY BE USED BY THE CONTRACTOR.
- C. INSTALLATION OF COVER SOIL AS REQUIRED BY THE CONTRACT DRAWINGS:
1. INSTALL COVER SOIL TO MINIMUM THICKNESSES AND GRADES SHOWN ON THE CONTRACT DRAWINGS. GRADE TO SMOOTH TRUE LINES APPROVED BY ENGINEER WITH NO SOFT SPOTS OR UNCOMPACTED AREAS. TOP OF FINAL COVER ELEVATIONS SHALL NOT EXCEED THE DESIGN ELEVATIONS SHOWN ON THE CONTRACT DRAWINGS.
2. PROVIDE APPROVED FILL MATERIAL:
- a. DO NOT PLACE MATERIAL IN LAYERS GREATER THAN A 12-INCH LOOSE THICKNESS.
- b. LIFT THICKNESS SHALL BE AT THE DISCRETION OF THE ENGINEER.
3. COMPACT BY SHEEPSFOOT, DOZER, PNEUMATIC ROLLERS, VIBRATORS, OR BY OTHER EQUIPMENT AS REQUIRED TO OBTAIN SPECIFIED DENSITY.
- a. CONTROL MOISTURE FOR EACH LAYER NECESSARY TO MEET REQUIREMENTS OF COMPACTION.

4. UPON REACHING THE REQUIRED COMPACTED THICKNESS OF COVER SOIL LAYER, PROOF ROLL AND OBTAIN THE ENGINEER'S REVIEW/RECOMMENDATION AND APPROVAL. IF UNSUITABLE MATERIALS ARE ENCOUNTERED, REPAIR AS DIRECTED AND APPROVED BY THE ENGINEER TO REMOVE UNSUITABLE MATERIALS.
5. PROOF ROLLING SHALL BE CONDUCTED WITH A 10-TON DRUM ROLLER APPROVED BY THE ENGINEER. AN ALTERNATE APPROVED BY THE ENGINEER MAY BE USED IN CONSTRICTED AREAS.
6. WHERE COVER SOIL LAYER MATERIALS ARE DETERMINED TO BE UNSUITABLE, SUCH MATERIALS SHALL BE REMOVED TO THE LENGTHS, WIDTHS, AND DEPTHS DIRECTED BY THE ENGINEER, AND BACKFILLED WITH SUITABLE MATERIAL UNLESS FURTHER EXCAVATION OR EARTHWORK IS REQUIRED. ADDITIONAL PAYMENT WILL BE MADE FOR EXCAVATION AND REPLACEMENT OF COVER SOIL LAYER EXCEPT FOR MATERIAL PREVIOUSLY PLACED BY CONTRACTOR THAT DID NOT MEET PROJECT SPECIFICATIONS.
- D. DEWATERING (AS REQUIRED): PROVIDE AND MAINTAIN DEWATERING OF ALL SURFACE WATER AND/OR GROUNDWATER AS REQUIRED FOR EXCAVATION. WHERE GROUNDWATER IS EXPECTED TO BE ENCOUNTERED DURING BORROW AREA EXCAVATION, INSTALL A DEWATERING SYSTEM TO PREVENT SOFTENING AND DISTURBANCE OF EXCAVATION, ALLOW BORROW MATERIAL TO BE EXCAVATED DRY, AND MAINTAIN A STABLE EXCAVATION.
- E. DO NOT PLACE FILL WHEN THE UNDERLYING MATERIAL IS FROZEN, WET, LOOSE, OR SOFT.
- F. MOISTURE CONTROL:
1. MOISTURE CONTENT OF MATERIALS PRIOR TO, AND DURING COMPACTION, SHALL BE UNIFORM THROUGHOUT EACH LAYER OF MATERIAL.
2. GRANULAR MATERIALS SHALL BE THOROUGHLY WETTED DURING OR IMMEDIATELY PRIOR TO COMPACTION.
3. SUPPLEMENTARY WATER SHALL BE ADDED AS REQUIRED TO MATERIALS BY SPRINKLING AND MIXING UNIFORMLY THROUGHOUT LAYER.
4. MATERIALS TOO WET FOR PLACING SHALL BE TEMPORARILY SPREAD OR AERATED UNTIL MOISTURE CONTENT IS ACCEPTABLE. IF THESE MATERIALS CANNOT BE PROCESSED IN TIME TO USE, THE CONTRACTOR SHALL FIND ALTERNATIVES ACCEPTABLE TO THE ENGINEER.
- G. INSTALLATION OF MILLINGS AS REQUIRED BY THE CONTRACT DRAWINGS:
1. INSTALL ASPHALT MILLINGS TO MINIMUM THICKNESSES AND GRADES SHOWN ON THE CONTRACT DRAWINGS. GRADE TO SMOOTH TRUE LINES APPROVED BY ENGINEER WITH NO SOFT SPOTS OR UNCOMPACTED AREAS.
2. LIFT THICKNESS SHALL BE AT THE DISCRETION OF THE ENGINEER.
3. COMPACT BY DOZER, PNEUMATIC ROLLERS, VIBRATORS, OR BY OTHER EQUIPMENT AS REQUIRED TO OBTAIN SPECIFIED DENSITY.
4. UPON REACHING THE REQUIRED COMPACTED THICKNESS OF ASPHALT MILLINGS, PROOF ROLL AND OBTAIN THE ENGINEER'S REVIEW/RECOMMENDATION AND APPROVAL. IF UNSUITABLE MATERIALS ARE ENCOUNTERED, REPAIR AS DIRECTED AND APPROVED BY THE ENGINEER TO REMOVE UNSUITABLE MATERIALS.
5. PROOF ROLLING SHALL BE CONDUCTED WITH A 10-TON DRUM ROLLER APPROVED BY THE ENGINEER. AN ALTERNATE APPROVED BY THE ENGINEER MAY BE USED IN CONSTRICTED AREAS.

1.4 FIELD QUALITY CONTROL

- A. MOISTURE DENSITY RELATIONS, TO BE ESTABLISHED BY THE OWNER ARE REQUIRED FOR ALL MATERIALS TO BE COMPACTED.
- B. EXTENT OF COMPACTION TESTING WILL BE AS NECESSARY TO ASSURE COMPLIANCE WITH SPECIFICATIONS.
- C. GIVE MINIMUM OF 24-HOUR ADVANCE NOTICE TO ENGINEER WHEN READY FOR COMPACTION OR SUBGRADE TESTING AND INSPECTION.
- D. SHOULD ANY COMPACTION DENSITY TEST, SUBGRADE INSPECTION, OR OTHER QA/QC PROBLEM BE IDENTIFIED, THE AFFECTED AREA SHALL BE DELINEATED AND REWORKED BY

CONTRACTOR AS NECESSARY TO ACHIEVE PASSING CRITERIA.

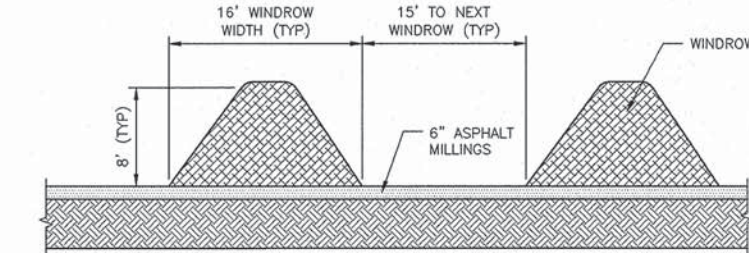
- E. CONTRACTOR SHALL PAY FOR ALL COSTS ASSOCIATED WITH CORRECTIVE WORK AND RETESTING RESULTING FROM FAILED TESTS.

1.5 COMPACTION DENSITY REQUIREMENTS

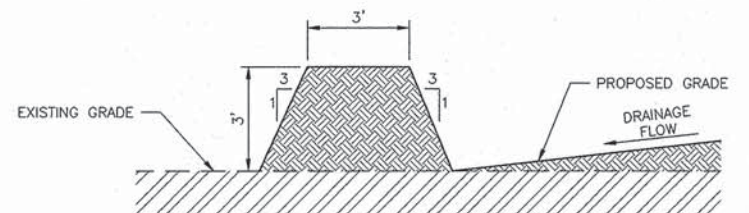
- A. OBTAIN APPROVAL FROM ENGINEER WITH REGARD TO SUITABILITY OF SOILS AND ACCEPTABLE SUBGRADE PRIOR TO SUBSEQUENT OPERATIONS.
- B. PROVIDE DEWATERING SYSTEM NECESSARY TO SUCCESSFULLY COMPLETE COMPACTION AND CONSTRUCTION REQUIREMENTS.
- C. REMOVE FROZEN, LOOSE, WET, OR SOFT MATERIAL AND REPLACE WITH APPROVED MATERIAL AS DIRECTED BY ENGINEER.
- D. STABILIZE SUBGRADE WITH APPROVED MATERIALS AS DIRECTED BY ENGINEER.
- E. COVER SOIL SHALL BE COMPACTED TO A MINIMUM 95% STANDARD PROCTOR MAXIMUM DRY DENSITY. ASPHALT MILLINGS SHALL BE COMPACTED TO 92% MODIFIED PROCTOR. THE SOILS SHALL BE WETTED OR DRIED AS NECESSARY SO THAT THE MOISTURE CONTENT DURING COMPACTION IS NEAR THE OPTIMUM MOISTURE CONTENT TO CONSISTENTLY ACHIEVE TARGET COMPACTION, OR AS OTHERWISE DETERMINED BY ENGINEER.
- F. PERFORM TESTING AT A MINIMUM FREQUENCY AS SHOWN BELOW:

TEST DESCRIPTION	TEST FREQUENCY
1. COVER SOIL	
DENSITY, NUCLEAR METHOD	1 PER 2,000 YD ³ , ASTM D6938
MOISTURE CONTENT, NUCLEAR METHOD	1 PER 2,000 YD ³ , ASTM D6938
SAND CONE OR DRIVE CYLINDER METHOD	1 PER 2 NUCLEAR TESTS, ASTM D2937
OVEN MOISTURE CONTENT VERIFICATION	1 PER 2 NUCLEAR TESTS, ASTM D2216
MOISTURE DENSITY RELATIONS	1 PER 2,000 YD ³ , ASTM D698*
SIEVE ANALYSIS	1 PER 2,000 YD ³ , ASTM D421*
2. RECYCLED ASPHALT PAVEMENT	
DENSITY, NUCLEAR METHOD	1 PER 1,000 YD ³ , ASTM D6938
MOISTURE CONTENT, NUCLEAR METHOD	1 PER 1,000 YD ³ , ASTM D6938
MOISTURE DENSITY RELATIONS	1 PER SOURCE, ASTM D1557*
SIEVE ANALYSIS	1 PER SOURCE, ASTM D421*

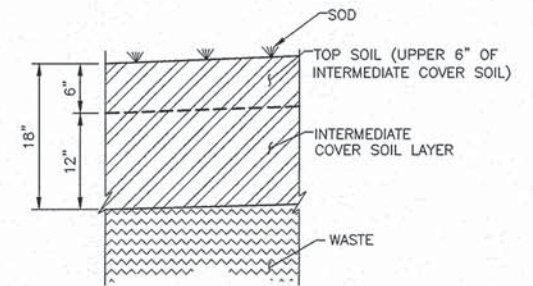
* INCREASE FREQUENCY AS NEEDED TO ENSURE EACH SOIL TYPE IS TESTED.



TYPICAL WINDROW
NOT TO SCALE

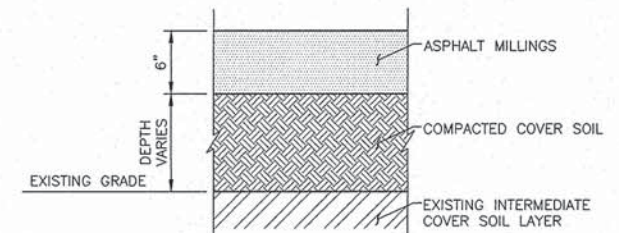


DRAINAGE BERM
NOT TO SCALE

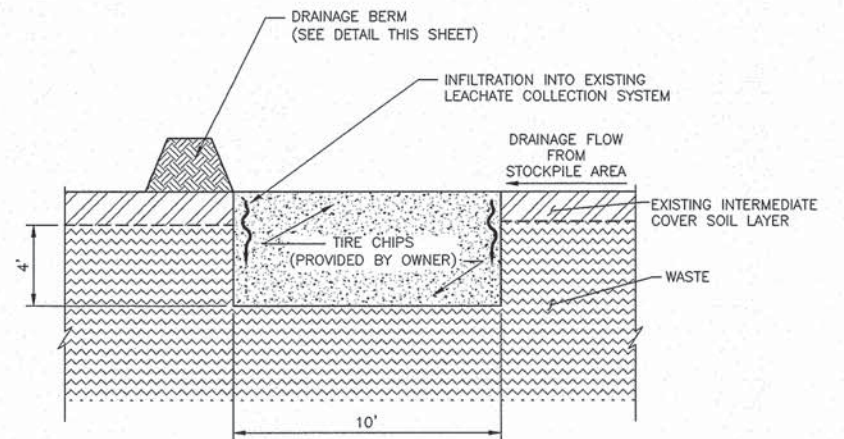


NOTE:
SOIL AVAILABLE ON SITE.

INTERMEDIATE COVER DETAIL
NOT TO SCALE



ACTIVE COMPOSTING AREA
TYPICAL SECTION
NOT TO SCALE



SUMP
NOT TO SCALE



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ISSUE	DATE	DESCRIPTION
A	MARCH 2015	ISSUED FOR CONSTRUCTION

PROJECT MANAGER	R. SIEMERING
REVIEWED BY	C. RESTREPO
CIVIL DESIGN BY	R. CURTIS
DRAWN BY	B. JOHNSON
PROJECT NUMBER	0100-243250-001



ROBERT B. CURTIS, P.E.
LICENSE NO. 73758



BIOSOLIDS COMPOSTING
PILOT STUDY
SITE PREPARATION

0 1" 2"

DETAILS
FILENAME C-06.DWG
SCALE AS SHOWN

SHEET
C-06