Hillsborough County
Florida

Hillsborough County

Southeast County Landfill

Stage 1 - Sinkhole Stabilization Plan

January 12, 2011

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Ms. Susan Pelz, P.E.
Program Manager, Solid Waste
Department of Environmental Protection
13051 North Telecom Parkway
Temple Terrace, Florida 33637-0926

RE: **Stage 1 - Sinkhole Stabilization Plan**
Hillsborough County Southeast County Landfill
FDEP Permit No. 35435-014-SO/01

Dear Ms. Pelz:

On behalf of Hillsborough County Public Utilities Department, Solid Waste Management Division, (SWMD), HDR Engineering, Inc. (HDR) and SDII Global Corporation (SDII) are pleased to submit four copies of the *Stage 1 – Sinkhole Stabilization Plan* (Stage 1 Plan) and four full size sets of the Stage 1 Plan drawings. The Stage 1 Plans and drawings are signed and sealed by a Professional Engineer, registered in the state of Florida. The Stage 1 Plan is intended to stabilize the sinkhole which is located on the west side of Phase VI, within Phases I-VI, at the Southeast County Landfill, in order to provide access and a safe working environment for the subsequent geotechnical/geophysical investigation.

As you are aware, SWMD, HDR, and SDII staff met with the FDEP on January 11, 2011, to briefly review and discuss the Stage 1 Plan for assisting the FDEP with their review, minimize the need for additional information, and to expedite FDEP's review process.

The County would appreciate your timely review of the enclosed Stage 1 Plan so that the sinkhole can be stabilized for further investigation and final remediation. More importantly, stabilizing (grouting) the sinkhole will reduce the potential for impacts to the environment.

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

Sincerely,

HDR ENGINEERING, INC.

Richard Siemering
Senior Project Manager
Solid Waste Section Manager

SDII GLOBAL CORPORATION

Steven H. Meiggs, PE
Principal Engineer
Florida License #64832

Enclosures

cc: Patricia Berry, PUD/SWMD
Larry Ruiz, PUD/SWMD
Dave Adams, PUD/SWMD
Michelle Van Dyke, PUD

STAGE 1 – SINKHOLE STABILIZATION PLAN

Southeast County Landfill
Hillsborough County, Florida

Prepared for:

Hillsborough County
Public Utilities Department
Solid Waste Management Division

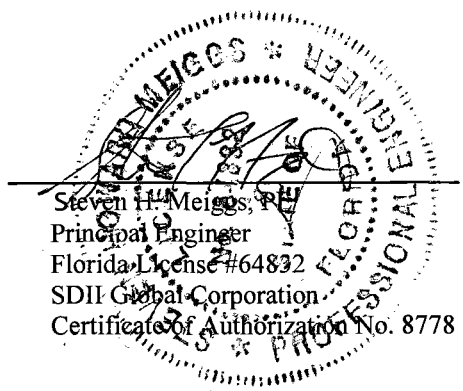
Prepared by:

SDII Global Corporation
4509 George Road
Tampa, FL 33634

Submitted to:

Florida Department of Environmental Protection
Southwest District

January 12, 2011



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STAGE 1 - SINKHOLE STABILIZATION PLAN NARRATIVE

SOUTHEAST COUNTY LANDFILL

HILLSBOROUGH COUNTY, FLORIDA

JANUARY 12, 2011

The initial stabilization of the landfill is required to provide safe access to the area of concern in order to complete a full subsidence/geotechnical investigation to determine the mechanism of the subsurface failure that led to the development of the apparent sinkhole (presumed sinkhole as defined by §627.706 Florida Statue), the extent of the subsurface impacts, to develop a thorough and complete remedial design for full subsurface stabilization, arrest the migration of material down the throat of the apparent sinkhole, etc. This initial stabilization is recommended to consist of compaction grouting.

Inclined Boreholes

The installation of two inclined boreholes will provide initial, although limited, insight into the subsurface conditions that underlie the area of concern. The boreholes will be advanced using the sonic technique that provides a continuous core sample and does not require the injection of drilling fluid (i.e. water) into the borehole. The borehole locations (B-SH-01 and B-SH-02) are shown on Sheets C-04 and C-05 (see Attachment C). The boreholes have been positioned to intersect the throat of the sinkhole. It is highly likely the upper borehole will intersect the sinkhole throat, but it is possible the lower borehole may not if the throat of the sinkhole is inclined to the north or south. If it does not, the borehole will be backfilled with grout and one or two additional boreholes will be advanced in an effort to locate the throat. The third borehole (B-SH-03) will be advanced 10 ft to the north and at the same elevation as B-SH-02. If this borehole does not intersect the throat, a fourth, B-SH-04, will be advanced 10 ft to the south of BH-SH-02. A 2-inch SCH 40 PVC casing will be installed in the two boreholes that intersect the throat, and boreholes that do not intersect it would be backfilled with grout.

Borehole Survey

After grouting the casing into the boreholes, a Reflex Instruments EZ-Shot downhole survey tool will be used to obtain 3D positioning of the casing. This will allow a more thorough evaluation of the core samples and provide a baseline measurement of the casing position prior to

compaction grouting. Borehole surveys will be performed during the grouting program and bi-weekly after completion of the grouting program.

Vertical Displacement Gauges

Two vertical displacement gauges will be placed in the base of the sinkhole that is approximately 64 ft below the original landfill surface. These gauges will be placed using a cable and pulley system to maintain personnel safety. The hydraulic gauges will measure change in elevation relative to a reference point that is a sufficient distance away from the sinkhole as shown on Sheet C-04. The reference point will be surveyed periodically to confirm it is stable.

Compaction Grouting

The initial stabilization will be accomplished through compaction grout injection to densify the soils beneath the sinkhole (see Attachment A - Technical Specification and Attachment C - Drawings). The compaction grout stabilization will utilize nine injection points spaced approximately 10 feet apart as shown on Sheet C-04. As shown on Sheet C-05, five of the injection points will be approximately 20 ft below the in-filled portion of the sinkhole and four injection points will then be placed at a relative depth of 30 ft. The grout points will be inclined at approximately a 35 degree angle as shown on Sheet C-05. As shown on the drawings, the initial orientation of the grout holes are east to west. However, based on the findings of the sonic boreholes and/or the compaction grouting, additional grout holes may be required in a south to north orientation.

Grout point casing installation and extraction shall be performed using rotary duplex drilling. This process involves the advancement of an outer casing, inner drill rod, and drill bit at the same time. Rotary duplex drilling will be required based on the following advantages:

1) Lowest risk of ground loss in the landfill and underlying soils as the hole will be cased full length
2) Minimize water from being introduced into the landfill given that the water and cuttings travel up the interior of the casing rather than the casing exterior as is common with conventional compaction grouting equipment.
3) Greater accuracy positioning the grout injection points.
4) Ability to sample the drill cuttings at the drill head; drill cuttings can be used to further characterize the landfill material and soils.
5) Drill bits can be changed by removing the inner drill rod during injection point installation if an obstruction is encountered (i.e. outer casing remains in place).

The outer casing will have a minimum inside diameter of 4.5 inches with an approximate outside diameter of 5.5 inches to allow for the injection of the low slump grout.

The drill rig to be utilized for the drilling will have a minimum of 12,000 ft/lbs of torque. Due to the angles of the inclined casing anticipated for this project, all of the pulling and grouting of the casing will be done with the drill.

Drilling in the casing will require approximately 100 gallons of water per minute and will generate a similar quantity of water and drill cuttings. As shown on Sheet C-03, a bermed temporary infiltration area will be constructed near the drilling activities (away from the sinkhole) to collect and allow for the infiltration of the flushing water into the landfill to avoid pumping and transport of the water to the County's on-site Leachate Treatment Plant and/or a County owned WWTP. The infiltration area was established based on an assumed infiltration rate of 2.835 ft/day (see Attachment B). During the course of the workday, the infiltration pond will allow for minor infiltration of the discharge water within the limits of the lined area of Phases I-VI. At the end of the work day, the residual water in the holding pond (not including the sedimentation pond area) will be pumped into a tanker truck for disposal. In addition, if the turbidity of the water in the holding pond appears to be reasonably low, the residual water may be pumped into the existing Phases I-VI leachate collection system at a sufficient distance away and down gradient from the sinkhole area. The volume of the water stored in the holding pond will be monitored to ensure adequate storage capacity for grout operations and for the potential occurrence of a rainfall event.

In order to supply water for the drilling, water will be accessed from the maintenance facility supply well. Water will be transferred via a jet pump to a 22,000 gallon holding tank near the drilling activities as shown on Sheet C-03.

A temporary access road will be constructed for drilling rig and ready-mix truck access. The driveway will extend from the Phase I area of the landfill to the drilling/injection site as shown on Sheet C-03. This roadway can be constructed from excess hardpan material available from within the landfill.

A compaction grout with sufficient silt sizes to develop internal friction to not enter soil pores but remain in a homogenous mass that can give controlled displacement of loose soils will be used. The material blend per cubic yard will consist of:

- 250 pounds of Portland cement (ASTM C150 Type I/II),
- 2,250 to 2,270 pounds of FDOT fine aggregate silica sand,

- 750 pounds of flyash (ASTM C618, Class F) with a fineness (amount retained on 325 sieve) of greater than 20%,
- Water (estimated 400 pounds) and admixtures (estimated 10 pounds) to achieve a pumpable, thixotropic, viscous grout with a 3 to 6 inch slump, to enable pumping at high pressure and remain intact after injection.

The strength of the grout is designed to have a minimum compressive strength of 1,500 pounds per square inch (psi) at 28 days and to provide a permanent, non-erodible material.

Grout mix design submittals will include the following:

1) Sieve analysis and source of fine aggregates.
2) Test for aggregate organic impurities.
3) Test for deleterious aggregate per ASTM C289.
4) Proportioning of all materials.
5) Type of cement with mill certificate for cement.
6) Type of fly ash with certificate of conformance to specification requirements and mill certificate.
7) Slump.
8) Air content.
9) Brand, type, ASTM designation, and quantity of each admixture proposed for use.
10) 28-day cylinder compressive test results of trial mixes per ACI 318 and as indicated herein.
11) Standard deviation value for concrete production facility.

The project geotechnical engineer will approve all grout mix design submittals prior to use. Adjustment of grout mix designs when material characteristics, job conditions, weather, strength, test results, or other circumstances warranted will not occur unless approved by the project geotechnical engineer.

Ready-mixed concrete batch plants will be certified by the National Ready Mixed Concrete Association (NRMCA). A delivery ticket for each load of ready-mixed concrete shall include:

1) Truck operator shall hand ticket to Construction Administrator or Laboratory Technician at the time of delivery.
2) Ticket to show:
    a. Mix identification mark.
    b. Quantity delivered.
    c. Amount of each material in batch.
    d. Outdoor temperature in the shade.
    e. Time at which cement was added.

f. Numerical sequence of the delivery.
g. Approved amount of water (if any) added.

The grout will be pumped at a relatively slow rate such that the grout will densify the formation and reduce the risk of hydraulic fracturing. The injection pressures (near the top of pipe) should be limited to between 300 to 500 psi. The grouting contractor will provide mechanical and electronic instrumentation to monitor grout pressure, flow rate of grout, and the volume of grout injected. Calibration information will be provided for all instrumentation.

Each point will be injected with compaction grout from the terminal depth of pipe to the ground surface. At a depth of 10 ft below the landfill liner, the grout pressure will be reduced so that the hole created by the drill casing is being filled and grout is not being forced into the landfill. In addition, the injected grout will change to a cement-bentonite grout to be mixed onsite. The material blend will consist of water, cement, and bentonite in a weight to ratio mixture of 2.5:1.0:0.3 (i.e. 30 gallons of water: 1 cubic foot of Portland (ASTM C150 Type I/II): 25 pounds of sodium bentonite powder (QUIK-GEL 200-mesh, premium-grade, high-yielding Wyoming sodium bentonite or equal). The water and cement will be mixed prior to the addition of the bentonite. The cement-bentonite grout is designed to have a minimum compressive strength of 50 pounds per square inch (psi) at 28 days and bulk modulus (equilateral resistance to compression) of 10,000 psi.

The project geotechnical engineer will approve all grout mix design submittals prior to use. Adjustment of grout mix designs when material characteristics, job conditions, weather, strength, test results, or other circumstances warranted will not occur unless approved by the project geotechnical engineer.

Since the purpose of the grouting program is to provide a stable working platform to enable completion of the geotechnical investigation program and sinkhole grouting program, each grout point will be limited to approximately 30 cubic yards of compaction grout. The grout pressure is expected to increase as the grouting program progresses indicating the formation is being densified.

Instrumentation Measurements During Grouting

At the completion of each grout hole, a downhole survey of the PVC pipe installed in the two boreholes will be performed with the Reflex Instruments EZ-Shot logging tool to determine the 3D position of the casing. The casing position relative to the initial position will provide information regarding the movement of the PVC pipe/formation in response to the compaction grouting.

The vertical displacement gauges will be monitored during the grouting program to see if the soil/waste in the base of the sinkhole (approximately 64 ft below original landfill surface) moves during grout pumping. Excessive heaving of the sinkhole base would indicate the grout point may be too shallow and the formation is not being densified. These gauges will also be monitored after grouting to confirm the soil base within the sinkhole maintains stability.

Health and Safety Plan

The grouting contractor will be required to submit an acceptable Health and Safety Plan to the Owner/Engineer for review prior to commencing with the work. The Health and Safety Plan will include, but not be limited to, monitoring of landfill gases, monitoring subsidence within the sinkhole area, precautions for placement of loads within the proximity of the sinkhole area, and other potential environmental issues associated with working on or near a Class I landfill and sinkhole formation.

Attachment A

Technical Specification

SECTION 02341
COMPACTION GROUT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Compaction grout injection.
   2. Grout mixes, proportioning, and source quality control.

B. Related Sections include, but are not necessarily limited to:
   1. Division 1 - General Requirements.

1.2 QUALITY ASSURANCE

A. Referenced Standards:
   1. American Concrete Institute (ACI):
      a. 116R, Cement and Concrete Terminology.
      b. 212.3R, Chemical Admixtures for Concrete.
      c. 318, Building Code Requirements for Structural Concrete.
   2. American Society for Testing and Materials (ASTM):
      a. C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
      b. C33, Standard Specification for Concrete Aggregates.
      c. C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
      d. C94, Standard Specification for Ready-Mixed Concrete.
      e. C138, Standard Method of Test for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
      f. C143, Standard Test Method for Slump of Hydraulic Cement Concrete.
      g. C150, Standard Specification for Portland Cement.
      h. C172, Standard Practice for Sampling Freshly Mixed Concrete.
      i. C173, Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
      j. C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
      k. C260, Standard Specification for Air Entraining Admixtures for Concrete.
      l. C289, Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).
      m. C494, Standard Specification for Chemical Admixtures for Concrete.
      n. C618, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
      o. E329, Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
   3. Federal Specification (FS):
      a. CEGS 03300, Vegetable Fiber.
   4. Florida Building Code, current edition.
   5. Florida Department of Transportation, 2010:
      a. Section 902 - Fine Aggregate

B. Quality Control:
   1. Grout testing agency.
      a. Contractor to employ and pay for services of an independent testing laboratory to:
         1) Perform materials evaluation.
         2) Perform retests due to initial failing tests.

b. See 3.4 "Field Quality Control" for Owner employment of testing laboratory.
c. Grout testing agency to meet requirements of ASTM E329 and be approved by Engineer.

2. Do not begin concrete production *until* proposed concrete mix design has been approved by Engineer.
   a. Approval of grout mix design by Engineer does not relieve Contractor of his responsibility to provide grout that meets the requirements of this Specification.
3. Adjust grout mix designs when material characteristics, job conditions, weather, strength test results or other circumstances warrant.
   a. All adjustments to be properly documented by Contractor
   b. Do not use revised concrete mixes until submitted to and approved by Engineer.

C. Qualifications:
1. Ready mixed concrete batch plant certified by National Ready Mixed Concrete Association (NRMCA).

1.3 DEFINITIONS

A. Per ACI 116R except as modified herein:
1. Grout Testing Agency: Testing agency employed to perform materials evaluation, design of concrete mixes or testing of concrete placed during construction.
2. Indicated: Indicated by Contract Documents.
3. Required: Required by Contract Documents.
4. Specified strength: Specified compressive strength at 28 days.
5. Submitted: Submitted to Project Geotechnical Engineer (Engineer).

1.4 SUBMITTALS

A. Shop Drawings:
1. See Section 01340.
2. Equipment to be utilized to include:
   a. Injection pump
   b. Drill rig
   c. Mechanical and electrical instrumentation
   d. Drill bits
   e. Casing
   f. Drill bit attachments
3. Grout mix designs proposed for use. Grout mix design submittal to include:
   a. Sieve analysis and source of fine and coarse aggregates.
   b. Test for aggregate organic impurities.
   c. Test for deleterious aggregate per ASTM C289.
   d. Proportioning of all materials.
   e. Type of cement with mill certificate for cement.
   f. Type of fly ash with certificate of conformance to specification requirements and mill report.
   g. Slump.
   h. Air content.
   i. Brand, type, ASTM designation, and quantity of each admixture proposed for use.
   j. 3, 7 and 28 day cylinder compressive test results of trial mixes per ACI 318 and as indicated herein.
   k. Standard deviation value for concrete production facility.
4. Strength test results of newly placed concrete, including slump, air content and concrete temperature.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery:
   1. Ready-mix Grout:
      a. Prepare a delivery ticket for each load for ready-mixed grout.
      b. Truck operator shall hand ticket to Construction Administrator Technician at the time of delivery.
      c. Ticket to show:
         1) Mix identification mark.
         2) Quantity delivered.
         3) Amount of each material in batch.
         4) Outdoor temp in the shade.
         5) Time at which cement was added.
         6) Numerical sequence of the delivery.
         7) Approved amount of water (if any) added.
         8) Time of completion of unloading

PART 2 - PRODUCTS

2.1 MATERIALS

A. Drilling Rig
   1. Klemm KR 806-3 or 802-1 (or equal) to have the following attachments/capabilities:
      a. 12,000 ft-lbs of torque
      b. Rotary Duplex Drilling
      c. Steel Outer drill casing of 5.5-inch outside diameter and 4.5-inch inside diameter
         1) Minimum onsite casing of 450 linear feet
      d. Steel Inner drill pipe with integrated flushing system
         1) Minimum onsite drill pipe of 450 linear feet
      e. Multiple drill head attachments for the end of the inner drill casing capable of advancement through multiple materials to include steel, clay, sand, concrete, wood, and plastic sheets and strands.
      f. Integrated injection system to allow for compaction grout injection from separate pump
   2. Trailer Concrete /Grout Pump - Reed Model C70S (or equal) capable of the following:
      a. Concrete output of 6 to 70 cy ft/hour
      b. Theoretical horizontal pumping distance of 1000 ft
      c. Variable-volume and RPM control
      d. Hydraulic outriggers
      e. Calibration capacity

B. Portland Cement: Conform to ASTM C150 Type I and Type II.

C. Fly Ash:
   1. ASTM C618, Class F.
   2. Minimum material retained on 325 sieve to be 20% from mill certification
   3. Nonstaining.
      a. Hardened concrete containing fly ash to be uniform light gray color.
   4. Maximum loss on ignition: 4 percent.
   5. Compatible with other concrete ingredients.
   6. Obtain proposed fly ash from a source approved by the State Highway Department in the state where the Project is located for use in bridge concrete.

D. Admixtures:
   1. Air entraining admixtures: ASTM C260.
   2. Water reducing, retarding, and accelerating admixtures:
      a. ASTM C494 Type A through E.
      b. Conform to provisions of ACI 212.3R.

c. Do not use retarding or accelerating admixtures unless specifically approved in writing by Engineer and at no cost to Owner.
d. Follow manufacturer's instructions.
e. Use chloride free admixtures only.

3. Maximum total water soluble chloride ion content contributed from all ingredients of concrete including water, aggregates, cementitious materials and admixtures by weight percent of cement:
   a. 0.10 all concrete.
4. Do not use calcium chloride.
5. Provide admixtures of same type, manufacturer and quantity as used in establishing required concrete proportions in the mix design.

E. Water: To be supplied by Hillsborough County.
1. Contractor to supply 22,000 holding tank for drilling water
2. Contractor to supply jet pump for water transfer from supply well tank to holding tank

F. Aggregates:
1. Normal weight concrete: ASTM C33, except as modified below.
2. Fine aggregate: Clean natural silica sand.
   a. No manufactured or artificial sand.
   b. FDOT specification code F01 fine aggregate sand

G. Concrete strength test results
1. Strength test - frequency:
   a. Not less than one test each day concrete placed.
   b. Not less than one test for each 50 CY or major fraction thereof placed in one day.
   c. Not less than one test for each type of concrete poured.
2. Not less than one test for each delivery where water addition has been approved at the jobsite.

2.2 CONCRETE MIXES

A. General:
1. All concrete to be ready mixed concrete conforming to ASTM C94 with all components and additives blended in at plant, unless otherwise approved.
2. Provide concrete of specified quality capable of being placed without segregation and, when cured, of developing all properties required.
3. All concrete to be normal weight concrete.
4. Mix shall contain fly ash.

B. The material blend per cubic yard will consist of:
1. 250 pounds of Portland cement (ASTM C150 Type I/II),
2. 2250 to 2270 pounds of FDOT fine aggregate silica sand,
3. 750 pounds of flyash (ASTM C618, Class F) with a fineness (amount retained on 325 sieve) of greater than 20%
4. Water (estimated 400 pounds) and admixtures (estimated 10 pounds) to achieve a pumpable, thixotropic, viscous grout with a 3 to 6 inch slump, to enable pumping at high pressure and remain intact after injection.

C. Strength:
1. Provide specified strength for grout as follows:

AREA	WEIGHT	SPECIFIED STRENGTH*
Injection points	Normal weight	1,500 psi

*Minimum 28-day compressive strength.

D. Air Entrainment: Provide air entrainment in all concrete resulting in a total air content percent by volume as follows:

TOTAL AIR CONTENT PERCENT
5% +/- 1 ½%

1. Air content to be measured in accordance with ASTM C231, ASTM C173, or ASTM C138.

E. Slump: 6 IN maximum, 3 IN minimum.
   1. Measured just before injection point.
   2. Pumped concrete:
      a. Provide additional water at batch plant or at site to allow for slump loss due to pumping.
         1) For site addition, hold back water from batch plant quantity.
      b. Provide only enough additional water so that slump of concrete at injection point does not exceed maximum slump specified above.
         1) Do not exceed approved mix design's water content.
   3. Determine slump per ASTM C143.

PART 3 - EXECUTION

3.1 INJECTION OF CONCRETE (GROUT)

A. General:
   1. Grout point casing installation and extraction shall be performed using rotary duplex drilling
      a. Drill rig capable of 12,000 foot-pounds of torque (Kleem 800 series or equal) equipped with the following:
         1) Outer casing outer diameter of 5.5 inches
         2) Outer casing inner diameter of 4.5 inches
         3) Flush system incorporated into inner drill casing
            a) Discharge to be piped to holding area by Contractor
         4) Inner casing tip with drill bit
   2. Contractor is responsible for all injection equipment and casing
   3. Provide capacity to return cuttings to surface for inspection
   4. Flushing system to be capable of utilizing air or water
   5. Drilling equipment must be able to install points as well as extract during injection
   6. Multiple drill bit types necessary to penetrate waste material in landfill including
      a. Clay
      b. Steel
      c. Concrete
      d. Wood
      e. Plastic sheets and strands

B. Testing Grout Equipment:
   1. Pump a minimum 3 CY of grout through 200 linear feet of casing placed on the ground surface.
   2. Measure grout pressure at three pumping rates of approximately 0.1, 0.25 and 0.5 cy/minute.
   3. Measure slump on a minimum of three samples obtained at the discharge end of pipe corresponding to the three pumping rates.

C. Placing Grout:
   1. Place in a continuous operation during casing extraction
   2. Injection pressures to be between 300 to 500 psi near top of injection point prior to casing extraction unless excessive heaving is noted.
   3. Injection pressures and casing extraction as per Project Geotechnical Engineer

D. Consolidation:
   1. Not required.

3.2 FIELD QUALITY CONTROL

A. Contractor will employ and pay for services of a concrete testing laboratory to perform testing of concrete placed during construction.
   1. Contractor to provide Owner with test results as soon as results are available.

B. Tests During Construction:
   1. Strength test - procedure:
      a. Four cylinders, 6 IN DIA x 12 IN high, will be taken from each sample per ASTM C172 and C31.
      b. Cylinders will be tested per ASTM C39:
         1) One at 3 days.
         2) One at 7 days.
         3) Two at 28 days.
         4) One held in reserve.
   2. Strength test - frequency:
      a. Not less than one test each day concrete placed.
      b. Not less than one test for each 50 CY or major fraction thereof placed in one day.
      c. Not less than one test for each type of concrete poured.
      d. Not less than one test for each delivery where water addition has been approved at the jobsite.
   3. Slump test: Per ASTM C143.
      a. Determined for each strength test sample.
      b. Minimum 1 per truck load delivered
      c. Additional slump tests may be taken.
   4. Air content: Per ASTM C231, C173, and C138.
      a. Determined for each strength test sample.
   5. Temperature: Determined for each strength test sample.

C. Evaluation of Tests:
   1. Strength test results: Average of 28-day strength of two cylinders from each sample.
      a. If one cylinder manifests evidence of improper sampling, molding, handling, curing or testings, strength of remaining cylinder will be test result.
      b. If both cylinders show any of above defects, test will be discarded.

D. Acceptance of Grout:
   1. Strength level of each type of concrete shall be considered satisfactory if both of the following requirements are met:
      a. Average of all sets of three consecutive strength tests equals or exceeds the required specified 28-day compressive strength.
      b. No individual strength test falls below the required specified 28-day compressive strength by more than 500 psi.
   2. If tests fail to indicate satisfactory strength level, perform additional tests and/or corrective measures as directed by Engineer.
      a. Perform additional tests and/or corrective measures at no additional cost to Owner.

END OF SECTION

Attachment B

Discharge Water Calculations

HDR | ONE COMPANY *Many Solutions*℠

Memo

To: Hillsborough County SWMD	
From: HDR Engineering, Inc.	Project: Hillsborough County Sink Hole Grouting Discharge Water Calculations
CC:	
Date: January 8, 2010	Job No:

RE: ICPR Model Discharge Water Calculations

The ICPR model was generated to model a sedimentation pond for storage capacity for 15,000 gallons of water from a grouting operation (estimated by Hayward Baker) in a 10-hour working day. The sedimentation pond size is 64 ft. by 64 ft. by 2 foot depth. In order to demonstrate adequate storage capacity the model was broken into three (3) stages. The stages are described below.

Stage 1

In this stage 15,000 gallons were inputted into the model with no infiltration was allowed through the bottom of the pond. The model output generated a water level elevation of 163.5 ft. See Attachment 1 for model outputs. This was doubled checked by hand calculating:

$15{,}000 \text{ gal} / 7.4805 \text{ gal/ ft}^3 = 2005.2 \text{ ft}^3$

$2005.2 \text{ ft}^3 / 4096 \text{ sf} = 0.49 \text{ ft}$

Bottom of pond = 163 ft. + 0.49 ft. = 163.49 ft.

Stage 2

Stage 2 inputted 15,000 gallons into the model but allowed infiltration through a 1 ft. thick layer of sand at vertical conductivity of 1×10^{-3}. The model output elevation is 163.19 ft. See Attachment 1 for model outputs. This was doubled checked by calculating storage capacity in the sand

$4096 \text{ sf} \times 1 \text{ ft.} = 4096 \text{ ft}^3$

$4096 \text{ ft}^3 \times 0.3 = 1228.8 \text{ ft}^3$

$1228.8 \text{ ft}^3 \times 7.4805 \text{ gal/ ft}^3 = 9{,}192 \text{ gal}$

$0.19 \text{ ft.} \times 4096 \text{ sf} = 778.24 \text{ ft}^3$

$778.24 \text{ ft}^3 \times 7.4805 \text{ gal/ ft}^3 = 5{,}821.62 \text{ gal}$

5,821.62 gal + 9,192 gal = 15,013.62 gal

Stage 3

This final stage inputted 15,000 gallons into the model for 2-consecutive days and allowed infiltration through a 1 ft. thick layer of sand. The output elevation is 163.65.

Summary

The Stage 1 model demonstrates that a proposed pond has capacity to accommodate a 10-hour working day of inflow from a grouting operation without infiltration through the bottom of the pond. Stage 2 model demonstrated the anticipated actual working conditions of the pond with infiltration through the bottom of the pond. Stage 2 demonstrates that there is over 1 ft. of freeboard in the pond. Stage 3 demonstrates that the pond has reserve capacity for two consecutive days of inflow from the grouting operations.

Attachment 1

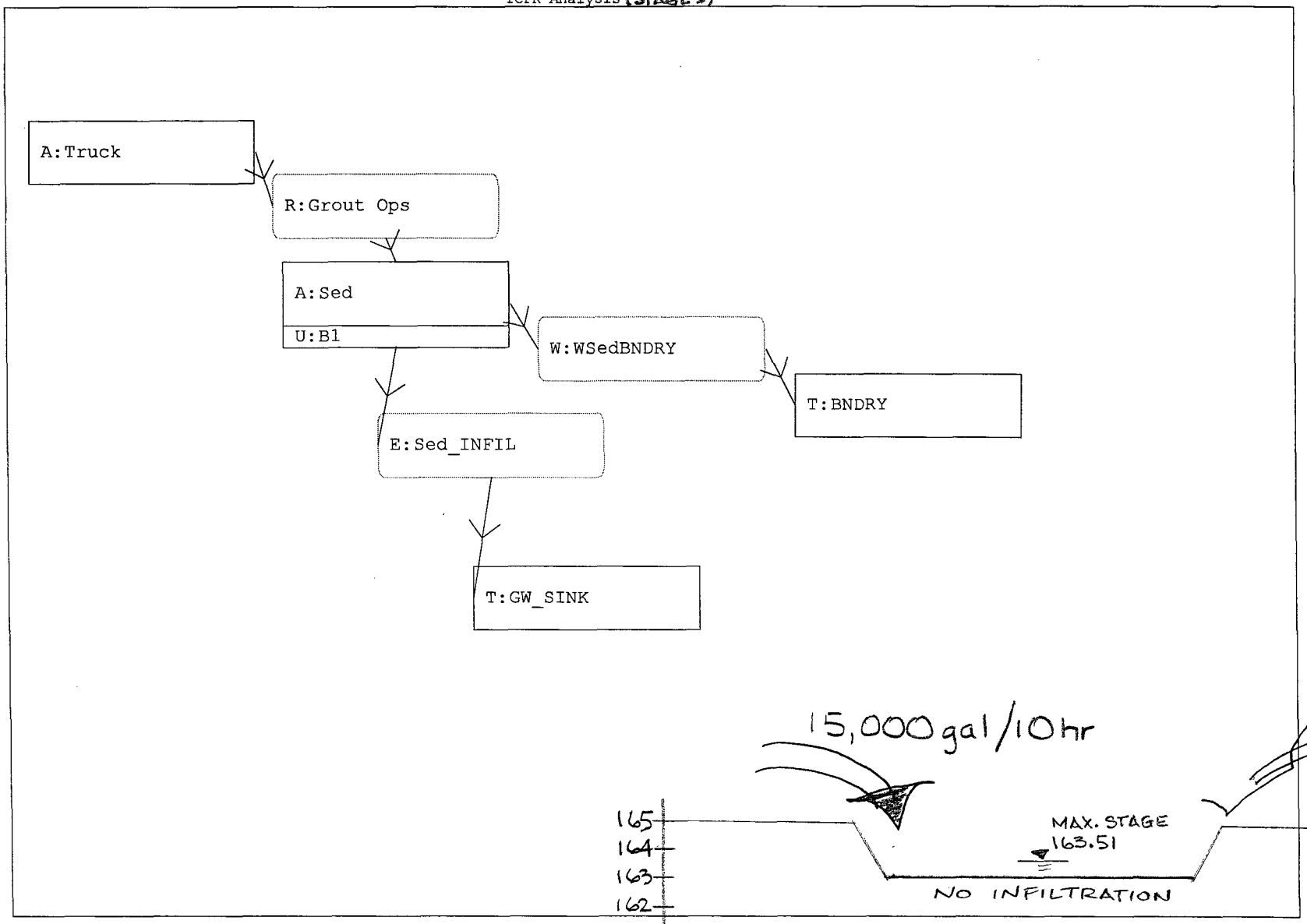
Stage 1

Hillsborough County
Phase I Sink Grouting
ICPR Analysis (STAGE 1)

Nodes
A Stage/Area
V Stage/Volume
T Time/Stage
M Manhole

Basins
O Overland Flow
U SCS Unit CN
S SBUH CN
Y SCS Unit GA
Z SBUH GA

Links
P Pipe
W Weir
C Channel
D Drop Structure
B Bridge
R Rating Curve
H Breach
E Percolation
F Filter
X Exfil Trench



Basins

Name: B1 | Node: Sed | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph:	Uh484	Peaking Factor:	484.0
Rainfall File:	Flmod	Storm Duration(hrs):	24.00
Rainfall Amount(in):	0.000	Time of Conc(min):	6.00
Area(ac):	0.023	Time Shift(hrs):	0.00
Curve Number:	100.00	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

Nodes

Name: BNDRY | Base Flow(cfs): 0.000 | Init Stage(ft): 165.000
Group: BASE | Warn Stage(ft): 165.000
Type: Time/Stage

Time(hrs)	Stage(ft)
0.00	165.000
999.00	165.000

Name: GW_SINK | Base Flow(cfs): 0.000 | Init Stage(ft): 162.000
Group: BASE | Warn Stage(ft): 162.000
Type: Time/Stage

Time(hrs)	Stage(ft)
0.00	162.000
999.00	162.000

Name: Sed | Base Flow(cfs): 0.000 | Init Stage(ft): 163.000
Group: BASE | Warn Stage(ft): 164.000
Type: Stage/Area

Stage(ft)	Area(ac)
163.000	0.0900
165.000	0.0900

Name: Truck | Base Flow(cfs): 0.000 | Init Stage(ft): 165.000
Group: BASE | Warn Stage(ft): 0.000
Type: Stage/Area

Stage(ft)	Area(ac)
165.000	0.0000
170.000	0.0000

Operating Tables

Name: Grout Ops | Group: BASE
Type: Rating Curve
Function: Time vs. Discharge

Time(hrs)	Discharge(cfs)
0.00	0.06
10.00	0.06
10.01	0.00

==== Weirs ====

Name: WSedBNDRY From Node: Sed
Group: BASE To Node: BNDRY
Flow: Both Count: 1
Type: Vertical: Mavis Geometry: Trapezoidal

Bottom Width(ft): 1.00
Left Side Slope(h/v): 3.00
Right Side Slope(h/v): 3.00
Invert(ft): 165.000
Control Elevation(ft): 165.000
Struct Opening Dim(ft): 9999.00
TABLE
Bottom Clip(ft): 0.000
Top Clip(ft): 0.000
Weir Discharge Coef: 3.200
Orifice Discharge Coef: 0.600

==== Rating Curves ====

Name: Grout Ops From Node: Truck Count: 1
Group: BASE To Node: Sed Flow: Both

	TABLE	ELEV ON(ft)	ELEV OFF(ft)
#1:	Grout Ops	165.000	165.000
#2:		0.000	0.000
#3:		0.000	0.000
#4:		0.000	0.000

==== Percolation Links ====

Name: Sed_INFIL From Node: Sed Flow: None
Group: BASE To Node: GW_SINK Count: 1

Surface Area Option: Use 1st Point in Stage/Area Table
Vertical Flow Termination: Horizontal Flow Algorithm
Aquifer Base Elev(ft): 162.000 Perimeter 1(ft): 256.000
Water Table Elev(ft): 162.000 Perimeter 2(ft): 382.000
**********0.000 Perimeter 3(ft): 758.000
Horiz Conductivity(ft/day): 1.400 Distance 1 to 2(ft): 10.000
Vert Conductivity(ft/day): 2.835 Distance 2 to 3(ft): 40.000
Effective Porosity(dec): 0.300 Num Cells 1 to 2: 76
Suction Head(in): 7.000 Num Cells 2 to 3: 152
Layer Thickness(ft): 1.000

==== Hydrology Simulations ====

Name: HILLS_SNKSTGI
Filename: C:\Program Files\Icpr3\HILLS_SNKSTGI.R32

Override Defaults: No

Time(hrs)	Print Inc(min)
30.000	2.00

==== Routing Simulations ====

Name: *HILLS_SNKSTG1* *Hydrology Sim: HILLS_SNKSTGI*
Filename: C:\Program Files\Icpr3\HILLS_SNKSTG1.I32

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000

Start Time(hrs): 0.000 End Time(hrs): 24.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 24.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
999.000	*15.000*

Group	Run
BASE	Yes

Hillsborough County
Phase I Sink Grouting
ICPR Analysis

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
BNDRY	BASE	HILLS_SNKSTG1	0.00	165.00	165.00	0.0000	0	0.00	0.00	0.00	0.00
GW_SINK	BASE	HILLS_SNKSTG1	0.00	162.00	162.00	0.0000	0	0.00	0.00	0.00	0.00
Sed	BASE	HILLS_SNKSTG1	24.00	163.51	164.00	0.0001	3920	10.00	0.06	0.00	0.00
Truck	BASE	HILLS_SNKSTG1	0.00	165.00	0.00	0.0000	113	0.00	0.00	0.00	0.06

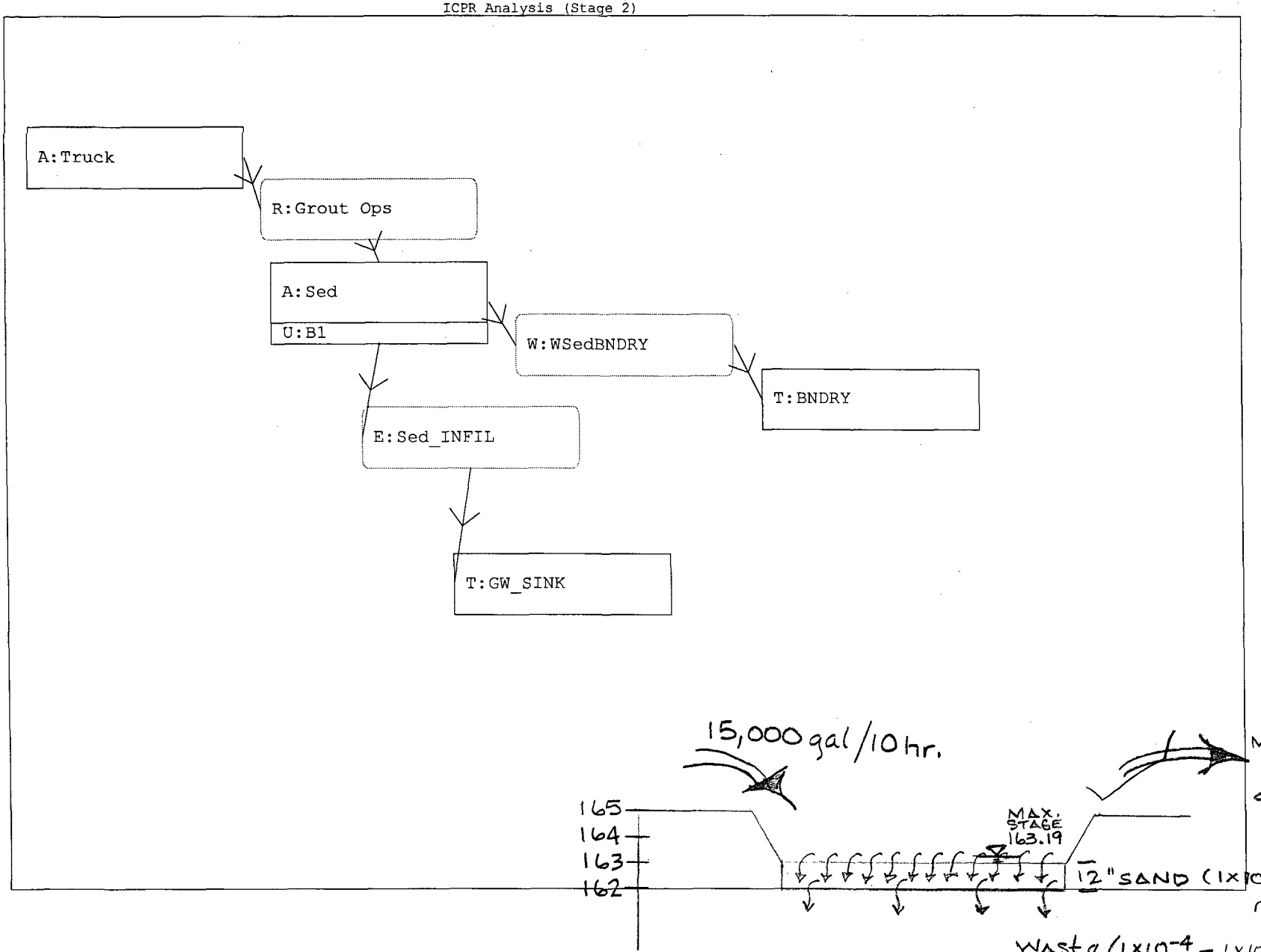
Stage 2

Hillsborough County
Phase I Sink Grouting
ICPR Analysis (Stage 2)

Nodes
A Stage/Area
V Stage/Volume
T Time/Stage
M Manhole

Basins
O Overland Flow
U SCS Unit CN
S SBUH CN
Y SCS Unit GA
Z SBUH GA

Links
P Pipe
W Weir
C Channel
D Drop Structure
B Bridge
R Rating Curve
H Breach
E Percolation
F Filter
X Exfil Trench



Basins

Name: B1 | Node: Sed | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph:	Uh484	Peaking Factor:	484.0
Rainfall File:	Flmod	Storm Duration(hrs):	24.00
Rainfall Amount(in):	0.000	Time of Conc(min):	6.00
Area(ac):	0.023	Time Shift(hrs):	0.00
Curve Number:	100.00	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

Nodes

Name: BNDRY | Base Flow(cfs): 0.000 | Init Stage(ft): 165.000
Group: BASE | Warn Stage(ft): 165.000
Type: Time/Stage

Time(hrs)	Stage(ft)
0.00	165.000
999.00	165.000

Name: GW_SINK | Base Flow(cfs): 0.000 | Init Stage(ft): 162.000
Group: BASE | Warn Stage(ft): 162.000
Type: Time/Stage

Time(hrs)	Stage(ft)
0.00	162.000
999.00	162.000

Name: Sed | Base Flow(cfs): 0.000 | Init Stage(ft): 163.000
Group: BASE | Warn Stage(ft): 164.000
Type: Stage/Area

Stage(ft)	Area(ac)
163.000	0.0900
165.000	0.0900

Name: Truck | Base Flow(cfs): 0.000 | Init Stage(ft): 165.000
Group: BASE | Warn Stage(ft): 0.000
Type: Stage/Area

Stage(ft)	Area(ac)
165.000	0.0000
170.000	0.0000

Operating Tables

Name: Grout Ops | Group: BASE
Type: Rating Curve
Function: Time vs. Discharge

Time(hrs)	Discharge(cfs)
0.00	0.06
10.00	0.06
10.01	0.00

Weirs

Name: WSedBNDRY From Node: Sed
Group: BASE To Node: BNDRY
Flow: Both Count: 1
Type: Vertical: Mavis Geometry: Trapezoidal

Bottom Width(ft): 1.00
Left Side Slope(h/v): 3.00
Right Side Slope(h/v): 3.00
Invert(ft): 165.000
Control Elevation(ft): 165.000
Struct Opening Dim(ft): 9999.00
TABLE
Bottom Clip(ft): 0.000
Top Clip(ft): 0.000
Weir Discharge Coef: 3.200
Orifice Discharge Coef: 0.600

Rating Curves

Name: Grout Ops From Node: Truck Count: 1
Group: BASE To Node: Sed Flow: Both

TABLE	ELEV ON(ft)	ELEV OFF(ft)
#1: Grout Ops	165.000	165.000
#2:	0.000	0.000
#3:	0.000	0.000
#4:	0.000	0.000

Percolation Links

Name: Sed_INFIL From Node: Sed Flow: Both
Group: BASE To Node: GW_SINK Count: 1

Surface Area Option: Use 1st Point in Stage/Area Table
Vertical Flow Termination: Horizontal Flow Algorithm
Aquifer Base Elev(ft): 162.000 Perimeter 1(ft): 256.000
Water Table Elev(ft): 162.000 Perimeter 2(ft): 382.000
**********0.000 Perimeter 3(ft): 758.000
Horiz Conductivity(ft/day): 1.400 Distance 1 to 2(ft): 10.000
Vert Conductivity(ft/day): 2.835 Distance 2 to 3(ft): 40.000
Effective Porosity(dec): 0.300 Num Cells 1 to 2: 76
Suction Head(in): 7.000 Num Cells 2 to 3: 152
Layer Thickness(ft): 1.000

Hydrology Simulations

Name: HILLS_SNKSTG2
Filename: C:\Program Files\Icpr3\HILLS_SNKSTG2.R32

Override Defaults: No

Time(hrs)	Print Inc(min)
30.000	2.00

Routing Simulations

Name: HILLS_SNKSTG2 Hydrology Sim: HILLS_SNKSTG2
Filename: C:\Program Files\Icpr3\HILLS_SNKSTG2.I32

Execute: Yes Restart: No Patch: No
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500
Time Step Optimizer: 10.000

Start Time(hrs): 0.000 End Time(hrs): 24.00
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 24.0000
Boundary Stages: Boundary Flows:

Time(hrs)	Print Inc(min)
999.000	15.000

Group	Run
BASE	Yes

Hillsborough County
Phase I Sink Grouting
ICPR Analysis (Stage 2)

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
BNDRY	BASE	HILLS_SNKSTG2	0.00	165.00	165.00	0.0000	0	0.00	0.00	0.00	0.00
GW_SINK	BASE	HILLS_SNKSTG2	0.00	162.00	162.00	0.0000	0	5.87	0.06	0.00	0.00
Sed	BASE	HILLS_SNKSTG2	10.01	163.19*	164.00	0.0001	3920	10.00	0.06	5.87	0.06
Truck	BASE	HILLS_SNKSTG2	0.00	165.00	0.00	0.0000	113	0.00	0.00	0.00	0.06

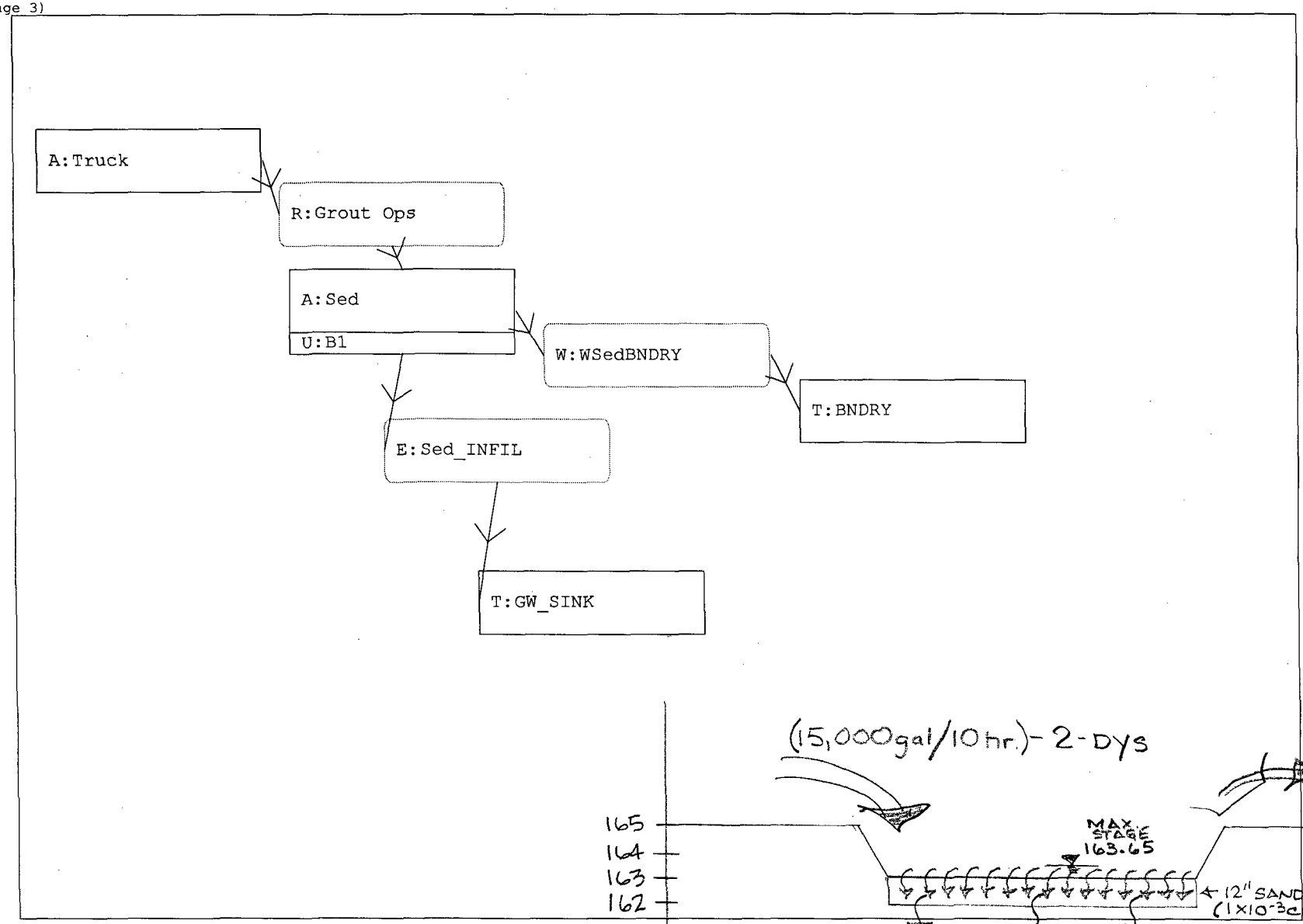
Stage 3

Hillsborough County
Phase I Sinkhole Grouting
ICPR Analysis (Stage 3)

Nodes
A Stage/Area
V Stage/Volume
T Time/Stage
M Manhole

Basins
O Overland Flow
U SCS Unit CN
S SBUH CN
Y SCS Unit GA
Z SBUH GA

Links
P Pipe
W Weir
C Channel
D Drop Structure
B Bridge
R Rating Curve
H Breach
E Percolation
F Filter
X Exfil Trench



Basins

Name: B1 | Node: Sed | Status: Onsite
Group: BASE | Type: SCS Unit Hydrograph CN

Unit Hydrograph:	Uh484	Peaking Factor:	484.0
Rainfall File:	Flmod	Storm Duration(hrs):	24.00
Rainfall Amount(in):	0.000	Time of Conc(min):	6.00
Area(ac):	0.023	Time Shift(hrs):	0.00
Curve Number:	100.00	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

Nodes

Name: BNDRY | Base Flow(cfs): 0.000 | Init Stage(ft): 165.000
Group: BASE | Warn Stage(ft): 165.000
Type: Time/Stage

Time(hrs)	Stage(ft)
0.00	165.000
999.00	165.000

Name: GW_SINK | Base Flow(cfs): 0.000 | Init Stage(ft): 162.000
Group: BASE | Warn Stage(ft): 162.000
Type: Time/Stage

Time(hrs)	Stage(ft)
0.00	162.000
999.00	162.000

Name: Sed | Base Flow(cfs): 0.000 | Init Stage(ft): 163.000
Group: BASE | Warn Stage(ft): 164.000
Type: Stage/Area

Stage(ft)	Area(ac)
163.000	0.0900
165.000	0.0900

Name: Truck | Base Flow(cfs): 0.000 | Init Stage(ft): 165.000
Group: BASE | Warn Stage(ft): 0.000
Type: Stage/Area

Stage(ft)	Area(ac)
165.000	0.0000
170.000	0.0000

Operating Tables

Name: Grout Ops | Group: BASE
Type: Rating Curve
Function: Time vs. Discharge

Time(hrs)	Discharge(cfs)
0.00	0.06
10.00	0.06
10.01	0.00
31.99	0.00

32.00	0.06
42.00	0.06
42.01	0.00

Weirs

Name: WSedBNDRY From Node: Sed
Group: BASE To Node: BNDRY
Flow: Both Count: 1
Type: Vertical: Mavis Geometry: Trapezoidal

Bottom Width(ft): 1.00
Left Side Slope(h/v): 3.00
Right Side Slope(h/v): 3.00
Invert(ft): 165.000
Control Elevation(ft): 165.000
Struct Opening Dim(ft): 9999.00
TABLE
Bottom Clip(ft): 0.000
Top Clip(ft): 0.000
Weir Discharge Coef: 3.200
Orifice Discharge Coef: 0.600

Rating Curves

Name: Grout Ops From Node: Truck Count: 1
Group: BASE To Node: Sed Flow: Both

TABLE	ELEV ON(ft)	ELEV OFF(ft)
#1: Grout Ops	165.000	165.000
#2:	0.000	0.000
#3:	0.000	0.000
#4:	0.000	0.000

Percolation Links

Name: Sed_INFIL From Node: Sed Flow: Both
Group: BASE To Node: GW_SINK Count: 1

Surface Area Option: Use 1st Point in Stage/Area Table
Vertical Flow Termination: Horizontal Flow Algorithm
Aquifer Base Elev(ft): 162.000 Perimeter 1(ft): 256.000
Water Table Elev(ft): 162.000 Perimeter 2(ft): 382.000
**********0.000 Perimeter 3(ft): 758.000
Horiz Conductivity(ft/day): 1.400 Distance 1 to 2(ft): 10.000
Vert Conductivity(ft/day): 2.835 Distance 2 to 3(ft): 40.000
Effective Porosity(dec): 0.300 Num Cells 1 to 2: 76
Suction Head(in): 7.000 Num Cells 2 to 3: 152
Layer Thickness(ft): 1.000

Hydrology Simulations

Name: HILLS_SINK1
Filename: C:\Program Files\Icpr3\HILLS_SINK1.R32

Override Defaults: No

Time(hrs)	Print Inc(min)
30.000	2.00

Routing Simulations

Name: HILLS_SINK1 Hydrology Sim: HILLS_SINK1
Filename: C:\Program Files\Icpr3\HILLS_SINK1.I32

Execute: Yes Restart: No Patch: No

Alternative: No

Max Delta Z(ft):	1.00	Delta Z Factor:	0.00500
Time Step Optimizer:	10.000		
Start Time(hrs):	0.000	End Time(hrs):	60.00
Min Calc Time(sec):	0.5000	Max Calc Time(sec):	60.0000
Boundary Stages:		Boundary Flows:	

Time(hrs)	Print Inc(min)
999.000	15.000

Group	Run
BASE	Yes

Hillsborough County
Phase I Sinkhole Grouting
ICPR Analysis (Stage 3)

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
BNDRY	BASE	HILLS_SINK1	0.00	165.00	165.00	0.0000	0	0.00	0.00	0.00	0.00
GW_SINK	BASE	HILLS_SINK1	0.00	162.00	162.00	0.0000	0	5.87	0.06	0.00	0.00
Sed	BASE	HILLS_SINK1	42.01	163.65	164.00	0.0001	3920	10.00	0.06	5.87	0.06
Truck	BASE	HILLS_SINK1	0.00	165.00	0.00	0.0000	113	0.00	0.00	0.00	0.06

Project:	Computed:	Date:
Subject:	Checked:	Date:
Task:	Page:	of:
Job #:	No:	

HDR | ONE COMPANY *Many Solutions*℠

GIVEN: - 15,000 GAL PUMP INTO POND PER DAY
- 10 HR. = 1 DAY
- 64' x 64' SETTLING POND (2' DEPTH) W/ 12" SAND LAYER
- POROSITY OF SAND (K_V) = 1×10^{-3} CM/S = 2.8346 FT/DAY

$K_H = \frac{K_V}{2} = \frac{2.8346}{2} = 1.4$ FT/DAY

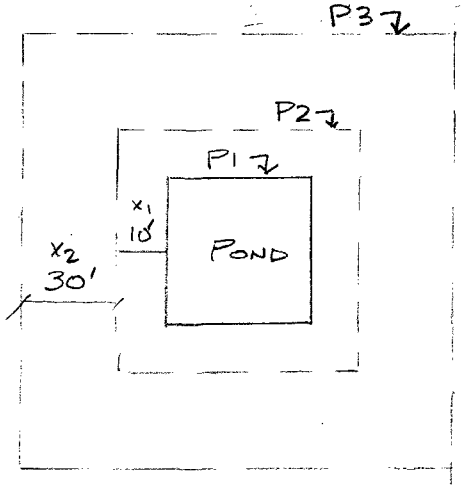
CONVERT: $\frac{15{,}000\text{gal}}{10\text{hr}} \left| \frac{1\text{cf}}{7.4805\text{gal}} \right| \frac{1\text{hr}}{60\text{min}} \left| \frac{1\text{min}}{60\text{sec}} \right. = 0.5571\text{ cfs}$

DISCHARGE IN 10 HR. DAY = 0.6 cfs

AREA OF POND = 64 FT x 64 FT = 4,096 SF OR 0.09 ac
- BOTTOM OF POND ELEV. = 163'
- TOP OF POND ELEV. = 165'
- AQUIFER ELEV. = 162'

PERCOLATION POND GEOMETRY CALCS:

FOR THE 64' x 64' POND:



$P1 = 2(64') + 2(64) = 256$

$P2 = P1 + 2\pi(x_1 * 2)$

$= 256 + (2 \cdot 3.14 \cdot 20)$

$P2 = 382$

$P3 = P1 + 2\pi[(x_1 \cdot 2) + (x_2 \cdot 2)]$

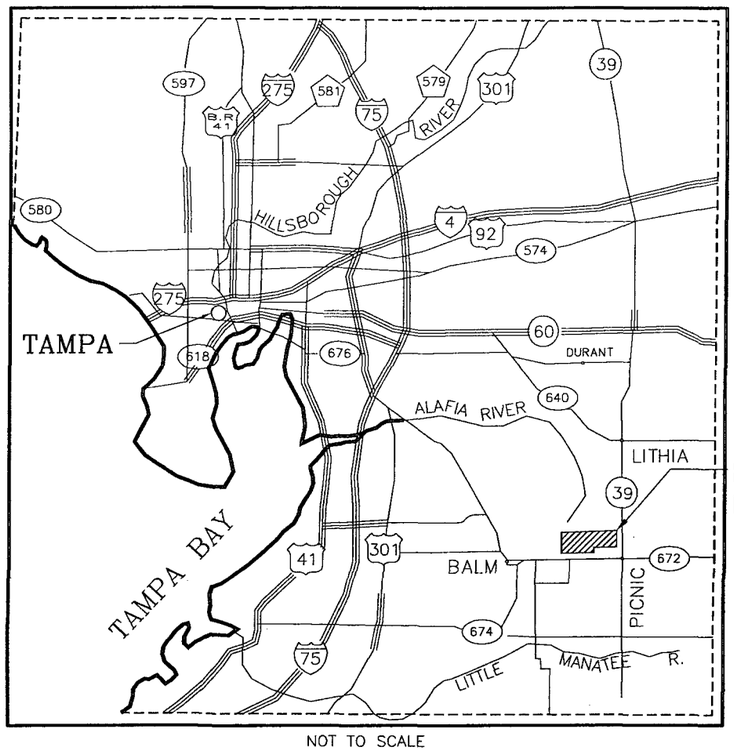
$= 256 + (2 \cdot 3.14 \cdot 80)$

$P3 = 758$

Attachment C

Construction Drawings

Hillsborough County
Florida



NOT TO SCALE

PROJECT LOCATION

Construction Drawings For

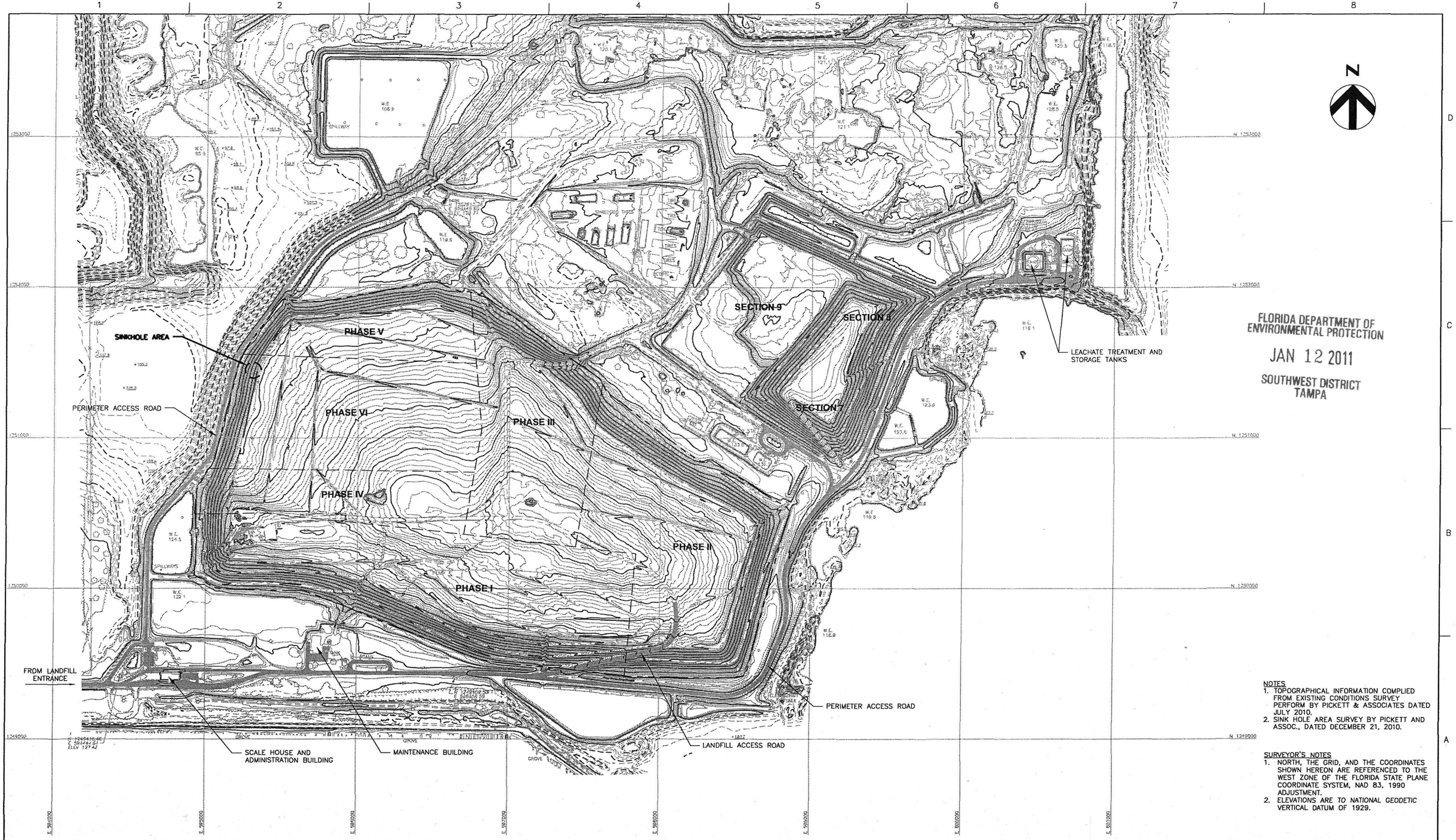
STAGE 1 SINKHOLE STABILIZATION GROUTING PLAN

Project No.
096-149350-010

LITHIA, FLORIDA
JANUARY 2011

INDEX OF DRAWINGS

STEVEN H. MEIGGS, PE
PRINCIPAL ENGINEER
FLORIDA LICENSE #64832



FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

JAN 12 2011

SOUTHWEST DISTRICT TAMPA

NOTES
1. TOPOGRAPHICAL INFORMATION COMPLIED FROM EXISTING CONDITIONS SURVEY PERFORM BY PICKETT & ASSOCIATES DATED JULY 2010.
2. SINK HOLE AREA SURVEY BY PICKETT AND ASSOC., DATED DECEMBER 21, 2010.

SURVEYOR'S NOTES
1. NORTH, THE GRID, AND THE COORDINATES SHOWN HEREON ARE REFERENCED TO THE WEST ZONE OF THE FLORIDA STATE PLANE COORDINATE SYSTEM, NAD 83, 1990 ADJUSTMENT.
2. *ELEVATIONS ARE TO NATIONAL GEODETIC* VERTICAL DATUM OF 1929.

SDII GLOBAL

Hillsborough County Florida

ISSUE	DATE	DESCRIPTION
A	01/12/2011	ISSUED FOR FDEP REVIEW

PROJECT MANAGER	R. SIEMERING
REVIEWED BY	J. TIMMONS
DRAWN BY	B. JOHNSON
PROJECT NUMBER	0096-149350-010

STEVEN H. MEIGGS, PE
PRINCIPAL ENGINEER
FLORIDA LICENSE #64832

STAGE 1 SINKHOLE STABILIZATION GROUTING PLAN SOUTHEAST COUNTY LANDFILL HILLSBOROUGH COUNTY, FLORIDA

EXISTING CONDITIONS

0 1" 2"

FILENAME	00C-01.DWG
SCALE	1"=300'

SHEET C-01

c:\pwworking\tpa\d0[illegible]\00C-01.dwg, Plot, 1/12/2011 1:34:31 PM, BradJohn

SINKHOLE AREA

PHASE V

LIMITED SINKHOLE AREA SURVEY BOUNDARY

TRUCK TURNAROUND AREA

PERIMETER ACCESS ROAD

PHASE VI

PHASE III

PROPOSED TEMPORARY STABILIZED ACCESS ROAD

PHASE IV

EXISTING LANDFILL ACCESS ROAD

PHASE I

W.E. 124.5

N

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

JAN 12 2011

SOUTHWEST DISTRICT TAMPA

LEGEND

2-WAY TRAFFIC

NOTES

1. TOPOGRAPHICAL INFORMATION COMPLIED FROM EXISTING CONDITIONS SURVEY PERFORM BY PICKETT & ASSOCIATES DATED JULY 2010.
2. LIMITED SINK HOLE AREA SURVEY BY PICKETT AND ASSOC., DATED DECEMBER 21, 2010.

SURVEYOR'S NOTES

1. NORTH, THE GRID, AND THE COORDINATES SHOWN HEREON ARE REFERENCED TO THE WEST ZONE OF THE FLORIDA STATE PLANE COORDINATE SYSTEM, NAD 83, 1990 ADJUSTMENT.
2. ELEVATIONS ARE TO NATIONAL GEODETIC VERTICAL DATUM OF 1929.

ISSUE	DATE	DESCRIPTION
A	01/12/2011	ISSUED FOR FDEP REVIEW

PROJECT MANAGER	R. SIEMERING
REVIEWED BY	J. TIMMONS
DRAWN BY	B. JOHNSON
PROJECT NUMBER	0096-149350-010

STEVEN H. MEIGGS, PE
PRINCIPAL ENGINEER
FLORIDA LICENSE #64832

STAGE 1 SINKHOLE STABILIZATION GROUTING PLAN SOUTHEAST COUNTY LANDFILL HILLSBOROUGH COUNTY, FLORIDA

SINKHOLE AREA PLAN

0 1" 2"

FILENAME	00C-02.DWG
SCALE	1"=100'

SHEET C-02

c:\pwworking\tpa\d0100C-02.dwg, Plot, 1/12/2011 1:34:38 PM, BradJohn

PERIMETER ACCESS ROAD

SINKHOLE AREA

GROUT HOLE AREA
(SEE SHEET C-04)

~80'

SINKHOLE DRILLING STAGING AREA

DISCHARGE TANK AND PUMP

DISCHARGE PIPE
(TO BASIN SEDIMENTATION AREA)

TRUCK LOADING AREA

SEDIMENTATION BASIN

DRILLING WATER DISCHARGE BASIN
(SEE SHEET C-06)

TEMPORARY HOLDING AREA

DISCHARGE PUMP

DRILLING BASIN DISCHARGE PIPE
(TO TRUCK LOADING AREA)

DRILLING SUPPLY WATER TANK

TEMPORARY STABILIZED ACCESS
ROAD AND TRUCK TURNAROUND
(SEE SHEET C-07)

AREA OF LIMITED SINKHOLE AREA SURVEY

PHASE V

PHASE VI

N

FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION
JAN 12 2011
SOUTHWEST DISTRICT
TAMPA

NOTES
1. TOPOGRAPHICAL INFORMATION COMPLIED FROM EXISTING CONDITIONS SURVEY PERFORM BY PICKETT & ASSOCIATES DATED JULY 2010.
2. LIMITED SINK HOLE AREA SURVEY BY PICKETT AND ASSOC., DATED DECEMBER 21, 2010.

SURVEYOR'S NOTES
1. NORTH, THE GRID, AND THE COORDINATES SHOWN HEREON ARE REFERENCED TO THE WEST ZONE OF THE FLORIDA STATE PLANE COORDINATE SYSTEM, NAD 83, 1990 ADJUSTMENT.
2. ELEVATIONS ARE TO NATIONAL GEODETIC VERTICAL DATUM OF 1929.

ISSUE	DATE	DESCRIPTION
A	01/12/2011	ISSUED FOR FDEP REVIEW

PROJECT MANAGER	R. SIEMERING
REVIEWED BY	J. TIMMONS
DRAWN BY	B. JOHNSON
PROJECT NUMBER	0096-149350-010

STEVEN H. MEIGGS, PE
PRINCIPAL ENGINEER
FLORIDA LICENSE #64832

STAGE 1 SINKHOLE STABILIZATION GROUTING PLAN SOUTHEAST COUNTY LANDFILL HILLSBOROUGH COUNTY, FLORIDA

SINKHOLE GROUTING LAYOUT PLAN

0 1" 2"

FILENAME	00C-03.DWG
SCALE	1"=60'

SHEET C-03

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PHASE V

PERIMETER ACCESS ROAD

VERTICAL DISPLACEMENT MONITORING GAUGE STATION

SINKHOLE AREA

VERTICAL DISPLACEMENT GAUGES

SINKHOLE GROUTING STAGING AREA

15' (TYP)

GROUT HOLE 4
GROUT HOLE 9
GROUT HOLE 2
GROUT HOLE 7
GROUT HOLE 1
GROUT HOLE 6
GROUT HOLE 3
GROUT HOLE 8
GROUT HOLE 5

B-SH-01

B-SH-02

A C-05

DISCHARGE WATER TANK AND PUMP

DRILLING WATER DISCHARGE BASIN (SEE SHEET C-06)

DRILLING WATER DISCHARGE BASIN PUMP AND PIPING

DRILLING WATER SUPPLY TANK

TEMPORARY STABILIZED ACCESS ROAD AND TRUCK TURNAROUND

TRUCK LOADING AREA

PHASE VI

BORING LOCATION TABLE		
LOCATION	NORTHING	EASTING
GROUT HOLE 1	1251417.28	595438.91
GROUT HOLE 2	1251427.00	595441.27
GROUT HOLE 3	1251407.56	595436.54
GROUT HOLE 4	1251436.71	595443.63
GROUT HOLE 5	1251397.85	595434.18
GROUT HOLE 6	1251408.88	595452.30
GROUT HOLE 7	1251418.59	595454.66
GROUT HOLE 8	1251399.16	595449.94
GROUT HOLE 9	1251428.31	595457.03
B-SH-01	1251420.70	595424.82
B-SH-02	1251408.89	595473.40

N

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
JAN 12 2011
SOUTHWEST DISTRICT TAMPA

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STAGE 1 SINKHOLE STABILIZATION GROUTING PLAN SOUTHEAST COUNTY LANDFILL HILLSBOROUGH COUNTY, FLORIDA

SINKHOLE GROUT HOLE AND CORE HOLE PLAN

0 1" 2"

FILENAME 00C-04.DWG
SCALE 1"=20'

SHEET C-04

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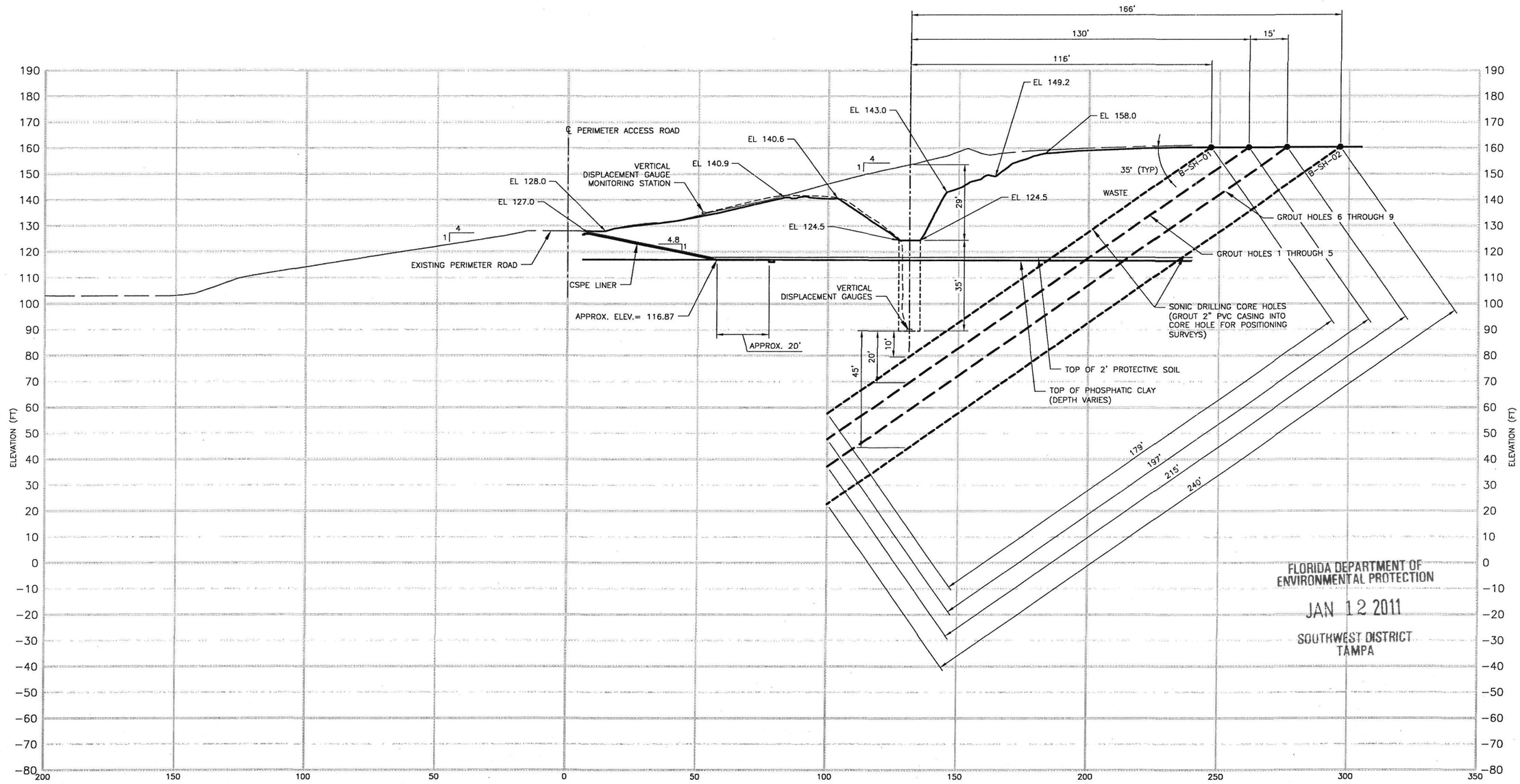

SECTION

SCALE: 1"=20' HORIZ.
1"=20' VERT.

A C-04

SURVEYOR'S NOTES
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2. LIMITED SINK HOLE AREA SURVEY BY PICKETT AND ASSOC., DATED DECEMBER 21, 2010.
3. APPROXIMATE SINKHOLE DEPTH FIELD MEASURED ON 12/16/2011.

SDII GLOBAL

Hillsborough County Florida

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STAGE 1 SINKHOLE STABILIZATION GROUTING PLAN
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH COUNTY, FLORIDA

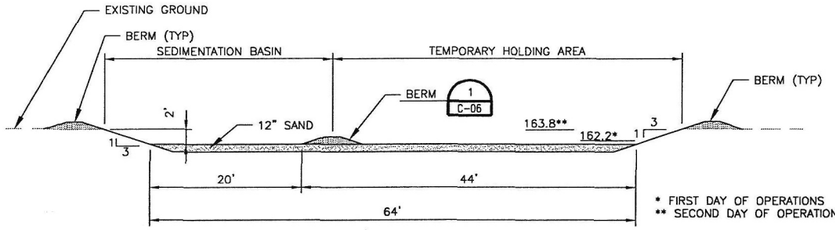
SINKHOLE GROUTING HOLES SECTIONS

0 1" 2"

FILENAME	00C-05.DWG
SCALE	1"=20' HORIZ. 1"=20' VERT.

SHEET C-05

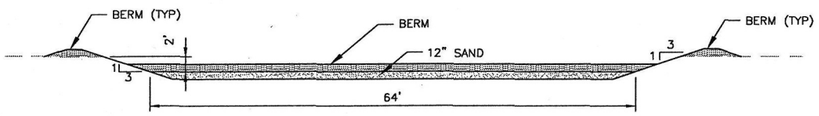
GROUT WATER DISCHARGE BASIN (1 / C-03)
1"=30'



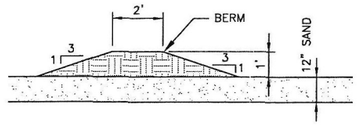
* FIRST DAY OF OPERATIONS
** SECOND DAY OF OPERATIONS

NOTE:
5,000 GAL. TANKER TRUCK(S) TO BE PROVIDED BY COUNTY TO DRAIN WATER FROM TEMP. HOLDING AREA.

SECTION (A / C-06)
1"=10'



SECTION (B / C-06)
1"=10'



BERM DETAIL (1 / C-06)
1"=3'

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
JAN 12 2011
SOUTHWEST DISTRICT TAMPA

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STAGE 1 SINKHOLE STABILIZATION GROUTING PLAN
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH COUNTY, FLORIDA

GROUTING WATER DISCHARGE BASIN PLAN AND SECTION

0 1" 2"

FILENAME	00C-06.DWG
SCALE	AS SHOWN

SHEET C-06

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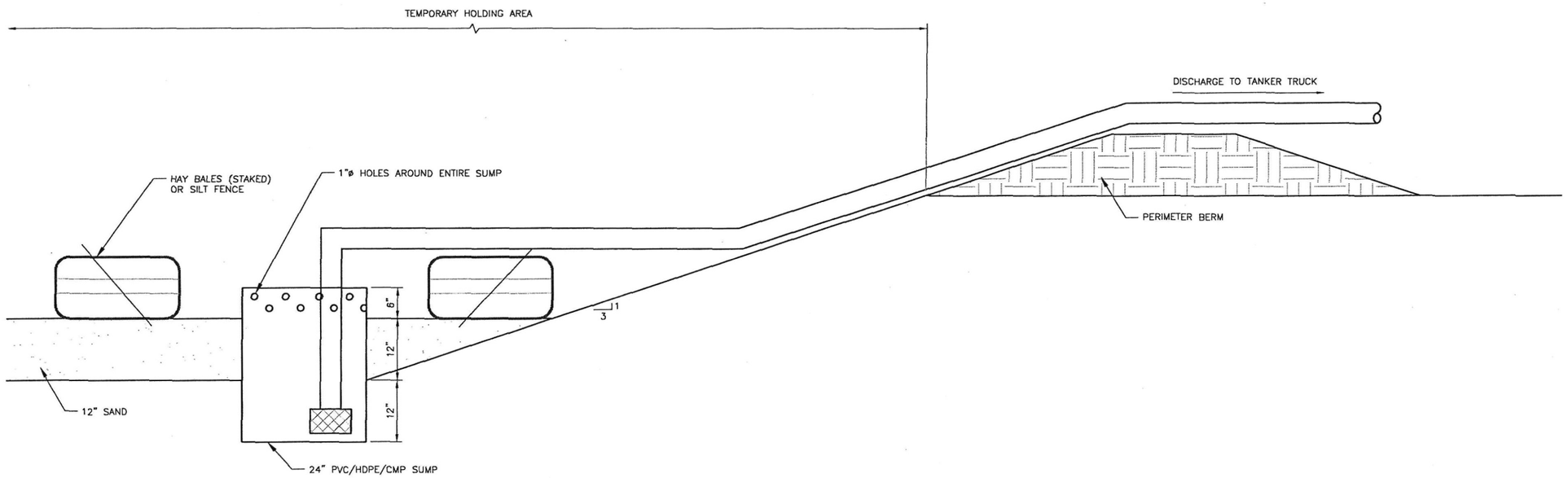

SUMP DETAIL (1 / C-06)
1"=1'

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STAGE 1 SINKHOLE STABILIZATION GROUTING PLAN
SOUTHEAST COUNTY LANDFILL
HILLSBOROUGH COUNTY, FLORIDA

DETAILS

0 1" 2"

FILENAME	00C-07.DWG
SCALE	1"=20'

SHEET C-07

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