

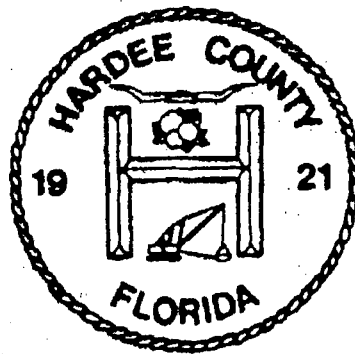
FILE

D.E.P.
JUN 27 1997
SOUTHWEST DISTRICT
TAMPA

HARDEE COUNTY REGIONAL LANDFILL

HARDEE COUNTY, FLORIDA

APPLICATION FOR CONSTRUCTION PERMIT



JUNE 1997

Part II

Prepared for:

HARDEE COUNTY BOARD OF COUNTY COMMISSIONERS

Room A-203, Courthouse Annex
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Wauchula, FL 33873-2867

Prepared by:

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- F. Bell Holes: Bell holes shall provide adequate clearance for tools and methods used in installing pipe. No part of any bell or coupling shall be in contact with the trench bottom, trench walls, or granular embedment when the pipe is jointed.

3.08 TESTS

- A. All tests required for preliminary review of materials prior to installation shall be made by an accepted independent testing laboratory at the expense of the Contractor. ~~Two initial gradation tests shall be made for the drainage sand and filter aggregate material and one additional gradation test shall be made for each 500 tons of material delivered by the Contractor's independent testing laboratory. A summary of the tests required in this Section is provided in Table 02220-C.~~

TABLE 02220-C

TESTING SCHEDULE

| Property | Material | Units | Frequency | Value | Test Method |
|------------------------------------|----------------------------|-------------|--|----------------------------|-------------|
| Compaction Field Density | See Table 02220-A | percent (%) | one/acre/lift (see Note 1) | See Table 02220-A | ASTM D2922 |
| Modified Proctor | | | 1 initial and visible change in material | | ASTM D1557 |
| Moisture Content | | | one/acre/lift (see Note 1) | | ASTM D5084 |
| Gradation | See Paragraph 2.01 D, G, H | N/A | 2 initial and 1 per 500 tons | See Paragraph 2.01 D, G, H | ASTM D2487 |
| Permeability | See Paragraph 2.01 H | cm/sec | 1 per every 200 feet of trench | See Paragraph 2.01 H | ASTM D5084 |

- 1 The liner bedding layer and liner protective cover soil layer shall be tested every 100 feet along slope alternating between near the top of slope and near the toe of slope.

3.09 DRAINAGE MAINTENANCE

- A. Bridges and other temporary structures required to maintain traffic across unfilled trenches shall be constructed and maintained by the Contractor. Backfilling shall be done so that water will not accumulate in unfilled or partially filled trenches. All material deposited in roadway ditches or other water courses crossed by the line of trench shall be removed immediately after backfilling is completed and the original

sections, grades, and contours of ditches or water courses shall be restored. Surface drainage shall not be obstructed longer than necessary.

3.10 SITE GRADING

- A. The construction tolerance for grading shall be ± 0.1 feet at the indicated elevations, slopes and contours as shown on the drawing. Final grades shall be brought to grade with the tolerance of ± 0.1 feet at the indicated elevations, slopes, and contours.
- B. Use of graders or other power equipment will be permitted for final grading and dressing of slopes as allowed within these specifications provided the result is uniform and equivalent to hand work. All surfaces shall be graded to secure effective drainage. Unless otherwise shown, a slope of at least 1 percent shall be provided.
- C. Grading and surfacing shall be completed to the satisfaction of the Engineer.

3.11 EXCESS EXCAVATED MATERIALS

- A. Insofar as needed, suitable excavated materials shall be used in fills and embankments shown on the Drawings. All suitable excess excavated material shall be stockpiled at an on-site location determined by the Owner or Engineer.
- B. The Contractor shall segregate excavated materials (i.e. common fill, select common fill). All debris, junk, stones, logs, stumps, roots, and other unsuitable materials may be disposed of by the Contractor in the sanitary landfill, but first must be weighed on the truck scales.
- C. The Contractor should slope and compact the stockpile with a light roller type vehicle to maintain stability. The Contractor shall maintain proper soil and erosion control measures.

3.12 SETTLEMENT

- A. The Contractor shall be responsible for all settlement of backfill, fills, and embankments which may occur prior to acceptance by the Owner.
- B. The Contractor shall make, or cause to be made, all repairs or replacements made necessary by settlement within 30 days after notice from the Engineer or Owner.

END OF SECTION

SECTION 02232

LIMEROCK BASE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish all labor, materials, equipment and transportation and perform all work necessary to construct a base course composed of limerock upon the prepared subgrade in accordance with these Specifications and with the lines, grades, notes and typical cross sections shown on the Drawings.

1.02 QUALITY ASSURANCE

- A. Furnish complete laboratory analysis and obtain approval of the material by the Engineer prior to placement.
- B. Construct the base course in accordance with the applicable provisions of the Florida Department of Transportation Standard Specifications For Road and Bridge Construction, 1991 Edition, (FDOT Specifications) and as specified herein.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Source: Miami Oolite Formation or Ocala Formation at the Contractor's option. Use only one formation on any project.
- B. Composition: Limerock material showing no significant tendency to air slake or undergo any chemical change under exposure to weather and containing:
 - 1. Not more than 0.5 percent of organic material or objectionable matter,
 - 2. Not less than 70 percent of carbonates of calcium and magnesium, and
 - 3. Not more than 3 percent of water sensitive clay material.

C. Gradation: Graded uniformly down to dust with at least 97 percent (by weight) passing the 3 1/2-inch sieve and the fine material consisting entirely of dust of fracture.

D. Quality:

1. Uniform in quality and not containing cherty or other extremely hard pieces or lumps, balls, or pockets of sand or clay size material in sufficient quantity as to prevent proper bonding, finishing or strength of the limerock base.
2. Nonplastic with liquid limit not exceeding 35.
3. Average LBR value not less than 100.

PART 3 - EXECUTION

3.01 GENERAL

- A. Equipment: As necessary for the proper construction of the work, in first-class working condition, and as approved by the Engineer prior to its use.
- B. Limits of Construction: Construct the base to the full dimensions shown on the Drawings.

3.02 PERFORMANCE

- A. Transporting Limerock: Transport limerock to the point where it is to be used, over rock previously placed if practicable, and dump on the end of the preceding spread. No hauling over the subgrade or dumping on the subgrade will be permitted.
- B. Spreading Limerock:
 1. Spread limerock uniformly, and remove and replace all segregated areas of fine or coarse rock with well-graded rock.
 2. When the specified compacted thickness of the base is greater than 6-inches, construct the base in two courses with the first course approximately one-half the total thickness of the finished base, but not less than the thickness required to bear the weight of the construction equipment without disturbing the subgrade.

C. Compacting and Finishing Base:

1. Single Course Base: After spreading is completed, scarify the entire surface and then shape to produce the required grade and cross section after compaction.
2. Double Course Base: After placing and compacting the first limerock course, clean the first limerock course of foreign material, blade and bring to a surface cross section approximately parallel to that of the finished base. Prior to the spreading of any material for the upper course, conduct the density tests for the lower course and determine that the required compaction has been obtained. After the spreading of material for the second course is completed, finish and shape its surface so as to produce the required grade and cross section after compaction, free of scabs and laminations.
3. Moisture Content: When the material does not have the proper moisture content to insure the required density, wetting or drying will be required. If the material is deficient in moisture, add water and uniformly mix in by discing the base course to its full depth. If the material contains an excess of moisture, allow to dry until the required moisture content is attained before being compacted. In wetting or drying operations, manipulate the entire width and depth of the base as a unit.
4. Density Requirements: As soon as proper conditions of moisture are attained, compact the material to a density of not less than 98 percent of the maximum density as determined by AASHTO T 180.
5. Density Tests:
 - a. During final compacting operations, if blading of any areas is necessary to obtain the true grade and cross section, complete the compacting operations for such areas prior to making the density determinations on the finished base.
6. Correction of Defects:
 - a. If at any time the subgrade material should become mixed with the base course material, dig out and remove the mixture, replace the materials removed with clean base material, and shape and compact the subgrade as specified above.
 - b. If cracks or checks appear in the base, either before or after priming, which in the opinion of the Engineer would impair the structural efficiency of the base course, remove such cracks or checks by rescarifying, reshaping, adding base material where necessary and recompacting.

D. Testing Surface: Check the finished surface with a templet cut to required crown and cross section and with a 10-foot straightedge laid parallel to the centerline of the road. Correct all irregularities greater than 1/4-inch by scarifying and by removing or adding limerock as may be required, and recompacting the entire area as specified hereinbefore.

E. Thickness Determinations:

1. Measure the thickness of the compacted limerock base at intervals of not more than 200 feet at various points on the cross sections, prior to the application of the prime coat.
2. Take the measurements in holes through the base of not less than 3 inches in diameter. Where the compacted base is deficient by more than 1/2-inch from the thickness called for on the Drawings, correct such areas by scarifying and adding limerock for a distance of 100 feet in each direction from the edge of the deficient area. Bring the affected areas to the required state of compaction and to the required thickness and cross section.

F. Priming and Maintaining:

1. Apply the prime coat only when the base is firm and unyielding, meets the specified density requirements and the moisture content in the top half of the base does not exceed 90 percent of the optimum moisture content of the base material.
2. Prior to applying the surface course, check that the grades are true, with no rutting or other distortion, and that the base meets all the specified requirements.

END OF SECTION

02232-4

SECTION 02233

PRIME COAT APPLICATION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish all labor, equipment, materials, and transportation and perform all work necessary to apply the prime coat for the access road in accordance with these Specifications and with the lines, grades, notes and typical cross sections shown on the Drawings.

1.02 QUALITY ASSURANCE

- A. Apply the prime coat for the access road in accordance with applicable provisions of the Florida Department of Transportation Standard Specification For Road and Bridge Construction, current edition, (FDOT Specifications) and as specified herein.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Prime Coat: Cutback asphalt conforming with AASHTO M81, Grade RC-70 or RC-250, at the Contractor's option unless otherwise indicated.

2.02 EQUIPMENT

- A. For placing the prime coat use a pressure distributor equipped with pneumatic tires having sufficient width of rubber in contact with the road surface to avoid breaking the bond or forming a rut in the surface, and a spray bar with the distance between the centers of openings of the outside nozzles equal to the width of the application required, within an allowable variation of 2-inches, and the outside nozzle at each end having an area opening of not less than 25 percent, nor more than 75% in excess of the other nozzles which shall have uniform openings

PART 3 - EXECUTION

3.01 GENERAL

- A. Equipment: As necessary, and as accepted by the Engineer prior to use.
- B. Limits of Construction: Construct to the full dimensions shown on the Drawings.

3.02 PERFORMANCE

- A. Thickness Determinations:
 - 1. Measure the thickness of the compacted limerock at intervals of not more than 200-feet at various points on the cross sections per the Engineer's instruction, prior to the application of the prime coat.
- B. Application of the Prime Coat
 - 1. Do not apply the prime coat when the air temperature is less than 50 °F in the shade, or when the weather conditions or the condition of the base surface is unsuitable. Do not apply the prime coat while rain is falling or when there is water on the surface to be covered.
 - 2. Prior to applying the prime coat, sweep the full width of the surface with a power broom supplemented with hand brooms and mechanical blowers. Take care to remove all loose dust, dirt and objectionable matter. Apply the prime coat only when the moisture content in the top half of the base does not exceed 90 percent of the optimum moisture content of the base material. If too dry, lightly sprinkle the base with water immediately in advance of the prime coat. Apply the prime coat to the full width of the base.
 - 3. Apply the prime coat at a rate sufficient to coat the surface thoroughly and uniformly without any excess to form pools or to flow off the base. Use a rate of application not less than 0.10 gallons per square yard.
 - 4. Following the application of the prime coat, apply and roll a light uniform application of clean sand. Use sand that is nonplastic, free from silt and rock particles and not containing any sticks, vegetation, grass, roots or organic matter. After the sand covering has been applied, the surface may be opened to traffic.

END OF SECTION

SECTION 02240

STABILIZED ROADWAY SUBGRADE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Where the roadway subgrade fails to meet the specified Limerock Bearing Ratio (LBR) 40, stabilize the subgrade to the uniformity, density and bearing ratio specified hereinafter. Stabilize to the extent indicated on the Drawings.
- B. Definitions: Use FDOT Type B stabilization as described hereinafter to obtain the required bearing ratio by the addition and mixing in of suitable stabilizing material.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General: Use either Commercial Materials or Local Materials as defined hereunder, at the Contractor's option.
- B. Local Material: High-bearing-value soils or sand-clay material with the portion passing the 40-mesh sieve having a liquid limit not greater than 30 and a plasticity index not greater than 10. Blending of materials to meet these requirements will not be permitted unless authorized in writing by the Engineer. When permitted, test and obtain acceptance of the blended material before using.
- C. Stabilization:
 - 1. Determine bearing value by the Limerock Bearing Ratio (LBR) Method.
 - 2. After grading operations are substantially complete, determine the quantity (if any) of selected stabilizing material to be added for compliance with the bearing value requirements.
 - 3. Ensure that the finished subgrade meets the bearing value requirements, regardless of the quantity of stabilizing materials necessary to be added.

PART 3 - EXECUTION

3.01 PREPARATION

A. General:

1. Prior to the beginning of stabilizing operations, complete the subgrade to the lines, grades and cross section shown in the plans.
2. Stabilize the subgrade in one course, unless the equipment and methods being used do not provide the required uniformity, particle size limitation, compaction and other desired results, in which case, perform the processing in more than one course.

3.02 APPLICATION

- A. **Stabilizing Material:** Spread the stabilizing material uniformly over the area to be stabilized by means of mechanical material spreaders, except that where use of such equipment is not practicable other means of spreading may be used, but only upon written approval of the Engineer.
- B. **Mixing:** By means of rotary tillers, or other equipment meeting the acceptance of the Engineer, thoroughly mix the subgrade throughout the entire depth and width of the area to be stabilized.
- C. **Maximum Particle Size Of Mixed Materials:** At the completion of mixing, check that all particles of material within the limits of the area to be stabilized pass a 1/4-inch ring. Remove from the stabilized area any particles not meeting this requirement or break them down so as to meet this requirement.
- D. **Compaction:** After the mixing operations have been completed and requirements for bearing value, uniformity and particle size have been satisfied, compact the stabilized area to a density of not less than 98% of maximum density as determined by AASHTO T 180. Compact the materials at a moisture content permitting the specified compaction. If the moisture content of the material is improper for attaining the specified density, either add water or allow drying until the proper moisture content for the specified compaction is reached.
- E. **Finish Grading:** Grade and shape the completed stabilized subgrade to conform with the finished lines, grades and cross-section indicated in the Drawings.

F. Quality Assurance:

1. After the stabilizing and compacting operations have been completed, check that the subgrade is firm and substantially unyielding, to the extent that it will support construction equipment and will have the bearing value required.
2. Remove and replace with suitable material all soft and yielding material, and any other portions of the sub-grade which will not compact readily, and bring the whole subgrade to line and grade, with proper allowance for subsequent compaction.

G. Maintenance Of Completed Subgrade: Upon completion, maintain the subgrade free from ruts, depressions and any damage resulting from the hauling or handling of materials, equipment, tools, etc. Maintain the required density until the subsequent base or pavement is in place. Make any repairs, which might become necessary in order to recompact the subgrade in the event of underwash or other damage. Construct and maintain ditches and drains as necessary to protect the completed subgrade from damage by storm water.

3.03 FIELD QUALITY CONTROL

A. Bearing Value Requirements:

1. General: Bearing value samples will be obtained and tested by the Engineer at completion of satisfactory mixing of the stabilized area. For any area where the bearing value obtained is deficient from the value indicated in the Drawings, in excess of the tolerances established herein, spread and mix in additional stabilizing material as specified above for the full width of the roadway being stabilized and longitudinally for a distance of 50-feet beyond the limits of the area in which the bearing value is deficient. Pay for all retesting required until subgrade meets the specified requirements.
2. Tolerances In Bearing Value Requirements: A undertolerance of 5.0 from the specified bearing value of LBR 40 will be allowed as based on tests performed on samples obtained after mixing operations have been completed.

END OF SECTION

SECTION 02513

ASPHALTIC CONCRETE SURFACE COURSE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Furnish all labor, materials, equipment, tools, and transportation and perform all work necessary for the construction of asphaltic concrete surface courses composed of a mixture of aggregates, mineral filler, and asphalt cement properly applied upon a prepared base, in accordance with these Specifications and in conformity with the lines, grades, thickness and typical cross sections shown on the Drawings.

1.02 QUALITY ASSURANCE

- A. Standards: Comply with the Standard Specifications for Road and Bridge Construction, 1991, of the Florida Department of Transportation, and Supplemental Specifications thereto, hereinafter referred to as FDOT Specifications, except as amended herein. The FDOT Specifications are hereby made a part of this Contract to the extent they are applicable thereto and shall be as binding upon the Contractor as though reproduced herein in their entirety. Pavement section shall conform to adjacent parking lot.
- B. Complete and submit laboratory analysis by a Certified Testing Laboratory on all materials and obtain materials acceptance by the Engineer, prior to placement.

1.03 SUBMITTALS

- A. Submit manufacturer's/supplier's certificates of compliance with Specifications for all materials proposed.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Bituminous Material: Asphalt cement, Viscosity Grade AC-20, conforming with FDOT Specifications, Section 916-1.
- B. Coarse Aggregate: Stone or slag conforming with FDOT Specifications, Section 901.

- C. Fine Aggregate: As specified in FDOT Specifications, Section 902-3.
- D. Mineral Filler: As specified in FDOT Specifications, Section 917-1 and 917-2.

2.02 GENERAL COMPOSITION OF MIXTURE

- A. Provide a combination of aggregate (coarse, fine, or mixtures thereof) mineral filler, if required, and bituminous materials, sized, graded and combined in such proportions that the resulting mixture will meet the grading and physical properties of the approved job mix formula. Use a mixture containing screenings, meeting with the requirements of FDOT Specification Section 902, equal to a minimum of 15 percent, by weight, of the total aggregate.
- B. In all cases, use a job mix formula with aggregate gradation within the design ranges specified in the following table.

| <u>Sieve Size</u> | <u>Gradation Design Range</u> <u>Percent by Weight Passing</u> | |
|-------------------|---|-------------------|
| | <u>Type S-I</u> | <u>Type S-III</u> |
| 3/4-inch | 100 | |
| 1/2-inch | 88-100 | 100 |
| 3/8-inch | 75-93 | 88-100 |
| No. 4 | 47-75 | 60-90 |
| No. 10 | 31-53 | 40-70 |
| No. 40 | 19-35 | 20-45 |
| No. 80 | 7-21 | 10-30 |
| No. 200 | 2-6 | 2-7 |

- C. Use a mixture containing proportions of silica sand and local materials equalling not more than 25 percent by weight total aggregate. Use only local materials conforming with all requirements of FDOT Specifications, Section 902-6.

2.03 FORMULA FOR JOB MIX

- A. Use job mix formula conforming to the requirements of FDOT Specifications, Section 331-4.3, and submit test data showing that the material, as produced, meets the requirements of the following table:

| Mix Type | <u>S-I</u> | <u>S-III</u> |
|-----------------------------------|-----------------|----------------|
| Minimum Marshall Stability | 1,500 lbs | 2,000 lbs |
| Flow | 0.08 - 0.14 in. | 0.08 - 0.16 in |
| Minimum VMA | 14 % | 15 % |
| Air Voids | 3 - 5 % | 3 - 7 % |
| Minimum Effective Asphalt Content | 5.0 % | 5.5 % |

- B. The job mix formula shall be reviewed and accepted by the Engineer prior to commencing work.

PART 3 - EXECUTION

3.01 TRANSPORTATION OF MIXTURE

- A. Transport the mixture in tight vehicles previously cleaned of all foreign material and, if necessary, cover each load with a waterproof canvas cover of sufficient dimensions to protect it from weather conditions. Thinly coat the inside surface of the truck bodies with soapy water, or a mixture of water with not more than five percent of lubricating oil, but no excess of either. After the truck bodies are coated and before any mixture is placed therein, raise them so that all excess water will drain out. Do not use kerosene, gasoline, or similar products to prevent adhesion.

3.02 LIMITATIONS FOR SPREADING

- A. Spread the mixture only when the surface is properly prepared and is intact, firm, cured, and dry. Do not spread the mixture when the air temperature is less than 40°F, or when the spreading cannot be finished and compacted during daylight hours. Ensure that the temperature of the mix at the time of spreading is not less than that recommended by FDOT Specifications for the particular work.

3.03 PLACING MIXTURE

- A. Place the mixture in accordance with FDOT Specifications, Section 330-9.

3.04 COMPACTING MIXTURE

- A. Compact the mixture in accordance with FDOT Specifications, Section 330-10.

3.05 JOINTS

- A. Form joints in accordance with FDOT Specifications, Section 330-11.

3.06 FIELD QUALITY CONTROL

- A. Surface Requirements:

1. For the purpose of testing the finished surface, provide a straightedge and a standard template cut to the true cross section of the road and designate an employee whose duty it is to handle the straightedge and template in checking all rolled surfaces, under the direction of the Engineer.
2. Construct the finished surface such that it will not vary more than 1/4 inch from the template cut to the cross section of the road, nor more than 3/16 inch from the straightedge applied parallel to the center line of the pavement. Correct any irregularity of the surface exceeding the above limits. Repair depressions which may develop after the initial rolling by loosening or removing the mixture and adding new material to bring the areas to a true surface. Skin patching will not be accepted. Remove such portions of the completed pavement as are defective in surface compaction or in composition, or that do not comply with all other requirements of these Specifications, and replace with suitable mixture, properly laid in accordance with these Specifications and at no cost to the Owner.

- B. Thickness Requirements: Verify that the thickness of the compacted asphaltic concrete surface course is not less than that shown on the Drawings. Remove and replace to the required thickness any surface course found to be deficient.
- C. Testing: Give timely notice to the testing laboratory of readiness for the required density and other tests. Pay for all retesting required due to non-compliance until satisfactory results are obtained.
- D. Protection of Pavement: After the completion of the pavement, allow no vehicular traffic of any kind on the pavement until it has set sufficiently to prevent rutting or other distortion.

END OF SECTION

SECTION 02550

D.E.P.

GEOTEXTILE

APR 27 1998

SOUTHWEST DISTRICT
TAMPA

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. Furnish all transportation, labor, materials, tools, installation equipment and supervision necessary for the manufacturing, storage, delivery, installation and testing of the geotextile portions of the leachate collection trench, as herein specified and as shown on the Drawings.

1.02 QUALITY ASSURANCE

- A. Manufacturer Qualifications: The geotextile manufacturer shall be a company, corporation, or firm regularly engaged in the development and manufacture of geotextile with a history of successful production for a minimum period of five (5) years. The manufacturer shall have supplied geotextile to a minimum of six (6) projects during the past five (5) years of similar size and scope totaling a minimum of ten million (10,000,000) square feet. Projects shall be considered similar only if the manufacturer had total responsibility for geotextile manufacture and the installed system has successfully fulfilled its primary function for a minimum of two (2) years.

1.03 DEFINITIONS AND RESPONSIBILITY

- A. The Contractor shall provide the services of a geotextile system manufacturer who shall meet the following qualifications. The Contractor shall accept and retain full responsibility for all materials and installation and shall be held responsible for any defects in the completed geotextile system(s).
- B. Manufacture of Geotextiles: The geotextile manufacturer shall be responsible for the production and delivery of rolls of the products and shall be a well established firm with more than five years experience in the manufacture of geotextiles. The Contractor shall submit a statement on behalf of the geotextile manufacturer to the Engineer listing the manufacturer's certified minimum property values of the geotextile and the tests used to determine those properties.

- C. Installation: The Contractor shall be responsible for transportation, field handling, storing, deploying, seaming, temporary restraining (against wind), anchoring and other site aspects of the geotextiles. The Contractor shall be trained and qualified to install geotextile and shall be approved and/or licensed by the manufacturer. The Contractor's qualifications will require the Owner's acceptance.

PART 2 - PRODUCTS

2.01 GEOTEXTILES

A. General Requirements:

1. The material shall be furnished by a single geotextile manufacturer. The manufacturer, through the Contractor, shall submit a manufacturing and field quality control plan accepted by the Engineer within twenty-one (21) days after award of contract.
2. Unless otherwise noted on the Drawings, geotextile manufacturers shall furnish materials whose minimum average roll values for geotextile materials, as defined by the Federal Highway Administration (FHWA), Task Force 25 Guidelines shall meet or exceed the criteria listed below under Geotextile Properties. The geotextiles provided by the supplier shall meet or exceed the property values specified and shall be stock products.
3. The non-woven material shall be comprised of yarns of polypropylene or polyester fibers, oriented into a stable network by needle punching which retains its structure during handling, placement, and long-term service. Geotextiles shall be capable of withstanding direct exposure to sunlight for 30 days with no measurable deterioration. The geotextile shall be chemically compatible with the leachate from a typical sanitary landfill; and inert to commonly encountered chemicals, hydrocarbons, mildew and rot resistant, and be insect and rodent resistant. The geotextile products shall conform to the properties of Table 02550-A.
4. During shipment and storage, the geotextile shall be protected from ultraviolet light exposure, precipitation or other inundation, mud, dirt, dust, puncture, cutting or any other damaging or deleterious conditions. During storage, the geotextile shall be raised off the floor/ground. The manufacturers shall furnish complete written instructions for the storage, handling and installation of the geotextile in compliance with this Specification and the conditions of the warranty.

B. Labelling:

1. Geotextiles shall be supplied in rolls wrapped in impermeable and opaque protective covers. Geotextile and rolls shall be marked or tagged with the following information:
 - a) Manufacturer's name.
 - b) Product identification.
 - c) Lot number.
 - d) Roll number.
 - e) Roll dimensions.
 - f) Mass expressed in oz/yd²
2. Additionally, if any special handling is required, it shall be so marked on the geotextile itself, e.g., "This Side Up".

C. Manufacturers: The geotextile manufacturer and model number are indicated on Table 02550-A, or Engineer accepted equal.

2.02 TRANSPORTATION, HANDLING AND STORAGE

- A. Transportation, handling, storage, and care of the geotextile materials prior to and following installation at the site, is the responsibility of the Contractor. The Contractor shall be liable for all damages to the materials incurred prior to final acceptance of the lining system by the Owner.

2.03 MANUFACTURING QUALITY CONTROL

A. Geotextiles:

1. The geotextile shall be manufactured with a high degree of quality control and shall contain no needles from the manufacturing process. In most cases, however, sampling can be carried out on sacrificial portions of the material. Consequently, repair of sampled locations should not be required as long as the rest of requirements are met in this Specification. The following criteria are necessary for these components.
2. Rolls:
 - a) All materials shall be tested, at a minimum, once every lot or once every 40,000 square feet, whichever is least, to evaluate the pertinent characteristics for quality control. This testing shall be performed and certified by the Contractor to show that the material samples meet the specifications described herein. Samples not

satisfying the specifications shall result in the rejection of the applicable rolls. At the Contractor's discretion and expense, additional testing of individual rolls may be performed to more closely identify the noncomplying rolls and/or to qualify individual rolls.

b) The Contractor shall provide to the Engineer the geotextile manufacturer's certification on the quality of the rolls of geotextiles. As a minimum, the certifications shall include quality control certificates for each shift's production and shall be signed by responsible parties employed by the manufacturer (such as the production manager), shall be notarized and supplied to the Engineer.

c) The quality control certificate shall include:

- 1) Roll numbers and identification.
- 2) Sampling procedures.
- 3) Results of quality control tests, including a description of test methods used.

B. Conformance Testing: Upon delivery to the site, samples of all geotextile materials shall be removed by the Engineer and sent to the Owner's independent specified laboratory for testing to ensure conformance to these specifications. Conformance tests by independent laboratory will be at Owner's expense. The Contractor shall be responsible for payment of any failed conformance tests. Samples shall be selected by the Engineer at a frequency of one (1) per 100,000 sf material delivered. The Engineer may increase the frequency of sampling at his discretion in the event that test results are negative. Any materials whose sample minimum average roll values do not meet these specifications shall be rejected and replaced, at the cost of the Contractor. The Contractor shall be responsible for the safe storage of rolls at the job site.

PART 3 - EXECUTION

3.01 INSTALLATION OF GEOTEXTILES

A. Handling and Placement: The Contractor shall handle all geotextiles in such a manner as to ensure they are not damaged in any way, and the following shall be complied with:

1. The geotextile shall be installed as shown on the plans with the required overlap of a minimum of 24 inches if the seams are to be thermally bonded and 6 inches if sewn. The surface on which the geotextile is placed shall

be free of sharp protruding objects that might puncture the geotextile. Care should be taken during installation to prevent damage to the geotextile. The geotextile shall be loosely laid to prevent unnecessary stretching of the material.

2. In the presence of wind, geotextiles shall be weighted with sandbags or the equivalent. Such sandbags shall be installed during placement and shall remain until replaced with earth cover material.
3. Geotextiles shall be cut using a tool capable of obtaining a clean cut, unstressed sample. If in place, special care must be taken to protect other materials from damage which could be caused by the cutting of the geotextiles.
4. During placement, care shall be taken not to entrap in the geotextile stones, excessive dust, or moisture that could generate clogging of drains or filters, or hamper subsequent seaming. At no time during geotextile placement shall any vehicle be allowed directly on the exposed geotextile.
5. An examination of the geotextile over the entire surface, after installation, shall be conducted to ensure that no potentially harmful foreign objects, such as needles, are present. Any foreign objects so encountered shall be removed by the installer or the geotextile shall be replaced.
6. If white colored geotextile is used, precautions shall be taken against "snowblindness" of personnel.

B. Seams and Overlaps:

1. Geotextiles shall be continuously thermally bonded or sewn (i.e., spot sewing is not allowed). Geotextiles shall be overlapped a minimum of 24 inches prior to seaming if thermally bonded and 6 inches if sewn.

C. Repair:

1. Any holes or tears in the geotextile shall be repaired as follows:
 - a) A patch made from the same geotextile shall be thermally bonded into place with a 24-inch overlap in all directions. Should any tear exceed 10 percent of the width of the roll, that roll shall be removed from the slope and replaced.
2. Care shall be taken to remove any soil or other material which may have penetrated the torn geotextile.

Table 02550-A

REQUIRED PROPERTY VALUES NON-WOVEN GEOTEXTILE ¹ APPLICATIONS ²

| Property | Units | Value ¹ | Test |
|-------------------------------------|--------------------|--------------------|-------------|
| Mass per unit area | oz/sy | 8 | ASTM D 5261 |
| AOS | U.S. Std. Sieve | 80 | ASTM D 4751 |
| Grab tensile strength | lb | 210 | ASTM D 4632 |
| Grab tensile elongation to break | % | 50 | ASTM D 4632 |
| Puncture strength | lb | 130 | ASTM D 4833 |
| Resistance Range | pH | 2-12 | - |

¹Values represent minimum average roll values as defined by the Federal Highway Administration.

Manufacturers: Carthage Mille FX-80HS, or equal.

C. Repair:

1. Any holes or tears in the geotextile shall be repaired as follows:
 - a) On non-slopes a patch made from the same geotextile shall be thermally bonded into place with a 24-inch overlap in all directions. Should any tear exceed 10 percent of the width of the roll, that roll shall be removed from the slope and replaced.
2. Care shall be taken to remove any soil or other material which may have penetrated the torn geotextile.

3.02 PLACEMENT OF SOIL MATERIALS

- A. The Contractor shall place all soil materials located on top of a geotextile, in such a manner as to ensure:
 1. No damage of the geotextile.
 2. Minimal slippage of the geotextile on underlying layers.
 3. No excess tensile stresses in the geotextile.
- B. Care shall be taken during filling operations to ensure that the geotextile is not damaged by earth-moving or other equipment. Any damage to the geotextile caused by the Contractor's equipment shall be repaired at no cost to the Owner.
- C. Upon completion of the covering operation, the Contractor shall certify the following to the Owner:
 1. The geotextile was constructed in accordance with the project plans and specifications.
 2. The cover material meets all requirements with the project plans and specifications. The geotextile has not been damaged during the covering operation or construction.

END OF SECTION

SECTION 02720

STORM DRAINAGE SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide storm drainage systems consisting of ponds, culverts, and other drainage structures as shown on the Drawings and specified herein.

1.02 SUBMITTALS

- A. Submit Shop Drawings, product data, certifications, etc. for the following items.
 - 1. Reinforced concrete piping and fittings
 - 2. Precast structures with accessories
 - 3. Pipe certification
- B. Submit product data and certification of quality by producers prior to installation.

1.04 JOB CONDITIONS

- A. Existing Drainage System: Maintain operation, prevent siltation and flooding.
- B. Cleanup: Maintain surface grade within 100 feet of pipe laying operation.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Concrete Pipe: Reinforced concrete culvert pipe conforming to ASTM C 76, Class III, unless otherwise indicated. Pipe joints shall be rubber gasket joints, and the pipe joint shall be manufactured to meet the requirements of the approved type of gasket to be used. Pipe joints shall conform to the requirements of Section 430-7 of the FDOT Standard Specification. Rubber gaskets shall conform to the requirements of Section 942 of the FDOT Standard Specifications.

- B. Precast Concrete Units: Precast concrete inlets shall conform to applicable requirements of Section 03300 of these Specifications. Concrete for use in precast units shall be Class A. Joints shall be O-ring rubber gaskets conforming to ASTM C443.
- C. Grates: Grates shall be made of steel reticulín bars conforming to FDOT Standards Index 232 for inlet Type C.

PART 3 - EXECUTION

3.01 PREPARATION

A. Pipe Trenches:

1. Pipe trenches shall be of necessary widths for the proper laying of the pipe and the banks shall be as nearly vertical as practicable with consideration to soil conditions. The clearance between the pipe and trench wall shall be as indicated in Section 02220. The bottom of the trenches shall be excavated to a depth of the outside bottom of the pipe barrel. Any over excavation shall be replaced with suitable compacted material. Excavation for inlets and other appurtenances shall be sufficient to provide a clearance between their outer vertical surfaces and the face of the excavation or sheeting, if used, of not less than 12 inches.
2. Soft, spongy, or otherwise unstable material encountered below the established grade of the excavation which will not provide a firm foundation for subsequent work shall be removed and replaced as directed. Unless otherwise directed, all such unstable materials shall be removed for the full width of the excavation and replaced with approved fill material.
3. Where sheeting and bracing are necessary to prevent caving of the trench sidewalls of excavation for other structures, and to safeguard the workmen, the trench or excavation for other structures shall be dug to such width that the proper allowance is made for the space occupied by the sheeting and bracing to provide clearance as specified above.

3.02 INSTALLATION

A. Concrete Pipe:

1. Install concrete pipe carefully, true to the line and grade shown on the Drawings. Any deviation from true alignment or grade which would result in a displacement from the normal position of the gasket of as much as 1/4 inch, or which would produce a gap exceeding 1/2 inch between sections of pipe for more than 1/3 of the circumference of the inside of the pipe, will not be acceptable and where such occurs, remove and reinstall the pipe without additional compensation. Use no mortar, joint compound, or other filler which would tend to restrict the flexibility of the gasket joint. Install pipes having defects that have not caused their rejection so that these defects will be in the upper half of the sewer.
2. Before installation of the pipe gasket, clean the gasket and the surface of the pipe joint, including the gasket recess free from grit, dirt, or other foreign matter. Application of an approved vegetable soap lubricant immediately prior to closing of the joint will be permitted.
3. Install all pipes with bells or grooves uphill. As the pipes are laid throughout the work, thoroughly clean and protect them from dirt and water. Lay no length of pipe until the two preceding lengths have been thoroughly embedded in place so as to prevent any movement or disturbance of the finished joint, and do not walk on or work over the pipes after they are laid, except as may be necessary in tamping earth and refilling, until they are covered to a depth of 1 foot. Place fill around the pipe on both sides simultaneously to approximately the same elevation and uniformly compacted. Whenever the pipe laying is discontinued, as at night, protect the unfinished end from displacement due to caving of the banks or from other injury and insert a suitable stopper.

B. Drainage Structures:

1. Install precast concrete structures in conformity with the Drawings. Set grates in mortar to the proper line and grade.

3.03 BACKFILLING FOR PIPE AND STRUCTURES

- #### A.
- After the pipe has been installed, place approved select material from excavation at a moisture content which will facilitate compaction alongside the pipe in layers not

exceeding 6 inches loose measure in depth. Thoroughly compact the fill under the haunches of the pipe and compact each layer by rolling or tamping with mechanical rammers. Continue this method of filling and compacting until the fill is 12 inches above the pipe, then place the remainder of the backfill in lifts not exceeding 9 inches. Operate heavy equipment in a manner so that no damage to the pipe will result. Compact backfill material 12 inches and more above the top of the pipe to not less than 95 percent of maximum density as determined by AASHTO T180. Tests for density of compaction may be required at the option of the Engineer. Correct deficiencies without additional cost to the Owner.

- B. Place and compact backfill for drainage structures in the same manner as specified above for pipe, except allow the concrete to cure for not less than five days before placing the backfill.

END OF SECTION

SECTION 02730

HIGH DENSITY POLYETHYLENE (HDPE) PIPING SYSTEMS

D.E.P.
APR 27 1998
SOUTH FLORIDA DISTRICT
TAMPA

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: These specifications describe the furnishing of all labor, equipment, and materials necessary for the construction and inspection of the High Density Polyethylene (HDPE) Pipe and appurtenances. The supply and installation of this piping shall be in strict accordance with the Engineer's Specifications and Engineering drawings and be subject to the terms and conditions of the contract.
- B. Related Work Described Elsewhere:
 - 1. Section 02220: Excavation, Backfilling, and Compaction

1.02 QUALITY ASSURANCE

- A. The manufacturer of the piping material hereunder shall have previously demonstrated his ability to produce this piping by having successfully manufactured similar piping material meeting all requirements of the National Sanitation Foundation. Prior to construction, the Manufacturer's Certificate of Compliance with this Specification for HDPE pipe shall be submitted to the Engineer in accordance with Section 01340, Shop Drawings, Working Drawings, and Samples.
- B. The manufacturer shall certify to the Engineer that the pipe supplied to this project will meet the level of service required.
- C. The Contractor shall TV inspect the leachate piping in accordance with 3.02 N.

1.03 DAMAGE CONTROL

- A. Transportation: Care shall be taken during transportation of the pipe that it is not cut, kinked or otherwise damaged.

B. Handling Pipe Lengths:

1. Ropes, fabric, or rubber-protected slings and straps shall be used when handling pipes.
2. Chains, cables, or hooks inserted into the pipe ends shall not be used. Two slings spread apart shall be used for lifting each length of pipe. Pipe or fittings shall not be dropped onto rocky or unprepared ground.

C. The Contractor shall conduct a TV inspection of the interior of the piping to ensure that the pipe has not been crushed or contains any foreign material or objects.

D. Storage: Pipes shall be stored on level ground (preferably turf or sand) that is free of sharp objects which could damage the pipe.

1. Stacking of the pipe shall be limited to a height that will not cause excessive deformation of the pipe bottoms under anticipated temperature conditions.
2. If ground conditions are unsuitable, the pipe shall be stored on wooden sleepers, spaced suitably and of such width as not to allow deformation of the pipe at the point of contact with the sleeper or between supports.

1.04 EXCAVATION AND BACKFILL

A. All excavation in the preparation of pipe bedding shall be performed in accordance with the requirements of Section 02220, Excavation, Backfilling, and Compaction.

B. All trenching requirements shall follow the Trench Safety Plan.

1.05 SHOP DRAWINGS

Shop Drawings, including layouts within and under structures, shall include the following:

- A. Details of special elbows and fittings.
- B. Copy of the manufacturer's quality control check of pipe material and production.
- C. Certified test records for high density polyethylene pipe.
- D. Manufacturer's Certification of Compliance with this specification for pipe. The certification shall be signed and sealed by an authorized corporate officer.

PART 2 - PRODUCTS

D.E.P.

APR 27 1998

SOUTH FLORIDA DISTRICT
TAMPA

2.01 MATERIALS

- A. The high density polyethylene pipe shall have a corrugated exterior, and smooth-wall interior, with slots to allow the inflow of ~~groundwater leachate~~ into the pipe. Pipe and fittings shall be made of new, first-quality polyethylene compounds which conform with the requirements of cell class 324420C (min.), as referenced in ASTM D 3350. The pipe shall contain a minimum of 2 percent, and a maximum of 5 percent, carbon black. The pipe shall be as manufactured by ADS (Advanced Drainage Systems), Inc., or approved equal.
- B. Fittings:
 - 1. Fittings shall be free of foreign inclusions and visible defects. Fittings may be either molded or fabricated. Fittings supplied by manufacturers other than the supplier of the pipe shall not be permitted without the approval of the Engineer. All fittings shall match the system piping to which they are attached. Pipe ends shall be cut squarely and cleanly so as not to adversely affect joining
 - 2. Joints shall be made with split couplings, corrugated to engage the pipe corrugations, and shall engage a minimum of 4 corrugations, 2 on each side of the pipe joint. A neoprene gasket shall be utilized with the coupling to provide a soil-tight joint.
- C. The Contractor shall submit a certification from the manufacturer of the piping, stating that the piping meets physical property requirements for the intended application.
- D. Each standard and random length of pipe in compliance with this specification shall be clearly marked at a minimum: (1) pipe size, (2) pipe stiffness, and (3) class and profile numbers. The pipe stiffness value shall be 50 or greater, unless otherwise indicated on the Drawings.
- E. Slot patterns for the collection laterals, headers, and toe drains shall ~~meet be as stated in AASHTO M252 and M294 standards unless otherwise indicated on the Drawings.~~ Slots shall be cut in the factory by the manufacturer before delivery to the site. Slots shall be cleanly cut so as not to restrict the inflow of ~~groundwater leachate~~. No field cut slots shall be allowed.

D.E.P.

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COMMUNITY DEVELOPMENT
TAMPA

PART 3 - EXECUTION

3.01 PREPARATION

- A. Upon satisfactory excavation of the pipe trench, a continuous trough for the pipe barrel shall be excavated by hand digging so that, when the pipe is laid in the trench, true to line and grade, the pipe barrel will receive continuous uniform support and the bell (if used) will receive no pressure from the trench bottom.
- B. The Manufacturer shall furnish complete written instructions for the storage, handling, installation, fusion, and repair of the piping in compliance with this Specification and the conditions of this warranty.
- C. The interior of all pipe shall be thoroughly cleaned of all foreign material before being lowered in the trench and shall be kept clean during laying operations by means of plugs, or other industry-approved methods.

3.02 INSTALLATION

- A. Before pipe is joined, it shall be cleaned of all dirt and other foreign material. Each pipe shall be carefully examined for cuts, scratches, gouges, etc. before being laid, and defective or damaged pipe shall not be used. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Under no circumstances shall pipe be laid in water, and no pipe shall be laid when trench or weather conditions are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary. All pipe in place shall be inspected before backfilling. Any pipe which is disturbed or found to be defective after laying shall be taken up and relaid or replaced.
- B. Lowering Pipe Into Trench: Care shall be exercised when lowering pipe into the trench to prevent damage to or twisting of the pipe.
- C. Cutting shall be done with approved mechanical cutters in a manner that will not damage the pipe. Pipe shall be firmly and uniformly supported on the bedding material. Pipe interior shall be kept thoroughly clean as the work progresses. ~~Care shall be taken that pipe is not disturbed until joints are cured.~~ Any adapters for joining shall be in accord with the pipe manufacturer's printed instructions.

- D. Special Precautions: Pipe connected to heavy fittings, manholes and rigid structures shall be supported in such a manner that no subsequent relative movement between the pipe and the joint with the rigid structures is possible.
- E. Joining: Joints shall be made with split couplings, corrugated to engage the pipe corrugations, and shall engage a minimum of 4 corrugations, 2 on each side of the pipe joint. A neoprene gasket shall be utilized with the coupling to provide a soil-tight joint.
- F. Handling Pipeline: The handling of the pipe shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. Sections of the pipe with deep cuts and gouges shall be removed.
- G. All necessary taps and plugs shall be inserted by the Contractor.
- H. Pipe and fittings shall be selected so that there will be as small a deviation as possible at the joints and so that inverts present a smooth surface. Pipe and fittings which do not fit together to form a tight fitting joint will be rejected.
- I. All pipe cuts shall be square, perpendicular to center line of pipe.
- J. Damaged pipe that results in reduction of the wall thickness by more than approximately 10 percent shall be cut out and discarded. Damaged pipe shall be repaired according to manufacturer's recommendations.
- K. The Contractor shall protect the pipe and workers from the build-up of static electricity, which can be generated in the pipe by friction from the handling of pipe in storage, shipping, and installation. The Contractor shall minimize the hazard of discharge by applying a film of water to the work surface, to drain away the static electricity. Other recommendations by the pipe manufacturer will be acceptable.
- L. Protection of Landfill Liner:
 - 1. During installation, no equipment shall be used that may damage the liner.
 - 2. Areas of the liner that will be exposed to traffic or other activities shall be protected by geotextiles, additional liners or other suitable material. Any portion of the liner which becomes damaged or shows signs of excessive wear shall be replaced at no cost to the Owner. Damaged portions of the liner shall immediately be removed from the work area.

- M. TV Inspection of Collection System - After the placement of backfill and cover soils over the collection piping, the collection piping shall be inspected by TV inspection. The inspection shall be video recorded in VHS format and noted on the tape the specific line and location being inspected. The inspection shall look for any foreign objects or debris within the lines. Should any of this material be found, it should be removed by jetting or other methods accepted by the Engineer. Two copies of the tape shall be submitted to the Engineer for review and record purposes.

3.03 CERTIFICATION OF COMPLETION

- A. Upon completion of the covering operation over the piping system, the Contractor shall certify the following to the Owner:
1. The piping system has been constructed in accordance with the approved project plans and specifications.
 2. The piping system has not been damaged during construction or the backfilling operation.

END OF SECTION

SECTION 02776

HIGH DENSITY POLYETHYLENE (HDPE) GEOMEMBRANE

D.E.P.

APR 27 1998

SOUTH TAMPA DISTRICT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work shall include furnishing all labor, materials, quality control, warranties, transportation, storage, supervision, management, and installation equipment necessary for watertight installation and testing of the HDPE geomembrane portion of the liner system, as herein specified and as shown on the Drawings. The supply and installation of these materials shall be in strict accordance with the Engineer's Specifications and Drawings and be subject to the terms and conditions therein.
- B. The installation of the geomembrane shall be performed in conjunction with other work, including but not limited to, leachate collection system installation and placement of cover soils.
- C. Applicable Standards: All geomembrane material supplied and installed as part of this Work shall comply or exceed conditions described in the latest edition of the National Sanitation Foundation (NSF) "Standard for Flexible Membrane Liners" (Standard No. 54) and applicable American Standards and Test Methods (ASTM) guidelines.

1.02 DEFINITIONS AND RESPONSIBILITY

- A. Geomembrane shall be strictly defined to be high density polyethylene (HDPE) in this specification section.
- B. Manufacturer Qualifications:
 - 1. Qualified Manufacturer shall be a company, corporation, or firm regularly engaged in the development and manufacture of geomembrane liners with a history of successful production of geomembrane for a minimum period of ~~three~~five (35) years. The geomembrane rolls shall be manufactured by a single Manufacturer. The Manufacturer shall submit written information as follows:
 - a) Quality Control procedures (manual) for production. The manual shall define sampling procedures, test frequencies and methods. The Manufacturer shall, at a minimum, comply with the quality control specification for this project.
 - b) Statement from the Manufacturer stating the manufacturing quality control measures specified for this project will be followed and the manufactured

geomembrane products will meet or exceed the product specifications for this project.

2. The Manufacturer shall have successfully supplied geomembrane liner for a minimum of six (6) projects, during the last five (5) years, of similar size and scope totaling to a minimum of ten (10) million square feet of installed geomembrane. Projects shall be considered similar only if the Manufacturer had total manufacturing responsibility for geomembrane production and the installed geomembrane has successfully fulfilled its primary function for a minimum of two (2) years. The Manufacturer shall submit written information as follows;

- a) Name and location of project and date of installation.
- b) Contact name and phone number for each project.
- c) Geomembrane thickness and surface area geomembrane installed.

C. Installer Qualifications:

1. Qualified Installer shall be a company, Corporation, or firm regularly engaged in the deployment and installation of geomembrane liners with a successful history of a minimum of five (5) years. The geomembrane shall be installed by a single Installer. The Installer shall submit written information as follows:

- a) Daily installation quantity shall be sufficient to meet the demands of the project schedule for this project.
- b) Quality Control procedures (manual) for field installation. The Installer shall, at a minimum, comply with the specifications for this project.

Quality Assurance/Quality Control Field Program: The QA/QC program shall provide for recording all inspection and testing of all work items to ensure conformance to applicable specifications and drawings with respect to materials, workmanship, construction, functional performance and identification. This program shall be subject to approval by the Engineer. The QA/QC program shall contain as a minimum:

- Storage and Handling
- Panel Identification
- Panel Inspection
- Panel Layout Drawings/Shop Drawings
- Seam Identification
- Seaming Process and Equipment
- Seaming Inspection
- Non-Destructive Tests (Seams, Repairs, Geomembrane Boots)
- Destructive Tests
- Laboratory Test

- Methods for Testing and Calibration of Field Testing Equipment
- Corrective Actions (Including Surveyed Locations)
- Procedures for Development of Record Drawings
- Weather Contingencies
- Record Keeping

c) Statement from the Installer stating the installation quality control measures specified for this project will be followed and the installed geomembrane products will meet or exceed the product specifications for this project.

2. The Installer shall have successfully installed geomembrane materials for at least six (6) projects, during the last five (5) years, of similar size and function totaling a minimum of ten (10) million square feet of installed geomembrane. At least one (1) of the projects shall be a double-lined installation with earthen cover with at least a minimum of one (1) million square feet of liner materials. Projects shall be considered similar only if the Installer had total installation responsibility for geomembrane installation and the installed geomembrane has successfully fulfilled its primary function for a minimum of two (2) years. The Installer shall submit written information as follows:

- a) Name and location of project and date of installation.
- b) Contact name and phone number for each project.
- c) Geomembrane thickness and surface area geomembrane installed.
- d) All personnel performing seaming operations shall be qualified by experience. At least one seamer shall have experience seaming a minimum of 1,000,000 linear feet of geomembrane seams using the same type of seaming apparatus to be used at the site. The master seamer shall provide direct supervision, as required, over less experienced seamers. No field seaming shall take place without the site supervisor or foreman being present on site.

1.03 SUBMITTALS

A. SHOP DRAWINGS: The Contractor shall submit to the Engineer, for approval, information on the following;

- 1. Twenty-one (21) contract days from Notice of Award:
 - a) Warranty (Materials)
 - b) Warranty (Workmanship)

2. A minimum of thirty (30) contract days prior to the geomembrane installation;
 - a) Manufacturer's Qualifications
 - b) Manufacturers Quality Control Plan
 - c) Statement from Manufacturer Product meets or exceeds these specifications
 - d) Installer's Qualifications
 - e) Installers Quality Control Plan, including proposed installation procedures
 - f) Geomembrane Resin Information & Quality Control Certificates
 - g) Geomembrane Manufacturer Material Information & Quality Control Certificates
 - h) Geomembrane Manufacturer's Material test results for EPA Test Method 9090
 - i) Statement from Installer that installed product will meet or exceed these specifications
 - j) Geomembrane Accessories
 - k) Resumes' of installation personnel
 - l) Panel Layout(s) and Details
 - m) Extrudate Rod Resin Information
 - n) Alternative seaming processes other than extrusion or fusion welding
 - ~~o) Procedures for Non-Destructive testing on field fabricated geomembrane penetration boots.~~
 3. During installation;
 - a) Seam quality under conditions outside of the approved weather conditions
 - b) Proposals for night operations
 4. If during geomembrane installation additional material or labor is required, documentation shall include the following:
 - a) Geomembrane Resin Information & Quality Control Certificates
 - b) Geomembrane Manufacturer Information & Quality Control Certificates
 - c) Geomembrane Accessories
 - d) Resumes of installation personnel
 - e) Panel Layout(s) and Details
- Note: Materials or labor shall not be used until the proper documentation is received and approved by the Engineer

4. After completion of installation;

- a) Record (As-Built) Drawings
- b) Contractors Written Certification
- c) Warranties (Materials and Workmanship)

B. Detailed information requirements for the shop drawing submittals are described within this specification section. The Contractor shall be required to submit and receive approval from the Engineer for all submittals described within this specification section.

1.04 WARRANTY

A. The Contractor shall guarantee the materials of all products supplied, on a prorated basis, as part of this work for a minimum period of twenty (20) years following final acceptance of the geomembrane installation by the Owner.

B. The Contractor shall guarantee the workmanship of all services supplied as part of this work for a minimum period of two (2) years following final acceptance of the geomembrane installation by the Owner.

C. Warranty conditions, for the materials and workmanship, proposed by the Manufacturer/Fabricator/Installer concerning limits of liability shall be evaluated upon receipt by the Owner and must be acceptable to the Owner prior to installation of the geomembrane. Proposed Warranty conditions shall be submitted to the Engineer within twenty-one (21) contract days after award of contract for review and approval.

PART 2 - PRODUCTS

2.01 GEOMEMBRANE RESIN RAW MATERIALS

A. The geomembrane shall be manufactured from virgin, first-quality polyethylene resin, and shall be designed and manufactured specifically for use in geomembrane systems. Reclaimed or reworked polymer shall not be used or added to the resin. The polyethylene resin shall meet or exceed the contract specifications for the following properties, at a minimum, and be recorded on the Quality Control Certificates:

| | | |
|------------|--------------------|---------------------------------------|
| Density | > .940 g/cc | ASTM D 792 Method A or ASTM D 1505 |
| Melt Index | 0.1 - 1.1 g/10 min | ASTM D 1238 |

- B. The frequency of testing the resin batches shall be per manufacturer's or supplier's quality control plan but shall not be less than one (1) test per lot.
- C. Testing of the resin shall be conducted to demonstrate that the resin meets or exceeds the contract specifications. Any geomembrane manufactured from non-complying resin shall be rejected and shall not be delivered to the project.
- D. At the Engineer's discretion, additional conformance sampling may be conducted. If the results of the Manufacturer and Engineer differ, the testing shall be repeated by the Engineer and the Manufacturer shall be allowed to monitor the testing. The latter of the tests will prevail, provided that the applicable test methods have been followed. The additional tests shall be at no cost to the Owner or Engineer if it is determined that the specifications have not been complied with.
- E. The Manufacturer shall submit written documentation on the geomembrane raw materials and resin batches;
 - 1. Resin supplier's name, plant location or identification, and production date(s) of resin.
 - 2. Copies of Quality Control Certificates, issued on company letterhead and shall be signed by responsible parties, employed by the manufacturer, supplier, or independent laboratory (such as the production manager), with test results conducted by the manufacturer or resin production plant.
 - 3. The manufacturer shall submit written documentation that no reclaimed or reworked polymer was added to the resin during the geomembrane manufacturing process to be used for this project.
 - 4. The manufacturer shall submit written documentation correlating each individual geomembrane roll delivered to the project to the respective resin batches.

2.02 GEOMEMBRANE MANUFACTURING

- A. The geomembrane for this project shall consist of a high density polyethylene (HDPE) sheet and shall meet the contract specification for the properties shown on Table 02776-A, at a minimum.

TABLE 02776-A

**MATERIAL PROPERTIES
HIGH DENSITY POLYETHYLENE (HDPE) LINER**

| PROPERTY | TEST METHOD | VALUE |
|-------------------------------|--------------------------|---|
| Thickness | ASTM D1593 | 60 mils, minimum average 57 mils, minimum individual |
| Density | ASTM D792 or ASTM D 1505 | 0.940 g/cm ³ (minimum) |
| Melt Index (MI) | ASTM D1238, Condition E | 0.1 ≤ MI ≤ 1.1 g/10 min |
| Minimum Tensile Properties | ASTM D638 | (each direction) |
| 1. Tensile Strength Yield | | 120 (lb./in width) |
| 2. Tensile Strength at Break | | 30 (lb./in width) |
| 3. Elongation at Yield | | 10% (minimum) |
| 4. Elongation at Break | | 100% (minimum) |
| Tear Resistance | ASTM D1004, Die C | 40 lb (minimum), |
| Puncture Resistance | FTMS 100 C, Method 2065 | 60 lb (minimum) |
| Carbon Black Content | ASTM D1603 | 2-3% |
| Carbon Black Dispersion | ASTM D3015 | A-1, A-2, and B-1 |
| Dimensional Stability | ASTM D1204 | 3% (each direction) 1 hour @ 100° C |
| Water Absorption | ASTM D570 | 0.1% (maximum) (% weight change) |
| Resistance to Soil Burial | ASTM D3083 | (maximum percent change in original value; as modified in NSF 54 Annex A) |
| 1. Tensile Strength Yield | | 10% |
| 2. Tensile Strength at Break | | 10% |
| 3. Elongation at Yield | | 10% |
| 4. Elongation at Break | | 10% |
| Environmental Stress Crack | ASTM D1693 | Minimum 2000 Hours |
| Water Vapor Transmission Rate | ASTM E 96 | 0.24 grams/square meter/ day |

Source: NSF 54 - 1991

In addition the geomembrane shall:

1. Contain no more than one (1) percent, by weight, additives, fillers, or extenders. (Note: Carbon Black not included in this limitation)
2. Be free of striations, folds, crimps, roughness, pinholes, or bubbles on the surface.
3. Be produced so as to be free of holes, blisters, undispersed raw materials, or any sign or contamination by foreign materials.
4. Be manufactured in a single layer, i.e. thinners layers shall not be welded together to produce the final required thickness.

B. Geomembrane Manufacturing Quality Control;

1. The carbon black shall be added to the pure polyethylene resin as part of the roll manufacturing process.
2. Rolls manufactured with inclusions, bubbles, or not complying with the specifications shall be rejected and not delivered to the project. Geomembrane thickness shall be monitored continuously during manufacturing. No geomembrane shall be accepted which fails to meet minimum specified thickness.
3. The geomembrane shall be tested once every 40,000 square feet of material to be delivered and installed on this project. The geomembrane shall be tested for the parameters listed below to evaluate stress deformation characteristics. This testing shall be preformed by the Manufacturer or the manufacturer's certified testing laboratory. Samples which do not satisfy the contract specifications shall be cause to reject applicable rolls. If a geomembrane sample fails to meet specifications, subsequent tests shall be preformed at random on additional geomembrane samples produced from the same resin batch to determine whether all rolls produced from the same batch shall be regarded as unsatisfactory and therefore rejected. This additional testing, at the Manufacturers discretion and expense, may be preformed to more closely identify the rolls which do not comply with the specifications.
4. The following test results shall be recorded on each the Quality Control Certificates;

| <u>Test</u> | <u>Procedure</u> |
|-------------------------|---------------------------------------|
| Density | ASTM D 792 Method A or ASTM D 1505 |
| Thickness | ASTM D 751 |
| Tensile Strength | ASTM D 638 (Each Direction) |
| Tensile Elongation | ASTM D 638 (Each Direction) |
| Carbon Black Content | ASTM D 1603 |
| Carbon Black Dispersion | ASTM D 3015 |
| Yield Strength | ASTM D 638 (Each Direction) |
| Yield Elongation | ASTM D 638 (Each Direction) |

Report to the Engineer the average thickness, the standard deviation and the lowest individual reading.

5. Samples shall be taken across the entire width of the rolls. The averaged test results of the geomembrane samples shall meet or exceed the specifications. Certifications of the test results obtained shall be provided to the Engineer and recorded on the Quality Control Certificates.
6. The Manufacturer shall submit the Quality Control Certificates, on company letterhead, and shall be signed by responsible parties, employed by the manufacturer or independent laboratory (such as the production manager). The Quality Control Certificates shall include;
 - a) Geomembrane Roll Number and resin batch identification
 - b) Sampling Procedures
 - c) Results of Quality Control tests, including description of test methods used.
7. The following testing need not be conducted at the rate of once (1) per 40,000 square feet of delivered material. However, the Manufacturer shall certified in writing, on company letterhead and signed by a responsible party (such as the production manager), that these tests have been conducted from the particular resin specified for this project and the results shall meet or exceed the specification;

| <u>Test</u> | <u>Procedure</u> |
|--|------------------|
| Puncture Resistance | ASTM D 4833 |
| Tear Resistance | ASTM D 1004 |
| Environmental Stress Cracking (1,500 Hrs) | ASTM D 1693 |
| Dimensional Stability | ASTM D 1204 |
| Water Absorption | ASTM D 570 |

8. The Manufacturer shall certified in writing, on company letterhead and signed by a responsible party (such as the production manager), that geomembrane manufactured from materials meeting or exceeding this projects specifications, has already passed the EPA Test Method 9090 using leachate that is representative of actual leachate generated by a municipal solid waste landfill.

2.03 ACCESSORY MATERIALS

- A. Accessory materials used for seaming sheets, sealing around pipes and geomembrane penetrations and other installation-related applications shall be submitted to the Engineer for approval.
- B. Two (2) inch wide by 1/4 inch thick closed-cell, neoprene sponge shall be used around the geomembrane penetration and geomembrane. Neoprene sponge or excess geomembrane material shall be placed directly between the geomembrane and the fastening device, i.e bands, clamps, batten strips.
- ~~C. All geomembrane penetrations shall be sealed in such a manner, approved by the Engineer, as to provide a leak proof seal around the penetrations.~~

PART 3 - TRANSPORTATION, HANDLING, STORAGE, EQUIPMENT

3.01 DESCRIPTION

- A. The Contractor shall provide transportation, labor, and handling for delivery of the geomembrane to the project location. Special transportation or handling requirements required for the geomembrane shall be provided by the Contractor.
- B. The equipment for transportation, handling, loading and unloading the geomembrane shall be of sufficient size and capacity to safely and efficiently handle to geomembrane materials. The type, size, and capacity shall be according to Manufacturer/Installer requirements.
- C. The Contractor shall provide all equipment and labor necessary for the loading, unloading, and handling of the geomembrane. The Contractor shall inspect the delivered materials for damage. Repairs, if approved by the Engineer, to damaged materials caused by transportation or handling of the geomembrane shall be at no additional cost to the Owner. Excessively damaged materials shall be rejected and replaced by the Contractor at no additional cost to the Owner.

- D. The materials shall be unloaded by the Contractor in areas designated by the Owner. If the Owner has not specified a storage area, the Contractor shall determine an area for storage of the materials to meet the project schedule requirements. In any case the materials shall not be stored or unloaded in areas which will impair the operations of the landfill facility or be deleterious to the materials. Roll suspect of damage shall be segregated from the undamaged rolls.
- E. Storage and protection requirements of the materials shall be provided by the Contractor. Storage requirements for the materials shall be specified by the Manufacturer/Installer. Protection shall be provided from puncture, cutting, ultraviolet radiation, precipitation, dirt or other damaging or deleterious conditions.
- F. The Contractor shall be responsible for all damages to the materials incurred prior to final acceptance of the line system.

PART 4 - GEOMEMBRANE MATERIAL ACCEPTABILITY

4.01 ON-SITE INSPECTION AND CONFORMANCE TESTING

- A. Upon delivery to the project site, the geomembrane material shall be inspected by the Contractor, Installer, and Engineer or Owner's Representative to confirm that proper labeling, transportation, handling, and storage procedures are followed. Damaged materials will be identified and repaired or rejected at the discretion of the Engineer or Owner's Representative. Repairs will be made, following the specifications established for this project, at no additional cost to the Owner. Rejected materials will be identified and removed from the project site at no additional cost to the Owner.
- B. Upon delivery to the project site, the geomembrane shall be randomly sampled, by the Engineer or Owner's Representative, once per every 100,000 square feet of installable material. The on-site conformance sampling shall insure compliance with the liner specifications. This initial on-site conformance testing shall be at the Owner's expense.
- C. Samples shall be taken across the entire width of the rolls. The averaged test results of the geomembrane samples shall meet or exceed the contract specifications.
- D. Samples which do not satisfy the contract specifications shall be cause to reject applicable rolls. If a geomembrane sample fails to meet specifications, subsequent tests shall be performed at random on additional geomembrane samples produced from the same resin batch to determine whether all rolls produced from the same batch shall be regarded as unsatisfactory and therefore rejected. This additional testing, at no additional cost to the Owner, may be performed to more closely identify the rolls which do not comply with the specifications. Rejected rolls will not be installed and shall be removed from the project site at no additional cost to the Owner.

4.02 GEOMEMBRANE MATERIAL ACCEPTABILITY

- A. Geomembrane materials shall be accepted, by the Engineer, for installation only upon receipt and approval of the following:
1. Information received and approved, by the Engineer, regarding resin quality control for delivered materials.
 2. Information received and approved, by the Engineer, regarding geomembrane manufacturing quality control for delivered materials.
 3. Information received and approved, by the Engineer, regarding geomembrane fabrication quality control for delivered materials.
 4. Approved repair methods established for damaged materials.

PART 5 - GEOMEMBRANE INSTALLATION

5.01 EXECUTION

- A. The Installer shall submit information, prior to installation, on the following;
1. All personnel performing supervisory and seaming operations shall be qualified by experience or certification. The Installer shall submit written information as follows:
 - a) Resumes of personnel performing the installation shall be submitted to the Engineer for approval. At least one seamer shall have experience seaming a minimum of 1,000,000 lineal feet of seam using the same type of seaming apparatus to be use on this project. The most experienced seamer shall provide direct supervision, as required, over the less experienced seamers. No field seaming shall take place without the Installer's site supervisor or foreman being present.
 - b) Resume(s) of supervisory personnel supervising the installation shall be submitted to the Engineer for approval. At least one supervisor shall have installation experience of a minimum of three (3) million square feet of similar geomembrane and experience using the same type of seaming apparatus to be use on this project.

2. The Installer shall submit a Panel Layout and related installation details:
 - a) The panel layout shall be drawn, using applicable drafting standards, to the same scale indicated on the Engineer's Drawings for easy comparison. The panel layout shall be on the installer's letterhead.
 - b) The panel layout shall indicate panel configuration, numbering, and dimensions, ~~geomembrane penetrations~~, access roads, and berms. Factory seams shall be differentiated from field seams (if any). The layout drawing(s) shall indicate individual panel dimensions, estimated waste quantities, estimated installed square footage.
 - c) The Installer shall submit drawings, using applicable drafting standards, detailing geomembrane details and cross sections showing seam overlaps for extrusion and fusion welds, ~~geomembrane penetrations~~, booting details, geomembrane connection details and be sufficient in detail for construction.
3. Documentation shall be submitted, from the Installer, that the extrudate rods are from similar resin materials as the geomembrane resin specified for this project.

B. Earthwork

1. Geomembrane Subgrade Preparation: The Contractor shall be responsible for preparation of the liner subgrade. Foreign objects such as rocks, sticks, glass, sharp objects, stones larger than 1/4-inch in diameter and any other harmful materials shall be removed from the surface of the geomembrane subgrade. Soil at the surface of the subgrade shall be graded to a smooth, even surface. ~~to within ± 0.1 feet as designated on the plans.~~ The subgrade shall be compacted as required in the contract specifications to allow movement of vehicles and equipment without causing rutting or other harmful effects on the subgrade area. No abrupt changes in grade, standing water, or excessive moisture will be permitted. The surface to be lined, including pipe trenches, shall be rolled with a smooth steel drum or pneumatic roller to ensure that the area is free of irregularities, loose earth and abrupt changes in grade. Perimeter anchor trenches shall be excavated to the lines and width shown on the plans. ~~The anchor trench shall extend a minimum of 1.5 feet into the clay as shown on the drawings.~~ All visible vegetation shall be removed. The Installer shall be responsible for inspection of the subgrade surface integrity and suitability in writing to the Contractor and Engineer prior to beginning geomembrane installation. This certification of acceptance shall be given to the Engineer, by the Contractor, prior to commencing geomembrane installation in the area being considered. Special care should be taken to maintain the prepared soil surface. No geomembrane shall be placed onto an area which has become

softened by precipitation. Any damage to the subgrade caused by installation activities shall be repaired at the Contractor's expense.

2. All required survey information and geotechnical testing shall be collected, reviewed, and accepted by the Engineer prior geomembrane deployment.
3. Immediately prior to deployment, the subgrade shall be inspected by the Contractor and Engineer or Owner's Representative. Upon acceptance of the areas for deployment of geomembrane, the Contractor and Engineer or Owner's Representative shall certify the acceptability of the geomembrane's subgrade in writing by signing the Subgrade Approval Form. Rejected and unacceptable areas of the geomembrane's subgrade shall be repaired and reinspected before any geomembrane is deployed over this area.
4. The subgrade shall also be inspected by the Installer and Engineer or Owner's Representative prior to geomembrane deployment. The Installer and Engineer or Owner's Representative shall certify the acceptability of the geomembrane's subgrade in writing by signing the Certificate of Acceptance. Rejected and unacceptable areas of the geomembrane's subgrade shall be repaired and reinspected before any geomembrane is deployed over this area.
5. Geomembrane Subgrade Protection: The Contractor shall protect the subgrade from desiccation, flooding, washouts, degradation, and freezing. Protection, if required, may consist of a thin plastic protective cover (or other material as approved by the Engineer) installed over the completed subgrade until such time as the placement of geomembrane begins over that specific area. Subgrades found to have desiccation cracks greater than 1/4 inch in width or depth, or which exhibit swelling, heaving, or other similar conditions, shall be replaced or reworked by the Contractor to remove these defects. The subgrade must be approved by the Engineer before placement of liner panels can begin.
6. Anchor Trench: The anchor trench shall be excavated prior to geomembrane installation to the lines and grades shown on the drawings. The trench shall have the configuration as shown on the drawings. No loose soil shall be allowed beneath the geomembrane. The anchor trench shall be backfilled and compacted. Care shall be taken to prevent any damage to the geomembrane when backfilling the trenches. Slightly rounded corners shall be provided in the trench where the geomembrane turns down into the trench so as to avoid sharp bends in the geomembrane. The geomembrane shall be welded the entire length of the panel including through the entire dimensions of the trench.

C. Geomembrane Deployment

1. Layout Drawings: The Installer shall have received an set of layout and detail drawing submittal approved by the Engineer. If the Installer changes the

configuration of the geomembrane or details, as shown on the approved submittals, due to field conditions, the Installer shall request prior approval by the Engineer. The layout drawings, as modified and/or approved by the Engineer shall become part of these specifications.

2. Panel Identification for Field deployment: Each panel shall be given an "identification code" (number or letter-number) consistent with the layout plan. The panel identification code shall be related, through a table or chart, to the original resin, and the constituent rolls and factory panels.
3. Field Panel Placement:
 - a) Location: Field panels shall be installed as approved or modified at the location and positions indicated in the layout drawings. Instructions on the wrapping containing the geomembrane materials shall be followed to assure that the rolls and/or factory panels are unrolled and in the proper direction for seaming.
 - b) Installation Schedule: Field panels may be installed using any one of the following schedules:
 - 1) All field panels shall be placed prior to field seaming (in order to protect the subgrade from erosion by rain).
 - 2) Field panels shall be placed one at a time and each field panel shall be seamed immediately after its placement (in order to minimize the number of unseamed field panels exposed to wind).
 - 3) Any combination of the above.
 - c) Weather Conditions: Geomembrane placement shall not proceed at an ambient temperature below 40°F, unless otherwise authorized in writing by the Engineer. Geomembrane placement shall not be done during any precipitation, in the presence of excessive moisture (e.g., fog, dew), in an area of pond water, or in the presence of excessive winds.
 - d) Method of Placement: The Contractor shall ensure that:
 - 1) No equipment used shall damage the geomembrane by handling, trafficking, leakage of hydrocarbons or other means;
 - 2) Personnel working on the geomembrane shall not smoke, wear damaging shoes, or engage in other activities which could damage the geomembrane;

- 3) The method used to unroll the panels shall not cause scratches, wrinkles, or crimps in the geomembrane and shall not damage the supporting soil, or other elements of the liner system;
 - 4) The prepared surface underlying the geomembrane must not be allowed to deteriorate after acceptance, and must remain acceptable up to the time of geomembrane placement;
 - 5) Adequate temporary loading and/or anchoring (e.g., sand bags, tires), not likely to damage the geomembrane, shall be placed to prevent uplift by wind (in case of high winds, continuous loading is recommended along edges of panels to minimize risk of wind flow under the panels);
 - 6) Geomembrane panels shall be positioned in a slackened condition so that they will conform to subgrade irregularities without being stretched taut when covered with fill. Geomembrane panels shall be positioned such that excessive wrinkling does not occur at the overlaps where field seaming is to be completed; and
 - 7) Direct contact with the geomembrane shall be minimized; i.e., the geomembrane in excessively high pedestrian traffic areas shall be protected by geotextiles, extra geomembrane, or other suitable materials.
- e) Damage: Any field panel or portion thereof which becomes seriously damaged (torn, twisted or crimped) shall be replaced by the Contractor at no cost to the Owner. Damaged panels or portions of damaged panels which have been rejected shall be removed from the work area. Underlying portions of the liner system shall also be checked for damage and repaired or replaced as needed.

D. Field Seaming:

1. Seam Layout: In general, seams shall be oriented parallel to the line of maximum slope, i.e., oriented along, not across, the slope. In corners and odd-shaped geometric locations, the number of field seams shall be minimized. No horizontal seams, (oriented parallel to the toe of slope) shall be permitted on sideslopes greater than 5(H):1(V) unless approved by the Engineer. No seams shall be located in the areas of potential stress concentrations.
2. Requirements of Personnel: All personnel performing seaming operations shall be qualified as previously indicated.

3. Overlapping and Temporary Bonding:

- a) The panels of HDPE geomembrane shall be overlapped by a minimum of three inches for extrusion welding, five inches for fusion welding, and five inches for double wedge fusion welding, but in any event, sufficient overlap shall be provided to allow peel tests to be performed on the seam.
- b) The procedure used to temporarily bond adjacent panels together shall not damage the geomembrane or underlying components of the liner system; in particular, the temperature of the air at the nozzle of any spot welding apparatus shall be controlled such that the geomembrane is not damaged.

4. Seam Preparation:

- a) Prior to seaming, the seam area shall be clean and free of moisture, dust, dirt, debris of any kind, and foreign material.
- b) If seam overlap grinding is required, the process shall be completed according to the geomembrane Installer's instructions within one hour of the seaming operation and in a way that does not damage the geomembrane.
- c) Seams shall be aligned with the fewest possible number of wrinkles and no "fishmouths".

5. Seaming Equipment and Products: Approved processes for field seaming are extrusion welding and fusion welding (hot air excluded). Only apparatus which have been specifically approved by make and model shall be used. Proposed alternate processes shall be documented and submitted for approval prior to any seaming being performed. Seam welding equipment shall be equipped with adequate temperature gauges to assure that proper seaming temperatures are maintained. Temperature gauges will be monitored and readings recorded every four hours by the geomembrane Installer.

- a) Extrusion Process: The Installer shall provide documentation, for approval to the Engineer, on the welding apparatus planned to be used at the site prior to any geomembrane seaming work. The Installer shall provide documentation and shall certify that the extrudate is compatible with the specifications, and is comprised of the same resins as the geomembrane sheeting. The geomembrane Installer shall maintain at least one spare operable seaming apparatus on site. Equipment used for

seaming shall not damage the geomembrane, and the geomembrane shall be especially protected from damage in areas of heavy pedestrian or other traffic. The extruder shall be purged prior to beginning a seam until all heat-degraded extrudate has been removed from the barrel. Whenever the extruder is stopped, the barrel shall be purged of all heat degraded extrudate. The electric generator shall be placed on a protective base such that no damage occurs to the geomembrane. Similarly, a protective insulation plate or fabric shall be placed beneath the hot welding apparatus after usage.

- b) Fusion Process: The Installer shall provide documentation, or approval to the Engineer, on the welding apparatus planned to be used at the site prior to any geomembrane seaming work. The fusion-welding apparatus must be automated vehicular-mounted devices. The fusion-welding apparatus shall be equipped with gauges giving the applicable temperatures and pressures. The geomembrane Installer shall maintain at least one spare operable seaming apparatus on site. Equipment used for seaming shall not damage the geomembrane, and the geomembrane shall be protected from damage in heavily trafficked areas. For cross seams associated with fusion welding, the edge of the cross seams shall be ground to a smooth incline (top and bottom) prior to welding. The electric generator shall be placed on a protective base such that no damage occurs to the geomembrane. Similarly, a protective insulating plate or fabric shall be placed beneath the hot welding apparatus after usage. A movable protective layer may be used directly below each overlap of geomembrane that is to be seamed to prevent buildup of moisture between the sheets. The double wedge fusion welding apparatus must be a self-propelled unit containing a high-temperature split wedge used to melt the plastic along the weld lines on the overlapped panels. The geomembrane panels are then squeezed together by pressure rollers so that the two sheets fuse together. The temperature, pressure, and welding speed are independently adjustable so that consistently high quality seams are produced. The split wedge system produces two fusion weld lines separated by an unwelded channel.

6. Weather Conditions for Seaming:

- a) Unless authorized in writing by the Engineer, no seaming shall be attempted at ambient temperatures below 40°F or above 104°F. At ambient temperatures between 40°F and 50°F,

seaming shall be allowed if the geomembrane is preheated by either sun or hot air device, and if there is no excessive cooling resulting from wind. At ambient temperatures above 50°F, no preheating shall be required. In all cases, the geomembrane shall be dry, clean and protected from wind damage.

- b) If the geomembrane Installer wishes to use methods which may allow seaming at ambient temperatures below 40°F or above 104°F, he shall demonstrate by seaming and testing trial seams under actual field conditions and he shall certify in writing that the seam so produced under these conditions is equivalent to those produced under normally approved conditions, and that the overall geomembrane's physical and chemical properties will not fall below the material and seam specifications for this project. In addition, an addendum to the contract between the Owner and the Contractor is required which specifically states that the seaming procedure does not cause any physical or chemical modification to the geomembrane that will generate any short- or long-term damage to the geomembrane.
- c) All seaming operations shall cease upon the presence of any precipitation (i.e. drizzle, sprinkle, etc.).

7. Trial Seams:

- a) Trial seams shall be made on fragment pieces of geomembrane to verify that seaming conditions are adequate. Such trial seams shall be made at the beginning of each seaming period, and at least once each four hours, for each seaming apparatus used that day. Also, each seamer shall make at least one trial seam each day. Trial seams shall be made under the same conditions as actual seams.

The trial seam sample shall be at least three feet long by one foot wide (after seaming) with the seam centered lengthwise. Seam overlap shall be as previously indicated.

- b) Two adjoining specimens, each one inch wide, shall be cut from the trial seam sample by the geomembrane Installer. The specimens shall be tested respectively in shear and peel using a field tensiometer, and shall not fail the seam specifications established for this project. If a specimen fails, the entire operation shall be repeated. If the additional specimen fails, the seaming apparatus or seamer shall not be accepted and shall not

be used for seaming until the deficiencies are corrected and two consecutive successful trial welds are achieved.

- c) After completion of the above described tests, the remaining portion of the trial seam sample can be discarded. Alternatively, the remaining portion of the trial seam can be subjected to destructive testing. If a trial seam sample fails a test, then a destructive test seam sample shall be taken from the seams completed by the seamer during the shift related to the considered trial seam. These samples shall be forwarded to the Engineer and, if they fail the tests, the procedure indicated in Section 5.01 (D) 10. shall apply. The conditions of this paragraph shall be considered as met for a given seam if a destructive seam test sample has already been taken from the considered seam(s).

8. General Seaming Procedures: The general seaming procedure used by the geomembrane Installer shall be as follows:

- a) For fusion welding, a movable protective layer of plastic may be placed directly below each overlap of geomembrane that is to be seamed. This is to prevent any moisture build-up between the sheets to be welded.
- b) Seaming shall extend the entire length of the panels, including seams within the anchor trench.
- c) If required, a firm substrate shall be provided by using a flat board, a conveyor belt, or similar hard surface directly under the seam overlap to achieve proper support.
- d) If seaming operations are carried out at night, written approval, by the Engineer, shall be required 24 hours in advance of the intended night operation. Adequate illumination shall be provided. If during the course of the night operations, the Engineer or Owner's Representative decide the illumination is inadequate, proper illumination shall be provided or night operations shall be ceased. Contract specifications for placing and seaming the geomembrane shall apply to the night operations.
- e) Fishmouths or wrinkles at the seam overlaps shall be cut along the ridge of the wrinkle in order to achieve a flat overlap. The cut fishmouths or wrinkles shall be seamed and any portion where the overlap is inadequate shall then be patched with an

oval or round patch of the same geomembrane extending a minimum of 6 inches beyond the cut in all directions.

- f) The seam bond strength shall be greater than or equal to the sheet.
- g) A width of one (1) foot along the edge, and between the surfaces to be welded, of the liner shall be cleaned to remove all extraneous materials (i.e. sand, silt, oily films, water, etc.) which could be detrimental to the seaming process. The extraneous materials shall be wiped, brushed, or blown from the area to be welded.

9. Non-Destructive Seam Continuity Testing:

- a) Concept: The geomembrane Installer shall non-destructively test all repairs and field seams over their full length using a vacuum test unit, air pressure (for double fusion seams only), or other approved method. Continuity testing shall be carried out as the seaming work progresses, not at the completion of all field seaming. Any required repairs shall be completed by the installer in accordance with Section 5.01 (D) 12. Test results shall be forwarded to the Engineer. The following procedures shall apply to locations where seams cannot be non-destructively tested:
 - 1) All such seams shall be cap-stripped with the same geomembrane.
 - 2) If the seam is accessible to testing equipment prior to final installation, the seam shall be nondestructively tested prior to final installation.
 - 3) If the seam cannot be tested prior to final installation, the seaming and cap-stripping operations shall be observed by the Engineer for uniformity and completeness. The Contractor shall identify these problem areas prior to beginning installation of the liner system.
 - 4) The Contractor shall identify these problem areas prior to beginning installation of the liner system.

b) Vacuum Testing:

1) The equipment shall be comprised of the following:

- (a) A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, port hole or valve assembly, and a vacuum gauge.
- (b) A steel or aluminum vacuum tank and pump assembly equipped with a pressure controller and pipe connections.
- (c) A rubber pressure/vacuum hose with fittings and connections.
- (d) A bucket, water and wide paint brush or mop.
- (e) A soapy solution.

2) The following procedures shall be followed:

- (a) Energize the vacuum pump and reduce the tank pressure to approximately 10 inches of mercury, i.e., 5 psi gauge. All gauges shall read zero (0) psi when the vacuum pump is not turned on. Gauges not reading zero (0) psi shall be replaced.
- (b) Wet a strip of geomembrane approximately 4 inches by 24 inches with the soapy solution.
- (c) Place the box over the wetted area.
- (d) Close the bleed valve and open the vacuum valve.
- (e) Ensure that a leak tight seal is created.
- (f) For a period of not less than 15 seconds, examine the geomembrane through the viewing window for the presence of soap bubbles, which would indicate defects in the geomembrane.
- (g) If no bubble appears after 15 seconds, close the vacuum valve and open the bleed valve, move the

box over the next adjoining area with a minimum 3 inches overlap, and repeat the process.

- (h) All areas where soap bubbles appear shall be marked and repaired in accordance with Section 5.03 (D) 12.
- c) Air Pressure Testing (For Double Fusion Seam Only): The following procedures are applicable to those processes which produce a double seam with an enclosed space.
 - 1) The equipment shall be comprised of the following:
 - (a) An air pump (manual or motor driven) equipped with a pressure gauge capable of generating and sustaining a pressure between 25 and 30 psi and mounted on a cushion to protect the geomembrane. All gauges shall read zero (0) psi when the air pump is not turned on. Gauges not reading zero (0) psi shall be replaced.
 - (b) A rubber hose with fittings and connections.
 - (c) A sharp hollow needle, or other approved pressure feed device.
 - 2) The following procedures shall be followed:
 - (a) Seal both ends of the seam to be tested.
 - (b) Insert needle or other approved pressure feed device into the tunnel created by the fusion weld.
 - (c) Insert a protective cushion between the air pump and the geomembrane.
 - (d) Energize the air pump to a pressure between 25 and 30 psi, close valve, and sustain pressure for approximately 5 minutes.
 - (e) If loss of pressure exceeds 2 psi or does not stabilize, locate faulty area and repair in accordance with Section 5.01 (D) 12.

(f) After a seam has passed a pressure test, release pressure at the end of seam that is opposite the air pump and pressure gauge assembly so as to ensure that the seam is continuous and has been completely tested.

(g) Remove needle or other approved pressure feed device and repair in accordance with Section 5.01 (D) 12.

3) ~~All field fabricated geomembrane penetration boots shall be non-destructively tested before the boot is installed. The boot and boot seams shall be non-destructively tested, in addition to visual inspection, using one of the following methods - hydraulically, air pressure, or smoke. The Installer shall submit procedures for non-destructively testing field fabricated geomembrane penetration boots, for the Engineer's approval, prior to any geomembrane installation.~~

10. Destructive Testing:

- a) Concept: Destructive seam tests shall be performed at selected locations by the Engineer. The purpose of these tests is to evaluate seam strength. Seam strength testing shall be done as the seaming work progresses, not at the completion of all field seaming. The seam strength shall be greater than or equal to the sheet.
- b) Location and Frequency: Destructive test samples shall be collected at a minimum average frequency of one test location per 500 feet of seam length. The Engineer reserves the right to increase the testing frequency should test results or seam conditions warrant. Test locations shall be determined during seaming, and may be prompted by suspicion of excess crystallinity, contamination, offset welds, or any other potential cause of imperfect welding. The Engineer shall choose the locations. The geomembrane Installer will not be informed in advance of the locations where the seam samples will be taken.
- c) Sampling Procedure: Samples shall be cut by the geomembrane Installer at locations designated by the Engineer as the seaming progresses in order to obtain laboratory test results before the geomembrane is covered by another material. Each sample shall be numbered and the sample number and location identified on the Record (As-Built) panel layout drawing. A

report completed by the installer's CQA personnel shall accompany each test strip listing the welder's number, date, time of day, welding machine's welding temperature, sheet temperature, sample location, and nominal thickness. All holes in the geomembrane resulting from the destructive seam sampling shall be immediately repaired in accordance with the repair procedures described in Section 5.01 (D) 12. The continuity of the new seams in the repaired area shall be tested according to Section 5.01 (D) 9.

- d) Size of Samples: The samples shall be 12 inches wide by 44 inches long with the seam centered lengthwise. One 1-inch wide strip shall be cut from each end of the sample and these shall be tested in the field by the Installer. The remaining sample shall be cut into three parts and distributed as follows:
 - 1) One portion to the Contractor for laboratory testing, 12 inches x 12 inches; and
 - 2) One portion for the Engineer for laboratory testing, 12 inches x 18 inches; and
 - 3) One portion to the Engineer for archive storage, 12 inches x 12 inches.
- e) Field Testing: The two 1-inch wide strips shall be tested, by the Installer, in the field, by hand or tensiometer, for peel and shear respectively and shall not fail to meet the specifications established for this project. If any field test sample fails to pass, then the procedures outlined in 5.01 (D) 12 shall be followed.
- f) Laboratory Testing: Testing by the Engineer will include "Seam Strength" and "Peel Adhesion". The minimum acceptable values to be obtained in these tests are those indicated in Table 02776-B. A total of five (5) specimens will be tested, from each sample, for each test method. Five (5) specimens must pass for each test in order for the seam to pass destructive test. The results will not be averaged. Specimens will be selected alternately by test from the samples (i.e., peel, shear, peel, shear). The Engineer will provide test results to the Contractor no more than 24 hours after the samples are received at the laboratory. The only exception shall be weekends or official holidays. On weekends and holidays the laboratories are closed. Arrangements to schedule testing of destructive samples on weekends and holidays shall be approved by the Engineer 24

hours in advance. Additional costs for lab work on holidays or weekends shall be at no additional expense to the Owner.

TABLE 02776-B

HDPE GEOMEMBRANE SEAM REQUIREMENTS

| Properties | Qualifiers | Units | Specified Values | Test Methods |
|---|------------|--------------|-----------------------------|--------------|
| Gauge | Nominal | mils | 60 | |
| Shear Strength ¹ (at yield point) | Minimum | lb/in. width | 120 and FTB ² | ASTM D4437 |
| Peel Adhesion | Minimum | lb/in. width | 85 and FTB ² | ASTM D4437 |

Source: NSF 54 - 1991

¹ - Minimum of 50 percent elongation of the test specimen will be required for the Shear test.

² - FTB - Film Tear Bond

- g) Procedures for Destructive Test Failure: The following procedures shall apply whenever a sample fails the destructive test, whether the test is conducted by the Engineer's specified laboratory, the geomembrane Installer's laboratory, or by field tensiometer. The geomembrane Installer shall have two options, the cost of which shall be at no additional expense to the Owner:
- 1) The geomembrane Installer can reconstruct the seam between any two passed test locations.
 - 2) The geomembrane Installer can trace the welding path to an intermediate location (at 10 feet) minimum from the location of the failed test in each direction) and take a specimen for an additional field test at each location. If these additional specimens pass the tests, then full laboratory destructive samples shall be taken. If these laboratory samples pass the tests, then the seam shall be reconstructed between these locations. If either sample fails, then the process shall be repeated to establish the zone in which the seam should be reconstructed. In any case, all acceptable seams must be bounded by two

locations from which samples passing laboratory destructive tests have been taken. In cases exceeding 130 feet of reconstructed seam, a sample taken from within the reconstructed zone must pass destructive testing. Whenever a sample fails, additional testing may be required for seams that were welded by the same welder and/or welding apparatus or welded during the same time shift.

~~11. Pipes Penetrating Geomembrane: All penetrations of the geomembrane by leachate collection, stormwater, or other piping shall be constructed according to the shop or construction drawings approved by the Engineer prior to installation.~~

~~11.12.~~ Defects and Repairs:

- a) Identification: All seams and non-seam areas of the geomembrane will be examined for identification of defects, holes, blisters, undispersed raw materials and any sign of contamination by foreign matter. The surface of the geomembrane shall be clean at the time of examination. The geomembrane surface shall be broomed or washed by the Contractor if the amount of dust or mud inhibits examination. The Contractor shall ensure that this examination of the geomembrane precedes any seaming of that section.
- b) Evaluation: Each suspect location both in seam and non-seam areas shall be nondestructively tested using the methods described in Section 5.01 (D) 9, as appropriate. Each location which fails the nondestructive testing shall be marked by the CQA monitor and repaired by the geomembrane Installer. Work shall not proceed with any materials which will cover locations which have been repaired until laboratory test results with passing values are available, non-destructive testing passed and the repair has been documented by the Engineer or Owner's Representative.
- c) Repair Procedures:
 - 1) Any portion of the geomembrane exhibiting a flaw, or failing a destructive or nondestructive test, shall be repaired by the geomembrane Installer. Several procedures exist for the repair of these areas. The final decision as to the appropriate repair procedure shall be

agreed upon between the Engineer and the Installer. The procedures available include:

- (a) Patching: used to repair large holes, tears, undispersed raw materials, and contamination by foreign matter.
- (b) Grinding and rewelding: used to repair small sections of extruded seams.
- (c) Spot welding or seaming: used to repair small tears, pinholes, or other minor, localized flaws.
- (d) Capping: used to repair portions of failed seams, less than five (5) feet in length. An extruded weld or fusion weld shall be permitted.
- (e) Topping: used to repair inadequate seams areas, which have an exposed edge, for lengths of seams under five (5) feet in length. An extruded weld will be permitted along the outside edge.
- (f) Removing the bad seam and replacing with a strip of new material welded into place. Used with large lengths of fusion seams (greater than five (5) feet in length). The strip shall be additional geomembrane material which is fusion welded over the failed seam. The cap strip shall be air-tested and vacuum tested.

2) In addition, the following provisions shall be satisfied:

- (a) Surfaces of the geomembrane which are to be repaired shall be abraded no more than one hour prior to the repair.
- (b) All surfaces must be clean and dry at the time of repair.
- (c) All seaming equipment used in repairing procedures must be approved.
- (d) The repair procedures, materials, and techniques shall be approved in advance of the specific repair by the Engineer and Installer.

- (e) Patches or caps shall extend at least six inches beyond the edge of the defect, and all corners of patches shall be rounded with a radius of at least three inches.
 - (f) The geomembrane below large caps should be appropriately cut to avoid water or gas collection between the two sheets.
- d) Verification of Repairs: Each repair shall be identified, tested and logged. Each repair shall be nondestructively tested using the methods described in Section 5.01 (D) 9, as appropriate. Repairs which pass the nondestructive test shall be taken as an indication of an adequate repair. Large caps may be of sufficient extent to require destructive test sampling, at the discretion of the Engineer. Failed tests indicate that the repair shall be redone and retested until a passing test results. The Contractor shall not cover any portion of the geomembrane until the Installer and Engineer have completed the documentation of the repair.
- e) Large Wrinkles: When seaming of the geomembrane is completed (or when seaming of a large area of the geomembrane is completed) and prior to placing overlying materials, the Engineer shall identify all excessive geomembrane wrinkles. The geomembrane Installer shall cut and reseam all wrinkles so identified. The seam, thus produced, shall be tested like any other seam.
- f) Bridging or Induced Tension: Bridging is defined as areas where the geomembrane is not in contact with the subgrade due to a void in the subgrade or the sheet is pulled in tension so as to span over depressions in the subgrade. Areas likely to promote bridging, i.e. trenches, toe of slopes, etc., shall be loaded with sandbags after deployment and after seaming. Induced tension is stress introduced into the geomembrane during installation or covering. These areas will likely result in bridging. Areas bridging excessively shall be identified and repaired by either of the following methods:
 - 1) The geomembrane shall be cut, by the Installer, so the tension is relieved and the geomembrane conforms to the subgrade contours. The cut geomembrane shall be repaired and tested according to the specifications regarding repairs and testing.

- 2) The geomembrane shall be cut, by the Installer, and subgrade material shall be added and placed, in accordance with the contract specifications, so as bring the geomembrane in contact with the subgrade. The cut geomembrane shall be repaired and tested according to the specifications regarding repairs and testing.
- g) Repairs, test sample locations, and defects in the geomembrane shall be replaced at no additional cost to the Owner until final acceptance of the geomembrane lining system. Repairs shall only be made by qualified members of the Installer's organization or authorized personnel.
- h) Wrinkles, gas bubbles, bridging, and inducing tension in the geomembrane system shall be avoided by the Contractor or subcontractors. Areas in the geomembrane which exhibit wrinkles, gas bubbles, bridging, and tension shall be repaired and documented before any cover material or other materials are placed over these areas. These repairs will be at no additional cost to the Owner.

PART 6 - MATERIALS IN CONTACT WITH THE GEOMEMBRANE

6.01 GENERAL

- A. General: The following provisions require the Contractor to take all necessary precautions so that the installation of materials does not damage the geomembrane. Installation on rough surfaces, such as concrete, shall be carefully performed to minimize damage. If approved, additional loosely placed geotextile or geomembrane sections, may be used by the Contractor as protection for the geomembrane.
- B. Granular Materials: Placement of granular materials on the geomembrane shall not proceed at an ambient temperature below 40°F (5°C) or above 104°F (40 degrees C), unless otherwise approved by the Engineer. Equipment used for placing granular material shall not be driven directly on the exposed geomembrane. A minimum thickness of 1 foot of granular material is specified between a light dozer (such as a wide pad caterpillar D-4 or lighter) and the geomembrane. The dozer movement shall be forward and backward, no turning will be allowed until a minimum of 2 feet of cover is placed above the geomembrane. All turning of equipment will be off the area underlain by geomembrane. A minimum thickness of 3 feet of granular material is specified between rubber-tired vehicles and the geomembrane. In areas of heavy traffic such as access ramps, granular material thickness should be at least 3 feet. In any case, the following table shall be complied with:

| <u>Equipment Ground Pressure</u> | <u>Minimum Lift Thickness</u> |
|----------------------------------|-------------------------------|
| ≤4 psi | 12" |
| 4-8 psi | 18" |
| 8-16 psi | 24" |
| ≥16 psi | 36" |

- C. Concrete: Geotextile or excess geomembrane layers shall be used between concrete and the geomembrane as required. Construction methods used shall not damage the geomembrane.

PART 7 - FINAL ACCEPTANCE

7.01 GEOMEMBRANE ACCEPTANCE

- A. The Contractor shall retain all ownership and responsibility for the geomembrane in the lining system until acceptance by the Owner. Full compensation for the geomembrane installation shall not occur until the lining system is accepted by the Owner. The Owner will accept the liner system when:
1. The entire geomembrane liner system installation is completed.
 2. All documentation of installation is completed.
 3. Verification of the adequacy of all field seams and repairs, including associated testing, is complete.
 4. Written certification documents have been received and approved by the Engineer. Certifications documents include:
 - a) Final approval of all required submittals by the Engineer.
 - b) Record (As-Built) Drawings.
 5. Upon completion of the covering operation, the Contractor shall certify the following to the Owner:
 - a) The geomembrane has been constructed in accordance with the approved project plans and specifications.
 - b) The cover material meets all requirements of the approved project plans and specifications. The geomembrane has not been damaged during the covering operation or construction.
 - 6) Receipt of the final geomembrane warranties.

7.02 RECORD (AS-BUILT) DRAWINGS

- A. The Contractor shall submit a Record Panel Layout and related installation details of the actual geomembrane lining system:
1. The record panel layout shall be drawn, using applicable drafting standards, to the same scale indicated on the Engineer's Drawings for easy comparison. The record panel layout shall be on the installer's letterhead.
 2. The record panel layout shall indicate installed field panel and seam numbering, configuration and dimensions, ~~geomembrane penetrations~~, access roads, and berms. The record panel layout shall have surveyed locations of the limits of geomembrane deployment. Factory seams shall be differentiated from field seams (if any). The record panel layout drawing(s) shall indicate individual panel dimensions and estimated installed square footage.
 3. The locations of destructive samples with the correct corresponding sample number shall be located on the record panel layout.
 4. The Installer shall submit detail drawings, using applicable drafting standards, of record (as-built) ~~geomembrane penetrations~~ details, ~~booting details~~, and connection details, etc.
- B. The Contractor shall submit a Record Survey, signed and sealed by the surveyor, of spot elevations (grade shots) of the geomembrane elevations of the installed liner:
1. The record panel layout shall be drawn, using applicable drafting standards, to the same scale indicated on the Engineer's Drawings for easy comparison.
 2. The spot elevations (grade shots) shall be taken at every 200 foot grid increment marker. The drawing shall indicate the design elevation prior to installation and the installed elevation at each survey point.
 3. The spot elevations (grade shots) shall also be taken at every 100 foot increment within the bottom of the leachate collection trenches. The drawing shall indicate the design elevation prior to installation and the installed elevation at each survey point.

END OF SECTION

SECTION 02934

SOLID SODDING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work specified in this section consists of establishing a stand of grass by furnishing and placing grass sod. Also included are fertilizing, watering and maintenance as required to assure a healthy stand of grass. Solid sodding shall be placed as designated on the Drawings, and all areas disturbed by Contractor's Operation.

1.02 SUBMITTALS

- A. A certification of sod quality by the producer shall be delivered to the Engineer ten days prior to use. The quality shall be that the sod will be live, fresh, well matted with grass roots and uninjured at the time of planting.

PART 2 - PRODUCTS

2.01 GRASS SOD

- A. Grass sod shall be either Argentine, Bahia grass, Centipede, or Bitter Blue and shall be well matted with grass roots. The sod shall be taken up in rectangles, preferably 12 inches by 24 inches, shall be a minimum of 2 inches in thickness and shall be live, fresh and uninjured at the time of planting. It shall be free of weeds and other grasses and shall have a soil mat of sufficient thickness adhering firmly to the roots to withstand all necessary handling. The sod shall be planted as soon as possible after being dug and shall be shaded and kept moist until it is planted.

2.02 FERTILIZER

- A. Commercial fertilizers shall comply with the state fertilizer laws.
- B. The numerical designations for fertilizer indicate the minimum percentages (respectively) of (1) total nitrogen, (2) available phosphoric acid and (3) water-soluble potash contained in the fertilizer.
- C. The chemical designation of the fertilizer shall be 16-4-8. At least 50 percent of the nitrogen shall be derived from organic sources. At least 50 percent of the phosphoric acid shall be from normal super phosphate or an equivalent source which will provide a

minimum of two units of sulfur. The amount of sulfur shall be indicated on the quantitative analysis card attached to each bag or other container.

2.03 WATER FOR GRASSING

- A. The water used in the sodding operations shall be obtained from any approved spring, pond, lake, stream or municipal water system. The water shall be free of excess and harmful chemicals, acids, alkalies, or any substance which might be harmful to plant growth or obnoxious to traffic. Salt water shall not be used.

PART 3 - EXECUTION

3.01 PREPARATION OF GROUND

- A. The area over which the sod is to be placed shall be scarified or loosened to a suitable depth and then raked smooth and cleaned of all debris. Where the soil is sufficiently loose and clean, the Engineer, at his discretion, may authorize the elimination of ground preparation.

3.02 APPLICATION OF FERTILIZER

- A. Before applying fertilizer, the soil pH shall be brought to a range of 6.0 - 7.0.
- B. The fertilizer shall be spread uniformly over the area to be sodded at the rate of 436 pounds per acre, or 10 pounds per 1,000 square feet, by a spreading device capable of uniformly distributing the material at the specified rate. Immediately after spreading, the fertilizer shall be mixed with the soil to a depth of approximately 4 inches.
- C. On steep slopes, where the use of a machine for spreading or mixing is not practicable, the fertilizer shall be spread by hand and raked in and thoroughly mixed with the soil to a depth of approximately 2 inches.

3.03 PLACING SOD

- A. The sod shall be placed on the prepared surface, with edges in close contact and shall be firmly and smoothly embedded by light tamping with appropriate tools.
- B. Where sodding is used in drainage ditches, or on slopes of 4:1 or greater, the setting of the pieces shall be staggered so as to avoid a continuous seam along the line of flow. Along the edges of such staggered areas, the offsets of individual strips shall not exceed 6 inches. In order to prevent erosion caused by vertical edges at the outer limits, the outer pieces of sod shall be tamped so as to produce a featheredge effect.

- C. On slopes greater than 2:1, the Contractor shall, if necessary, prevent the sod from sliding by driving wooden pegs through the sod blocks into firm earth, at suitable intervals.
- D. As sodding is completed in any one section, the entire area shall be rolled or tamped to insure solid contact of roots with the soil surface. Sod shall be watered immediately after rolling or tamping until the underside of the new sod and soil surface below the sod are thoroughly wet. Laying, tamping, and irrigating shall be completed within 8 hours.
- E. Sod which has been cut for more than 72 hours shall not be used unless specifically authorized by the Engineer after his inspection thereof. Sod which is not planted within 24 hours after cutting shall be stacked in an approved manner and maintained and properly moistened. Any pieces of sod which, after placing, show an appearance of extreme dryness shall be removed and replaced by fresh, uninjured pieces.
- F. Sodding shall not be performed when weather and soil conditions are, in the Engineer's opinion, unsuitable for proper results.

3.04 WATERING

- A. The areas on which the sod is to be placed shall contain sufficient moisture, as determined by the Engineer, for optimum results. After being placed, the sod shall be kept in a moist condition to the full depth of the rooting zone for at least 2 weeks. Thereafter, the Contractor shall apply water as needed until the sod roots and starts to grow for a minimum of 60 days (or until final acceptance, whichever is latest).

3.05 MAINTENANCE

- A. The Contractor shall, at his expense, maintain the sodded areas in a satisfactory condition until final acceptance of the project. Such maintenance shall include repairing of any damaged areas and replacing areas in which the establishment of the grass stand does not appear to be developing satisfactorily.
- B. Replanting or necessary repair due to the Contractor's negligence, carelessness or failure to provide routine maintenance shall be at the Contractor's expense. Replanting or necessary repair due to factors determined to be beyond the control of the Contractor shall be paid for under the appropriate contract pay items.
- C. First mowing should not be attempted until sod is firmly rooted. No more than 1/3 of the grass leaf shall be removed by the initial cutting or subsequent cuttings. Grass height shall be maintained between 2 and 3 inches unless other specified.

END OF SECTION

DIVISION 3

CONCRETE

SECTION 03100
CONCRETE FORMWORK

D.E.P.
APR 27 1998
SOUTHWEST DISTRICT
TAMPA

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide formwork for cast-in-place concrete.

1.02 QUALITY ASSURANCE

- A. Standards:

- 1. Standard Building Code
- 2. ACI 347, Recommended Practice for Concrete Formwork.
- 3. Local codes and regulations.

- B. Contractor's Responsibility: For design of the formwork and for safety in its construction, use and removal.

- C. Tolerances: Construct formwork to insure that finished concrete surfaces will be in accordance with the tolerances listed in ACI 347. Provide camber as necessary to compensate for anticipated deflection in formwork and concrete due to weight and pressure of fresh concrete and other construction loads.

1.03 SUBMITTALS

- A. Submit product data and other manufacturer's literature on form ties, spreaders, corner formers, form coatings and bond breakers.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Lumber: Douglas Fir or Larch, No. 2 grade, seasoned and surfaced on four sides.
- B. Plywood: Plyform, Class I, BB-Exterior type, mill oiled and edge sealed, with thickness not less than 3/4-inch.

- C. Medium Density Overlay (MDO) Plywood Forms: PS-1, B-B High Density Concrete Form Overlay, Class I, unoled.
1. Butt form panels, make contact surface fully flush and seal butting holes with sponge form tape. Chamfer edges of beams and ceilings.
 2. Where MDO plywood is used to form beams, use no piece of MDO plywood that has been patched or damaged.
- D. Drip Forms: Varnished ponderosa pine or equally rigid non-staining plastic, 1/2-inch wide on each leg.
- E. Steel Forms: Uncoated steel, 3/16-inch minimum thickness, fabricated to close tolerances, protected only by the specified release agent, braced so as not to bend, dent or dimple under wet concrete loads, vibrator impact, and tool impact. Maintain steel forms in rust-free condition by use of steel wool and light grinding, followed by coats of specified release agent. Use forms that can be adjusted into true alignment without stops or ridges.
- F. Glass Fiber Reinforced Plastic (FRP) Forms: Smooth coated forms, braced so as not to bend, dent or dimple under wet concrete loads, vibrator impact and tool impact, and at least 0.11-inch thick. Design forms for external bracing at piers and columns, without use of form ties.
- G. Plugged Cone Form Ties: Rod type, with ends or end fasteners which can be removed without spalling the concrete and which leave a hole equal in depth to the required reinforcement clearance. Form ties shall be of a design in which the hole left by the removed end or end fastener is easily filled to match the surface of the hardened concrete. Provide removable cones 1 1/4-inches in diameter by 1 1/2-inches deep. Provide preformed mortar plugs to match the color of the concrete, recessed 1/4-inch, adhered with an approved two part epoxy.
- H. Circular Column Forms: Fabricate of two pieces, clamped watertight using gaskets and without horizontal joints. Install horizontal construction joints only where indicated or as directed by the Engineer.
- I. Beam Forms: Provide is one length without form joints and suitable for cambering up to 1/60 of span without distortion of profile or opening of seams.
- J. Styrofoam Board: Expanded polystyrene extruded into board form, closed cell, moisture resistant, capable of maintaining indicated clear space between concrete structures.

- K. Control Joint Filler: Use epoxy joint filler equal to Burk Epoxy Joint Filler to fill voids left by saw cuts and to resist against spalling caused by vehicle traffic in concrete slabs.
- L. Inserts: Galvanized cast steel or galvanized welded steel, complete with anchors to concrete and fittings such as bolts, wedges and straps. Provide hanger inserts spaced to match grid of suspended ceilings.
- M. Shoring: As designed and executed by Contractor to support all loads.
- N. Chamfer Strips: Polyvinyl strips designed to be nailed in the forms to provide a 3/4-inch chamfer at all exposed edges of concrete members, unless otherwise noted on the drawings.
- O. Form Release Agent: A blend of natural and synthetic chemicals that employs a chemical reaction to provide quick, easy and clean release of concrete from forms, and equal to Eucoslip, by the Euclid Chemical Company, or Release #1, by The Burke Company. Use a non-staining release agent that leaves the concrete with a paintable surface

PART 3 - EXECUTION

3.01 DESIGN

- A. Contractor's Responsibility: The design, engineering, and construction of a formwork.
- B. Design watertight formwork in accordance with ACI 347 Chapter 1, to withstand the pressure resulting from the placement and vibration of the concrete, and which is sufficiently hard and rigid to resist indentation and scratching while maintaining tolerances, and with maximum deflection between form supports of 1/240 span length.

3.02 INSTALLATION/ERECTION

- A. Construction Of Formwork: Construct forms sufficiently strong to withstand the pressure resulting from the placement and vibration of concrete, sufficiently rigid to maintain specified tolerances, and sufficiently tight to prevent loss of mortar. Brace forms against lateral, upward or downward movement.
- B. Form Facing Materials: Use form facing materials that produce a hard uniform texture on the concrete. Do not use facing materials with raised grain, torn surfaces, worn edges, patches, dents or other defects. Use facing materials with maximum deflection, as reflected in concrete surfaces not in excess of 1/240 of the span between structural members. Prevent formation of ridges, fins, offsets, or similar surface defects of finished concrete.

- C. Preparation Of Form Surfaces: After each use and prior to placing reinforcing, clean forms of mortar, grout and other foreign material and apply the form release agent. Do not allow the form release agent to stand in puddles in the forms, to come in contact with hardened concrete against which fresh concrete is to be placed, or with reinforcing steel and items to be embedded. Reuse only forms which maintain a uniform surface texture on exposed concrete surfaces. Apply light sanding between used to obtain such uniform texture. Plug unused tie rod holes with corks, and shave flush and sandpaper on the concrete surface side.
- D. Adjustment: Provide positive means of adjustment of shores and struts to take up all settlement during concrete placing.
- ~~E. Temporary Openings: Provide temporary openings in wall forms to limit the free fall of concrete to a maximum of 6 feet unless an elephant trunk is used. Locate such openings to facilitate placing and consolidation, and space no more than 8 feet apart. Provide temporary openings in the bottom of wall and column forms and elsewhere as necessary to facilitate cleaning and observation immediately prior to placing.~~
- E. Construction Joints: At construction joints, overlap the contact surfaces of the form sheathing over the hardened concrete by not more than 1 inch. Hold forms against the hardened concrete to prevent offsets or loss of mortar.
- F. Chamfers: Provide 3/4-inch x 3/4-inch chamfers at all exposed edges of concrete members unless otherwise noted on the Drawings.
- G. Do not embed any form-tying device or part thereof other than metal in concrete.
- H. Form all surfaces of concrete members except where placing concrete against ground. Dimensions of concrete members shown on Drawings apply to formed surfaces, except where otherwise indicated. Add at least 2 inches of concrete where concrete is placed against trimmed undisturbed ground in lieu of forms. Limit placement of concrete against ground to footings and then only where ground can be trimmed to required lines and will stand securely without caving or sloughing.
- I. Runways: Provide smooth and rigid runways (if needed) for moving equipment and concrete. Support runways directly on formwork or on grade and in no case on reinforcing steel or bar supports.
- J. Form Removal:
1. Maintain formwork in place for the following structural conditions until the concrete has attained the minimum percentage of indicated design comprehensive strength or for the period of time specified in the following table.

Note: Time periods in the table include all days except those in which the temperature falls below 40 degrees F.

| <u>Structural Member or Condition</u> | <u>Normal Strength Concrete</u> | <u>Normal High-Early Strength Concrete</u> | <u>Minimum Compressive Strength for Form Removal (% Design Strength)</u> |
|--|---------------------------------|--|--|
| Cantilevers | 12 days | 7 days | 90 |
| Beams Over 20 feet between supports | 12 days | 7 days | 90 |
| Stairways | 10 days | 5 days | 80 |
| Floor slabs | 5 days | 3 days | 70 |
| Free standing walls, column and piers | 5 days | 3 days | 70 |
| Sides of beams, footings, slabs on grade | 24-48 hours | 12-24 hours | 70 |
| Front face form of curbs | 6-24 hours | 6 hours | 70 |

2. Do not remove forms from concrete placed when outside air temperature is below 50°F without first determining if concrete has properly set without regard to time. Do not apply heavy loading on green concrete.

K. Embedded Items: Set anchor bolts and other embedded items accurately and hold securely in position in the forms until the concrete is placed and set. Check all special castings, channels, or other metal parts that are to be embedded in the concrete prior to and again after concreting. Check all nailing, blocks, plugs and strips necessary for the attachment of trim, finish and similar work prior to concreting. Coordinate with other trades for items to be embedded in the concrete and not shown on Structural Drawings.

~~M. Pipes and Wall Spools Cast in Concrete:~~

- ~~1. Install wall spools, wall flanges and wall anchors before placing concrete. Do not weld, tie or otherwise connect the wall spools to the reinforcing steel.~~
- ~~2. Support pipe and fabricated fittings to be encased in concrete on concrete piers or pedestals. Carry concrete supports to firm foundations so that no settlement will be possible during construction.~~

~~L. Form Tolerances:~~

1. Tolerances or allowable variations from dimensions or positions of structural concrete work:
 - a) Sleeves and Inserts $+1/4"$ to $-1/4"$
 - b) Projected ends of anchors $+1/4"$ to $-0.0"$
 - c) Anchor bolt setting $+1/4"$ to $-1/4"$
 - d) Finished concrete, all locations $+1/4"$ to $-1/4"$ in 10 feet of length
2. Planes or axes from which above tolerances are measured:

| | |
|---------------------------|--------------------------------------|
| Sleeves and Inserts | Centerline of sleeve or insert |
| Projected ends of anchors | Plane perpendicular to end of anchor |
| Anchor bolt setting | Centerline of anchor bolt |
| Finish concrete | Concrete surface |
3. Comply with equipment manufacturer's tolerances if more severe than above.

END OF SECTION

SECTION 03200
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide steel reinforcement for cast-in-place and precast concrete structures.

1.02 QUALITY ASSURANCE

- A. Standards:

1. Standard Building Code
2. ACI 315, Details and Detailing of Concrete Reinforcement.
3. ACI 318, Building Code Requirements for Reinforced Concrete.
4. CRSI Manual of Standard Practice, MSP-1.
5. Local codes and regulations.

1.03 SUBMITTALS

- A. Submit the following:

1. Mill test certificates identifying chemical and physical analyses for each load of reinforcing steel delivered.
2. Bending lists and placing drawings for reinforcement. Indicate openings (mechanical, electrical, equipment), including additional reinforcing at openings and intersecting wall, beam and footing arrangements. Coordinate placing drawings with concrete placing schedule. Submit complete bending lists and placing drawings together for each element of structure (grade slabs, footings, walls, deck, floor or roof slabs), including all dowels and other bars.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Ship reinforcement with bars of same size and shape fastened in bundles with metal identification tags giving size and mark securely wired on. Label identification tags with same designation as shown on bar lists and shop drawings.
- B. Store bars off ground. Protect from moisture and keep free from dirt, oil and injurious contaminants.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Reinforcing Bars: ASTM A615, Grade 60, deformed bars of a USA manufacture.
- B. Welded Wire Fabric: ASTM A185, gauges, spacing and dimensions as indicated.
- C. Metal Bar Supports: CRSI MSP-1, Chapter 3, Class 2, Type B, Stainless Steel Protected Bar Supports, or as otherwise approved by the Engineer. Use concrete supports for reinforcement in concrete placed on grade.
- D. Tie Wire: 16 gauge minimum, black, soft annealed.
- E. Coupler Splice Devices: Cadweld tension couplers, capable of developing the ultimate strength of the bar as manufactured by Erico Products, Incorporated, Solon, Ohio, or equal.

2.02 FABRICATION

- A. Do not commence fabrication until receipt of the shop drawings approval. Fabricate reinforcing steel in accordance with all requirements of the specified standards and within CRSI tolerances, and unless otherwise indicated, with the following:
 - 1. Provide standard hooks.
 - 2. Extend bottom bars a minimum of 6 inches into supporting members.
 - 3. Provide cover indicated to the outermost stirrup, tie or bar.
 - 4. Provide splices only where indicated on the Drawings.

PART 3 - EXECUTION

3.01 . INSTALLATION

- A. Before placing, clean reinforcement of loose mill scale and rust, dirt and other coatings and contaminants that reduce or destroy bond.
- B. Supporting Reinforcing: Provide bar supports as required by CRSI MSP-1. Support top and bottom bars in slabs formed on earth on precast concrete block supports except where such bars are properly supported from formwork. Precast concrete block supports are not required in slabs formed on tremie concrete but may be used at the Contractor's option.
- C. Placing Reinforcing: Place reinforcing and welded wire fabric as indicated on the Drawings and as recommended by CRSI MSP-1 and ACI 315. Securely tie and support reinforcement to prevent displacement during concrete placement.
- D. Welded Wire Fabric: Splice welded wire fabric such that the overlap between outermost cross wires of each fabric sheet is not less than the spacing of the cross wires, plus 2 inches. Do not extend fabric through expansion joints or construction joints in slabs on grade except as otherwise indicated.
- E. Where splices are indicated on the Drawings, splice bars in slabs, beams and girders according to ACI 315. Unless otherwise shown on Drawings, lap splices in reinforcement not less than 30 bar diameters. Splice horizontal bars in circular structures 40 bar diameters. Provide splices and laps in columns, piers and struts in a manner sufficient to transfer full stress bond. When splicing bars of different diameters, length of lap is based on larger bar. Stagger splices in adjacent bars.
- F. Coupler Splice: Unless indicated on the Drawings, provide full positive tension connections. Install such devices in accordance with the recommendations of the manufacturer.
- G. Dowels: Wire dowels in position prior to placing concrete.
- H. Field Bending: Do not use heat to bend bars. Do not bend bars after being embedded in concrete.
- I. Welding: Welding of reinforcing will not be permitted.
- J. Place reinforcement a minimum of 2 inches clear of any metal pipe or fitting.

K. Unless otherwise shown, install reinforcement with the following clearances for concrete coverage.

- | | | |
|----|--------------------------|---|
| 1. | Beams and Girders | 2" outside of ties |
| 2. | Solid Slabs and Joists | 2" top and side 3" cover when placed against earth |
| 3. | Columns | 2" outside of ties |
| 4. | Walls | 2" top and sides |
| 5. | Grade Beams and Footings | 3" outside of steel, side and bottom, when cast against earth 2" top and sides. |

END OF SECTION

SECTION 03250

CONCRETE ACCESSORIES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide accessories for cast-in-place concrete.

1.02 SUBMITTALS

- A. Submit product data and samples in accordance with Section 01340.
- B. Submit product data on the following items.

- 1. Water Stops
- 2. Tongue and Groove Joint Forms
- 3. Preformed Expansion Joint Fillers

- C. Submit samples on the following items:

- 1. Water Stops
- 2. Precast Concrete Block Supports for Reinforcing Bars

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Precast Concrete Block Supports For Reinforcing Bars: Comply with AI 318. Provide blocks with No. 4 dowels bent 90 to support top bars.
- B. Membrane: 6 mil polyethylene film.
- C. Water Stops: Polyvinyl chloride meeting all requirements of U.S. Army Corps of Engineer's Specification CRD-C-572 and equal to Burke Water Stops as manufactured by The Burke Company. Provide flat dumbbell type and center bulb type, 9 inches x 3/8-inch at wall thickness of 12 inches or greater, and 6 inches x 3/8-inch at wall

thickness less than 12 inches. Provide 6 inch split-ribbed with center bulb type at connections of new concrete structures with existing concrete. Provide water stops as indicated on the Drawings.

D. Preformed Expansion Joint Filler:

1. Bituminous type conforming to the requirements of ASTM D 994.
2. Nonextruding type, self-expanding cork, 3/4-inch thick or as otherwise shown on the Drawings, conforming to the requirements of ASTM D1752, Type III, and compatible with the specified joint sealant compound.

E. Joint Sealant: A two component gray, non-sag, non-flowing polysulfide-base sealant meeting U.S. Federal Specification TT-S-00227E and recommended by the manufacturer for continuous immersion in water. Provide sealants as manufactured by Products Research and Chemical Corporation, Mameco International, The Burke Company, W.R. Meadows, or equal.

F. Tongue And Groove Joint Forms: 24 gauge steel forms complete with steel stakes and splice plates, designed for joints not to receive a poured seal, and equal to Burke Keyed Kold Joint as manufactured by The Burke Company.

G. Inserts: Galvanized steel to fit the proposed hanger or support.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Precast Concrete Block Supports For Reinforcing Bars: Provide in sufficient quantity to support reinforcing bars in slabs formed on earth at a spacing not to exceed 4-feet on centers in both directions. Provide blocks with dowels to support top bars. Block supports are not required in slabs formed on tremie concrete, but may be used at the Contractor's option. Blocks are not required for reinforcing bars properly supported from formwork. At other locations, refer to ACI 315 and CRSI MSP-1. Block supports shall have a minimum compressive strength equal to the compressive strength of the concrete being placed (3000 psi minimum). Blocks shall be square in vertical cross section.
- B. Membrane: Provide polyethylene film under all slabs formed on earth, except for liquid containment structures. Lap membrane sheets 6 inches in the direction of spreading concrete. Do not puncture film.

C. Water Stops:

1. Installation: Protect water stops from dirt, oil and concrete spatter and rigidly secure in position by means of split bulkheads and by fastening to reinforcing bars in two directions at not more than 12 inches on centers. Install water stops in construction joints in hydraulic structures required to contain liquid or to resist the entry of groundwater.
2. Splices: Butt-splice water stops using a thermostatically controlled electric splicing iron as recommended by the manufacturer.

D. Expansion Joints: Provide expansion joints of size and at locations as shown on the Drawings. Place expansion joint fillers every 30 feet in straight runs of walkways, at right angle turns and wherever concrete butts into vertical surfaces, unless otherwise shown on the Drawings.

E. Joint Sealants: Provide joint sealants where indicated on the Drawings. Prepare surfaces, prime, prepare materials, all in complete compliance with the manufacturer's instructions.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Provide cast-in-place concrete as shown on the Drawings and specified herein.

1.02 QUALITY ASSURANCE

- A. Standards:

1. Standard Building Code
2. Local codes and regulations
3. ACI 212, Guide for Use of Admixtures in Concrete
4. ACI 301, Specifications for Structural Concrete for Buildings
5. ACI 309, Recommended Practice for Consolidation of Concrete
6. ACI 318, Building Code Requirements for Reinforced Concrete
7. ACI 350R, Environmental Engineering Concrete Structures

- B. Plant Qualification: Comply with all requirements of the Check List for Certification of Ready Mixed Concrete Production Facilities of the National Ready Mixed Concrete Association and ASTM C 94.

- C. Worker Qualification: Workers with at least 5 years experience in performing concrete work of high quality, including forming, color, texture and finishing and of the size and complexity of this project.

- D. Testing:

1. Obtain standard laboratory compressive test cylinders as required by the laboratory when concrete is discharged from the mixer at the point of placing. Test cylinders will be made and cured by the laboratory in accordance with the requirements of ASTM C 31, including a set of 6 cylinders for each 50 cubic

yards or fraction thereof placed each day, for each type of concrete. The cylinders will be cured under laboratory conditions and will be tested in two groups of three at 7 and 28 days of age, respectively in accordance with the requirements of ASTM C 39.

2. Air entrainment tests will be made by the laboratory when concrete is discharged from the mixer at the point of placing, for each pour or other volume of concrete for which a set of test cylinders is required in accordance with the previous paragraph. The amount of air entrained will be determined by either the pressure method or the volumetric method in accordance with ASTM C231 or ASTM C173, respectively.
3. The laboratory will make slump tests of Class A and Class B concrete as it is discharged from the mixer at the point of placing. Slump tests will be made of every batch of concrete placed, and failure to meet specified slump requirements will be sufficient cause for rejection of that batch.

E. Evaluation And Acceptance Of Concrete: Evaluation and acceptance of concrete will be in accordance with ACI-318, Chapter 5.

1.03 SUBMITTALS

A. Submit the following information.

1. Plant Qualification: Submit satisfactory evidence indicating compliance with the specified qualification requirements.
2. Materials: Submit satisfactory evidence indicating that materials to be used, including cement, aggregates and admixtures meet the specified requirements.
3. Design Mix: Submit the design mix to be used as prepared by qualified persons, including data on consecutive test and standard deviation. The design of the mix is the responsibility of the Contractor subject to the limitations of the Specifications.
4. Submit, at least 24 hours before placing concrete, signed certification providing the following:
 - a) Exact location and portion of structure to be placed.
 - b) Date and time concrete is to be placed.

- c) Type of concrete to be used (mix), and the method to be used in placing the concrete.
- d) Estimated quantity of concrete to be placed.
- e) That line and grade have been checked and grade properly compacted.
- f) That location, type, size and spacing of reinforcement has been checked and conform to the Drawings.
- g) That any water stops, construction joints, or seals have been placed and conform to the Drawings.
- h) That any embedded pipes have been placed, are the correct size and type and conform to the Drawings.
- i) That any embedded conduits, grounding wires or receptacles have been placed and conform to the Drawings.
- j) That any embedded anchor bolts, bearing plates, dowels etc. are in place, are of the correct size and are located as indicated on the Drawings.
- k) That forms are properly located and adequately braced.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement:

1. Domestic Portland cement conforming to the requirements of ASTM C 150 Type I, Type II or Type III. Construct all structures exposed to water with Type II cement. Use Type III cement for high early strength concrete only for special locations and only with the approval of the Engineer. Use Type I cement for tremie concrete, pipe encasements, etc.
2. Use only one brand of cement in any individual structure unless otherwise approved by the Engineer. Do not use cement which has become damaged, partially set, lumpy or caked and discard the entire contents of the sack or container which contains such cement. Do not use salvaged or reclaimed cement.

3. Fly ash shall be permitted in either Class A or Class B cement. Fly ash shall conform to ASTM C 618, Class F and shall not exceed 20 percent by weight of concrete. Class C fly ash may be used only with special circumstances with the approval of the Engineer.

B. Aggregates:

1. ASTM C 33. Coarse aggregates shall be size No. 67, 3/4-inch to No. 4 or No. 57, 1 inch to No. 4, as shown on the Drawings, unless otherwise directed by the Engineer. Use size No. 8 for filling of cells of masonry units.
2. In addition to requirements of ASTM C 33, apply the following criteria for structures exposed to sewage:
 - a) Soft particles: Not more than 2.0 percent
 - b) Chert as a soft impurity (defined in Table 3 of ASTM C 33): Not more than 1.0 percent
 - c) Total of soft particles and chert as a soft impurity: Not more than 2.0 percent
 - d) Flat and elongated particles (long dimension more than 5 times short dimension): Not more than 15.0 percent

C. Water: Potable quality, clean and free from injurious amounts of deleterious materials.

D. Air Entraining Admixture: ASTM C 260.

E. Water Reducing and Retarding Admixture:

1. Concrete Without Superplasticizer:
 - a) Water Reducing Admixtures: ASTM C494 Type A, equal to Eucon WR-75 by the Euclid Company, Pozzoloth 200N by Master Builders, Plastocrete 161 by Sika Chemical Corporation, and containing no calcium chloride.
 - b) Water Reducing and Retarding Admixtures: ASTM C494 Type D, equal to Eucon Retarder-75 by the Euclid Company, Pozzoloth 100 XR by Master Builders, Plastiment by Sika Chemical Corporation, and containing no calcium chloride.

- c) Accelerating Admixtures: ASTM C494 Type C or E, equal to Accelguard 80 by the Euclid Company, Darex Set Accelerator by W.R. Grace, and containing no calcium chloride.
2. Concrete With Superplasticizer:
- a) Water Reducing, High Range Admixtures: ASTM C494, Type F or G, equal to Eucon 37 by the Euclid Company, Rheobild 716 by Master Builders, Daracem 100 by W.R. Grace, Sikament by Sika Chemical Corporation, and consisting of a second-generation admixture, free of chlorides and alkalis (except for those attributable to water) composed of a synthesized sulfonated complex polymer, enabling the concrete to maintain its rheoplastic state in excess of two hours if necessary.
 - b) Manufacturer's Job Site Representation: Provide the services of a competent field service representative from the manufacturer of each of the admixtures selected for use to provide at the job site advice and consultation on the use of the admixture materials, including the effect on the concrete in place, including recommending maximum discharge time for superplasticizer method and procedure to induce superplasticizer into mixer, quantities of admixtures to be used if variations are required because of temperature/humidity, wind, or other environmental considerations, and to be available on short call at any time requested by the Owner, Contractor, or concrete producer.
- F. Curing Compound: ASTM C 309, Type 1 and Type 1D, Class A and Class B, containing no ingredient which would adversely affect the bond of coatings or toppings.
- 1. For exposed concrete not to receive special finishes, protective coatings and/or concrete toppings, provide curing and sealing compound equal to Super Rez-Seal, by Euclid Chemical Co., or Burke Spartan-Cote Cure-Seal Hardener by The Burke Company.
 - 2. For exposed concrete to receive special finishes, protective coatings and/or concrete toppings, provide curing compound equal to Kurez-DR, by Euclid Chemical Co., or Burke Rez-X Curing Compound by The Burke Company.
- G. Mortar for Repair of Concrete: Same materials as used for concrete, except omit coarse aggregate and use not more than one part cement to two and one-half parts sand by damp loose volume. Use no more mixing water than is necessary for handling and placing.
- H. Burlap Mats: Conform to AASHTO Specification M182.

- I. Epoxy Bonding Agent: Euco #452, BurkEpoxy MV, Sikadur Hi Mod, Concresive 1001-LPL, or equal.
- J. Powdered Epoxy Coating For Anchor Bolts: Powdered epoxy resin as manufactured by the 3M Company, Scotchkote No. 213, Armstrong No. R349, or equal.

2.02 MIXES

A. General Requirements:

- 1. Mix Design: Proportioning shall be on the basis of field experience and/or trial mixture as specified in ACI 318, Section 5.3. Data on consecutive tests and standard deviation shall be submitted.
- 2. Maximum Water-Cement Ratio:
 - .37 (lbs/lb) - Concrete with superplasticizer
 - .45 (lbs/lb) - Class A concrete without superplasticizer
 - .55 (lbs/lb) - Class B concrete without superplasticizer
 - .65 (lbs/lb) - Class C concrete without superplasticizer
- 3. Air Content: 5 percent plus or minus 1.5 percent (Class A and B).
- 4. Slump:
 - 4 inches plus or minus 1 inch for Class A and B without superplasticizer.
 - 7 inches plus or minus 1 inch for Class A and B with superplasticizer.
 - 8 inches plus or minus 1 inch for tremie concrete.
- 5. Minimum Compressive Strength at 28 Days:
 - Tremie, 4000 psi
 - Class A, 4000 psi, water retaining structures
 - Class B, 3000 psi, buildings, slabs on grade, pipe supports, concrete fill, curbs and sidewalks
 - Class C, 2500 psi thrust blocks and pipe encasement

B. Production Of Concrete:

- 1. General: Use ready mixed concrete, batched, mixed and transported in accordance with ASTM C 94, unless as otherwise indicated.

2. Air Entraining Admixture: Add admixture into the mixture as a solution measured by means of an approved mechanical dispensing device, and as a part of the total mixing water.
 3. Water Reducing and Retarding Admixture: Measure and add water reducing and retarding admixture as recommended by the manufacturer. Complete the addition of the admixture within one minute after addition of water to the cement has been completed, or prior to the beginning of the last three-quarters of the required mixing, whichever occurs first. Store, handle and batch admixtures in accordance with the recommendations of ACI 212.
- C. Delivery Tickets: Conform to ASTM C94, including cement content and water/cement ratio. Furnish ticket for each batch of ready-mixed concrete delivered to the site.
- D. Temperatures: Deliver concrete to site at temperature not higher than 90F, otherwise, ice or other approved method, shall be used to reduce the temperature, as recommended by ACI.
- E. Modifications To The Mix: Do not make modifications to the mix in the plant or on the job which will decrease the cement content or increase the water-cement ratio beyond that specified. No modifications of any kind shall be made except by a qualified and responsible representative of the concrete producer.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Preparations Before Placing: Place no concrete until the approval of the Engineer has been received. Ensure that forms are thoroughly clean and reinforcing and all other items required to be set in concrete have been placed and thoroughly secured. Notify Engineer 24 hours before concrete is placed.
- B. Conveying:
1. General: Transport concrete from the truck to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients to maintain the quality of the concrete. Place no concrete more than 90 minutes after mixing has begun for that batch.
 2. Buckets and Hoppers: Provide buckets and hoppers having discharge gates with a clear opening equal to no less than one-third of the maximum interior horizontal area or five times the maximum aggregate size being used, and having side slopes

no less than 60 degrees. Provide controls on gates to permit opening and closing during the discharge cycle.

3. Runways: Provide runways as specified in Section 03100. Use extreme care to avoid displacement of reinforcement during the placing of concrete.
4. Elephant Trunks: Use hoppers and elephant trunks to prevent the free fall of concrete for more than 6 feet.
5. Chutes: Provide metal or metal lined chutes having a slope not exceeding one vertical to two horizontal and not less than one vertical to three horizontal. Use chutes more than 20 feet long and chutes not meeting the slope requirements only if they discharge into a hopper before distribution.
6. Pumping Equipment: If required, provide pumping equipment and procedures conforming to ACI 304.2R, Placing Concrete by Pumping Methods. Measure slump at the point of discharge. Do not allow loss of slump in pumping to exceed 1 1/2-inches.
7. Conveying Equipment Construction: Do not use aluminum or aluminum alloy pipe for tremies or pump lines and chutes, except for short lengths at the truck mixer.
8. Cleaning: Clean conveying equipment at the end of each concrete operation.

3.02 APPLICATION

A. Placing:

1. General: Deposit concrete continuously, or in layers of such thickness (not exceeding 2 feet in depth) that no concrete will be deposited on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness. Repair any such seams or planes of weakness with injected epoxy grout and patch to match adjacent surfaces.
2. Supported Elements: Allow at least two hours to elapse after depositing concrete in columns or walls before depositing in beams, girders, or slabs supported thereon.
3. Segregation: Deposit concrete as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Do not subject the concrete to procedures which cause segregation.

4. Concrete Under Water: Place all concrete in the dry.
- B. Consolidating Concrete:
1. General: Consolidate concrete by means of internal vibrators operated by competent workmen.
 2. Vibrators: Use vibrators having a minimum head diameter of at least 2 inches, a minimum centrifugal force of 700 pounds and a minimum frequency of 8,000 vibrations per second.
 3. Vibrators for Confined Areas: In confined areas, use additional vibrators having a minimum head diameter of 1 1/2-inches, a minimum centrifugal force of 300 pounds and a minimum frequency of 9,000 vibrations per second.
 4. Spare Vibrator: Keep one spare vibrator for each three in use on the site during all concrete placing operations.
 5. Use of Vibrators: Insert and withdraw vibrators at points approximately 18 inches apart. At each insertion operate vibrator for 5 to 15 seconds. Do not transport concrete in the forms by means of vibrators. Consolidation of concrete shall be in conformance with ACI 309.
- C. Protection: Do not allow rainwater to increase the mixing water or to damage the surface finish. Protect concrete from construction overloads and do not apply design loads until the specified strength has been attained.
- D. Construction Joints: Except as otherwise indicated on the Drawings, provide horizontal construction joints at top of foundation members and slabs on grade and at the soffit of supported slabs and beams. Locate other horizontal and vertical construction joints as indicated on the Drawings. Except in the locations shown, provide no other joints, unless otherwise recommended by the Contractor and approved by the Engineer.
- E. Bonding: Before depositing new concrete on or against concrete that has set, thoroughly clean the surfaces of the set concrete to expose the coarse aggregate and to ensure they are free of laitance, coatings, foreign matter and loose particles. Retighten forms. Dampen, but do not saturate hardened concrete of joints and then thoroughly cover with a coat of cement grout of similar proportions to the mortar in the concrete. Place the grout as thick as possible on vertical surfaces and at least 1/2-inch thick on horizontal surfaces. Place the fresh concrete before the grout has attained its initial set.
- F. Embedded Items: In addition to steel reinforcement, securely place pipes, inserts and other metal objects as shown, specified or ordered to be built into, set in or attached to the

concrete. Take all necessary precautions to prevent these objects from being displaced, broken or deformed. Before concrete is placed, take care to determine that all embedded parts are firmly and securely fastened in place as indicated. Thoroughly clean surfaces free from paint and other coating, rust, scale, oil, and any foreign matter. Pressure test embedded pipes for leakage, as specified elsewhere, before concrete is placed. Wrap metal rainwater leaders, firelines and other such piping with at least two thicknesses of 30 lb. roofing felt before placing concrete. Do not embed wood in concrete. Pack concrete tightly around pipes and other metal work to prevent leakage and to secure perfect adhesion. Adequately protect drains from intrusion of concrete.

- G. Bonding To Existing Surfaces: Clean existing concrete surfaces that are to have new concrete bonded thereto of all grease, oil, dust, dirt and loose particles and coat with an epoxy bonding agent just prior to placing of the new concrete. Apply the bonding agent as recommended by the manufacturer and allow the agent to become tacky before the new concrete is placed. Do not allow the bonding agent to overlap or be spilled on the surfaces to be exposed after the work is completed.

3.03 CONCRETE FINISHINGS

A. Repair Of Surface Defects:

1. General: Repair surface defects, including tie holes immediately after form removal. Dampen the area to be patched and an area at least 6 inches wide surrounding it to prevent absorption of water from the patching mortar. Notify the Engineer prior to commencing operations.
2. Removal of Defective Concrete: Remove all honeycombed and other defective concrete down to sound concrete. Cut edges perpendicular to the surface or slightly under cut. Sand blast surfaces to receive repair.
3. Bonding Grout: Thoroughly dampen surfaces to be patched and apply a coat of bonding grout consisting of one part cement to one part fine sand passing a No. 30 sieve and having the consistency of thick cream.
4. Placing Patching Mortar: After the bonding grout begins to lose its water sheen, apply a premixed patching mortar, thoroughly consolidating it into place and striking it off so as to leave the patch slightly higher than the surrounding surface. Leave mortar undisturbed for one hour to permit initial shrinkage and then finally finish.
5. Tie Holes: After being cleaned and thoroughly dampened, fill the tie holes solid with patching mortar.

B. Concrete Finishes:

1. Formed Surfaces: After removal of forms, chip off all irregular projections, grind flush with adjacent surfaces and finish concrete surfaces in accordance with the following schedule:

| <u>Finish Designation</u> | <u>Area Applied</u> |
|---------------------------|--|
| F-1 | Exterior walls below grade not exposed to water: Repair defective concrete, fill depressions deeper than 1/2-inch, and fill tie holes. |
| F-2 | Exterior and interior walls exposed to water: Repair defective concrete, remove fins, fill depressions 1/4-inch or deeper, and fill tie holes. |
| F-3 | Walls of structures of buildings exposed to view and underside of formed floors or slabs: In addition to Finish F-2, fill depressions and airholes with mortar. Dampen surfaces and then spread a slurry consisting of one part cement and one and one-half parts sand by damp loose volume on the surface with clean burlap pads or sponge rubber floats. Remove any surplus by scraping and then rubbing with clean burlap. |
| F-4 | Tops of walls, beams and similar unformed surfaces occurring adjacent to formed surfaces: Strike smooth after concrete is placed and float to a texture reasonably consistent with that of formed surfaces. |

2. Slab Surfaces:

- a) General: After concrete has been consolidated, finish all concrete slabs with a floated finish. After floating, trowel finish all concrete slabs, except for areas to receive roofing, insulation, tile or topping, and immediately light broom finish. Where a finish is not indicated, provide a troweled finish.

Finish
Designation

Area Applied

S-1

Slabs and floors not water bearing:

Smooth steel trowel finish.

S-2

Slabs and floors which are water bearing and slab surfaces on which mechanical equipment moves:

Steel trowel finish free from trowel marks and all irregularities.

S-3

Slabs, floors and stair treads of structures or buildings exposed to view:

Steel trowel finish without local depressions or high points and apply a light hair-broom finish. Do not use stiff bristle brooms or brushes. Leave hair-broom lines parallel to the direction of slab drainage.

S-4

Slabs and floors at slopes greater than 10 percent:

Steel trowel finish without local depressions or high points. Apply a stiff bristle broom finish. Leave broom lines parallel to the direction of slope drainage.

S-5

Exposed edges of slabs, floors and tops of walls:

Finish with a 1/4-inch radius edge if a chamfer is not indicated.

- b) Floated Finish: After concrete has been placed, consolidated, struck off and leveled, do not work the surface further until water sheen has disappeared and the surface has hardened sufficiently to permit floating. During the first floating, check the planeness of the slab with a 10 foot straightedge applied at no less than two angles. Cut down all high spots and fill all low spots to produce a surface having the required tolerance. Then refloat the slab to a uniform sandy texture.
- c) Light Broomed Finish: After floating, power trowel slabs to receive a light broomed finish to produce a smooth surface, relatively free of defects.

Before the surface sets, pass a soft broom drag over the surface to produce a surface uniform in texture and appearance.

- d) Troweled Finish: After floating, power trowel slabs to receive a troweled finish to produce a smooth surface, relatively free of defects. Hand trowel after the surface has hardened sufficiently. When a ringing sound is produced as the trowel is moved over the surfaces, perform final troweling by hand to produce a surface which is thoroughly consolidated, free from trowel marks, uniform in texture and appearance and plane to a tolerance of 1/8-inch in 10 feet as determined by a 10 foot straightedge placed anywhere on the slab in any direction.
- e) Hardener Finish: Where indicated to receive a troweled hardener finish, water cure slabs without application of curing and sealing agent. When slab is at least 28 days old and thoroughly dry, apply the hardener in accordance with the manufacturer's recommendations. Where dry-shake hardener or slip-resistant finish is required, apply the hardener or slip-resistant product prior to complete curing and finishing, in accordance with the requirements and recommendation of the product manufacturer.
- f) Saw Cut Joints: Cut joints that are to be saw cut not sooner than 2 hours after the concrete is poured and not later than 8 hours after the pour.

3.04 PROTECTING

A. Curing:

1. Immediately after surface defects have been repaired, apply a spray coat of curing compound to all exposed surfaces, including slabs, walls, beams and columns in accordance with the manufacturer's recommendations. Protect exposed steel keyways and other embedded items from the curing compound. Water cure, as specified in paragraph B hereunder, all concrete surfaces that are to be exposed to wastewater, surfaces that are to be coated with a coal tar epoxy system, and concrete floors requiring a bond for special finishes.
2. Do not apply curing compound during periods of rainfall. Should the film become damaged from any cause within the required curing period, immediately repair the damaged portions with additional compound. Upon removal of forms, immediately coat the newly exposed surfaces to provide a curing treatment equal to that provided for the surface.
3. Curing and Sealing Compound: Use clear compound conforming to Federal Specification TT-C-800A, 30 percent solids content minimum, having test data from

an independent laboratory indicating a maximum moisture loss of 0.030 grams per sq. cm. when applied at a coverage rate of 300 sq. ft. per gallon, and equal to Super Floor Coat or Super Pliocure by The Euclid Chemical Company or Masterseal 66 by Master Builders. Furnish manufacturer's certification as required.

4. Apply specified clear curing and sealing compound to all horizontal areas so noted on the Drawings or in the Specifications. Apply immediately after final finishing. Apply this compound to non-structural construction joints of slabs on grade to act as a bond breaker prior to placement of adjacent concrete.
- B. Water Curing Method: Cure all concrete that is to be water cured by either the wet burlap method, by continuous fogging or by covering with waterproof sheet.
1. Wet Burlap Method: Cover concrete surface with a double thickness of burlap, cotton mats, or other approved material, kept thoroughly saturated with water. Keep the forms wet until removed and upon removal, start the curing specified herein immediately. Cure the concrete for a period of 7 days for normal Portland cement or 4 days for high early strength cement. Do not submerge concrete poured in the dry until it has attained sufficient strength to adequately sustain the stress involved and do not subject it to flowing water across its surface until it has cured 4 days.
 2. Continuous Fogging: Perform continuous fogging by fogging with a nozzle which so atomizes the flow of water that a mist, and not a spray, is formed. Fog the concrete surface regularly without allowing any part of the surface to become dry. Take all necessary precautions to prevent erosion of the concrete surface by the water.
 3. Covering With Waterproof Sheet: Keep the entire area to be cured continuously wet by fogging, as specified in the fogging paragraph above, for at least 18 hours and then immediately cover with waterproofing curing sheet conforming to ASTM C171, waterproof paper and polyethylene film, free of holes or tears. Keep sheet fully flat, without wrinkles or air bubbles, held down tautly at all edges. Do not use this method on slabs which will be exposed to view.

END OF SECTION

SECTION 03410

PRECAST CONCRETE STRUCTURES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work under this Section includes the design, casting, delivery and erection of concrete structures as indicated on the Drawings.

1.02 QUALITY ASSURANCE

- A. Standards: Unless otherwise indicated, all materials, workmanship and practices shall be in accordance with the current editions of the following standards:

1. Standard Building Code.
2. ACI 318, Building Code Requirements for Reinforced Concrete.
3. PCI MNL 116, Manual for Quality Control for Plants and Production of Precast Concrete Products.

1.03 SUBMITTALS

- A. The following information shall be submitted for approval. Fabrication shall not begin until submission has been approved.

1. Quality Control: Satisfactory evidence shall be submitted that plant and production methods meet the requirements of PCI MNL 116.
2. Design: Complete calculations including shear, moment, buoyancy, and camber calculations shall be submitted. All computation sheets shall bear the seal of a Professional Engineer registered in the State of Florida. Design water table shall be assumed to be at finished grade.
3. Shop Drawings: Complete fabrication and erection drawings shall be submitted. All drawings shall bear the seal of a Professional Engineer registered in the State of Florida.

- B. Manufacturer's data sheets shall be submitted on the following:

1. Joint mastic and gaskets.
2. Pipe connections.
3. Grout material.
4. Hatches.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Transportation and erection shall be done by qualified personnel using proper equipment. Lifting and supporting shall be done only at points indicated on the shop drawings.

1.05 MANUFACTURERS

- A. Mack Precast Corporation (American Precast Corporation), Astatula, Florida.
- B. Taylor Precast.
- C. Volusia Precast
- D. Or approved equal

PART 2 - PRODUCTS

2.01 MATERIALS AND FABRICATION

A. Precast Concrete Structures:

1. Design loads shall consist of dead load, live load, impact, soil loads and loads due to water table, as well as other loads which may be imposed upon the structure. The minimum wall thickness shall be 8 inches.
2. Forms used for precast concrete shall be of metal and sufficiently designed and braced to maintain their alignment under pressures of the concrete during placing. Base and first section of precast structures shall be an integral cast.
3. Aggregates. All aggregates, fine and coarse, other than lightweight aggregate shall conform to ASTM C 33. Lightweight aggregates, fine and coarse, shall conform to ASTM C 330. Aggregates shall be free of deleterious substances causing reactivity with oxidized hydrogen sulfide. Both types of aggregate shall

be graded in a manner so as to produce a homogenous concrete mix. All materials are to be accurately weighed at a central batching facility for mixing.

4. Cement shall be Portland cement Type II.
5. Minimum compressive strength of concrete used for precast concrete structures shall be 4,000 psi at 28 days.
6. Placing. All concrete shall be handled from the mixer or transport vehicle to the place of final deposit in a continuous manner, as rapidly as practicable, and without segregation or loss of ingredients, until the approved unit is completed. Maximum elapsed time from batching to placement shall be 2 hours. Concrete shall be placed in layers not over 2 feet deep. Each layer shall be compacted by mechanical internal or external vibrating equipment. Duration of the vibration cycle shall be limited to the time necessary to produce satisfactory consolidation without causing objectionable segregation.
7. Curing:
 - a) For purposes of early reuse of forms, precast concrete may be steam cured after an initial set has taken place. The steam temperature shall not exceed 160°F, and the temperature shall be raised from normal ambient temperatures at a rate not to exceed 40°F per hour.
 - b) The steam cured unit shall not be removed from the forms until sufficient strength is obtained for the unit to withstand any structural strain to which it may be subjected during the form stripping operation. After the stripping of forms, further curing by means of water spraying or a membrane curing compound may be used, and shall be of a clear or white type, conforming to ASTM C 309.
8. Reinforcing steel shall be sufficiently tied to withstand any displacement during the pouring operation. All bars shall be Grade 60.
9. Joints shall be tongue and groove pipe ends sealed with round or other flexible type natural rubber joint ring gaskets in conformance with ASTM C 433 or by a flexible preformed bitumastic sealing material equal to Ram-Nek as manufactured by R.K. Snyder and Co., Houston, Texas. If rubber joint ring gaskets are used, interior and exterior voids in the pipe joints shall be sealed with flexible sealing material specified above, installed in strict accordance with the manufacturer's printed instructions. If sections are sealed with a flexible preformed bitumastic sealing material, adequate material shall be applied so that "squeeze out" occurs

at the interior and exterior of the joint. Rubber joint ring gaskets and flexible preformed bitumastic sealing material shall be provided by the manufacturer.

10. Lifting holes through the structures are not permitted. Equally spaced lifting lugs, rings or non-penetrating lift inserts shall be provided.
 11. Top slabs may be precast or cast-in-place. Concrete for top slabs shall have a compressive strength of 4,000 psi at 28 days. Thickness of concrete for top slabs shall be a minimum of 6 inches for shallow manholes and 8 inches for pumping station wetwells.
- B. Sealing Compound and Grout: Plastic sealing compound shall comply with Federal Specification SS-S-00210. Mortar shall comply with ASTM C 387, Type S, or use grout complying with Division 3.
- C. Pipe Connections: Pipe connections for wall penetrations for valve vaults shall be provided with wall sleeves and link seals or as specified elsewhere.
- D. Aluminum Access Hatches: Aluminum hatches shall be provided for wetwells and valve vaults sized as indicated on the Drawings or as specified elsewhere.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Earthwork: The Contractor shall prepare an excavation large enough to accommodate the structure and permit sealing of openings, waterproofing, and backfilling operations. Earthwork shall conform to the applicable sections of Division 2.
- B. Installation of Precast Concrete Structures: Precast concrete structures shall be constructed in a workmanlike manner at the locations and dimensions indicated on the Drawings. Precast structures shall be set on a foundation of crushed stone, 12 inches thick. Crushed stone material shall be a well-graded crushed stone or crushed gravel meeting the requirements of ASTM C33, Gradation No. 67 (3/4-inch to No. 4 sieve). The precast structures shall be constructed such that the structure will not transmit dead or live loads to the piping. Care shall be taken to prevent earth and other material from entering precast structures.
- C. Sealing and Grouting: Fill all interior and exterior joints between precast sections with a joint sealant, as recommended by the structure manufacturer.

D. Installing Precast Sections:

1. Set each precast concrete unit plumb on a bed of sealant to make a watertight joint at least 1/2-inch thick with the concrete base or with the preceding unit. Point the inside joint and wipe off the excess sealant.
2. Assemble units so that the cover conforms to the elevations shown on the Drawings.
3. Pipe connections at precast structures shall be provided at the locations shown on the Drawings. Connections shall be resilient and waterproof.
4. All voids in interior and exterior section joints and lift holes shall be filled with a non-shrinking, non-metallic grout. Grout shall be applied and cured in strict accordance with the manufacturers recommendations. The grout shall be finished smooth and flush with the wall surface.

- E. Backfill: After the structure and all appurtenances are in place and approved, backfill shall be placed to the original ground line or to the limits designated on the Drawings. Backfill material shall consist of sand or loose earth, free from stones, clods, or other deleterious material. It shall be placed in conformance with the requirements of Division 2.

END OF SECTION

SECTION 03600

GROUT

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work included in this Section consists of grouting the various items listed hereinafter and indicated on the Drawings.

1.02 SUBMITTALS

- A. Manufacturer's literature shall be submitted for review in accordance with Section 01340 on the following items:
 - 1. Nonshrink grout data shall include grout properties, mixing, surface preparation and installation instructions.
 - 2. Urethane chemical grout data shall include chemical resistant properties, mixing, surface preparation and installation instructions.
 - 3. MSDS Sheet.

1.03 DELIVERY AND STORAGE

- A. Grouting materials shall be delivered and stored in unbroken containers with seals and labels intact as packaged by the manufacturer.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Nonshrink, Nonmetallic Grout: Sauereisen F-100 Level Fill, Master Builders Masterflow 713, Burke Non-Ferrous, Non-Shrink Grout, Five Star Grout or equal pre-mixed type.
- B. Urethane Chemical Grout, Type 5600, 3M Company or approval equal.

PART 3 - EXECUTION

3.01 PREPARATION

- A. All bonding surfaces shall be clean and dust and oil free, and in strict accordance with manufacturers instructions.

3.02 INSTALLATION

A. Nonshrink Grout:

1. Nonshrink, nonmetallic grout shall be used for grouting column base plates, anchor bolts, reinforcing bars, pipe sleeves, machinery supports and pump base plates.
2. Nonshrink grout shall be mixed and placed as recommend by the manufacturer.
3. Grout shall be mixed as closed to the work area as possible and transported quickly to its final position in a manner which will not permit segregation of materials.
4. Nonshrink grout shall be cured with water saturated burlap for at least three days.
5. Machinery set on grout pads shall not be operated until the grout has cured for at least 24 hours.

B. Urethane Chemical Grout:

1. Installation methods shall be in strict accordance with manufacturer's instructions.

END OF SECTION

SECTION 03800

LEAKAGE TESTING OF STRUCTURES

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PART 1 - GENERAL

1.01 DESCRIPTION

- A. Test hydraulic structures for leakage as described herein, including the storage tanks containment structure.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Water: Potable or non-potable as determined by the Engineer. Water for testing will be made available to the Contractor by the Owner.
- B. Piping: As required to fill and empty structures.
- C. Equipment: As required to fill and empty structures.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Hydrostatically test ~~concrete~~ structures which are intended to contain liquid to determine that they are watertight and free of detectable leaks.

3.02 INSPECTION AND TESTING

- A. Prior to testing, clean exposed surfaces by thorough hosing and remove all loosened matter and wash water from the structures.
- B. Conduct testing before backfill is placed against walls and after all concrete has attained the specified compressive strength.
- C. Fill hydraulic structures to be subjected to leakage tests with water to the ~~normal~~ maximum liquid level line. Do not fill more than 36 inches of water depth per day, unless otherwise approved by the Engineer. Repair any running leaks which appear

during filling before continuing. ~~After~~ Once filled to the structure has been kept full for 48 hours, it will be assumed, for the purposes of the test, that the absorption of moisture by the concrete in the structure is complete. Then maximum level, close all valves and gates to the structure and measure the change in water surface each day for a five-day period.

- D. During the test period, examine all exposed portions of the structure, and mark all visible leaks or damp spots. Repair such leaks or damp spots later. If the drop in water surface in a 24 hour period exceeds 1/10 of 1 percent of the normal volume of liquid contained in the structure, the leakage will be considered excessive.
- E. If the leakage is excessive, drain the structure, repair leaks and damp spots, refill the structure and again test for leakage. Continue this process until the drop in water surface in a 24 hour period, with the structure full, is less than 1/10 of 1 percent of the volume of liquid held in the structure.
- F. Make repairs and additional tests at no additional cost to the Owner.
- G. Apply specified coatings only after acceptance of leakage testing by the Engineer.

3.03 REPAIR METHODS

- A. Repair concrete not passing the leakage test in conformance with the applicable provisions of Section 03300 and to the satisfaction of the Engineer.

END OF SECTION

DIVISION 5

METALS

SECTION 05140

STRUCTURAL ALUMINUM

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work under this Section includes fabrication and erection of structural aluminum.

1.02 QUALITY ASSURANCE

- A. Standards: Unless otherwise specified, all materials, workmanship and practices shall conform to the following Standards:

1. Standard Building Code
2. Aluminum Construction Manual, Latest Edition, by the Aluminum Association.

- B. Qualifications: Fabrication and erection shall be by a qualified fabricator and erector approved by the Engineer. Preparation of shop drawings shall not begin until the fabricator and erector have been approved.

1.03 SUBMITTALS

- A. Complete shop drawings, including material lists, fabrication and erection drawings shall be submitted for approval. Fabrication shall not be approved until the submission has been approved.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Standard Shapes, Bars & Plates:

1. ASTM B 209 - Alloy 6061-T6
2. ASTM B 308 - Alloy 6061-T6

B. Standard Threaded Fasteners:

1. Aluminum Bolts - Alloy 2024-T4
2. Aluminum Nuts - Alloy 6061-T6

C. Aluminum Grating: Federal Specification RR-G-661c, Type I with right angle cross member. Bearing bar size shall not be less than 1-1/2-inch x 3/16-inch and of 6063-T5 alloy, except as otherwise indicated. Cross bars shall be of 6063-T5 alloy. Aluminum bars shall have a standard mill finish. Joints shall occur at supporting members. Grates shall be fastened to supporting members at each contact point.

D. Miscellaneous Aluminum: Miscellaneous aluminum shapes, bars and plates shall be Alloy 6061-T6, except when otherwise specified.

2.02 FABRICATION

- A. Fabrication shall be in accordance with the specified standards. Splices not indicated on the Drawings will not be permitted.
- B. Surface Treatment: Treatment is required only if indicated on the Drawings.

PART 3 - EXECUTION

3.01 ERECTION

- A. Erection shall be in accordance with the specified standards and as indicated on the Drawings.
- B. Painting: See Section 09900 - Painting.
- C. Where the contact of dissimilar metals may cause electrolysis or where aluminum will contact concrete, mortar or plaster, the contact surface of the metals shall be coated in accordance with Section 09900-Painting. Finished works shall be cleaned and excess cement removed.

END OF SECTION

SECTION 05500

MISCELLANEOUS METALS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: This Section covers the use of miscellaneous metals, shapes and sheets, fittings, fasteners, wirework, etc., not specified elsewhere in these Specifications.

1.02 SUBMITTALS

- A. Contractor shall submit shop drawings which shall indicate fabrication, assembly and erection details, sizes of members, profiles, fastenings, supports and anchors, patterns, clearances and connection to other work. Shop drawings shall be approved by the Engineer before fabrication begins.

1.03 QUALITY ASSURANCE

- A. Standards: Unless otherwise specified, all materials, workmanship and practices shall conform to the current editions of the Standard Building Code, OSHA Standards, AISC Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings, Code of Standard Practice, American Welding Society Code AWS D1.1, Aluminum Construction Manual and the other Standards referenced in this Section.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Steel: Miscellaneous steel plates, shapes, bars and connections shall conform to the requirements of ASTM Designation A 36 and shall be galvanized by the hot dip method after fabrication in accordance with the requirements of ASTM Designation A 123.
- B. Steel Pipe: Steel pipe used for miscellaneous members and connections shall conform to the requirements of ASTM Designation A 53, Schedule 40, galvanized, except as otherwise indicated.

C. Anchor Bolts and Fasteners:

1. Anchor bolts securing equipment or any assemblies subject to vibrations or movements, shall be stainless steel hook anchors conforming to ANSI 316 and ASTM A193 grade B8M, unless otherwise noted. Hook anchors shall be to the farthestmost layer of reinforcing. The minimum length protruding from the face of concrete shall be 6 inches and the minimum length of hook shall be 6 inches. All dimensions and sizes of anchor bolt shall comply with manufacturer's recommendations.
2. Anchor bolts and fasteners not securing equipment or assemblies subject to vibration shall be stainless steel wedge or adhesive anchors conforming to ANSI 316 and ASTM A193 grade B8M, unless otherwise noted. Wedge anchors shall be as manufactured by "HILTI", or equal. Adhesive anchors shall consist of a self-contained vinylester adhesive cartridge and anchor rods. Adhesive anchor shall be AVA adhesive anchoring system as manufactured by "HILTI", or equal.

D. Castings: Castings for manhole frames, covers and other items shall conform to the requirements of ASTM Designation A 48, Class 30 and the details shown on the Drawings. Castings shall be true to pattern in form and dimensions and free of blow holes, cracks and other pouring faults and defects. The seating surfaces between frames and covers shall be machined to fit true as not to rock or rattle. Lifting or "pick" holes shall be provided, but shall not penetrate through the cover. No plugging or filling will be allowed. If the area is subject to flooding, the castings shall be of a waterproof design with rubber gasket and stainless steel bolts to fasten lid to frame.

E. Welding Electrodes: Welding electrodes for structural steel shall conform to AWS A5.5, E70XX. Use 4043 filler metal for aluminum. Use type E308 electrode where the base metal is type 304 stainless steel and type E309 where the base metal is type 316 stainless steel or where stainless steel is welded to carbon steel. Field welding of galvanized steel shall not be acceptable.

F. Caged Ladder: Ladder and cage shall be fabricated from aluminum alloy 6061-T6, or approved equal. Ladder uprights shall be 3/8-inch by 2 inches and shall be spaced 18 inches apart. Supports shall be 3/8-inch by 2 inch bars bent to shape and shall be spaced not over 5 feet apart. Ladders shall be rigidly supported not less than 7 inches from adjacent surfaces and shall be secured to the concrete block wall by Type 316 stainless steel toggle bolts embedded in the CMU wall. Rungs shall be not less than 1 inch in diameter, smooth, spaced 12 inches on centers with the ends fitted into and welded to the uprights. The ladder and cage shall be designed, fabricated, and erected in accordance with Part 1910 of the Occupational Safety and Health Standards of the Department of Labor.

- G. Aluminum Stairs: Aluminum stairs shall be as indicated on the Drawings. Stairs shall be connected to the appropriate structural members. Stair members shall be constructed to support dead loads and additional live working stresses permitted for materials in Standard Building Code. Size of various members and number of parts indicated on the Drawings are minimum, and shall be increased as necessary to meet requirements. Stairs shall comply with OSHA Standards.
- H. Aluminum Stair Treads: Aluminum stair treads shall be of the same pattern and alloys as the aluminum grating and shall have a 1 1/4-inch wide abrasive nosing. Aluminum bars shall have a standard mill finish.
- I. Miscellaneous Aluminum: Miscellaneous aluminum shapes, bars and plates shall be Alloy 6061-T6, except when otherwise specified.

2.02 FABRICATION

- A. Insofar as possible, fabricated material shall be fitted and shop assembled ready for erection. Welding and equipment shall conform to American Welding Society's Code for Welding in Building Construction, latest edition. All work shall be square, plumb and true, accurately fitted with tight joints and intersections. Exposed work shall be finished smooth with welds ground smooth.
- B. Painting And Protective Coating:
 - 1. All ferrous metal, except stainless steel and galvanized surfaces, shall be properly cleaned and given one shop coat of primer compatible with coating system specified in Section 09900 Painting. Anchors that are built into masonry shall be coated with asphalt paint unless specified to be galvanized. Metal work to be encased in concrete shall be left unpainted unless specified or noted otherwise. Where hot-dip galvanized or zinc coated metal is specified or shown, it shall be shop primed unless specifically not required. Castings that are to be left unpainted shall be cleaned and coated with a coal-tar-pitch varnish.
 - 2. Hot-dip galvanizing or zinc coatings applied on products fabricated from rolled, pressed or forged steel shapes, plates, bars and strips shall comply with ASTM Designation A 123. Hot-dip galvanizing or zinc coatings on assembled steel products shall comply with ASTM Designation A 386. The weight of coatings shall be designated in Table 1 for the class and thickness of material to be coated. Galvanized surfaces for which a shop coat of paint is specified shall be chemically treated to provide a bond for the paint. Except for bolts and nuts, all galvanizing shall be done after fabrication.

3. Aluminum to be placed adjacent to masonry or dissimilar metals shall be coated in accordance with Section 09900 - Painting.

PART 3 - EXECUTION

3.01 ERECTION

- A. Where the contact of dissimilar metals may cause electrolysis and where aluminum will contact concrete, mortar or plaster, the contact surface of the metals shall be coated in accordance with Section 09900 - Painting. Finished works shall be cleaned and excess cement removed.
- B. All work shall be adequately anchored in place at proper elevations, planes and locations.

END OF SECTION

SECTION 05520

ALUMINUM RAILING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work under this Section includes fabrication and erection of aluminum railings.

1.02 SUBMITTALS

- A. Shop drawings for aluminum railings shall be submitted for approval prior to fabrication of these items.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. The aluminum railing shall be equal to either one of the following specifications:
 - 1. Aluminum railings shall be 1 1/2-inch Schedule 40 aluminum pipe, alloy 6063-T6 or Alcoa alloy 6063-T832. Brackets shall be cast aluminum alloy B214. Floor flanges shall be forged aluminum, alloy 6061-T6. Brackets and flanges shall be secured to concrete with expansion bolts. Railings shall be fabricated in shop, made and erected square, plumb, straight and true, designed for adjustment to field variations, accurately fitted with tight joints and intersections. Fittings shall be fastened to pipe members by inert gas shielded metal arc welding method as per Alcoa's Welding Alcoa Aluminum, latest edition. Finish shall be 1-hour anodized - #215R1 & #204R1. Completed railings shall conform to OSHA Standards.
 - 2. Aluminum railing equal to the system produced by C/S Rigid Rail, Construction Specialties, Inc. All posts shall be extruded aluminum hollow, one-piece sections - .250 inches thick, alloy 6063-T6 square tube of nominal 1 3/4-inch dimension. Rails shall be extruded aluminum, alloy 6063-T6 with minimum wall thickness of .140 inches and nominal 1 3/4-inch square dimension. Cast fittings shall be fabricated from alloy 514T. Fittings are to be adjustable where required to meet directional changes without cutting, welding or bending. For exposed aluminum surfaces provide clear anodized finishes as follows: extruded aluminum - caustic

etch and 1-hour anodizing #215R1 minimum 0.7 mil coating; cast aluminum - etch and anodize #204R1. All post to rail fasteners shall be Type 316 stainless steel and internally threaded 1-piece tubular inserts receiving fasteners shall have a minimum tensile strength of 85,000 psi. Fasteners shall have threads treated with epoxy or vinyl lock patches to prevent loosening. Railings shall be fabricated in shop, made and erected square, plumb, straight and true, designed for adjustment to field variations, accurately fitted with tight joints and intersections. Where removable railings are indicated, insert posts into recessed sleeves.

- B. Kickplates: Aluminum kickplates where not specifically called for in the Drawings shall be furnished and installed typically at the edges of all metal walkways. Kickplates shall be 1/4-inch angle or plate stock (depending on the specific walkway edge detail) meeting OSHA requirements and shall project 4-inches above walkway surface. Kickplates shall not infringing on minimum required walkway width and material must be same as that of the railing construction.

2.02 FABRICATION

- A. Insofar as possible, fabricated material shall be fitted and shop assembled ready for erection. Welding and equipment shall conform to American Welding Society's Code for Welding in Building Construction, latest edition. All work shall be square, plumb and true, accurately fitted with tight joints and intersections. Exposed work shall be finished smooth with welds ground smooth. The completed work shall conform to OSHA Standards and the Standard Building Code.

PART 3 - EXECUTION

3.01 ERECTION

- A. Where the contact of dissimilar metals may cause electrolysis and where aluminum will contact concrete, mortar or plaster, the contact surface of the metals shall be coated in accordance with Section 09900 - Painting. Finished works shall be cleaned and excess cement removed.
- B. All work shall be adequately anchored in place at proper elevations, planes and locations.

END OF SECTION

DIVISION 6

WOOD AND PLASTIC

SECTION 06600

FABRICATED FIBERGLASS PRODUCTS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Furnish all labor, materials, equipment and incidentals to fabricate and install the items specified herein.

1.02 QUALITY ASSURANCE

- A. Products to comply with the current edition of the applicable National Bureau of Standards, Voluntary Product Standard PS 15.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Products shall be furnished by manufacturers having a minimum of 5 years experience in the manufacture of similar items with a record of successful installations. Support members shall be as shown on the Drawings and as required in Section 05500, Miscellaneous Metals, unless otherwise noted.

2.02 MATERIALS

- A. Interior Tank Ladders and Cages:
 - 1. FRP ladders: Able to withstand a 1,200 lb. vertical concentrated load at midspan of a rung.
 - 2. Utilize channel side rails and 1 3/8-inch minimum diameter rungs.
 - 3. Rung to side rail connections: Utilize a keyed pinned and bonded joint.
 - 4. Rungs: Skid resistant surface.
 - 5. Material: Pultruded structural fiberglass shapes with a synthetic surfacing veil for chemical and ultraviolet resistance.

6. Minimum glass content: 60 percent.
7. Pultruded parts: Series 525 "Eltren" as manufactured by Morrison Molded fiberglass Co., or approved equal.
8. Fiberglass properties:
 - a) Ultimate tensile strength - 30,000 psi.
 - b) Ultimate compressive strength - 30,000 psi.
 - c) Modules of elasticity - 3.0×10^6 .
 - d) Barcol hardness - 50.
9. Ladders and Cages (if required): Supplied completely assembled.
10. Cut edges: Sealed with compatible resin system.
11. Each unit to be tagged with manufacturer's drawing and part numbers for each installation.
12. Ladders and Cages: Manufactured by Imco Reinforced Plastics Co. or approved equal.
13. The ladder and cage shall be designed, fabricated and erected in accordance with Part 1910 of the Occupational Safety and Health Standards.

B. Fiberglass Structural Shapes (as applicable):

1. Structural FRP members supplied under this specification shall be manufactured using the "pultrusion" process. The composite shall consist of a glass fiber reinforced polyester resin matrix, approximately 50 percent resin to glass ratio.
2. Glass reinforcement shall be of three varieties:
 - a) A surfacing mat shall be used on all exterior surfaces for maximum chemical resistance.
 - b) Continuous glass strand rovings shall be used internally for longitudinal strength.
 - c) Continuous strand mats shall be used internally for transverse strength.

3. Resin shall be a polyester material, possessing inherent U.V., fire, and chemical resistance. Material shall be fire rated for Class I flame spread and flammability ratings as per ASTM E-84 and D-635.
4. The following minimum mechanical properties shall apply:

| | | |
|----|--|-------------------|
| a) | Ultimate tensile strength (longitudinal direction) | 30,000 psi |
| | Ultimate tensile strength (transverse direction) | 9,000 psi |
| | Ultimate tensile strength (full section in bending) | 25,000 psi |
| b) | Ultimate compressive strength (longitudinal direction) | 30,000 psi |
| | Ultimate compressive strength (transverse direction) | 18,000 psi |
| | Ultimate compressive strength (full sec. in bending) | 25,000 psi |
| c) | Ultimate shear strength (either direction) | 4,500 psi |
| d) | Ultimate bearing strength (either direction) | 30,000 psi |
| e) | Modulus of elasticity (full section in bending) | 2.8×10^6 |
| f) | Barcol hardness test | 50 |
5. Structural shapes and supports shall be as manufactured by Aickinstrut, Inc.; or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All work shall be erected level, and/or plumb, and shall meet required heights, layout and details precisely. All work shall be adequately fastened, anchored or braced.
- B. All work shall be executed in accordance with the best practices of the trade, by persons skilled in the craft.
- C. Installation shall be in strict accordance with manufacturer's instructions and recommendations in the locations shown on the Drawings.

3.02 INSPECTION AND TESTING

- A. Final acceptance test shall demonstrate that products have been properly installed and are in correct alignment.

END OF SECTION

DIVISION 7

THERMAL AND MOISTURE PROTECTION

SECTION 07165

VAPOR BARRIER

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

- A. Install vapor barrier under all floor slabs and concrete pads, and at other locations shown on the Drawing.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Vapor barrier shall be 6-mil polyethylene film or equal as approved by the Engineer.

PART 3 - EXECUTION

3.01 JOB CONDITIONS

- A. Proceed with vapor barrier work only after substrate construction and penetrating work have been completed.

3.02 PREPARATION OF SUBSTRATE

- A. Examine the substrate and the conditions under which vapor barrier work is to be performed. Do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Under occupied buildings, soil treatment work shall be completed just prior to installation of vapor barrier.

3.03 APPLICATION

- A. Vapor barrier shall be applied parallel with direction of concrete pour, lapping adjacent sides and ends 6 inches minimum.
- B. Seal all joints with continuous approved 2-inch wide plastic tape.

END OF SECTION

DIVISION 8

DOORS AND WINDOWS

SECTION 08350

ACCESS HATCH DOORS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: This Section includes providing all labor, materials and equipment necessary to install the miscellaneous access doors as indicated on the Drawings and/or specified herein.

1.02 QUALITY ASSURANCE

- A. Standards: The access doors shall meet the standards of the following:
 - 1. Standard Building Code
 - 2. OSHA Requirements
- B. Manufacturers: Halliday Products, Orlando, Florida; The Bilco Company, New Haven, Connecticut; U.S. Foundry & Manufacturing Corp., Medley, Florida; or approved equal.

1.03 SUBMITTALS

- A. Shop Drawings: Shop drawings shall be submitted to the Engineer for approval. Shop drawings shall include manufacturer's data sheets showing all materials, connections and other required details to illustrate a complete operating access door.

1.04 WARRANTY AND GUARANTEES

- A. The manufacturer shall guarantee the access door against defects in material and workmanship for a period of ten (10) years.

PART 2 - PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. The access doors, in sizes as shown on the Drawings, shall be the standard design of the manufacturer.

2.02 MATERIALS

- A. Each hatch shall be designed according to the openings shown on the Drawings. All access hatch doors shall be aluminum. The access frames shall be manufactured from 1/4-inch thick, one-piece frame. The frame shall be a self-draining channel with 1 1/2-inch draining coupling located in the channel frame. The door panels shall close flush and shall be 1/4-inch thick diamond (checker) plate. The installed access doors shall be designed to withstand a minimum live load of 300 pounds per square foot. Access doors shall be designed with a safety factor of 3. Removable cross-beams shall be provided by the hatch supplier as required to accomplish the stated loading. The doors shall have heavy duty stainless steel butt hinges with tamperproof fasteners. All hardware shall be made of 316 stainless steel. Each door shall have stainless steel spring operators, such that the maximum lifting effort is less than 25 pounds. The hatch supplier shall provide the number of spring operators as required to accomplish the lifting requirement. Each door shall open to 90° and lock automatically with a positive locking arm and a release handle. Each door shall have a recessed lifting handle. All doors shall have a provision for locking with a padlock.
- B. All access doors shall be designed with a neoprene gasket on the inside lip of the frame perimeter, to form an essentially watertight seal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The access hatches and doors shall be installed as recommended by the manufacturer and adjusted for proper operation without binding.

END OF SECTION

DIVISION 9

FINISHES

SECTION 09900

PAINTING

D.E.P.

APR 27 1998

SOUTHWEST DISTRICT
TAMPA

PART 1 - GENERAL

1.01 DESCRIPTION

WORK INCLUDED

A. Scope of Work:

The Contractor shall furnish all materials, labor equipment, and incidentals required to provide a protective coating system for the surfaces listed herein and not otherwise excluded. The Contractor shall furnish all materials, labor equipment, and incidentals required to provide a protective coating system for the All surfaces listed herein and not otherwise excluded. described, whether new or existing, shall be included within the scope of this section.

B. The work includes painting and finishing of interior and exterior exposed items and surfaces such as walls, floors, miscellaneous metal, doors, frames, construction signs, guardrails, posts, pipes, fittings, valves, equipment, and all other work obviously required to be painted unless otherwise specified herein or on the Drawings. The omission of minor items in the schedule of work shall not relieve the Contractor of his obligation to include such items where they come within the general intent of the Specifications as stated herein. The following major items to be painted on the Project shall include, but not be limited to, the following:

a) ~~Exposed concrete and structural steel, except factory prefinished items.~~

1. b) ~~The reinforced Exposed concrete slab for the aboveground leachate storage tanks and truck loading pump area structural steel, except factory prefinished items.~~

c) ~~Interior and exterior of the concrete wetwells for the submersible pumping stations and concrete manholes and valve vaults, meter vaults, etc.~~

d) ~~Exterior surfaces of all interior and exterior piping, fittings, valves and equipment.~~

32. The reinforced concrete slab for the aboveground leachate storage tanks and truck loading pump area.

3. Interior and exterior of the concrete wetwells for the submersible pumping stations and concrete manholes and valve vaults, meter vaults, etc.

4. Exterior surfaces of all interior and exterior piping, fittings, valves and equipment.

C.

"Paint" as used herein means all coating systems, materials, including primers, emulsions, enamels, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

D.

The following items will shall not be painted:

a) ~~Any code-requiring labels, such as Underwriters' Laboratories and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plates~~

1. b) ~~Any moving parts of operating units, mechanical code-requiring labels, such as Underwriters' Laboratories and electrical parts Factory Mutual, valve operators, linkages, sensing devices or any equipment identification, performance rating, and motor shafts, unless otherwise indicated name or nomenclature plates.~~

e) ~~Traffic stripes on paving~~

2. d) ~~Aluminum handrails, walkways, and grating Any moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motor and fan shafts, unless otherwise indicated.~~

e) ~~Stainless steel angles, tube, pipe, etc.~~

f) ~~Products with polished chrome, aluminum, nickel or stainless steel finish~~

3. g) ~~Flexible couplings Aluminum doors, lubricated bearing surfaces, insulation and metal and plastic pipe interiors windows, louvers, and other exposed members.~~

h) ~~Plastic switch plates and receptacle plates.~~

4 i) ~~Signs and nameplates Stainless steel angles, tube, pipe, or other components.~~

j) ~~Finish hardware~~

5. k) ~~Structural members and panels already coated Products with polished chrome, aluminum, nickel or stainless steel finish.~~

l) ~~Any packing glands, unless otherwise indicated.~~

6. ~~Flexible couplings, lubricated bearing surfaces, insulation and metal and plastic pipe interiors.~~

~~7. Signs and Equipment nameplates.~~

~~8. Finish hardware.~~

~~1.02~~ RELATED WORK

~~A. Paint piping and equipment for identification purposes in accordance with Section 09905: Piping, Valve and Equipment Identification System.~~

~~1.03~~ QUALITY ASSURANCE

~~A. Provide the best quality grade of the various types of coatings as regularly manufactured by approved paint materials manufacturers. Materials not displaying the manufacturer's identification as a standard, ~~best-grade~~best-grade product will not be acceptable.~~

~~B. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer, and use only within recommended limits.~~

~~C. Undercoat and finish coat paints shall be compatible.~~

~~D. Painting shall be accomplished by experienced painters specializing in industrial painting familiar with all aspects of surface preparations and applications required for this project.~~

~~1.03~~ ~~1.04~~ SUBMITTALS

~~A. Submittals shall include manufacturer's data and samples as indicated below and shall be prepared and submitted in time to provide adequate review by the Engineer.-~~

~~Submittals shall be submitted in accordance with Section 01340~~

~~B. Samples - Painting:~~

~~1. Paint colors will be selected by the Owner.— Compliance with all other requirements is the exclusive responsibility of the Contractor.~~

~~2. Samples of each finish and color shall be submitted to the ~~Owner and~~ Engineer for approval before any work is started.~~

~~3. Samples shall be prepared so that an area of each sample indicates the appearance of the various coats. For example, where three coat work is specified, the sample shall be divided into three areas: one showing the application of one coat only,~~

one showing the application of two coats and one showing the application of all three coats.

4. Such samples when approved in writing shall constitute a standard, as to color and finish only, for acceptance or rejection of the finish work.
5. For piping, valves, equipment and miscellaneous metal work, provide sample chips or color charts of all paint selected showing color, finish and general characteristics.
6. Rejected samples shall be resubmitted until approved.

~~1.04~~ ~~1.05~~ DELIVERY, HANDLING AND STORAGE

A. Deliver all materials to the job site in original, unopened packages and containers bearing manufacturer's name and label.

1. Provide labels on each container with the following information:
 - a) Name or title of material
 - b) Fed. Spec. number if applicable
 - c) Manufacturer's stock number and date of manufacture
 - d) Manufacturer's formula or specification number
 - e) Manufacturer's batch number
 - f) Manufacturer's name
 - g) Generic type
 - h) Contents by volume, for major pigment and vehicle constituents
 - i) Thinning instructions
 - j) Application instructions
 - k) Color name and number
2. Containers shall be clearly marked to indicate any hazards connected with the use of the paint and steps which should be taken to prevent injury to those handling the product.

- B. All containers shall be handled and stored in such a manner as to prevent damage or loss of labels or containers.
- C. The Engineer shall designate areas for storage and mixing of all painting materials. Comply with the requirements of pertinent codes and fire regulations. Proper containers ~~outside of the building~~ shall be provided by the Contractor and used for painting wastes. No plumbing fixtures shall be used for this purpose.
- D. Used rags shall be removed from the ~~building~~ site every night and every precaution taken against spontaneous combustion.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. ~~All~~ Unless specified otherwise, all paint shall be manufactured by one of the following and shall be their highest grade of paint: ~~Tnemec Company, Inc., Porter Paint Company, Carboline Company, Master Builders ICI Paints and Devco Coatings, Tnemec Company, Inc., or Sauereisen Cements Company~~ approved equal.
- B. The following coating systems list a product by name to establish a standard of quality; other products of the same generic types may be submitted to the Engineer for approval. When other than the specified coating system is proposed, the Contractor shall submit on a typewritten list giving the proposed coatings, brand, trade name, generic type and catalog number of the proposed system for the Engineer's approval ~~review~~.
- C. Paint used in successive field coats shall be produced by the same manufacturer. Paint used in the first field coat over shop painted or previously painted surfaces shall cause no wrinkling, lifting, or other damage to underlying paint.
- D. Emulsion and alkyd paints shall contain a mildewcide and both the paint and mildewcide shall conform to OSHA and Federal requirements, including Federal Specification TT-P-19.
- E. ~~Finish coats~~ Any coating containing lead shall not be allowed. Oil shall be pure boiled linseed oil.
- F. Rags shall be clean painters' rags, completely sterilized.

COATING SYSTEMS

- A. ~~Class 2 Exposures - Exterior/Interior Concrete Surfaces (Buried/Submerged or Exposed to Leachate):~~ Class 2 exposures consist of all exterior below grade surfaces for precast and/or cast-in-place concrete structures, all exterior concrete footings below grade and shall include the following:

~~Exterior Buried Concrete Surfaces.~~ — 1. Surfaces to be coated:

- a) ~~Exterior below grade surfaces of precast and/or cast-in-place concrete wetwells and manholes and exterior and~~ Class 2 exposure consists of interior surfaces of precast and/or cast-in-place concrete valve vaults, meter vaults, etc.
- b) ~~Exterior concrete surface of below grade walls and footings for buildings, tanks and wet wells and~~ shall include the following:

1. Surfaces to be Coated

— 2. Class 2 Coating System:

- a) ~~Surface Preparation:~~ Surface preparation shall not begin until at least 30 days after the concrete has been placed. All efflorescence, chalk, dust, dirt, oil and grease shall be removed by detergent cleaning per SSPC-SP1. Acid etch or abrasive blast clean to remove laitance and roughen the entire surface equivalent to the surface of No. 80 grit sandpaper. Concrete shall have a consistent, even texture (void free), and shall be patched where needed. After acid etching, if used, surfaces shall be rinsed to neutralize the acid. The pH of the surfaces shall be between 7.0 and 8.0 before coating. Surfaces shall be clean and dry before coating is started. The presence of moisture shall be determined with a moisture detection device.
- b) ~~Prime Coat:~~ Polyamide cured coal tar epoxy thinned 33 percent.
(1 coat, 4 mils DFT)
(Carboline: Bitumastic No. 300-M thinned 33 percent with Carboline: Thinner 2000).
- c) ~~Finish Coats:~~ Polyamide cured coal tar epoxy.
(3 coats, 10 mils DFT per coat)
(Kop Coat: Bitumastic No. 300-M)

NOTE: — MAXIMUM ELAPSED TIME BETWEEN COATS, AS STATED BY THE COATING MANUFACTURER, SHALL NOT BE EXCEEDED.

~~B. Class 3 Exposures - Concrete (Submerged) (Landfill Leachate): Class 3 exposures consist of precast or cast-in-place reinforced concrete that are subject to exposure to landfill leachate, or intermittent or continuous submersion to landfill leachate and shall include the following:~~

~~1. Surface To Be Lined:~~

- ~~a) All interior concrete surfaces of the leachate collection system manholes, valve vaults and leachate pump station wet well.~~

~~2. Class 3 Coating System:~~

- ~~a) Surface Preparation: Surface preparation shall not begin until at least 30 days after the concrete has been placed. All efflorescence, chalk, dust, dirt, oil and grease shall be removed by detergent cleaning per SSPC-SP1. Acid etch or abrasive blast clean to remove laitance and roughen the entire surface equivalent to the surface of No. 80 grit sandpaper. Concrete shall have a consistent, even texture (void free), and shall be patched where needed. After acid etching, if used, surfaces shall be rinsed to neutralize the acid. The pH of the surfaces shall be between 7.0 and 8.0 before coating.~~

- ~~a) Exterior below grade surfaces of precast and/or cast-in-place concrete wetwells and manholes and exterior and interior surfaces of precast and/or cast-in-place concrete wetwells, sumps, valve vaults, meter vaults, etc.~~

- ~~b) Exterior concrete surface of below grade walls and footings.~~

~~2. Class 2 Coating System: Surface preparation shall not begin until at least 30 days after the concrete has been placed. All efflorescence, chalk, dust, dirt, oil and grease shall be removed by detergent cleaning per SSPC-SP1. Abrasive blast clean to remove laitance and roughen the entire surface equivalent to the surface of No. 80 grit sandpaper. Concrete shall have a consistent, even texture and shall be patched where needed and free of all honeycombs, bugholes and voids. The completed lining must be completely pinhole and holiday free.~~

~~3. Surfaces shall be clean and dry before coating is started. The presence of moisture shall be determined with a moisture detection device.~~

- ~~ba) Lining Prime Coat: Corrosion-clad, trowel applied, monolithic, polymer lining High build polyamide cured epoxy.~~

~~(1 coat @ 4 mils DFT)~~

(Carboline Super Hi-Gard 891, 1/8-inch may be thinned up to 1/4-inch thickness)

(Sauereisen Corrosion-Clad Polymer Lining No. 10% with Carboline #2 Thinner).-

210b)

- e) Finish Coat: Trowel apply lining to specified thickness tolerance, then finish roll with a short-nap mohair paint roller slightly dampened with water to provide a pinhole free surface and to remove trowel marks. High build polyamide cured epoxy.
(1 coat @ 6 mils DFT)
(Carboline Super Hi-Gard 891)

NOTE: — Lining shall be applied in strict accordance with the lining manufacturer's printed installation instructions. The lining shall be installed by a contractor experienced in the installation of the specified lining system and who is approved by the lining manufacturer.

B. ~~C.~~ Class 4 Exposures - Concrete (Intermittently Submerged) (Landfill Leachate): Class 4 exposures consist of precast or cast-in-place reinforced concrete that are subject to exposure to, or intermittent submersion to leachate and shall include the following:

1. Surface To Be Lined:
 - a) All interior concrete surfaces of the leachate storage tank concrete slab, including under the tank.
 - b) All interior concrete surfaces of the truck loading pump station.
2. Class 4 Coating System:
 - a) Surface Preparation: Surface preparation shall not begin until at least 30 days after the concrete has been placed. Coatings shall not be applied until 90 days after the hydraulic load/leak tests have been completed. All efflorescence, chalk, dust, dirt, oil and grease shall be removed by detergent cleaning per SSPC-SP1. Acid etch or abrasive blast clean to remove laitance and roughen the entire surface equivalent to the surface of No. 80 grit sandpaper. Concrete shall have a consistent, even texture (void free), and shall be patched where needed. After acid etching, if used, surfaces shall be rinsed to neutralize the acid. The pH of the surfaces shall be between 7.0 and 8.0 before coating. Surfaces shall be

clean and dry before coating is started. The presence of moisture shall be determined with a moisture detection device.

- b) Primer: Coat Clear Epoxy.
(1 coat, 3 mils DFT)
(Ceilcote 680)
- c) Base Coat: Polyamine Adduct Epoxy.
(1 coat, 9 mils DFT)
(Ceilcote 663 Resin with hardener,
2 parts resin to 1 part hardener)
- d) Top Coat: Polyamine Adduct Epoxy.
(1 coat, 9 mils DFT)
(Ceilcote 663 Resin with hardener,
mixing ratio of 2:1 respectively)

Horizontal surfaces (except for trench floors under tanks and equipment) will have sand broadcasted over surface or mixed with top coat to provide a non-skid surface. Vertical surfaces shall not contain sand.

D C. Class 5 Exposures - Metal (~~Nonsubmerged Exterior/Interior~~Submerged in Water, Wastewater or Leachate): Class 5 exposures consist of interior or exterior ferrous metal surfaces that do not come in contact with corrosive atmospheres are submerged in or exposed to water, wastewater or leachate and shall include the following:

1. Surfaces To Be Coated:

- a) ~~Pumps~~ Ferrous metal surfaces that are submerged, ~~motors and other mechanical equipment~~ wetted or within 3 feet above liquid surfaces.
- b) ~~Aboveground piping~~ All equipment, valves, fittings and piping piping and miscellaneous steel supports, etc., inside structures and miscellaneous buried vaults.
- c) ~~Miscellaneous steel shapes, angles, etc.~~
- d) ~~Galvanized steel surfaces.~~

2. Surfaces Not To Be Coated: Nonferrous metal surfaces.

3. Class 5 Coating System:

- a) Surface Preparation: Ferrous metal - sandblast clean to near-white metal (SSPC-SP10) all surfaces not shop primed or shop primed surfaces damaged during installation.
- b) Prime Coat: High build polyamide cured epoxy
(1 coat @ 4 mils DFT)
(Carboline Super Hi-Gard 891)
- c) Finish Coat: High build polyamide cured epoxy
(1 coat @ 6 mils DFT)
(Carboline Super Hi-Gard 891)

D. Class 6 Exposures - Metal (Non-submerged Exterior/Interior): Class 6 exposures consist of interior or exterior metal surfaces that are not subject to submergence and shall include the following:

1. Surfaces To Be Coated:

- a) Pumps and Equipment.
- b) Aboveground piping, valves, conduit, fittings, and pipe supports.
- c) Miscellaneous steel shapes, angles, etc.
- d) Exposed surfaces of electric panels, conduit, ventilation fans, A/C units, duct work, etc.
- e) Galvanized steel surfaces.

2. Class 56 Coating System:

- a) Surface Preparation: Sandblast to commercial blast surface (SSPC-SP6)
all non-galvanized unfinished metal surfaces. All metal surfaces shall be completely degreased by solvent cleaning in compliance with SSPC-SP1.
- b) ~~Prime Coat: Ferrous metals - medium oil alkyd primer~~
~~(3.0 mils DFT)~~
~~(Carboline: 622-LCF Primer)~~
~~Non-Ferrous and Galvanized Metals - Wash primer~~
~~(0.5 mils DFT)~~

~~Carboline: 40 Passivator~~

- e) ~~Finish Coats: Straight long oil alkyd enamel~~
~~(2 coats, before abrasive blasting)~~
- b) ~~Prime Coat: Ferrous metals - Acrylic inhibitive primer~~
~~(1 coat @ 3.0 mils DFT)~~
~~(Carboline 3358)~~
~~Non-Ferrous/Galvanized Metals - Modified acrylic primer~~
~~(1 coat @ 2.0 mils DFT)~~
~~(Carboline Multi-Bond 120)~~
- c) ~~Finish Coat: Acrylic latex~~
~~(1 coat @ 3 mils DFT per coat)~~
~~(Carboline: Rustarmor 500 3359)~~

E. ~~Class 67 Exposures - PVC Plastic Conduit, Piping, and Valves: Class 67 exposures consist of all above ground PVC/PVC or other plastic piping or electrical systems and those requiring color coding, and exposed exterior plastic components.~~

- 1. ~~Surfaces to be Coated:~~
 - a) ~~PVC and Plastic Piping, Valves and Fittings above ground or requiring color coding in accordance with Section 09905.~~
 - 2b) ~~Exposed exterior plastic piping and components subject to possible UV degradation.~~

~~Class 6 Coating System:~~

- a) ~~Surface Preparation: Clean or wash with detergent to remove all dirt and foreign material~~
- b) ~~Finish Coats 2. Class 7 Coating System: Acrylic Latex (high sheen)~~
~~(2 coats, 2.0 mils DFT per coat)~~
~~(Carboline: 620 Acrylic Emulsion)~~
- a) ~~Surface Preparation: Clean or wash with detergent to remove all dirt and foreign material.~~

~~Class 7 Exposures - Aluminum b) Finish Coats: -Class 7 exposures consist of aluminum surfaces embedded or in contact with concrete, mortar, or plaster or aluminum in contact~~

with dissimilar metals which may cause corrosion due to electrolysis or aluminum with the potential for contact with leachate vapors. Acrylic latex

(1st coat @ 2.0 mils DFT; Carboline Multi-Bond 120)
(2nd coat @ 3 mils DFT; Carboline 3359)

~~4F~~ Class 8 Exposures - Aluminum: Class 8 exposures consist of aluminum surfaces embedded or in contact with concrete, mortar, or plaster or aluminum in contact with dissimilar metals which may cause corrosion due to electrolysis. — Surfaces to be Coated:

- ~~a) Aluminum surfaces in contact with concrete, mortar, or plaster.~~
- ~~1) Surfaces to be Coated:~~
- ~~a) Aluminum surfaces in contact with concrete, mortar, or plaster.~~
- ~~b) Aluminum surfaces in contact with dissimilar metals which may cause corrosion due to electrolysis.~~
- ~~c) Aluminum surfaces with potential for contact with leachate vapors including pump station and valve box hatches, storage tank hatches and vents, and ladder, cage and access door platform assemblies~~

2. Class 8 Coating System:

- ~~a) Surface Preparation: Aluminum surfaces to be coated shall be cleaned in accordance with SSPC-SP1. —~~

Class 7 Coating System:

- ~~a) b) Surface Preparation Primer Coat: Aluminum surfaces to be coated shall be cleaned in accordance with SSPC-SP1 Modified waterborne acrylic.~~
- ~~b) Primer (1 coat @ 2 mils DFT per coat)
(Carboline Multi-Bond 120)~~
- ~~c) Finish Coat: — Zinc chromate wash primer Coal tar epoxy, high build.
(1 coat, 0.5 @ 20 mils; DFT per coat)-
(Carboline: 40 Passivator) Bitumastic No. 300-M)~~
- ~~c) Finish Coat: Coal tar epoxy, high build~~

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

~~A.~~

~~(1 coat, 20 mils DFT per coat)~~

~~(Carboline: Bitumastic: No. 300-M High Build)~~

~~G. Class 8 Exposures - Metal (Submerged) (Landfill Leachate): Class 8 exposures consist of metal surfaces that are buried, submerged or exposed to landfill gases or are within wetwells and valve vaults for leachate pumping.~~

~~1. Surfaces to be Coated:~~

~~a) Pumps, equipment and appurtenances, as applicable:~~

~~b) Pipes, valves and fittings:~~

~~c) Miscellaneous carbon steel plates, shapes, etc:~~

~~d) Wet well and valve vault access covers and frames (interior surfaces):~~

~~e) Exterior surfaces of buried metal piping, valves, fittings, etc:~~

~~2. Class 8 Coating System:~~

~~a) Surface Preparation: Ferrous metal - sandblast clean to white metal (SSPC-SP5). Non-Ferrous Metal - degrease by solvent cleaning in compliance with SSPC-SP1.~~

~~b) Prime Coat: Ferrous Metal - Rust Inhibitive Primer (2 mils DFT) (Carboline: Pug Primer)
Non-Ferrous Metal - wash primer (0.2 mils DFT) (Carboline 40 Passivator)~~

~~c) First Intermediate Coat: Coal Tar Epoxy (10 mils DFT) (Carboline: Bitumastic No. 300M, Color: Black)~~

~~d) Second Intermediate Coat: Coal Tar Epoxy (10 mils DFT) (Carboline: Bitumastic No. 300M, Color: Red)~~

~~e) Finish Coat: Coal Tar Epoxy (10 mils DFT) (Carboline: Bitumastic No. 300M, Color: Black)~~

~~NOTE: MAXIMUM ELAPSED TIME BETWEEN COATS, AS STATED BY THE COATING MANUFACTURER, SHALL NOT BE EXCEEDED.~~

~~PART 3 - EXECUTION~~

~~3.01 - SURFACE PREPARATION~~

~~A. In addition to the aforementioned preparations, all dirt, rust, scale, splinters, loose particles, disintegrated paint, grease, oil and other deleterious substances shall be removed from all surfaces which are to be coated.~~

- ~~B. Hardware, hardware accessories, machined surfaces, plates, lighting fixtures and similar. Items in contact with painted surfaces and not to be painted shall be removed, masked, or otherwise protected prior to surface preparation and painting operations.~~
- ~~C. Before commencing work, the painter must make certain that surfaces to be covered are in perfect condition. Should the painter find such surfaces impossible of acceptance, he shall report such fact to the Engineer. The application of paint shall be held as an acceptance of the surfaces and working conditions and the painter will be held responsible for the results reasonably expected from the materials and processes specified.~~
- ~~D. Program the cleaning and painting so contaminants from the cleaning process will not fall onto wet, newly-painted surfaces.~~
- ~~E. Prepare cementitious surfaces of concrete, concrete block, cement plaster and cement-asbestos-board stucco to be painted by removing all efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze.~~

See Section 03300 for concrete finish requirements.

- ~~F. Clean ferrous substances, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning. All welds, blisters, etc., shall be ground and sanded smooth. All pits and dents shall be filled and all imperfections shall be corrected so as to provide a smooth surface for painting.~~
- ~~G. Surface profile as obtained from sandblasting shall be as recommended by the coating manufacturer and verified using the press o tex film.~~

3.02 MATERIALS PREPARATION

- A. Mix and prepare painting materials in strict accordance with manufacturer's recommendations and directions, stirring materials before and during application to maintain a mixture of uniform density, free of film, dirt and other foreign materials.
- B. No thinners shall be used except those specifically mentioned and only in such quantity as directed by the manufacturer in his instructions. If thinning is used, sufficient additional coats shall be applied to assure the required dry film thickness is achieved. The manufacturer's recommended thinner or cleanup solvent shall be used for all clean-up. Application by brush, spray, airless spray or roller shall be as recommended by the manufacturer for optimum performance and appearance.

3.03 APPLICATIONS

- A. Paint all exposed surfaces ~~in rooms~~ scheduled for painting whether or not colors are designated in schedules, except where the natural finish of material is obviously intended and specifically noted as a surface not be painted. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas. If color or finish is not designated, the Engineer will select these from standard colors available for the materials systems as specified.
- B. Color Selection ~~for Color Coding~~:
 - 1. Color Coding Piping: All exposed piping shall be identified as specified in Section 09905. Pipe identification system shall include color coding or banding, legends and arrows.
 - 2. Color Coding Conduit: All exposed electrical conduit with conductors over 120 volts shall be color banded as specified in Division 16 and Section 09905.
- C. All painting shall be done by skilled and experienced craftsmen and shall be of highest quality workmanship.
- D. Apply paint in accordance with the manufacturer's directions. Use applicators and techniques best suited for the type of material being applied.
- E. All paint shall be at room temperature and the surface to be painted shall be dry and clean.

- F. Apply additional coats, when undercoats, stains or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance.
- G. Paint shall be applied in a neat manner with finished surfaces free of runs, sags, ridges, laps and brush marks. Each coat shall be applied in a manner that will produce an even film of uniform and proper thickness.
- H. Paint surfaces behind moveable items ~~equipment and furniture~~ the same as similar exposed surfaces. Paint surfaces behind permanently fixed items ~~equipment or furniture~~ with prime coat only.
- I. Paint back sides of access panels and removable or hinged covers to match the exposed surfaces.
- J. Sand lightly between each succeeding enamel or varnish coat.
- K. Omit the first coat (primer) on metal surfaces which have been ~~shop primed~~ ~~shop-primed~~ and touch-up painted, unless otherwise specified.
- L. The prime and intermediate coats as specified for the various coating systems may be applied in the shop by the manufacturer. The shop coats shall be of the type specified and shall be compatible with the field coat or coats. Such items as pumps, motors, equipment, electrical panels, etc. shall be given at least one touch up coat with the intermediate coat material and one complete finish coat in the field.

3.04 APPLICATIONS RESTRICTIONS

- A. Application of materials shall be done only on properly prepared surfaces as herein specified, and all exterior painting shall be done only in dry weather. Any surface coating damaged by ~~humidity~~, moisture or rain shall be removed and redone as directed by the Engineer.
- B. In no case shall paint be applied to surfaces which show a moisture content greater than 15 percent.

3.05 MINIMUM COATING THICKNESS

- A. Coatings shall be applied in accordance with the manufacturer's recommendations ~~and per SSPC PA2 Standards.~~ Minimum coating ~~millage~~ ~~thickness~~ shall be as specified above.

B. Apply a prime coat to material which is required to be painted or finished, and which has not been prime coated by others.

~~C. Recoat primed and sealed walls and ceiling surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.~~

3.06 FINISHES

A. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.

B. Complete Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specific requirements.

3.07 FIELD QUALITY CONTROL

A. All completed surfaces will be checked by the Engineer, and the Contractor shall provide the necessary properly calibrated gauges. All nonferrous surfaces shall be checked for number of coats and thickness by use of a Tooke gauge. All ferrous surfaces shall be checked for film thickness by use of an Elcometer or Micro-Test magnetic dry film gauge properly calibrated. In addition, submerged tank linings and metals shall be tested for freedom from holidays and pinholes by use of a Tinker-Razor or K-D Bird Dog Holiday Detector. All defects shall be corrected to the satisfaction of the Engineer. The presence of moisture shall be determined prior to coating by testing with a moisture detection device such as a Delmhors Model DB.

3.08 PROTECTION

A. All other surfaces shall be protected while painting equipment, piping, etc.

B. Protection of ~~furniture and other movable~~ objects, equipment, fittings, and accessories shall be provided throughout the painting operation. ~~Remove all electric plates, surface hardware, etc., before painting, protect and replace when completed.~~ Mask all machinery nameplates and all machined parts not to receive paint. Lay drop cloths in all areas where painting is being done to adequately protect structures, flooring, piping, equipment, and other work from all damage.

3.09 CLEANING

- A. The Contractor shall perform the work under this Section while keeping the premises free from accumulation of debris and rubbish and shall remove all scaffolding, paint cloths, paint, and brushes from the building and project site when completed.
- B. Cleaning: All paint brushed, splattered, spilled or splashed on any surface not specified to be painted shall be removed.

3.10 EXTRA STOCK

- A. Paint To Be Supplied To Owner: Upon completion of painting work, the Owner shall be furnished at no additional cost, one gallon of each type and color of finish paint for touching up. Paint container labels shall be complete with manufacturer's name, generic type, number, color and location where used.

END OF SECTION

DIVISION 11

EQUIPMENT

SECTION 11200
OPEN TOP BOLTED STEEL TANK
WITH ALTERNATE BID ITEM FOR BOLTED STEEL TANK COVER

D.E.P.

PART 1 -GENERAL

APR 27 1998

SOUTHWEST DISTRICT
TAMPA

1.01 WORK INCLUDED

- A. The work under this section shall include furnishing and installation of all materials, labor and equipment necessary for the construction of open top factory-coated bolted primary storage steel tank(s) with steel floor on a concrete slab and bolted steel secondary containment tank(s), and tank appurtenances as follows: overflow pipe; safety cages; platform and ladder assembly and access door complete with all accessories and appurtenances required for a complete storage tank and as shown on the Drawings. All components and materials, as specified herein, shall be provided by the tank manufacturer. As an alternate bid item, bolted steel tank roofs and handrails shall be added complete with all accessories and appurtenances required to cover the primary tanks as shown on the drawings.
- B. The tank installation as shown on the plans and specified herein, is based on the equipment furnished by one manufacturer. A tank which is offered as a substitute to the specific requirements of these Specifications and/or which differs in detail and arrangement from that shown may require changes in design and construction of other portions of the project. All costs which result from such changes in design and construction are to be borne entirely and unconditionally by the Contractor; said costs to included but not be limited to structural, piping, mechanical and electrical changes and all engineering costs incurred as a result of the substitution, in the revision of Plans and Specifications, review of design changes by others, preparation of change orders, and any other costs directly or indirectly resulting from said substitution.

1.02 QUALITY ASSURANCE

- A. The tank shall be of factory-coated steel bolt together tank construction.
- B. The tank manufacturer shall own and operate the production plant, fabricate and coat the tank materials at one location. The manufacturer shall transport the tank components to the site and install the tank in accordance with the Drawings.
- C. The materials, design, fabrication, and erection of the bolted steel tank shall conform to AWWA D103-87 or with the Principles of API 12B. The tank coating system shall conform solely to Section 10.5 of AWWA D103-87 specification.

- D. The tank manufacturer shall be solely responsible for the adequacy of design and safety of the completed tank systems. Tank manufacturer shall provide the services of a qualified Professional Engineer, licensed in the State of Florida, for the design of all components, including but not limited to the tank structure, tank cover, tank anchoring system, and concrete slab and foundation.
- E. The tank manufacturer shall be quality certified, having an active ISO-9000 or an active API-Q1 certification.

1.03 WARRANTY AND GUARANTEES

- A. Structure: All equipment shall be guaranteed against defects in material and workmanship for a minimum period of one year from the date of Owner's final inspection and acceptance to the effect that any defective equipment shall be repaired or replaced without cost or obligation to the Owner.
- B. Coating System: The Tank Manufacturer shall warranty the coating system for a period of five (5) years from date of final acceptance by the Owner. This shall include the coating on the tank, chips, cracks, spalls, or under-cuts during normal treatment storage service. The Contractor shall replace or repair such part(s) at no cost to the Owner.

1.04 SHOP DRAWINGS

- A. Before the equipment is manufactured, the Contractor shall submit detailed Shop Drawings to the Engineer for review. Furnished drawings shall show dimensions, material grade, material thickness, material sizes, finishes, joint attachment details, method of anchoring tank to foundation, slab and foundation design, and erection procedure. A complete set of structural design calculations shall be provided for the tank structure foundation, handrailing, grating, platforms, walkways, ladders, etc. Calculations will also be submitted verifying that the secondary containment volume is at least 110% of the primary tank volume. Both calculations and shop drawings shall bear the signature and seal of a Professional Engineer registered in the State of Florida.
- B. There shall be no deviation from the drawings and specifications, except upon written order from the Engineer. Any deviations from the plans or specifications shall be clearly indicated in the submittal package. Failure to do so shall be cause for removal of said materials from the jobsite and supply of specified materials at no cost to the Owner or Engineer regardless of the stage of the construction.

1.06 EQUIPMENT

A. Factory-Coated Bolted Storage Tanks:

1. The primary storage shall have nominal dimensions of 29 foot diameter by 16 foot height with a nominal capacity of 69,000 usable volume of 79,000 gallons. The secondary containment tank An overflow shall have nominal dimensions of 42 foot diameter by 8 foot height with a nominal capacity be placed in the primary tank to limit the usable volume such that the ratio of 83,000 gallons secondary containment volume to primary tank volume described below can be achieved. The secondary containment tank shall have nominal dimensions of 42 foot diameter by 8 foot height with a nominal capacity of 87,000 gallons.
2. The volume of the secondary containment shall be a minimum of 110% of the primary tank volume. Calculations verifying this requirement shall be submitted by the Contractor.
3. The tank shall be as manufactured by Peabody Tec Tank, Inc., Columbian Steel Tanks Company, or equal. The tank shall be of steel bolt together tank construction with factory applied coatings. The principal items of equipment shall include: tank, floor, roof (alternate bid item), sump, roof vent (alternate bid item), level indicator, manways, cage, platform and ladder assembly, handrail walkways, pipe, level sensor, conduit connections and supports and overflow piping.
34. Inspection, instructions on operation, start-up supervision, maintenance manuals and all other items as hereinafter called for in the Specifications or shown on the Drawings shall be furnished.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Plates and Sheets:

1. Steel plate shall conform to, or at least be equal to, the requirements of ASTM A36 with a minimum yield strength of 36,000 psi. High strength plate shall conform to, or at least be equal to, the requirements of ASTM A572-Gr50, ASTM A572-Gr60, ASTM A607-Gr50, or at least ASTM A607-Gr60.
2. Steel sheet shall conform to, or at least equal to ASTM A570-Gr40 with a minimum yield strength of 33,000 psi. Minimum thickness shall be 12 gauge.

3. Under no circumstances shall the coating system be considered in determining the ultimate steel strength. Steel plate yield strengths up to 60,000 psi may be utilized for calculations detailed in AWWA D103.

4. When multiple bolt lines are used, the spacing of bolt lines in a direction parallel to the line of stress shall not be less than the bolts spacing in a line perpendicular to the line of stress. Vertical bolt lines shall not be staggered so as to cause a decrease in the number of bolts in adjacent lines.

B. Rolled Structural Shapes:

1. Material shall conform to minimum standards of ASTM A36 or AISI 1010.

C. Horizontal Wind Stiffeners:

1. When intermediate wind girders are required, the girders shall be either rolled structural shapes of truss design of equivalent strength, coated the same as the tank exterior.

D. Bolt Fasteners:

1. Bolts used in the construction of the tank shall be a minimum ½ inch diameter, galvanized, and shall meet the minimum requirements of API 12B, Appendix A.

2. Bolts shall conform to ASTM A307 or API-12B, as required by the tank design.

3. All bolts in contact with stored liquid shall be provided with nitrile or neoprene-backed steel washers for placement between the nuts and the sheets. Other joints shall have steel flat washers under the nuts to protect the external coatings. Additionally, any steel nuts that are in contact with the stored liquid shall be factory-encapsulated so that the nut forms one piece with the corrosion resistant encapsulating material.

E. Gaskets/Sealants

1. Gaskets and/or sealants shall conform to AWWA D103-87 Section 2.10. The Contractor shall provide documentation that the proposed gasket/sealant material is compatible with leachate or other similar wastewaters.

2.02 COATING

A. Surface Preparation:

1. Following fabrication, parts shall be thoroughly cleaned by a power wash-rinse process followed immediately by hot air drying.
2. The parts shall then be grit-blasted to the equivalent of a near-white finish SSPC-SP10-63T.
3. The surface anchor pattern shall not be less than 1.0 mil.

B. Coating:

1. Interior coating shall be Peabody Thermo-Thane 7000, Columbian Trico-Bond 478, or equal. Interior coating shall be applied to the interior surfaces of the primary tank and both sides of the steel floor. Coating shall be NSF approved and be in accordance with AWWA D103-87 Section 10.5.
2. Exterior coating shall be applied to the exterior surfaces of the primary tank and all surfaces of the secondary containment tank and shall be Peabody System 4, Columbian Z-Bond 493, or equal. Coating shall be in accordance with AWWA D103-87 Section 10.5.

D. Manufacturer Inspection (prior to shipping):

1. All coated sheets shall be inspected for required mil thickness (Mikrotest or equal).
2. All coated sheets shall be checked for color uniformity.
3. All coated parts shall be marked with a part number, which shall correspond to the appropriate tank erection drawings to clarify and simplify tank assembly.
4. A holiday detection test shall be conducted on each steel sheet before shipping. Sheets with detected holidays shall be rejected and not shipped to the jobsite.

2.03 TANK SIDEWALLS AND FLOOR

A. Factory coated bolted steel.

2.04 TANK ROOF (ALTERNATE BID ITEM)

- A. Roof Construction: Tanks shall include a radially sectioned roof fabricated from factory coated, bolted steel panels, as produced by the tank manufacturer, and shall be assembled in a similar manner as the sidewall panels utilizing the same gaskets, sealant and bolting techniques, so as to assure a water/air tight assembly. The roof shall be clear-span and self-supporting. Both live and dead loads shall be carried by the tank walls. In addition to the structure loads, the roof shall be designed for a minimum superimposed dead load and live load of 20 pounds per square foot each. The roof shall be designed such that the maximum deflection of the roof under live load conditions is less than 1/4-inch. The exterior coating finish shall match the tank sidewalls.
1. Combined Loads: The basic live load plus dead load combinations for the roof analysis shall be in accordance with ANSI.

2.05 APPURTENANCES

- A. All appurtenances shall be supplied by the storage tank supplier.
- B. Roof Vent (Alternate Bid Item)
1. A properly sized vent assembly in accordance with AWWA D103 shall be furnished and installed above the maximum water level of sufficient capacity so that at maximum possible rate of water fill or withdrawal, there will be no resulting interior pressure or vacuum.
 2. The overflow pipe shall not be considered to be a tank vent.
 3. The vent shall be constructed of aluminum.
 4. The vent shall be so designed in construction as to prevent the entrance of insects, birds and/or animals by including a screen of 23 to 25 mesh polyester monofilament.
- C. Access Manway/Door
1. One manway shall be provided in the first ring of both the primary and secondary tanks as shown on the contract drawings in accordance with AWWA D103. Such manway shall be a minimum of 24 inches in diameter. Manway shall be factory coated steel with the same coatings as the corresponding tank surfaces.
- D. Roof Hatch (Alternate Bid Item)

1. Furnish and install one 24 inch by 24 inch roof hatch with the tank cover placed near the cover access point and provide with hinges and a hasp for locking. Roof hatch shall be factory coated steel with the same coatings as the corresponding tank surfaces.

E. Inlet and Outlet Connections

1. Inlet and outlet connections shall conform to the sizes and locations specified on the Plans.
2. Flanges shall be Class 150 with dimensions and bolt pattern conforming to ANSI B16.5.
3. Connection flanges shall be 9 inches from face of flange to tank surface.
4. Connections shall be factory coated steel with the same coating as the corresponding tank surfaces.

F. Pipe and Conduit Supports: Tank manufacturer shall provide suitable conduit and pipe support brackets as required for all vertical runs on the side of the tank, made of stainless steel, and bolted to the tank walls.

G. Tank Ladders and Cages:

1. Outside tank ladders and cages shall be furnished and installed as shown on the contract drawings.
2. Outside ladders shall be fabricated of aluminum and utilize grooved, skid-resistant rungs.
3. Safety cage, step-off platforms, and tank connecting deck shall be fabricated of aluminum. Step-off platforms, if required, shall be at least 36 inch wide by 48 inch long, with 1 1/2-inch aluminum grating. Platforms, walkways, grating and handrail shall comply with Division 5.
4. All safety cages shall be equipped with a lockable anti-climb gate attached to the bottom of the cage.
5. Inside ladders and cages shall be fiberglass.
6. Ladders shall comply with AWWA D103.

H. Identification Plate:

1. A manufacturer's nameplate shall list the tank serial number, tank diameter and height, maximum design capacity, intended storage use, and date of installation. The nameplate shall be affixed to the tank exterior sidewall at a location approximately five (5') feet from grade elevation in a position of unobstructed view.
- I. Level Sensor:
1. Provide an ultrasonic level sensor as specified in Division 16.
 2. It shall be mounted as shown on the drawings.
- J. Overflow and Interconnecting Piping:
1. Tank manufacturer shall be responsible for supplying overflow and/or interconnecting piping as shown in the Contract Drawings. The piping shall be factory coated steel with the same coatings as the corresponding tank surfaces.
- K. Roof Handrail (Alternate Bid Item):
1. If the tank roof alternate bid item is selected, aluminum handrail shall be provided around the entire tank periphery. Handrail shall be supplied by the tank manufacturer and shall comply with applicable specifications. Handrail mounting shall be performed in accordance with the tank manufacturer's recommendations.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The tank manufacturer/Contractor shall submit general installation procedures along with an accurate time estimate for complete installation of the proposed unit.
- B. Field erection of the factory-coated, bolted-steel tank shall be in strict accordance with the procedures outlined in the manufacturer's erection manual, and performed by an authorized dealer of the tank manufacturer, regularly engaged in erection of these tanks.
- C. Specialized building equipment developed and supplied by the manufacturer shall be used to erect the tanks.
- D. Particular care shall be taken in handling and bolting of the tank panels and members to avoid abrasion of the coating system. Prior to liquid test, all surface areas shall be visually inspected by the Engineer. Touch-up coating shall be done in accordance with tank manufacturer's recommendation where and as directed.

E. A field holiday test shall be performed on both sides of all panels (except the floor where the top side only shall be tested) after erection, but prior to the liquid test using a nine (9) volt holiday testing device. All holidays shall be repaired in accordance with the tank manufacturer requirements and retested.

F. Appurtenances:

1. Pipe Connections:

- a) Where pipe connections are shown to pass through tank panels, they shall be field located, saw cut, (acetylene torch cutting or welding is not permitted), and utilize an interior and exterior flange assembly. Sealer as recommended by the tank manufacturer shall be applied on any cut panel edges or bolt connections.

3.02 MANUALS

A. The Contractor shall supply to the Owner operation and maintenance manuals and parts lists for all equipment prior to final acceptance as specified.

3.03 FIELD TESTING AND INSPECTION

A. Hydrostatic Testing: Following completion of erection, holiday testing and cleaning of the tank, the structure shall be tested for liquid tightness by filling tank to its overflow elevation. Any leaks disclosed by this test shall be corrected by the erector in accordance with the manufacturer's recommendations. Water required for testing will be furnished by the Owner at the time of tank erection completion, and at no charge to the Contractor. Upon completion of testing, the Owner will dispose of the water used for testing. Labor and equipment necessary for tank testing is to be included in the price of the tank.

3.04 START-UP SERVICES

A. The Contractor shall furnish the services of the manufacturer's technical representative to inspect and correct or supervise correction of any defects or malfunctions and furnish start-up services. The Contractor shall provide qualified technical representative(s) to inspect the completed installation. Costs to check the installation shall be included in the purchase price of the equipment. The manufacturer's technical representative shall be available for system start-up, performance tests, and operating instructions for not less than 24 hours over a minimum of 3 days at no cost to the Owner.

3.05 FINAL INSPECTION

A. On or slightly before the one-year anniversary date of final completion, and at or slightly before the five (5) year coating system warranty expiration, the manufacturer's

representative shall make a visual inspection of the tank interior coating and appurtenances; tank exterior coating and appurtenances; and the immediate area surrounding the tank. A written summary of this inspection will be filed with the Owner, the Engineer, and the tank manufacturer. Any noted repairs shall be performed by the Contractor as warranty work at no cost to the Owner.

END OF SECTION

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SECTION 11210

SUBMERSIBLE LEACHATE PUMPS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work included under this Section consists of furnishing and installing submersible pumps, motors, and related equipment for the leachate collection pump station fully tested, complete and in operating condition.

1.02 QUALITY ASSURANCE

- A. Unit Responsibility: The pumps, motors, control panel, frame and cover, and guide bars shall be supplied by the pump supplier to ensure unit responsibility.
- B. Factory Tests: Each pump shall be fully tested on water at the manufacturer's plant. Tests shall be at rated speeds, capacities, heads, efficiencies and brake horsepower and at such other conditions of head and capacity to establish performance curves. The pump motors shall not be overloaded (in excess of their nameplate rating without the 1.15 service factor) within the limits of operation of the impeller performance curve. Five copies of the tests results shall be submitted to and approved by Engineer before pumps are shipped. Tests shall include:
 - 1. Megger the pump for insulation breaks or moisture.
 - 2. Prior to submergence, the pump shall be run dry and be checked for correct rotation.
 - 3. Pump shall be run for 30 minutes in a submerged condition.
 - 4. Pump shall be removed from test tank, meggered immediately for moisture; oil plugs removed for checking lower seal; inspection plug removed for checking of upper seal and possible water intrusion of stator housing.
 - 5. A written test report giving the above information shall be supplied with each pump at the time of shipment.
 - 6. All end of pump cables will then be fitted with a rubber shrink fit boot to protect cable prior to electrical installation.

- C. Guaranteed Parts Stock Program: The pump supplier shall have a guaranteed parts stock program in the State of Florida. These parts shall include at least one set of spare parts as detailed below for each different model of pump supplied on this Contract.

| | |
|----------------------------|-------------------------|
| Upper Mechanical Seal | Inspection Plug Washers |
| Lower Mechanical Seal | Impeller Bolt |
| Wear Rings | Impeller Key |
| Motor Cable | Upper Bearing |
| Cable Entry Washer/Grommet | Lower Bearing |
| Complete Set of "O" Rings | |

1.03 SUBMITTALS

- A. Shop Drawings: Certified pump curves shall be submitted with the shop drawings and shall indicate actual test performance of similar units furnished. The Contractor shall submit, with the certified pump shop drawings, layout drawings showing exact installation, piping and foundation details for the pumping units being submitted. The Engineer may reject any pump which in his opinion is not suitable for the designed pumping conditions due to too great or too little capacity at heads other than those specified.

1.04 WARRANTY

- A. Warranty: The pump manufacturer shall warrant the pumps being supplied to the Owner against defects in workmanship and materials for a period of 18 months under normal use, operation and service. In addition, the manufacturer shall replace certain parts which shall become defective through normal use and wear for a period of 18 months; parts included are the mechanical seal, impeller, pump housing, wear ring and ball bearings. The warranty shall be in published form and apply to all similar units.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All metal components in the wet well, with the exception of the pumps and piping, shall be Type 304 stainless steel.

- B. Except as noted, major pump components shall be gray cast iron, Class 30B, with smooth surfaces devoid of blow holes or other irregularities.
- C. Piping: Unless otherwise noted, pipe and fittings shall be ductile iron with flanges and conform to the requirements of Section 15050.

2.02 EQUIPMENT

A. Pumps:

1. The Contractor shall furnish and install motor driven totally submersible leachate pumps to meet the following requirements:

| <u>Location</u> | <u>Leachate Collection Pump Station</u> |
|--|---|
| Pumps required | 2 |
| Flygt Model | CP/CS-3085 |
| Pump discharge elbow size, (inches) | 4 |
| Primary Capacity, each (gpm) | 130 |
| Primary TDH, (feet) | 32 |
| Secondary Capacity, each (gpm) | 300 |
| Secondary TDH, (feet) | 23 |
| Pump Shutoff Head (feet) | 42 |
| Impeller No. | 434 |
| Maximum Motor hp required | 3 |
| Speed, (rpm) | 1750 |
| Power | 3Ø/480v/240v60Hz |

2. The pumping unit design operating conditions shall be within 25 percent + / - of the flow at the point of best operating efficiency, unless otherwise approved.
3. All pumps shall be capable of passing a 3-inch sphere without clogging.
4. Pump Manufacturer: Pumping equipment shall be submersible non-clog wastewater pumps as manufactured by Flygt or an approved equal.
5. Materials: The volute, stator casing, oil casing, impeller shall be of ASTM A-48 Class 35B gray iron construction. All exposed nuts, bolts, washers and other fastening devices coming in contact with leachate shall be 304 stainless steel. All mating surface requiring watertight sealing shall be machined and fitted with nitrile rubber O-rings.

6. Cable Connection: Cable shall enter the pump through a heavy-duty entry assembly with a compression fitting with or without and epoxy secondary sealing system. The system used must insure an absolutely watertight submersible seal. Cable shall terminate in a junction chamber. Junction chamber shall be sealed from motor by a stator lead sealing gland or terminal board which shall eliminate water or solids from entering the pump top.
7. Cooling: Each pumping unit shall be provided with a cooling system allowing unsubmerged continuous operation at any power output to and including rated power in ambient air of 40 degrees C.
8. Seals: Each pump shall be provided with a tandem double mechanical rotating shaft seal system. The seals, both upper and lower, shall be of lapped design and operated in an oil bath. The stationary and rotating lower seal shall be silicone/tungsten carbide. The rotating upper seal shall be graphite and the stationary seal shall be tungsten carbide. Seal faces shall be self-aligning, positively driven. Each seal shall be held by separate spring systems. The seals shall require neither maintenance nor adjustment and shall be easily replaceable. Conventional double mechanical seals with a single or double spring between the rotating faces, requiring constant differential pressure to effect sealing shall not be considered equal to the tandem seal specified.
9. Shaft: The pump/motor shaft shall be AISI Type 420 stainless steel and shall rotate on two grease lubricated bearings. Upper bearing shall be single row and lower bearing shall be double row.
10. Impeller: The pump impeller shall be Class 35B gray iron, statically and dynamically balanced. Impellers shall have heavy-duty wear rings as required.

B. Motor:

1. The pump motor shall be class F (minimum) insulation, NEMA B design housed in a watertight chamber. The stator shall be dual voltage copper wound designed to withstand a heat rise to 155 degrees C. Motor starting code shall be H or less. Thermal and moisture, if required by manufacturer sensing shall be provided to sense excessive motor temperatures or seal leakage. The pump motor shall be suitable for operation on a 240/480 volts, 3-phase, 60 hertz power and shall have a 1:15 service factor.
2. The pump motor shall be air cooled and guaranteed to run continuously in a totally, partially or non-submerged condition without damage to the pump motor. Pump motor shall be of sufficient horse-power as to be non-overloading, over the entire length of pump curve. Pump motors shall be rated for the horsepower

indicated in the Table herein, and shall operate at a maximum speed of 1,800 RPM.

C. Pump Motor Cable: Pump motor cable shall be installed with a double-jacketed protection system suitable for submersible pump application and the rating shall be indicated by a code or legend permanently embossed on the cable. Cable sizing shall meet or exceed NEC Specifications for pump motors.

D. Pump Accessories:

1. Guide Rails: Guide rail system shall be Schedule 40, Type 304 stainless steel suitably sized for pumps furnished. The guide rail system shall require two parallel guide rails. Lower guide holders shall be integral to the pump discharge connection. Upper guide brackets shall be Type 304 stainless steel mounted with Type 304 stainless steel anchor bolts.
2. Lift Cables: Lift cables shall be of Type 304 stainless steel. Cables shall have adequate strength to lift the pump out of the wetwell with a safety factor of 3. Lift cables shall be shackled to a yoke attached to stator housing for removal and reinstallation of the unit. Provide 3 feet of excess cable above top of wet well cover to facilitate removal of pumping units. Cable holders shall be suitably sized to accommodate lift cables provided without deformation.
3. Discharge: The pump discharge fitting shall Class 35B gray iron, quick disconnect type compatible with the guide rail system and allowing the pump to be lifted from the wet well for service and lowered in place for pumping without unbolting any flange, lowering the liquid level, or requiring personnel to enter the wet well. The entire weight of pump shall rest on discharge elbow; no part of the pump shall bear directly on the floor of the wetwell. The pump discharge shall seal to the discharge elbow by a metal to metal contact.
4. Section 08350: Wetwell and Valve Vault Frame and Cover.
5. Anodes: Provide three (3) one pound zinc cathodic protection anodes fastened (with electric continuity) directly to the pump stator housing.

E. CONTROL PANEL

1. The pump manufacturer shall supply the pump control panel as described herein.
2. The design, testing, assembly, and methods of installation of the wiring and electrical equipment shall conform to the National Electrical Code and to

applicable state and local requirements. Panel shall be constructed to UL standards.

3. Provide control panel in materials and rating noted below. Panel shall be sized to adequately dissipate heat generated by equipment mounted inside or on the panel face.

| Panel Name | Rating | Material |
|-----------------------|---------|--------------------|
| Sanitary Pump Station | NEMA 3R | 304 SS or Aluminum |

a) Finish:

- 1) Smoothly finish panel face openings for panel-mounted equipment. Cut with counter boring, and provide with trim strips as required to give a neat finished appearance.
- 2) Stainless steel or aluminum surfaces shall not be painted. Paint the panel steel interiors with two coats of baked enamel, white, ANSI No. 51.

b) Access and Identification:

- 1) Provide a continuous piano hinge door on the enclosure. Expose a minimum of 80 percent of the panel interior for door opening. Door opening shall be sealed and fully gasketed. Provide a print pocket on the door.
- 2) All components and terminals shall be accessible without removing other components except for covers.
- 3) Conduit entry shall be from the bottom.
- 4) Provide laminated plastic nameplates for all dead-front panel mounted controls to completely define their use.
- 5) Provide identification tags and wire number tags as specified elsewhere for all internal components, wires, and terminals.

- c) Corrosion Control: Protect all panels from internal corrosion by the use of corrosion-inhibiting vapor capsules, Hoffman, model A-HCI, or equal.

- d) Construction: The panel shall be dead-front construction and shall be a manufactured item, Hoffman Engineering, or equal. Minimum metal thickness shall be 14-gauge on stainless steel panels or 12 gauge for aluminum panels, and interior steel or aluminum panel shall be 12-gauge. Provide stiffeners as required to prevent deflection under instrument loading and permit lifting without racking or distortion. When required, provide removable lifting rings and fill plugs to replace rings after installation.
- e) Electrical Wiring:
 - 1) Design, furnish, and install all interior wiring within the control panels and furnish complete wiring diagrams showing the electrical circuits inside the panel and interconnections between the panel and the external instruments and components. Identify and number all terminals and wires. Attach plastic, snap-on numbered tags to each panel wire for identification. Inside each panel, provide a copy of the panel wiring diagram.
 - 2) Wiring within panels shall meet the following requirements:
 - (a) Discrete signal wiring shall be 600-volt, type THWN stranded copper, sized for the current carried, but not smaller than No. 14 AWG.
 - (b) Power wiring for 120V service shall be 600-volt, type THWN stranded copper, No. 12 AWG size, minimum.
 - (c) Power wiring for 240V or 480V service shall be 600-volt, type THWN stranded copper, sized for the load and current carried.
 - (d) Restrain wiring with plastic ties or ducts. Hinge wiring shall be secured at each end with bend area protected with a plastic sleeve.
 - 3) Terminal blocks shall meet the following requirements:
 - (a) Provide the greater of 20 percent of all connected terminals or four unused spare terminals.
 - (b) Screw-type terminal connections shall be with locking, fork-tongue or ring-tongue lugs crimped with proper sized

anvil. Terminate no more the two lugs per terminal with no more than one wire per lug.

- (c) Compression clamp terminal connections shall be stripped and prepared per manufacturer's recommendations. Terminate no more than one wire per screw and yoke.

4. Control Functional Descriptions

- a) The system furnished shall provide the automatic control functions to provide alternating lead/lag operation. Control panel shall include lead/lag selector switch, HOA switches and ETMs for each pump, alarm and operation indicators, and pump protection circuits as recommended by the pump manufacturer. Functions shall be sufficient to provide continuous, unsupervised operation of the submersible pump stations.
- b) Control devices such as push buttons, indicators, and selector switches shall be mounted on the dead-front panel face unless otherwise.

5. Pump Control Panel Electrical Components

- a) The named manufacturers below for equipment within the control panel shall be the basis of the design and are to establish a standard of quality. Substitute components will be compared to the standard features of the named devices to determine an equal product.

| <u>Component Description</u> | <u>Manufacturer/Part Number</u> |
|-------------------------------------|---------------------------------|
| Normal/Emergency Main Breakers | Westinghouse, Square D |
| Motor Circuit Breakers | Westinghouse, Square D |
| Branch Circuit Breakers | Square D, QOU |
| Fuses, sized per current carried | Buss, Little Fuse |
| Motor Starters | Square D 8536, Furnas |
| Reset Pushbuttons, Red | Square D, 9066-RA1 |
| Alternator, DPDT, 120V | Diversified, Struthers A311 |
| Selector Switches, Black, Std. Knob | Square D, Type SK |
| Pushbuttons, Black or Red | Square D, Type SK |
| Pilot Lights, Color as Shown | Square D, Type SK |

| <u>Component Description</u> | <u>Manufacturer/Part Number</u> |
|--------------------------------------|---------------------------------|
| Elapsed Time Meter, 120V, Hrs/tenths | Engler 10NG7 |
| Alarm Light, 120V, Red | Stonco VCXL, Benjamin |
| Flasher, 75 fpm, 120V, SS | SSAC FS127 |
| Lightning Arrestor, 600V, 3-ph | GE 9L15, Square D SDSA |
| Phase Monitor, 190-270V, Adj. | Diversified SLA-230-ASA |
| Relays, DPDT, 10A, 120V, Ind. Light | Square D, AA Electric |
| Surge Protector | GE 9L18, Square D |
| Alarm Bell | Edwards |
| Generator Receptacle | Russell Stoll (Per Hardee Co.) |
| Receptacle, GFI, 125V, 15A, duplex | Square D, Eagle Signal |
| Level Floats | Roto-Float, Anchor-Scientific |
| Transformer, 480/120V & 120V/24V | Square D, Valutran |

6. All control panels shall be mounted above the 100 year flood elevation.
7. Spares: Provide the following spares for the control panel components:
 - a) One spare relay of each type provided.
 - b) Ten spare indicator light bulbs.
 - c) Four spare fuses of each type supplied.
 - d) Replace any spares consumed during the Contract at no cost to the Owner.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All materials and equipment shall be installed as shown on the Drawings and as recommended by the manufacturer.
- B. Additional items of construction, such as valve boxes, flanged adapters, restrained joints, and other items necessary for the complete installation of the system shall conform to

specific details on the Drawings and shall be constructed of first-class materials conforming to the applicable portions of these Specifications.

3.02 INSPECTION AND TESTING

A. Field Acceptance Testing:

1. **Pre-final Inspection:** Prior to final inspection, the Contractor shall conduct a preliminary pump performance test and pre-final site inspection in the presence of an Owner representative. Any deficiencies noted at this time shall be corrected prior to scheduling of the final inspection.
2. **Final Inspection:** The Contractor shall be responsible for conducting the following field acceptance tests and start-up procedures in the presence of the Owner or his authorized representative. The Contractor shall notify the Owner, the Engineer, and the pump manufacturer's representative 48 hours prior to start-up. The Contractor shall furnish all labor piping, equipment, water and materials required to perform the acceptance testing.
 - a) **Pump Performance:** Prior to acceptance as part of the final inspection, the Contractor shall conduct a pump performance test. Pumps shall operate according to the operating conditions herein before specified without excessive vibration or overheating. Testing shall be performed using clean water. The Contractor shall utilize Owner supplied on site well water to perform the required testing. Pumping rates shall be determined by pumping a calculated volume of water in a specified time interval. Head and flow conditions shall be measured and recorded. Water levels during testing shall fall within the pump control levels shown on the Drawings. Amperage draws shall be monitored to determine effectiveness and efficiency of equipment. The test shall be repeated until satisfactory results are obtained. The test results shall be recorded on the Pump Test Report sheet included herein.
 - b) If the Contractor is unable to demonstrate to the Owner that the pumping unit performs satisfactorily, the unit shall be rejected. The Contractor shall then remove and replace the defective unit at his own expense.
 - 1) **Pumps:** Pumps shall deliver rated gpm at rated TDH.
 - 2) **Motors:** Running amperage shall be noted and recorded on each leg of power cord while pump is operating under full load.

- 3) All self test trip relays shall demonstrate ability to simulate a fault condition. Level control system shall simulate various liquid levels and signal appropriate relays in pump logic controller to perform appropriate call functions as displayed by LED status indicators. All test results shall be recorded on pump test report and submitted to the Engineer.
 - 4) Pumps, when tested, shall operate within 5 percent of the approved, certified head capacity curve.
 - 5) Following performance testing, pumps shall be meggered for pump-moisture intrusion.
- c) Operation and Maintenance Procedures: After the equipment has been placed into operation, the qualified service representatives of the pump system supplier shall instruct the Owner's personnel in the proper operation and maintenance procedures.

3.03 PUMP CURVES

- A. Submit to the Engineer six (6) copies of the certified performance curve from similar pump, 8 1/2-inch by 11-inch in size, two of these copies shall be laminated in plastic. The pump curve shall indicate the pump number, type of service, manufacturer, model number, serial number, location in the plant and other data specified to the pump as required above for submittals.

PUMP TEST REPORT

PROJECT Hardee County **DATE** _____
Sanitary Landfill Improvements
Southern Leachate Barrier and
Collection System

LOCATION Hardee County, Florida **PUMP DATA** _____

Manufacturer _____
Model _____ Serial No. _____
Motor HP _____ RPM _____
Wetwell Diameter _____ Gals/V. Ft. _____

Pump Design Point _____ **GPM @** _____ **Feet T.D.H.**

TEST DATA

| | | |
|---------------------|-------|-------|
| Pump No.: | _____ | _____ |
| Start Time: | _____ | _____ |
| Stop Time: | _____ | _____ |
| Elapsed Time (min): | _____ | _____ |

| | | |
|---------------------------------|-------|-------|
| Water El. Start (HWL) (feet) | _____ | _____ |
|---------------------------------|-------|-------|

| | | |
|--------------------------------|-------|-------|
| Water El. Stop (MWL) (feet) | _____ | _____ |
|--------------------------------|-------|-------|

| | | |
|--------------------|-------|-------|
| Net Drawdown (ft.) | _____ | _____ |
| Gallons | _____ | _____ |
| Gallons/Minute | _____ | _____ |

| | | |
|----------------------------------|-------|-------|
| Pressure Gauge Reading (feet) | _____ | _____ |
| Ammeter Reading (amps) | _____ | _____ |

| | |
|-------------------------------------|-------|
| Contractor | _____ |
| Planning and Engineering | _____ |
| Maintenance Superintendent | _____ |
| Contract Administration | _____ |
| Manufacturer's Representative | _____ |
| Engineering Firm and Representative | _____ |
| Developer | _____ |

END OF SECTION

SECTION 11211

LEACHATE TRUCK LOADING PUMPS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work covered in this section consists of providing all equipment and materials necessary for furnishing pumping equipment with the appropriate drive system for end suction type pumps.

1.02 QUALITY ASSURANCE

- A. Balancing: All pump and motor units shall be statically and dynamically balanced. The vibration allowance in the units shall not exceed the upper limits as established by the Hydraulic Institute Standards.
- B. Tests: Each pump shall be fully tested on water at the pump manufacturer's plant before shipment. Tests shall consist of checking the unit at its rated speed for head, capacity, efficiency, brake horsepower and NPSH or such conditions of head and capacity to properly establish a complete performance curve. Certified copies of test reports shall be submitted to the Engineer. The Standards of the Hydraulic Institute shall govern the procedures and calculations for these tests.
- C. Unit Responsibility: The entire pump and motor assembly shall be supplied by the pump manufacturer to insure unit responsibility.

1.03 SUBMITTALS

- A. Materials and Shop Drawings: The Contractor shall submit the following to the Engineer for approval:
 - 1. Manufacturer's literature, illustrations and applicable data for each type of pump.
 - 2. Prior to shipment from the factory, submit manufacturer's certified performance curves for similar pump and motor combination furnished illustrating pump characteristics of head, discharge flow, efficiency, required net positive suction head, available suction lift, impeller size, motor speed, and horsepower for the full range of head conditions specified. Curves shall be submitted on 8 1/2-inch by 11-inch sheets, at as large a scale as is practical. Curves shall be plotted from

no flow at shut off head to maximum pump runout head and gallonage allowed by the manufacturer.

Points of operation which cause bearing stress or shaft deflection in excess of the manufacturer's tolerances for continuous operation shall be indicated on the submitted curves.

3. The shop drawings shall include details of pump assembly; installation layout and procedures; piping and electrical connections and requirements; types of materials used in pump construction; details on all pump accessories, such as couplings, belts, sheaves, etc.; dimensions of major components; weights, structural and operating features, space required, clearances, type of finish or shop coat, and other pertinent data. Where applicable, and pump is provided as part of a complete package inclusive of controls, control diagrams shall be provided.
 4. Lubricants: Pumps and drive units shall be delivered with the equipment fully lubricated insofar as possible. If any point cannot be so serviced, it shall be clearly marked to the effect that it is not lubricated and requires servicing prior to operation. An adequate supply of proper lubricant, with instructions for its application, shall be supplied with the equipment for each point not lubricated prior to shipment.
 5. A list of manufacturer's recommended spare parts to be supplied, with the manufacturer's current price for each item. Include O-rings, seals, etc. on the list. List bearings by the bearing manufacturer's numbers only.
 6. Pumping equipment, requiring special tools for maintenance, shall be provided with one set of tools labeled, packed with instructions for use, and housed in a metal tool box with lock-end hoop for each two units provided.
 7. The following data shall be provided on the drive motor: materials of construction, dimensions, rpm at full load, frequency, voltage, full load current, code and design letter, efficiency, horsepower, number of phases, duty rating, temperature rise, service factor and bearing life rating. The submittal shall include motor manufacturer's recommended lubrication requirements.
- B. Operating and Maintenance Instructions: The Contractor shall submit operation and maintenance manuals in accordance with the requirements of Section 01730. The operation and maintenance manuals shall have been prepared specifically for the model and type of pump furnished and shall not refer to other models and types of similar equipment. The operation and maintenance manuals shall include but not be limited to the following:

1. Equipment function.
2. Description.
3. Normal and limiting operating characteristics.
4. Installation instructions (assembly, alignment and adjustment procedures).
5. Operation instructions (normal start-up and shutdown procedures, normal operating conditions and emergency situations).
6. Lubrication and maintenance instructions.
7. Troubleshooting guide.
8. Parts list with catalog numbers and predicted life of parts subject to wear.
9. Drawings - cross sectional view, assembly and wiring diagrams.
10. Performance curves.

C. Factory Performance Test Data:

1. After acceptance of pump shop drawings, factory performance test data will be submitted for approval on the pumping unit.
2. Tests shall be in accordance with the standards of the Hydraulic Institute including head, capacity, brake horsepower, and pump efficiency.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is complete and the units and equipment are ready for operation.
- B. Factory assembled parts and components shall not be dismantled for shipment unless permission is received in writing from the Engineer. Pumps shall be prepared for shipment in accordance with API Standard 610.
- C. Finished surfaces of all exposed pump openings shall be protected by wooden blanks.
- D. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.

- E. After hydrostatic or other tests, all entrapped water shall be drained prior to shipment, and proper care shall be taken to protect parts from the entrance of water during shipment, storage, and handling.
- F. Each box or package shall be properly marked to show its net weight in addition to its contents.
- G. Pump shall be shipped and handled in such manner as to prevent damage. At the job site the pump and motor shall be stored in a clean, dry and protected location.

1.05 WARRANTY AND GUARANTEES

- A. All equipment supplied under this section shall be warranted for a period of one (1) year by the manufacturer. Warranty period shall commence upon Owner acceptance as outlined in the General Conditions.
- B. The equipment shall be under warranty to be free from defects in workmanship, design and materials. If any part of the equipment should fail during the warranty period, it shall be replaced at no expense to the Owner.
- C. The replacement or repair (including cost of parts and labor) of those items normally consumed in service, such as pump packing, oil, grease, and the like, shall be considered as part of routine preventive maintenance by the Owner.
- D. Certifications: The Contractor shall furnish the Engineer with a written certification signed by the manufacturer's representative, that the installed equipment:
 - 1. Has been installed per manufacturer's requirements.
 - 2. Has been lubricated per manufacturer's instructions.
 - 3. Has been accurately aligned and proper running clearances set.
 - 4. Is free from undue stress imposed by piping or mounting bolts.
 - 5. Suction lines and seal water lines have been flushed and all debris removed prior to start-up.
 - 6. Is ready to be operated on a continuous basis, and is free from any known defects.
- E. The nominal nameplate horsepower rating for the motors at their rated speed shall not be exceeded by the driven equipment at any point of operation on its characteristic curve.

PART 2 - PRODUCTS

2.01 END SUCTION PUMP (horizontally mounted)

A. Service Conditions:

| CONDITION | TRUCK LOADING PUMP |
|----------------------|--------------------------------------|
| Pump Speed, RPM | 875 |
| Primary Duty Point | 600 gpm @ 17.5 FT |
| Secondary Duty Point | 1,000 gpm @ 11 FT |
| Minimum Shutoff Head | 24.5 FT |
| Pump Size | 6 x 6 x 11 |
| Model No. | Worthington 6 MF11 or approved equal |
| Motor HP | 5 |

B. Pump Construction:

1. Acceptable Manufacturers: Worthington, Ingersoll-Dresser, Peerless, or approved equal.
2. Pump Casing:
 - a) The pump casing shall be of the end suction, single volute design and be constructed of ductile iron ASTM A-395, Class 30 of sufficient thickness to withstand all stresses and strains of service at a 150 psi discharge pressure.
 - b) Suction and discharge connections shall be 125 lb. ANSI Standard flat-face flanges positioned as indicated on the Drawings. A 3/8-inch tap, 3/8-inch by 1/2-inch Type 316 stainless steel reducer and 1/2-inch Type 316 stainless steel pet cock for a pressure gauge shall be provided on the discharge flange.
3. Suction and Back Covers: The volute casing shall be provided with ductile iron suction and back covers of the same material as the volute, cast separately from the volute, and shall be built to allow for complete removal of the bearings, shaft and impeller by simply unbolting the back cover. The back cover and suction cover shall shoulder fit to the volute casing to assure accurate alignment. The

back cover shall be designed to support the head frame and shall be designed to support the mechanical seal assembly. The pump shall be fitted with mechanical seals. The seals shall be silicon-carbide or tungston-carbide as recommended by the seal manufacturer for leachate service. The seals shall not require any external flushing water.

4. Pump Impeller: Pump impeller shall be of the open type manufactured of ductile iron, ASTM 536.
5. Pump Shaft: The pump shaft shall be constructed of SAE 1045 high grade carbon steel having a tapered impeller extension and accurately machined. The pump shaft shall be protected from wear by a corrosion and wear resisting hardened 316 stainless steel shaft sleeve. An "O" ring type gasket must be provided between the impeller hub and the shaft sleeve to prevent pumped liquid from corroding the shaft. Shaft deflection shall be no greater than 0.002 inch through seal box with pump running at shut-off condition.
6. Pump Bearing Frame and Bearings:
 - a) The pump bearing frame shall be equipped with a bearing system designed to accept all thrust loadings and radial loads imposed by the pump impeller.
 - b) The bearing frame shall be of heavy duty cast iron construction and shall be precision bored and machined to provide a self-centering and self-indexing fit with the frame adapter of the pump to assure positive alignment of the rotating assembly.
 - c) The bearing frame shall contain external provision for axial adjustment of the rotating element to provide proper clearance between the impeller and suction cover over the life of the pump. Adjustment shall be accomplished with integral jacking screws.
 - d) The rotating assembly shall include heavy duty ball or roller bearings, designed for maximum pump loads and thoroughly protected against dirt and moisture. Bearings shall be oil lubricated with constant level oilers. The outboard bearing shall be the single row, angular contact ball thrust type with cartridge type mounting. The inboard bearing shall be the single row ball or roller type pressed onto the pump shaft, and allowed to float axially in a precision bored housing. Bearings shall be retained and fitted in accordance with AFBMA Standards and shall be selected to give a minimum L-10 rating life of ten (10) years in continuous operation at the rated pump conditions.

- C. Pump Base and Coupling: The pump and motor shall be mounted on a common, heavy duty, fabricated steel pump base designed to minimize shaft displacement from mechanical forces. The pump base shall be furnished with grout hole(s) and shall have underside members shaped to lock into the grout. A heavy duty, spacer-type flexible shaft coupling shall be provided to connect the motor to the pump. The coupling shall be enclosed in an OSHA coupling guard recommended by the pump manufacturer.
- D. Motor: Drive motor for the pump shall be squirrel cage induction type, designed for operation with a 240/480 volt, 3 phase, 60 Hertz power supply with a maximum speed of 1150 RPM. The motor shall be non-overloading, without use of the service factor, at any point on the driven pump's performance curve. The motor shall be NEMA Design B, standard tropicalized and shall be designed, constructed and tested in accordance with applicable IEEE, NEMA, AFBMA and ANSI standards as manufactured by U.S. Electrical Motors, General Electric, or an equal approved by the Engineer. Motors shall be furnished with the following construction features:
1. Construction: All cast iron construction for frame, end brackets, conduit box box and fan shroud. Motor shall be supplied with lifting lugs or "O" type bolts on the top of the motor.
 2. Enclosure: TEFC with a dynamically balanced fan and 120V operated space heaters.
 3. Horsepower: 5 HP
 4. Efficiency: Premium
 5. Insulation: Class F
 6. Temperature Rise: Class B based upon 40 degrees C ambient
 7. Service Factor: 1.15
 8. Epoxy coated rotor and stator windings
 9. Motor windings for stator and rotor and motor leads shall be manufactured using solid copper wire.
 10. Motor fan shall be constructed to resist corrosion and be of non-sparking material.
 11. Neoprene shaft slinger shall be provided and lead wires shall be nonbraided and nonwicking to prevent entrance of moisture and contaminants.

12. All leads shall be brought out to a separate terminal box and shall be marked and identified. The terminal box shall be split construction, double gasketed, containing provisions for grounding the motor and shall comply with NEMA standards for minimum volume.
13. Motors shall have stainless steel breather drains at both ends to allow proper drainage of condensation.
14. Shielded, regreasable, vacuum degassed steel ball bearings. Minimum B-10 bearing life of 100,000 hours.
15. Corrosion resistant hardware, insect screens and grease plugs
16. Gasket between motor frame and conduit box
17. Gasketed cast iron conduit box
18. Stainless steel nameplate fastened with stainless steel pins
19. Accessories: Motor shall be provided with a 120 volt single phase strip heater to maintain a motor temperature of at least 40 degrees C. or 10 degrees C. above ambient, whichever is greater.

E. Control Panel

1. The pump manufacturer shall supply the pump control panel as described herein and as depicted on the Drawings.
2. The design, testing, assembly, and methods of installation of the wiring and electrical equipment shall conform to the National Electrical Code and to applicable state and local requirements. Panel shall be constructed to UL standards.
3. Provide control panel in materials and rating noted below. Panel shall be sized to adequately dissipate heat generated by equipment mounted inside or on the panel face.

| Panel Name | Rating | Material |
|-----------------------|---------|--------------------|
| Sanitary Pump Station | NEMA 3R | 304 SS or Aluminum |

a) Finish:

- 1) Smoothly finish panel face openings for panel-mounted equipment. Cut with counterboring, and provide with trim strips as required to give a neat finished appearance.
- 2) Stainless steel or aluminum surfaces shall not be painted. Paint the panel steel interiors with two coats of baked enamel, white, ANSI No. 51.

b) Access and Identification:

- 1) Provide a continuous piano hinge door on the enclosure. Expose a minimum of 80 percent of the panel interior for door opening. Door opening shall be sealed and fully gasketed. Provide a print pocket on the door.
- 2) All components and terminals shall be accessible without removing other components except for covers.
- 3) Conduit entry shall be from the bottom.
- 4) Provide laminated plastic nameplates for all dead-front panel mounted controls to completely define their use.
- 5) Provide identification tags and wire number tags as specified elsewhere for all internal components, wires, and terminals.

c) Corrosion Control: Protect all panels from internal corrosion by the use of corrosion-inhibiting vapor capsules, Hoffman, model A-HCI, or equal.

d) Construction: The panel shall be dead-front construction and shall be a manufactured item, Hoffman Engineering, or equal. Minimum metal thickness shall be 14-gauge on stainless steel panels or 12 gauge for aluminum panels, and interior steel or aluminum panel shall be 12-gauge. Provide stiffeners as required to prevent deflection under instrument loading and permit lifting without racking or distortion. When required, provide removable lifting rings and fill plugs to replace rings after installation.

e) Electrical Wiring:

- 1) Design, furnish, and install all interior wiring within the control panels and furnish complete wiring diagrams showing the electrical circuits inside the panel and interconnections between the panel and the external instruments and components. Identify and number all terminals and wires. Attach plastic, snap-on numbered tags to each panel wire for identification. Inside each panel, provide a copy of the panel wiring diagram.
- 2) Wiring within panels shall meet the following requirements:
 - (a) Discrete signal wiring shall be 600-volt, type THWN stranded copper, sized for the current carried, but not smaller than No. 14 AWG.
 - (b) Power wiring for 120V service shall be 600-volt, type THWN stranded copper, No. 12 AWG size, minimum.
 - (c) Power wiring for 240V or 480V service shall be 600-volt, type THWN stranded copper, sized for the load and current carried.
 - (d) Restrain wiring with plastic ties or ducts. Hinge wiring shall be secured at each end with bend area protected with a plastic sleeve.
- 3) Terminal blocks shall meet the following requirements:
 - (a) Provide the greater of 20 percent of all connected terminals or four unused spare terminals.
 - (b) Screw-type terminal connections shall be with locking, fork-tongue or ring-tongue lugs crimped with proper sized anvil. Terminate no more the two lugs per terminal with no more than one wire per lug.
 - (c) Compression clamp terminal connections shall be stripped and prepared per manufacturer's recommendations. Terminate no more than one wire per screw and yoke.

4. Control Functional Descriptions

- a) The system furnished shall provide the control functions shown on the wiring diagram. Control panel shall include HOA switches and ETMs for each pump, alarm and operation indicators, and pump protection circuits as recommended by the pump manufacturer.
- b) Control devices such as push buttons, indicators, and selector switches shall be mounted on the dead-front panel face unless otherwise.

5. Pump Control Panel Electrical Components

- a) The named manufacturers below for equipment within the control panel shall be the basis of the design and are to establish a standard of quality. Substitute components will be compared to the standard features of the named devices to determine an equal product.

| <u>Component Description</u> | <u>Manufacturer/Part Number</u> |
|--------------------------------------|---------------------------------|
| Normal/Emergency Main Breakers | Westinghouse, Square D |
| Motor Circuit Breakers | Westinghouse, Square D |
| Branch Circuit Breakers | Square D, QOU |
| Fuses, sized per current carried | Buss, Little Fuse |
| Motor Starters | Square D 8536, Furnas |
| Reset Pushbuttons, Red | Square D, 9066-RA1 |
| Selector Switches, Black, Std. Knob | Square D, Type SK |
| Pushbuttons, Black or Red | Square D, Type SK |
| Pilot Lights, Color as Shown | Square D, Type SK |
| Elapsed Time Meter, 120V, Hrs/tenths | Engler 10NG7 |
| Alarm Light, 120V, Red | Stonco VCXL, Benjamin |
| Flasher, 75 fpm, 120V, SS | SSAC FS127 |
| Lightning Arrestor, 600V, 3-ph | GE 9L15, Square D SDSA |
| Phase Monitor, 190-270V, Adj. | Diversified SLA-230-ASA |
| Relays, DPDT, 10A, 120V, Ind. Light | Square D, AA Electric |
| Surge Protector | GE 9L18, Square D |

| <u>Component Description</u> | <u>Manufacturer/Part Number</u> |
|------------------------------------|---------------------------------|
| Generator Receptacle | Russell Stoll |
| Receptacle, GFI, 125V, 15A, duplex | Square D, Eagle Signal |
| Transformer, 480/120V & 120V/24V | Square D, Valutran |

6. All control panels shall be mounted above the 100 year flood elevation.
7. Spares: Provide the following spares for the control panel components:
 - a) One spare relay of each type provided.
 - b) Ten spare indicator light bulbs.
 - c) Four spare fuses of each type supplied.
 - d) Replace any spares consumed during the Contract at no cost to the Owner.

F. Spare Parts: The Contractor shall furnish the following spare parts properly boxed and labeled for each end suction pumps.

1. 1 set wear rings (If applicable)
2. 2 sets O-rings and gaskets

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation of pumping equipment shall be in strict accordance with the respective manufacturer's instructions and recommendations in the locations shown on the Drawings. Installation shall include furnishing the required oil and grease for initial operation. The grades of oil and grease shall be in accordance with the manufacturer's recommendations.
- B. Install pressure gauges on the pump suction and discharge nozzles including an isolation valve at each location.
- C. Conduct cement grouting of pump base in accordance with Appendix G, Precision Cementitious Grouting of API Standard 610.

- D. Align pump and motor in accordance with the manufacturer's instructions, except angular alignment (coupling face) shall be within 0.001 inch at outermost point on coupling and parallel alignment (coupling runout) shall be within 0.001 inch per inch of shaft diameter, unless otherwise directed by the equipment (pump and motor) manufacturer's instructions. No more than two shims of proper thickness shall be used to secure proper alignment. Prior to placing the pump in operation, recheck the alignment after piping and other external connections have been made up to the pump, and after the pump base has been grouted. Adjust and realign as required if alignment has changed. All alignments and adjustments made to the pump shall be by technicians with prior experience and training in making such alignments and adjustments for the specific equipment provided.

3.02 FACTORY SERVICE REPRESENTATIVE

- A. For each pump supplied, the Contractor shall arrange for the services of a qualified factory service representative. The period of service shall be one day for each type of pump.
- B. The duties of the service representative shall be as follows: After the equipment has been installed but before it is operated by others, the representative shall inspect the completed installation for soundness (no damaged or cracked components), completeness, correctness of setting and alignment, that the pumps are free from stresses imposed by attached piping, and for the adequacy and correctness of mechanical seal alignment and lubricants. The service representative shall start-up the equipment and instruct the Owner's personnel in proper operation and maintenance procedures. The responsibility of the Contractor with regards to start up shall be fulfilled when the start-up is complete, the equipment is functioning properly and has been accepted by the Owner.
- C. The service representative shall submit to the Engineer six (6) copies of a signed report of the result of his inspection, adjustments and start-up. The report shall include descriptions of the inspection, adjustments made, and the start-up. The report shall also include a statement that the equipment is ready for permanent operation and that nothing in the installation will render the manufacturer's warranty null and void. Final payment shall not be made to the Contractor until this report has been submitted to and approved by the Engineer.

3.03 INSPECTION AND TESTING

- A. After the pump has been completely installed, the Contractor shall conduct, in the presence of the Engineer, field tests to indicate that pump efficiency and discharge capacity conforms to the Specifications. The Contractor shall supply all oil, grease, electric power, water and all other material necessary to complete the field tests.

- B. If the pump performance does not meet the Specifications, corrective measures shall be taken by the Contractor, or pump shall be removed and replaced with pump which satisfies the conditions specified.
- C. Motor Field Testing: Motor shall be disconnected from the pump and run for four (4) hours. Following the run-in test, reconnect the motor to the pumping equipment and reinstall all coupling guards.
- D. Pump Field Testing:
 - 1. Upon completion of all the mechanical work, the Contractor shall conduct testing as specified herein to demonstrate that the equipment performs in accordance with all specifications.
 - 2. The Contractor shall perform initial testing of the equipment to insure himself that the tests listed in the Demonstration Test paragraph below can be completed.
 - 3. The Demonstration Test shall demonstrate that all items of these Specifications have been met by the equipment, as installed, and shall include the following tests:
 - a) That the pump can deliver the specified pressure and discharge flow at rated efficiency.
 - b) That the pump controls perform satisfactorily.
 - 4. In the event that the equipment does not meet the Demonstration Test, the Contractor shall, at his own expense, make such changes and adjustments in the equipment which he deems necessary and shall conduct further tests until written certification is received from the Engineer.

3.04 PUMP CURVES

- A. Submit to the Engineer six (6) copies of the certified performance curve for similar pump, 8-1/2 inch by 11 inch in size, laminated in plastic. The pump curve shall indicate the pump number, type of service, manufacturer, model number, serial number, location in the plant and other data specific to the pump as required above for submittals.

END OF SECTION

DIVISION 13

SPECIAL CONSTRUCTION

SECTION 13200

ALTERNATE BID ITEM GLASS-COATED BOLTED STEEL TANKS

D.E.P.

APR 27 1998

SOUTHWEST DISTRICT
TAMPA

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work under this Section shall include furnishing and installation of all materials, labor and equipment necessary for the construction of glass coated steel bolted primary and secondary containment tanks with a glass coated steel roof over the primary tank on a concrete slab and tank appurtenances as follows: glass coated steel floor for the primary storage tanks, ladder and cage assembly, pipe and conduit connections, pipe and conduit supports, manways level indicator, roof vent, stainless steel cable holder, access door, platform and handrails complete with all accessories and appurtenances required for a complete storage tank.
- B. The tank installation as shown on the plans and specified herein, is based on the equipment furnished by one manufacturer. The tank system specified in this section differs in detail and arrangement from that shown and may require changes in design and construction of other portions of the project. All costs which result from such changes in design and construction are to be borne entirely and unconditionally by the Contractor; said costs to included but not be limited to structural, piping, mechanical and electrical changes and all engineering costs incurred as a result of the substitution, in the revision of Plans and Specifications, review of design changes by others, preparation of change orders, and any other costs directly or indirectly resulting from said substitution.

1.02 QUALITY ASSURANCE

- A. The bidder shall offer a new tank structure as supplied from a manufacturer specializing in the design, fabrication and erection of factory applied glass-fused-to-steel, bolt together tank systems. The manufacturer shall own and operate its production plant, fabricate and glass coat the tank at one location.
- B. The tanks and roof shall be of factory applied glass-fused-to-steel bolt together tank construction.
- C. The tank structural design shall conform to AISC Specifications. The materials, fabrication and erection of the bolt together tank shall conform to the AWWA Standard for "Factory-Coated Bolted Steel Tanks for Water Storage" - ANSI/ AWWA D103, latest revision. The tank coating system shall conform solely to Section 10.4 of ANSI/AWWA D103. ~~Tanks shall meet the dimensions as detailed in accordance with contract drawings.~~

- D. The tank manufacturer shall be solely responsible for the adequacy of design and safety of the completed tank systems. Tank manufacturer shall provide the services of a qualified Professional Engineer, licensed in the State of Florida, for the design of all components, including but not limited to the tank structure, dome, tank anchoring system and concrete slab and foundation.
- E. Structures, specified accessories supplied and construction procedures employed by the Contractor shall comply with federal, state, or local laws, ordinances, rules, regulations and standards.
- F. Strict adherence to the standards of design; fabrication; erection; product quality; and long-term performance, established in this Specification is required.
- G. Tank suppliers wishing to be accepted shall submit the following in the bid form for consideration:
 - 1. typical structure and foundation drawing(s).
 - 2. List of tank materials, appurtenances and tank coating specs.
 - 3. List of five (5) tanks presently in leachate service, of size and character specified herein, operating satisfactorily for a minimum of five (5) years, including the name and telephone number of Owner, Engineer, and Contractor.

1.03 WARRANTY AND GUARANTEES

- A. Structure: All equipment shall be guaranteed against defects in material and workmanship for a minimum period of one year from the date of Owner's final inspection and acceptance to the effect that any defective equipment shall be repaired or replaced without cost or obligation to the Owner.
- B. Glass Coating System: In addition to the Contractor warranty, the tank manufacturer shall warranty the glass coating system for a period of five (5) years from date of final Owner acceptance. This warranty shall include any chips, cracks, spalls, or under-cuts during normal service. The tank manufacturer shall replace or repair such part(s) at no cost to the Owner.

1.04 SHOP DRAWINGS

- A. Before the equipment is manufactured, the Contractor shall submit detailed Shop Drawings to the Engineer for review and approval.
- B. Construction shall be governed by the drawings and specifications showing general dimensions and construction details, after written approval of the shop drawings (showing all features of the tank, including the foundation) prepared by the tank supplier. There shall be no deviation from the drawings and specifications, except upon written order.
- C. The tank supplier is required to furnish the number of sets specified in Section 01340 of complete specifications and construction drawings for all work not shown in complete detail on the drawings. A complete set of structural calculations shall be provided for the tank structure foundation, handrailing, grating, platforms, walkways, ladders, etc. Calculations shall also be submitted verifying that the secondary containment volume is at least 110% of the primary tank volume. All such submissions shall be stamped by a Registered Professional Engineer licensed in the State of Florida.
- D. When approved, two sets of such prints and submittal information will be returned to the tank supplier marked "APPROVED FOR CONSTRUCTION" and these drawings will then govern for the work detailed thereon. The approval of the tank supplier's drawings shall be an approval relating only to their general conformity with the bidding drawings and specifications and shall not guarantee detail dimensions and quantities, which remains the supplier's responsibility.
- E. The tank manufacturer's and installing contractor's standard published warranty shall be included with submittal information.

1.05 EQUIPMENT

- A. Glass Coated Steel Bolted Storage Tanks:
 - 1. The proposed tank system shall be similar to the tank system shown and specified in the contract documents.
 - 2. The primary tanks shall be Aquastore Tank System Model 3115 (nominal 81,000 gallon capacity each) as manufactured by A.O. Smith Harvestore Products, Inc. or approved equal. The tanks, floors and roofs shall be of factory applied glass-fused-to-steel bolt together tank construction. The secondary tanks shall be Aquastore Tank System Model 3910 (nominal 89,000 gallon capacity each). The principal items of equipment shall include: tank, roof, floor, outlet sump, cage, ladder and cage assembly, access door, platforms and railing assembly, roof vent, level indicator, stainless steel cable holder, handrail, walkways, manways, pipe and conduit connections, pipe and conduit supports and overflow piping.

3. The volume of the secondary containment shall be a minimum of 110% of the primary tank volume. Calculations verifying this requirement shall be submitted by the Contractor.
4. Inspection, instructions on operation, start-up supervision, maintenance manuals and all other items as hereinafter called for in the Specifications or shown on the Drawings shall be furnished.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Plates and Sheets:

1. Plates and sheets used in the construction of the tank shell and tank roof shall comply with the minimum standards of AWWA D103, Section 2.4.
2. Design requirements for mild strength steel shall be ASTM A570 Grade 30 with an allowable tensile stress of 18,000 psi per AISC Specifications.
3. Design requirements for high strength steel shall be ASTM A607 Grade 50 with an allowable tensile stress of 30,000 psi per AISC Specifications.
4. The annealing effect created from the glass coated firing process shall be considered in determining ultimate steel strength. In no event shall a yield strength greater than 50,000 psi be utilized for calculations detailed in AWWA D103, Sections 3.4 and 3.5.
5. Multiple vertical bolt line plates and sheets (ASTM A607 Grade 50 only) shall be manufactured such that holes are staggered in the vertical bolt lines, and that no two adjoining holes are in-line horizontally, except at the center of the plate or sheet.

B. Rolled Structural Shapes:

1. Material shall conform to minimum standards of ASTM A36 or AISI 1010.

C. Horizontal Wind Stiffeners:

1. Design requirements for intermediate horizontal wind stiffeners shall be of the "web truss" design.
2. Web truss stiffeners shall be galvanized steel.
3. Rolled steel angle stiffeners are not permitted for intermediate stiffeners.

D. Bolt Fasteners:

1. Bolts used in tank lap joints shall be 1/2-inch - 13 UNC-2A rolled thread and shall meet the minimum requirements of AWWA D103, Section 2.2.
2. Bolt Material:
 - a) SAE Grade 2:
 - 1) Tensile Strength - 74,000 psi Min.
 - 2) Proof Load - 55,000 psi Min.
 - 3) Allowable shear stress - 18,164 psi (AWWA D103).
 - b) ASTM A490:
 - 1) Tensile Strength - 150,000 psi Min.
 - 2) Proof Load - 120,000 psi Min.
 - 3) Allowable shear stress - 36,818 psi (AWWA D103).
3. Bolt Finish - Zinc Plate:
 - a) .0003" Min - under bolt head.
 - b) .0003" Min - on shank.
 - c) .0005" to .0007" - on last five threads.
 - d) Iridite No. 3 bronze color coat.
4. Bolt Head Encapsulation: High impact polypropylene (natural resin only) co-polymer encapsulation of entire bolt head up to the splines on the shank.
5. All sidewall bolts shall be installed such that the head portion is located inside the tank, and the washer and nut are on the exterior.
6. All lap joint bolts shall be properly selected such that threaded portions will not be exposed in the "shear plane" between tank sheets. Also, bolt lengths shall be sized as to achieve a neat and uniform appearance. Excessive threads extending beyond the nut after torquing will not be permitted.
7. All lap joint bolts shall include a minimum of four (4) splines on the underside of the bolt head at the shank in order to resist rotation during torquing.
8. Polypropylene caps shall be required to cover exterior exposed nut, washer and bolt thread. Such caps are to be partially filled with Harvestore System Sealer No.

79 and manually pushed over the fastener. Color shall be black for the sidewalls and white for the top to match the top's color.

- E. Sealants: The lap joint sealant shall be a two component, chemical resistant asphalt extended urethane elastomer. The sealant shall be suitable for contact with leachate and meet applicable FDA Title 21 regulations, as well as, ANSI/NSF Additives Standard 61. The sealant shall be used to seal lap joints, bolt connections and sheet edges. The sealant shall cure to a rubber-like consistency, have excellent adhesion to the glass coating, have low shrinkage, and a useful life of 20 years to interior and exterior exposure. The sealant shall be manually applied from cartridges at ambient temperatures between 20 and 110°F. Sealant curing rate at 74 F/50% RH with tack-free time of 6 to 8 hours, and final cure time of 5 to 8 days. The sealant shall be Harvestore No. 79 or Sika 1A. Color shall be black for the sidewalls and white for the top to match the top's color. Neoprene gaskets and tape type sealer shall not be used.

2.02 GLASS COATING

A. Surface Preparation:

1. Following the decoiling and shearing process, sheets shall be steel grit-blasted on both sides to the equivalent of SSPC-SP10. Sand blasting and chemical pickling of steel sheets is not acceptable.
2. The surface anchor pattern shall be not less than 1.0 mils.
3. These sheets shall be evenly oiled on both sides to protect them from corrosion during fabrication.

B. Cleaning:

1. After fabrication and prior to application of the coating system, all sheets shall be thoroughly cleaned by a caustic wash and hot rinse process followed immediately by hot air drying.
2. Inspection of the sheets shall be made for traces of foreign matter or rust. Any such sheets shall be recleaned or grit-blasted to an acceptable level of quality.

C. Coating:

1. All sheets shall receive one coat of a catalytic nickel oxide glass precoat to both sides and the outside edges, and then air dried in accordance with AWWA D103 Section 10.4.2.1. All fully sized sheets shall have a thermally applied alloy treatment of all edges prior to glassing. This treatment shall provide corrosion protection to the edge of the sheet similar to that provided to the surface of the sheet.

2. A final coat to both sides of the sheets, of cobalt glass frit, shall be made.
3. The sheets shall then be fired at a minimum temperature of 1,500°F in strict accordance with the manufacturer's quality process control procedures, including firing time, furnace humidity, temperature control, etc.
4. Minimum dry coating thickness shall be 7.0 mils.
5. The tank wall panels shall be provided with a second coat of titanium dioxide for added corrosion resistance (Glass 97 process). The interior side of the wall panels shall be white/cream in color.

D. Inspection:

1. All coated sheets shall be inspected for mil thickness (Mikrotest or approved equal).
2. All coated sheets shall be checked for color uniformity by an electronic colorimeter.
3. A holiday detection test shall be performed on all surfaces after fabrication of the sheet. Sheets with detected holidays shall be rejected so as to eliminate the need for field touch up (See Sec. 3.01, C. 4.)
4. An Owner's representative may be present during these inspection procedures.

2.03 TANK SIDEWALLS AND FLOOR

- A. Glass-coated bolted steel.

2.04 TANK ROOF

- A. Roof Construction: Tanks shall include a radially sectioned roof fabricated from glass-coated, bolted steel panels, as produced by the tank manufacturer, and shall be assembled in a similar manner as the sidewall panels utilizing the same sealant and bolting techniques, so as to assure a water/air tight assembly. The roof shall be clear-span and self-supporting. Both live and dead loads shall be carried by the tank walls. In addition to the structure loads, the roof shall be designed for a minimum superimposed dead load and live load of 20 pounds per square foot each. The roof shall be designed such that the maximum deflection of the roof under live load conditions is less than 1/4-inch. The exterior coating finish shall include a white glass fired over the cobalt blue glass. Exterior bolt caps and sealant shall match the roof panel color.

2.05 APPURTENANCES

- A. The tank manufacturer shall provide for all outside tank ladders with cages and platform assemblies integral with the tank roof and sidewalls and inside tank ladders:
 - 1. Outside ladders shall be fabricated of aluminum and utilize grooved, skid resistant rungs. Ladders shall conform to AWWA D103 Section 5.4.
 - 2. Safety cages and step-off platforms and tank connecting deck shall be fabricated of aluminum. Step-off platforms shall provide access to access doors and have skid resistant pattern. Platforms, walkways, grating and handrail shall comply with Division 5.
 - 3. All Safety cages shall be equipped with lockable, anti-climb gate.
 - 4. The handrailing for the platform shall be aluminum.
 - 5. Supports shall be aluminum.
 - 6. Inside ladders and cages shall be fiberglass.
- B. Access Roof Hatches: Roof hatches shall be provided as shown on the Drawings. The hatches shall include a properly designed reinforcing frame and cover plate, and a hinged opening mechanism for cover opening. Roof hatches shall be of aluminum construction and comply with AWWA D-103, Section 5.6.
- C. Level Sensor:
 - 1. Provide an ultrasonic level sensor as specified in Division 16.
 - 2. It shall be mounted as shown on the drawings.
- D. Manways: Manways shall be provided as shown on the Drawings. Each manway shall be davited, fully gasketed and furnished with a glass-coated steel fabricated blind flange. Reinforcing on the shell plate where the manway is located shall be glass fused steel construction same as the tank. Flange diameter and drilling shall conform to ANSI B16.5, Class 150.
- E. Roof Vents:
 - 1. A properly sized vent assembly in accordance with AWWA D103 shall be furnished and installed as shown on the Drawings; and shall be sized with sufficient capacity so that at the maximum possible rate of leachate fill or withdrawal, the resulting interior pressure or vacuum will not exceed 0.5-inch water column.
 - 2. The vent shall be constructed of aluminum.
 - 3. The vent shall be designed to prevent the entrance of insects by including a 23 to 25 mesh polyester monofilament.

- F. Pipe Connection Nozzles: Where pipe connections are shown to pass through tank panels and roof, they shall be field located, saw cut, (acetylene torch cutting or welding is not permitted), and utilize an interior and exterior flange assembly matched to the curvature of the tank. Flanges shall be ~~Class~~ Class 150 with dimensions and bolt pattern conforming to ANSI B16.5. Harvestore No. 79 or Sika 1A sealant shall be applied on any cut panel edges or bolt connections. Nozzle material shall be steel coated in accordance with Section 09900 or Type 304 stainless steel and shall match the bolt hole pattern and pressure rating of the connected pipe.
- G. Pipe and Conduit Supports: Tank manufacturer shall provide suitable conduit and pipe support brackets as required for all vertical runs on the side of the tank, made of stainless steel, and bolted to the tank walls.
- H. Roof Walkway: The roof walkway structural shapes, grating, and handrails shall be aluminum and shall fully comply with per Section 05140, 05520, and other applicable project specifications. The grating shall be non-skid aluminum. The tank manufacturer shall be responsible for the roof walkway design. Signed and sealed calculation shall be submitted with the shop drawings, including tank connection details.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The Contractor shall submit general installation procedures along with an accurate time estimate for complete installation of the proposed unit.
- B. Steel Floor and Sidewall Structure:
 - 1. Field erection of the glass-coated, bolted-steel tank shall be in strict accordance with the procedures outlines in the manufacturer's erection manual, and performed by an authorized dealer of the tank manufacturer, regularly engaged in erection of these tanks.
 - 2. Specialized erection jacks and building equipment developed, manufactured and supplied by the manufacturer shall be used to erect the tanks.
 - 3. Particular care shall be taken in handling and bolting of the tank panels and members to avoid abrasion of the coating system. Prior to liquid test, all surface areas shall be visually inspected by the Engineer.
 - 4. A holiday test shall be performed after erection, but before jacking into place, using a nine (9) volt holiday detection device. Sheets with detected holidays shall be rejected so as to eliminate the need for field touch-up. Detected holidays at

connection points shall be repaired in accordance with manufacturer recommendations.

5. The placement of sealant on each panel shall be inspected prior to placement of adjacent panels.

3.02 PACKAGING

- A. All approved sheets shall be protected from damage prior to packing for shipment. Heavy paper or plastic foam sheets shall be placed between each panel to eliminate sheet-to-sheet abrasion during shipment.
- B. Individual stacks of panels will be wrapped in heavy mil black plastic and steel banded to special wood pallets built to the roll-radius of the tank panels. This procedure eliminates contact or movement of finished panels during shipment. Shipment from the factory to the jobsite will be by truck, hauling the tank components exclusively.

3.03 MANUALS

- A. The Contractor shall supply to the Owner operation and maintenance manuals and parts lists for all equipment prior to final acceptance.

3.04 FIELD TESTING AND INSPECTION

- A. Hydrostatic Testing: Following completion of erection, cleaning of the tank and field holiday testing, the structure shall be tested for liquid tightness by filling tank to its overflow elevation. Any leaks disclosed by this test shall be corrected by the erector in accordance with the manufacturer's recommendations. Water required for testing shall be furnished by the Owner at the time of tank erection completion, and at no charge to the Contractor. Disposal of test water shall be the responsibility of the Owner. Labor and equipment necessary for tank testing is to be included in the price of the tank.

3.05 START-UP SERVICES

- A. The Contractor shall furnish the services of the manufacturer's technical representative to inspect and correct or supervise correction of any defects or malfunctions and furnish start-up services. The Contractor shall provide qualified technical representative(s) to inspect the completed installation. Costs to check the installation shall be included in the purchase price of the equipment. The manufacturer's technical representative shall be available for system start-up, performance tests, and operating instruction for not less than 24 hours over a minimum of 3 days at no cost to the Owner.

3.06 REPORT INSPECTION

- A. On or slightly before the one-year anniversary date of final completion, and at or slightly before the five (5) year coating system warranty expiration, the manufacturer's representative shall make a visual inspection of the tank interior coating and appurtenances; tank exterior coating and appurtenances; and the immediate area surrounding the tank. A written summary of this inspection will be filed with the Owner, the Engineer, and the tank manufacturer. Any noted repairs shall be performed by the Contractor as warranty work at no cost to the Owner.

END OF SECTION

DIVISION 15

MECHANICAL

SECTION 15000

MECHANICAL - GENERAL REQUIREMENTS

D.E.P.

APR 27 1998

COUNTY DISTRICT
TAMPA

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Furnish all labor, materials, services, supplies, tools, equipment, transportation and facilities necessary to install complete and operable all mechanical equipment as shown on the Drawings and specified in this Division.
- B. Drawings and Specifications: The Drawings and Specifications shall be considered as complementary, one to the other, so that materials and work indicated, called for, or implied by the one and not by the other shall be supplied and installed as though specifically called for by both. ~~The Drawings are to be considered diagrammatic, not necessarily shown in the detail or to scale all of the equipment or minor items.~~ In the event of discrepancies between the Drawings and the Specifications, or between either of these and any regulations or ordinances governing work of this Division, the Bidder shall notify the Engineer in ample time to permit revisions.
- C. Safety Requirements: In addition to the components specified and shown on the Drawings and necessary for the specified performance, the Contractor shall incorporate in the design and show on the shop drawings all the safety features required by the current codes and regulations, including, but not limiting to, those of the Occupational Safety and Health Act of 1970, and Amendments thereto.

1.02 QUALITY ASSURANCE

- A. All equipment and materials used in this installation shall be new, of the best quality and, unless otherwise noted, shall be standard catalog items of the various manufacturers.
- B. Equipment and appurtenances shall be designed in conformity with ANSI (formerly ASA), ASME, IEEE, NEMA, OSHA, AGMA, and other generally acceptable applicable standards. They shall be of rugged construction and of sufficient strength to withstand all stresses which may occur during fabrication, testing, transportation, installation, and all conditions or operations. All bearings and moving parts shall be adequately protected against wear by bushings or other approved means. Provisions shall be made for adequate lubrication with readily accessible devices.
- C. Machinery parts shall conform to the dimensions shown on the working drawings within allowable tolerances. The corresponding parts of identical machines shall be made

interchangeable. Protruding members such as joints, corners and gear covers shall be finished in appearance. All exposed welds shall be ground smooth and the corners of structural shapes shall be rounded or chamfered.

- D. Clearances and Access: Ample clearance shall be provided for inspection and adjustment. All equipment shall fit the allotted space and shall leave reasonable access room for servicing and repairs. Greater space and room required by substituted equipment shall be provided by the Contractor and at his expense. Provide access panels ~~at walls or ceilings~~ for access to valves, dampers, equipment or any part requiring maintenance or service. Provide minimum sizes of 12 inches by 12 inches for hand access or 24 inches by 24 inches for personnel access.

E. Safety Requirement:

1. All machinery and equipment shall be safeguarded in accordance with the safety codes of the ANSI, OSHA, and local industrial codes.
2. The Contractor shall provide for each V-belt drive or rotating shaft a protective guard which shall be securely bolted to the floor or apparatus. The guard shall completely enclose drives and pulleys and be constructed to comply with all safety requirements.
3. For fans, the belt guard shall be arranged so as not to restrict the air flow into the fan inlet. Guards shall not interfere with lubrication of equipment.

1.03 PROTECTIVE COATINGS

- A. All machined surfaces and shafting shall be cleaned and protected from corrosion by the proper type and amount of coating necessary to assure protection during shipment and prior to installation.
- B. Oil lubricated gearing, bearings, etc. are to be shipped with an oil soluble protective coating as recommended by the equipment manufacturer.
- C. Motors, reducers and electric controls shall have the standard factory finish prior to delivery.

1.04 PREPARATION FOR SHIPMENT

- A. Fabricated sub-assemblies, if any, shall be shipped in convenient sections as permitted by carrier regulations and shall be properly match-marked for ease of field erection.

1.05 INSTALLATION OF EQUIPMENT

- A. Precision gauges and levels shall be used in setting all equipment. All piping and equipment shall be perfectly aligned, horizontally and vertically. Tolerances for piping and equipment installation shall be 1/2- inch in 30 ft. horizontal and vertically. All valves and operators shall be installed in the position shown on the plans or as directed by the Engineer if not shown.
- B. The Contractor shall have on site sufficient proper construction equipment and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character. To minimize field erection problems, mechanical units shall be factory assembled when practical.
- C. Equipment shall be erected in a neat and workmanlike manner on the foundations and supports at the locations and elevations shown on the Drawings, unless otherwise directed by the Engineer during installation.
- D. The equipment shall be brought to proper level by shims (1/4-inch maximum). After the machine has been leveled and aligned, the nuts on the anchor bolts shall be tightened to bind the machine firmly into place against the wedges or shims. Grout shall be as specified in Division 3.
- E. The grout shall be tamped into position with a board, steel bar or other tool. Tamping should not be so hard as to raise or otherwise displace the plate.
- F. All equipment shall be installed in such a manner as to provide access for routine maintenance including lubrication.
- G. For equipment such as pumping units, which require field alignment and connections, the Contractor shall provide the services of the equipment manufacturer's qualified mechanic, millwright, machinist, or authorized representative, to align the pump and motor prior to making piping connections or anchoring the pump base.
- H. All rotating equipment shall be statically and dynamically balanced. Unless otherwise specified, the vibration allowance in the units shall not exceed the upper limits as established by the manufacturer.
- I. Equipment of a portable nature which require no installation shall be delivered to a location designated by the Owner.
- J. All cutting and patching necessary for the work shall be performed by the Contractor. Where interferences occur, and departures from indicated arrangements are required, the Contractor shall coordinate the mechanical work with the other trades involved and make

a determination as to changed locations and elevations of ductwork and/or piping and shall obtain approval from the Engineer for the proposed changes.

- K. Where the contact of dissimilar metals may cause electrolysis and where aluminum will contact concrete, mortar or plaster, the contact surface of the metals shall be coated.

1.06 EQUIPMENT FOUNDATION AND SUPPORTS

- A. All foundations, platforms and hangers required for the proper installation of equipment shall be furnished and installed by the Contractor.
- B. All floor mounted equipment shall be mounted on a reinforced concrete pad of four inches in height as a minimum or as required by the Drawings. Concrete for pads shall be 3,000 lb. and shall conform to the requirements of Section 03300. Reinforcement shall be as shown on the Drawings or specified in Section 03200 and all edges shall be chamfered.
- C. The Contractor shall furnish, install, and protect all necessary guides, bearing plates, anchor and attachment bolts, and all other appurtenances required for the installation of equipment. These shall be of ample size and strength for the purpose intended.
- D. Anchor bolts required or indicated by the Drawings shall be furnished and built into the concrete foundations.
- E. Structural steel supports and miscellaneous steel required for supporting and/or hanging equipment and piping furnished under this Division shall be provided and installed by Contractor.
- F. All foundations, anchor pads, piers, pipe supports, and structural steel supports shall be built to template and reinforced as required for loads imposed on them.
- G. The Contractor shall assume all responsibility for sizes, locations and design of all foundations, anchor pads, piers, pipe supports, curbs and structural steel supports.

1.07 VIBRATION ISOLATION

- A. All rotating or reciprocating equipment unless otherwise directed shall be mounted on vibration isolators and provided with flexible connections to isolate the equipment from the structure and/or installation.
- B. Isolators shall produce uniform loading and deflections, regardless of equipment weight distribution, and shall be the product of a manufacturer regularly engaged in the production of such items and who publishes engineering and selection data.

1.08 LUBRICATION

- A. The Contractor shall thoroughly lubricate all equipment in accordance with the equipment manufacturer's instructions. Lubricating oils and greases shall be of type and viscosity as recommended by the equipment manufacturer.
- B. All lubricants shall be furnished by the Contractor.
- C. All systems requiring oil lubrication for gearing, bearings, etc., are to be flushed with flushing oils as recommended by the equipment manufacturer. This includes all gearings, bearings, etc., regardless of whether they have been shipped with or without oil soluble protective coatings.
- D. Following flushing, oil lubricated systems shall be filled with "run-in" oil as recommended by the equipment manufacturer. The equipment will be "run-in" at the no-load condition for a minimum period of 2 hours. Following "run-in" and inspection, the equipment is to be drained and flushed again with flushing oil as recommended by the equipment manufacturer.
- E. The schedule for the above procedures is to be submitted for review by the Engineer at least two (2) weeks prior to the selected procedure starting date. At this time inspection details can be worked out.
- F. The Contractor shall provide a one-year supply of all types of lubricants required for the various types of equipment furnished and installed under this Contract. Lubricants shall be in metal containers suitably labeled.

1.09 TEST OPERATION

- A. When equipment is required to be factory tested, the results of the tests shall be submitted to the Engineer and approval of the test results shall be obtained before shipment of the equipment.
- B. When an item of equipment, including controls and instrumentation, has been completely erected, the Contractor shall notify the Engineer, who will designate a time to make such tests as required, and operate the item to the satisfaction of the Engineer. All testing shall be done in the presence of the Engineer. "Completely erected" shall mean that the installation is erected, all necessary adjustments have been made, all required utility connections have been made, required lubricants and hydraulic fluid have been added and the unit has been cleaned up.
- C. Contractor shall furnish labor, lubricants, and all other materials, equipment and instruments necessary for all tests.

1.10 FAILURE OF TESTS

- A. Any defects in the equipment, or deviations from the guarantees or requirements of the Specifications, shall be promptly corrected by the Contractor by replacements or otherwise. The decision of the Engineer as to whether or not the Contractor has fulfilled his obligations under the Contract shall be final and conclusive. If the Contractor fails to correct any defects or deviations, or if the replaced equipment when tested shall fail again to meet the guarantees or specified requirements, the Owner, notwithstanding his having made partial payment for such equipment, may reject that equipment and order the Contractor to remove it from the premises at the Contractor's expense.
- B. In case the Owner rejects a particular item of equipment, then the Contractor hereby agrees to repay the Owner all sums of money paid to him and the Owner agrees to deliver to the Contractor a bill of sale of all his rights, title, and interest in and to the rejected equipment provided, however, that the equipment shall not be removed from the premises until the Owner obtains from other sources other equipment to take the place of that rejected. The bill of sale shall not abrogate the Owner's right to recover damages for delays, losses or other conditions arising out of the basic Contract. The Owner hereby agrees to obtain the alternate equipment within a reasonable time and the Contractor agrees that the Owner may use the original equipment furnished by him without rental or other charge until the other equipment is obtained.

1.11 RESPONSIBILITY DURING TESTS

- A. The Contractor shall be fully responsible for the proper operation of equipment during tests and instruction periods and shall neither have nor make any claim for damage which may occur to equipment prior to the time when the Owner formally takes over the operation thereof.

1.12 EQUIPMENT MANUFACTURER'S SERVICE REPRESENTATIVE

- A. Equipment which will require any manufacturer's service representative for the purpose of assisting and directing and installation and adjustment of equipment is noted in the applicable sections of this Division. All costs relative to services by equipment manufacturer's service representatives shall be borne by the Contractor.
- B. A letter of certification (check-out memo) shall be submitted to the Engineer from the manufacturer's representative upon completion of plant visit indicating that the equipment has been checked out and is in proper working order and that the plant personnel have been instructed in the proper use of the equipment.

1.13 NAMEPLATES

- A. Provide identification nameplates for all equipment, controls, and apparatus where nameplates and/or data plates are not specified elsewhere.
 - 1. Equipment and apparatus nameplates shall be fabricated from 1 1/2-inch high black laminated plastic with 1 inch high cut-in white letters, permanently secured with stainless steel screws.
 - 2. Controls and switches shall be labeled with 1 inch high black laminated plastic with 1/2-inch white letters to designate functions.
 - 3. Nameplates schedule and sample shall be submitted to the Engineer for approval.
- B. Each piece of equipment shall be provided with stainless steel data plate securely fastened in a conspicuous place and clearly inscribed with the equipment manufacturer's name, year of manufacture, serial number and principal rating data. These data plates shall not be painted.

1.14 EQUIPMENT CLEANING

- A. All equipment, piping, duct work, insulation and other work provided under this Division and to receive finish painting by the General Contractor shall be thoroughly cleaned and ready for finish painting.
- B. Thoroughly inspect all items of equipment and any items dented, scratched or otherwise damaged in any manner shall be replaced or repaired and painted to match original finish. All item so repaired and refinished shall be brought to the attention of the Engineer for inspection and approval.

1.15 SYSTEM CLEANING

- A. Each system of piping shall be blown through, washed out and/or flushed after completion to remove grit, dirt, sand, etc., from coils and piping for as long a time as required to thoroughly clean the apparatus.
- B. All elements within the system that may be damaged by the cleaning operation shall be removed or otherwise protected during the operation.
- C. Repair or replace any control valves or other system components which do not function properly due to damage during the cleaning operation or because of imperfect cleaning of any piping system.

- ~~D. All strainers shall be inspected and cleaned as often as required and left in a clean condition at project completion.~~

1.16 PROTECTION OF PIPING, DUCT WORK AND APPURTENANCES

- A. All duct work, piping, appurtenances, and openings furnished and installed under this Division shall be protected from dirt, foreign objects, and damage during the construction period. Damaged piping, duct work or other appurtenances shall be replaced without additional cost to the Owner, should the damage occur prior to final acceptance of the work by the Owner. As soon as installed, all metal plated or polished fixture trimmings shall be thoroughly covered with noncorrosive grease which shall be maintained until all construction work is completed.
- B. Suitable precautions against freezing shall be taken during cold weather.
- C. All open ends of piping shall be closed by suitable cap or plug fitting to prevent obstruction and damage.
- D. The Contractor shall also be responsible for the work of other trades that may be damaged or disturbed in the course of this work and he shall restore it to the condition existing prior to damage without additional cost to the Owner.

1.17 FIRE HAZARD RATING

- A. All piping, duct work, and equipment insulation, fastener, and jacketing materials shall have a fire hazard rating not to exceed 25 for flame spread, 50 for fuel contributed, and 50 for smoke developed. Rating shall be determined by ASTM Designation E84, "Surface Burning Characteristics of Building Materials". Corresponding ratings determined by Underwriters' Laboratories, Inc., UL-723, "Test Method for Fire Hazard Classification of Building Materials", will also be acceptable.
- B. Fire hazard ratings for materials proposed for use shall be substantiated by test results from the National Bureau of Standards, a certified report from an approved testing laboratory, or a UL label or listing.
- C. Flameproofing treatments will not be accepted.

1.18 SHOP DRAWINGS

- A. The Contractor shall submit in conformance with the General Conditions for review by the Engineer, complete sets of detailed and dimensioned working shop drawings showing the construction of the proposed facility and installation of all equipment complete in every respect.

- B. Each drawing shall be indexed and/or referenced to the Drawings and Specifications.
- C. No work upon the manufacture or fabrication of any equipment shall be performed until the Engineer's review has been completed.
- D. The review of Shop Drawings by the Engineer will not relieve the Contractor of his responsibility to furnish all necessary material and equipment, and to perform all work required by the Contract Documents.
- E. Certified performance data/curves shall indicate actual test performance of units furnished. The Contractor shall submit, with the certified shop drawings, layout drawings showing exact installation, piping and foundation details for the units being submitted.
- F. The various Sections in this Division specify additional requirements for shop drawings with which the Contractor shall comply.

1.19 RECORD DRAWINGS

- A. Record drawings shall be submitted to the Engineer before final acceptance and shall include the following minimum requirements:
 - 1. Exact vertical and horizontal locations of all buried pipes and conduits, giving dimensions from fixed reference points.
 - 2. Tanks and Structures: A survey shall show any deviations from contract drawings and such changes shall be reviewed prior to approval.
 - 3. ~~Ductwork: Drawings shall show routing of ductwork with indications of balancing dampers, splitter dampers, fire and smoke dampers, access doors, and fans or other items needing periodic maintenance.~~
 - 3 4. Piping: Drawing shall show routing of piping indicating valves, cleanouts, and access panels.

1.20 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Bound Operation and Maintenance Manuals: Before final payment is made, the Contractor shall furnish the specified number of sets of bound operation and maintenance manuals to the Owner. The manuals shall consist of catalog cuts, bulletins shop drawings, wiring diagrams, schedules, parts lists, procedures and other data showing the equipment installed and shall include the following:
 - 1. System layout showing piping, valves and controls.

2. Approved wiring and control diagrams, with data to explain the detailed operation and control of each component.
 3. A control sequence describing startup, operation, and shutdown.
 4. Operating and maintenance instructions for each piece of equipment, including lubrication instructions.
 5. Parts lists and recommended spare parts.
 6. Other data and instructions as specified under the various Sections.
- B. All data furnished shall conform to the installation as constructed. Cuts showing other equipment and data not applicable to the installation shall be crossed out and where practical shall be omitted from the manual. The assembly of the manual shall be in a logical manner and each section shall be indexed in the Table of Contents.
- C. Each manufacturer shall outline a maintenance procedure for his equipment installed and the Contractor shall then compile these procedures in a logical manner to provide a procedure for the operating personnel of the Owner to follow in their day to day operation of the facility.
- D. The materials shall be permanently bound into each manual between 3-ring vinyl binding covers. The instruction booklets shall be approximately 9 inches by 12 inches and the diagram booklet large enough to contain the drawings without excessive folding so that they may be easily opened.
- E. The booklets shall be neatly entitled with a descriptive title, the name of the job, the location, year of installation, Owner, Manufacturer, Contractor and Engineer. Copies of drawings shall be in black on white background and shall be easily legible. The arrangements of the booklets, the method of binding, materials to be included and the composite text shall all be reviewed and approved by the Engineer and Owner.

1.21 FIELD INSTRUCTIONS

- A. Upon completion and start-up of the work and at a time designated, the Contractor shall provide the services of one or more project engineers to work in conjunction with the service engineers and suppliers' representative in instructing the Owner's personnel in the proper operation and maintenance of the equipment. The project engineer(s) shall also be required to start up and operate under normal working conditions the entire installation as a unit. These field instructions shall cover all the items contained in the bound instructions. The instruction period shall be given at the time the facility is operating

under normal conditions. In addition to these requirements, the Contractor shall provide field instructions as specified under the various Sections of the Specifications.

1.22 FRAMED INSTRUCTIONS

- A. Approved wiring and control diagrams showing the complete layout of the entire system, including equipment, piping, valves and control sequence, framed in laminated plastic, shall be posted within the associated control panels or where directed by the Owner. In addition, condensed operating instructions explaining preventive maintenance procedures, methods of checking the system for normal safety operation and procedures for safely starting and stopping the system shall be prepared in typed form, framed as specified above for the wiring and control diagrams and posted beside the diagrams. Proposed diagrams, instructions and other sheets shall be submitted for approval prior to posting. The framed instructions shall be posted before acceptance testing of the systems.

1.23 GUARANTEE AND WARRANTIES

- A. The Contractor shall guarantee all work, materials, equipment, etc. against defects for a period of one year from the date of the final acceptance, that all the equipment has the capacity specified and that it will operate without excess noise or vibration caused by improper installation. In addition to the guarantee, the Contractor shall provide the performance warranties as specified for the equipment in the various sections.

END OF SECTION

SECTION 15050

PROCESS AND UTILITY PIPING, FITTINGS, VALVES AND ACCESSORIES

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work included in this Section consists of furnishing all labor, equipment and materials and in performing all operations necessary for the construction or installation of all process and utility piping, valves, valve boxes and all castings and appurtenances within, adjacent and connecting to pump stations, leachate storage tanks and transfer pumps and inside the limits of the work shown, complete and ready for operation as shown on the Drawings and specified herein.

1.02 QUALITY ASSURANCE

A. Construction Requirements:

1. All underground lines shall be installed with at least 36 inches of cover.
2. For underground utilities, changes in horizontal alignment of less than 11-1/4 degrees may be achieved through the use of allowable pipe deflection in lieu of fittings shown on the Drawings at the Contractor's option, but subject to approval of the Engineer as to layout. Said deflection shall not exceed 80 percent of the maximum allowable deflection as stated in the pipe manufacturer's installation instructions.

- B. Pipe Inspection: The Contractor shall obtain from the pipe manufacturers a certificate of inspection to the effect that the pipe and fittings supplied for this Contract have been inspected at the plant and that they meet the requirements of these specifications.

All pipe and fittings shall be subject to visual inspection at time of delivery by rail or truck and also just before they are lowered into the trench to be laid. Joints or fittings that do not conform to these specifications will be rejected and must be removed immediately by the Contractor.

The entire product of any plant may be rejected when, in the opinion of the Engineer, the methods of manufacture fail to secure uniform results, or where the materials used are such as to produce inferior pipe or fittings.

1.03 SUBMITTALS

A. Shop Drawings:

1. In general, the following shop Drawings shall be submitted to the Engineer for approval prior to construction:
 - a) Mill test certificates or certified test reports on pipe and fittings
 - b) Details of restrained and flexible joints
 - c) Valve vaults
 - d) Valve boxes
 - e) All gate, plug, ball, solenoid, check valves, and automatic air release valves
 - f) Couplings
 - g) Service saddles
 - h) Flexible expansion joints
 - i) Pressure gauges
 - j) Identification tape
 - k) Joint lubricant
 - l) Cam-lock couplers
 - m) Swivel joints
 - n) Tie rods
 - o) Reduced pressure backflow preventers.
2. A separate shop drawing submittal will be required for each major item listed above and for each different type of an item within a major item. For example, separate submittals will be required for gate, plug, ball, solenoid, check and automatic air release valves.

B. Acceptance Of Material:

1. The Contractor shall furnish an Affidavit of Compliance certified by the pipe manufacturer that the pipe, fittings and specials furnished under this Contract comply with all applicable provisions of current AWWA and ASTM Standards and these Specifications. No pipe or fittings will be accepted for use in the work on this project until the Affidavit has been submitted and approved by the Engineer.
2. The Owner reserves the right to sample and test any pipe or fitting after delivery and to reject all pipe and fittings represented by any sample which fails to comply with the specified requirements.

C. Operation and Maintenance Manuals:

Submit operation and maintenance manuals for valves, swivel joints and reduced pressure backflow preventers.

1.04 DELIVERY, STORAGE AND HANDLING

- A. During shipping, delivering and installing pipe, fittings, valves, backflow preventers, and accessories, they shall be handled in such manner as to ensure a sound undamaged condition.
- B. Particular care shall be taken not to injure the pipe coating.
- C. Insides of valves and backflow preventers shall be kept free of dirt and debris.

1.05 JOB CONDITIONS

- A. Water in Excavation: Water shall not be allowed in the trenches while underground pipes are being laid and/or tested. The Contractor shall not open more trench than the available pumping facilities are able to dewater to the satisfaction of the Engineer. The Contractor shall assume responsibility for disposing of all water so as not to injure or interfere with the normal drainage of the territory in which he is working.

In no case shall the pipelines being installed be used as drains for such water, and the ends of the pipe shall be kept properly and adequately plugged during construction by the use of approved stoppers and not by improvised equipment. All necessary precautions shall be taken to prevent the entrance of mud, sand, or other obstructing matter into the pipelines. If on completion of the work any such materials has entered the pipelines, it must be cleaned as directed by the Engineer so that the entire system will be left clean and unobstructed.

PART 2 - PRODUCTS

2.01 DUCTILE IRON PIPE AND FITTINGS

- A. Ductile Iron Pipe: Ductile iron pipe shall conform to the requirements of ANSI/AWWA C151, latest revision. The minimum thickness class for underground pipe shall be Class 52. Flanged pipe shall have a minimum thickness class of Class 53. Pipe shall have a minimum rated water working pressure of 250 psi and shall be furnished in laying lengths of 20 feet or less, unless specifically shown otherwise on the Drawings. The pipe shall be lined and coated as specified below.
- B. Lining and Coating: The applicator of the linings and coatings shall be by Vulcan Painters, Birmingham, Alabama or Bauman Coatings, Birmingham, Alabama, no other applicator firm will be considered. The applicator firm and personnel shall be certified, experienced, and qualified to perform the application of the lining and coating materials specified herein. All ductile iron pipe and ductile iron fittings shall have the linings and coatings applied and warranted by the same applicator firm. The applicator firm shall submit certification attesting that it met the requirements of this specification and the requirements of the lining and/or coating materials manufacturer's application specifications.
 - 1. Interior Lining for Leachate Piping: Ductile iron pipe, fittings and specials shall be coated with Protecto 401, a high build multi-component amine cured Novalac epoxy polymeric lining manufactured by Indurall Coatings, Inc., Birmingham, Alabama or approved equal. The interiors of the ductile iron pipe, fittings and specials shall receive 40 mils DFT of the protective lining. Storage, surface preparation, application and safety precaution shall strictly follow manufacturers instructions.
 - 2. Interior Lining for Potable Water Piping: Ductile iron pipe, fittings and specials shall be cement lined in accordance with ANSI/AWWA C104, current revision, "Cement-Mortar Lining for Ductile Iron and Gray Iron Pipe and Fittings for Water". The cement lining shall have a standard thickness and after curing the lining shall have a seal coat of bituminous material in accordance with ANSI/AWWA C104, current revision.
 - 3. Exterior Coatings: Ductile iron pipe, fittings and specials to be installed underground shall be coated on exterior at the factory with two coats, 10.0 mils DFT per coat, of coal tar epoxy. All clamps, bolts, nuts, studs and other uncoated parts of joints for underground installation shall be coated with coal tar epoxy prior to backfilling. Coal tar epoxy shall be equal to Carboline Bitumastic No. 300-M.

Ductile iron pipe, fittings and specials to be installed aboveground shall be furnished with a shop applied primer on the exterior. The shop primer shall be as specified in Section 09900-Painting.

4. The pipe linings shall be tested for freedom from holidays and pinholes by use of a Tinker-Rasor or K-D Bird Dog Holiday Detector.
- C. Fittings: Fittings for ductile iron pipe shall be either mechanical joint, restrained joint or flanged joint as indicated on the Drawings and shall have a minimum working pressure of 250 psi. Fittings shall be ductile iron and shall conform to ANSI/AWWA C110, ANSI/AWWA C111 and ANSI/AWWA C153, latest revisions for flanged and mechanical joint pipe. Fittings shall be coated and lined as specified above for ductile iron pipe. The rubber gaskets for flanged, mechanical, and push-on joints shall be as described below.
- D. Push-On Joints: Pipe using push-on joints shall be in strict accordance with ANSI/AWWA C111, latest revision and shall be as manufactured by American Cast Iron Pipe Company (Fastite Joint), United States Pipe Company (Tyton Joint), or Clow Corporation (Super Bell Tite Joint). Jointing materials shall be provided by the pipe manufacturer and installation shall be in strict accordance with the manufacturer's recommended practice.
- E. Mechanical Joints: Jointing materials for mechanical joints shall be provided by the pipe and fitting manufacturer. Materials assembly and bolting shall be in strict accordance with ANSI/AWWA C111 and ANSI/AWWA C153, latest revisions. Tee head bolts and nuts for mechanical joints shall be manufactured of CORTEN, high strength, low alloy, corrosion resistant steel as manufactured by NSS Industries, Plymouth, Michigan or an equal approved by the Engineer.
- F. Flanged Joints: Flanges shall be American Standard for 125 pound steam pressure with any special drilling and tapping as required to insure correct alignment and bolting. Gaskets shall be rubber full face type, minimum thickness of 1/8-inch. Flanged joints shall be made with bolts and nuts, studs with a nut on each end, or studs with nuts where the flange is tapped.

The number and size of bolts shall conform to the same American National Standard as the flanges. Unless noted otherwise, bolts and nuts shall be Grade B conforming to the ASTM Specifications for Steel Machine Bolts and Nuts and Tap Bolts, Designation A 307. Bolts and studs shall be of the same quality as machine bolts. Bolts and nuts shall have hexagonal heads. Where noted on the Drawings or where flanges are underground, stainless steel nuts and bolts shall be used for flanges. Stainless steel shall be Type 316 in accordance with ASTM A320, Class 2.

1. , Machined Surfaces: Machined surfaces shall be cleaned and coated with a suitable rust preventive coating at the shop immediately after being machined.
- G. Restrained Joints: Restrained joints shall be provided for all buried piping systems at the location required to restrain system thrust. Pipe joints and fittings shall be restrained as specified below.

1. Manufactured Restrained Joints: Manufactured restrained joints shall be Flex-Ring, Lok-Ring or Lok-Fast manufactured by the American Cast Iron Pipe Company, Lok-Tyte or Tr-Flex Type manufactured by the United States Pipe Company or an equal approved by the Engineer. Joints shall be manufacturer's standard specifically modified push-on type joints with joint restraint provided by ductile iron retainer rings joined together by corrosion resistant, high strength steel tee head bolts and nuts or with joint restraint provided by a welded-on retainer ring and a split flexible ring assembled behind the retainer ring.

Restrained joint pipe and fittings shall be ductile iron only and shall comply with applicable portions of this specification. Manufactured restrained joints shall be capable of deflection during assembly. Deflection shall not exceed 80 percent of the manufacturer's recommendations.

Tee head bolts and nuts for restrained joints shall be manufactured of CORTEN, high strength, low alloy, corrosion resistant steel as manufactured by NSS Industries, Plymouth, Michigan, or an equal approved by the Engineer.

2. Alternate Restrained Joints: When prior approval is obtained from the Engineer, ductile iron pipe and fittings with mechanical joints may be restrained using a follower gland which includes a restraining mechanism. When actuated during installation, the restraining device shall impart multiple wedging action against the pipe wall which increases resistance as internal pressure in the pipeline increases.

The joint shall maintain flexibility after installation. Glands shall be manufactured of ductile iron conforming to ASTM A536 and restraining devices shall be of heat treated ductile iron with a minimum hardness of 370 BHN. The gland shall have standard dimension and bolting patterns for mechanical joints conforming to ANSI/AWWA C111 and C153, latest revisions.

Tee head bolts and nuts shall be manufactured of corrosion resistant, high strength, low alloy CORTEN steel in accordance with ASTM A242.

The restraining wedges shall have twist-off nuts to insure proper torquing. The mechanical joint restraint device shall have a minimum working pressure rating

of 250 psi with a minimum safety factor of 2 to 1 and shall be MEGALUG^R as manufactured by EBBA Iron, Inc. No other retainer gland type device will be acceptable. After installation prior to backfilling, all parts of the joint restraint system shall be coated with coal tar epoxy equal to Carboline Bitumastic No. 300-M.

2.02 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

- A. ~~Gravity Drainage Piping: PVC pipe smaller than 4 inches used for gravity drainage piping installed underground shall be Schedule 40 pipe in accordance with ASTM D1785. Schedule 40 PVC pipe shall have solvent welded joints. Pipe 4 inches and over shall be per AWWA C-900 as specified below.~~
- ~~B.~~ Small PVC Pressure Piping: Unless otherwise specified, all PVC pressure pipe smaller than 4 inches nominal diameter shall be Schedule 80 PVC in accordance with ASTM D1785. Schedule 80 pipe shall have either solvent welded or threaded joints. PVC pressure pipe shall bear the approved seal of the National Sanitary Foundation (NSF). PVC pipe that is exposed to sunlight shall be manufactured with additives to provide resistance to ultraviolet deterioration.
- EB. Fittings: Socket type, solvent welded fittings for Schedule 80 PVC pipe shall be in conformance with ASTM D2467. Threaded type fittings for Schedule 80 PVC pipe shall be in conformance with ASTM D2464. All solvent welded or threaded joints shall be watertight.
- EC. Flanges: Flanges for Schedule 80 PVC pipe shall be rated for a 150 psi working pressure with ANSI B16.1 dimensions and bolting pattern. Flanges shall be connected to PVC piping with either solvent welded or threaded joints in accordance with ASTM D2467 or ASTM 2464, respectively. Gaskets shall be neoprene, full faced type with a minimum thickness of 1/8-inch. Nuts and bolts shall be hexagonal with machine threads, manufactured of Type 316 stainless steel in accordance with ASTM A320, Class 2. Type 316 stainless steel flat washers w/lock washers shall be used against PVC flanges.
- ED. Solvent Cement: PVC solvent cement shall be in compliance with ASTM D2564 and in accordance with the pipe manufacturer's recommendations.
- FE. Thread Lubricant: Lubricant for Schedule 80 threaded joints shall be Teflon tape only.
- GF. Polyvinyl Chloride Pipe 4 Inches and Larger in Size for Pressure Service: Polyvinyl chloride pipe for nominal diameters 4 inches and larger in size shall conform to the requirements of AWWA C-900 with a dimension ratio of DR 18, pressure class 150, and gasketed integral bell ends. Pipe shall be designed for maximum working pressure of not less than 150 psi and with not less than a 400 to 1 sustained hydrostatic pressure safety

factor. Fittings for C-900 PVC pipe shall be ductile iron fittings with mechanical joint ends as specified above.

HG. Joints (4 Inches and Larger PVC Pipe):

1. Bell and Spigot:

Pipe joints shall be made with integral bell and spigot pipe ends. The bell shall consist of an integral thickened wall section designed to be at least as strong as the pipe wall. The bell shall be supplied with factory glued rubber ring gasket which conforms to the manufacturer's standard dimensions and tolerances. The gasket shall meet the requirements of ASTM F477 "Elastomeric Seals (Gaskets) for Joining Plastic Pipe". PVC joints shall be "Ring-Tite" as manufactured by J-M Manufacturing Company, Inc. or an equal approved by the Engineer.

2. Restrained Joints:

Where indicated on Drawings, to prevent pipe joints and fittings from separating under pressure, pipe joints and fittings shall be restrained as follows:

- a) PVC pipe bell and spigot joints shall be restrained with the EBBA Iron MEGALUG[®] Series 1500 Restrainer or an equal approved by the Engineer. The restraining device and Tee head bolts shall be manufactured of high strength ductile iron meeting ASTM A536, Grade 65-42-10. Clamping bolts and nuts shall be manufactured of corrosion resistant high strength, low alloy COR-TEN steel meeting the requirements of ASTM A242.
- b) Cast iron mechanical joint fittings used with PVC pipe shall be restrained with the EBBA Iron MEGALUG[®] Series 2000 PV Restrainer or an equal approved by the Engineer. The restraining device and Tee head bolts shall be manufactured of high strength ductile iron meeting ASTM A536, Grade 65-42-10. Clamping bolts and nuts shall be manufactured of corrosion resistant high strength, low alloy COR-TEN steel meeting the requirements of ASTM A242.

2.03 WALL SLEEVES, SEALS, AND PIPES AND NON-STANDARD CASTINGS

- A. ~~Wall Sleeves: Wall sleeves shall be of cast iron, ductile iron or carbon steel hot dip galvanized after fabrication and shall have a waterstop located in the center of the wall. Sleeves shall be provided with seals and shall be oversized as required for the installation of seals. Sleeves shall terminate flush with finished surfaces of walls and ceilings, and shall extend 2 inches above the finished floor.~~

- ~~1. Wall sleeves shall be installed for all piping passing through building walls and floors, except where noted on the Drawings. Sleeves shall be of sufficient size to pass the pipe without binding. Sleeves shall terminate flush with finished surfaces of walls and ceilings, and shall extend 2 inches above the finished floor. Escutcheons shall be provided at walls and floor to completely conceal the sleeves smaller than 3 inches. Escutcheons shall be cast iron, nickel plated split-type.~~
- ~~B. Wall Sleeve Seals: Wall sleeve seals shall be modular mechanical type consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall sleeve. Links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and nut. After the seal assembly is positioned in the sleeve, tightening of the bolts shall cause the rubber sealing elements to expand and provide an absolutely water-tight seal between the pipe and wall sleeve. The synthetic rubber shall be suitable for exposure to leachate and groundwater. Bolts, nuts and hardware shall be 18-8 stainless steel. The seals shall be Link Seal as manufactured by Thunderline Corporation or equal, and the wall sleeve and seal shall be sized as recommended by the seal manufacturer.~~
- ~~C.B. Wall Pipes: Wall pipes shall be of the size and types indicated on the Drawings. All wall pipes shall be of ductile iron and shall have a central fin not less than 1/2-inch thick and the same diameter as the bolting flange cast midway of the length to form a waterstop. Each wall pipe shall be of the same grade, thickness and interior coating as the piping to which it is joined. Those portions of the wall pipes that are buried shall have a coal tar epoxy outside coating.~~
- DC** Non-Standard Fittings and Castings: Fittings having non-standard dimensions and cast especially for this project shall be of an approved design. Fittings shall be manufactured to meet the requirements of the same specifications and shall have the same diameter and thickness as standard fittings but laying lengths and types of ends shall be determined by positions in the pipelines and by the particular piping to which it is connected. Flange facing and drilling shall conform to the 125 pound American National Standard. Where required, flanges shall be drilled and tapped for studs. Other dimensions shall be substantially equal to corresponding parts of standard bell and spigot fittings.

2.04 PIPE COUPLINGS

- A. Couplings: Pipe couplings used to joint two pieces of plain end pipe shall be sized to suit the outside diameter of the pipe ends to be jointed. Transition couplings shall be used to join pipes of different outside diameters. Pipe couplings shall be bolted type with steel middle ring and end followers.

1. Wall sleeves shall be installed for all piping passing through building walls and floors, except where noted on the Drawings. Sleeves shall be of sufficient size to pass the pipe without binding. Sleeves shall terminate flush with finished surfaces of walls and ceilings, and shall extend 2 inches above the finished floor. Escutcheons shall be provided at walls and floor to completely conceal the sleeves smaller than 3 inches. Escutcheons shall be cast iron, nickel plated split-type.

B. Wall Sleeve Seals: Wall sleeve seals shall be modular mechanical type consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall sleeve. Links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and nut. After the seal assembly is positioned in the sleeve, tightening of the bolts shall cause the rubber sealing elements to expand and provide an absolutely water-tight seal between the pipe and wall sleeve. The synthetic rubber shall be suitable for exposure to leachate and groundwater. Bolts, nuts and hardware shall be 18-8 stainless steel. The seals shall be Link Seal as manufactured by Thunderline Corporation or equal, and the wall sleeve and seal shall be sized as recommended by the seal manufacturer.

C. Wall Pipes: Wall pipes shall be of the size and types indicated on the Drawings. All wall pipes shall be of ductile iron and shall have a central fin not less than 1/2-inch thick and the same diameter as the bolting flange cast midway of the length to form a waterstop. Each wall pipe shall be of the same grade, thickness and interior coating as the piping to which it is joined. Those portions of the wall pipes that are buried shall have a coal tar epoxy outside coating.

D. Non-Standard Fittings and Castings: Fittings having non-standard dimensions and cast especially for this project shall be of an approved design. Fittings shall be manufactured to meet the requirements of the same specifications and shall have the same diameter and thickness as standard fittings but laying lengths and types of ends shall be determined by positions in the pipelines and by the particular piping to which it is connected. Flange facing and drilling shall conform to the 125 pound American National Standard. Where required, flanges shall be drilled and tapped for studs. Other dimensions shall be substantially equal to corresponding parts of standard bell and spigot fittings.

2.04 PIPE COUPLINGS

A. Couplings: Pipe couplings used to joint two pieces of plain end pipe shall be sized to suit the outside diameter of the pipe ends to be jointed. Transition couplings shall be used to join pipes of different outside diameters. Pipe couplings shall be bolted type with steel middle ring and end followers.

All carbon steel parts of the coupling shall be coated on the interior and exterior with a fusion bonded thermosetting epoxy coating with a 12 mil nominal coating thickness. The coating shall be equal to AL-CLAD as manufactured by Dresser Industries, Inc.

Gaskets for the coupling shall be wedge type manufactured of Buna-N resilient rubber.

Bolts shall be manufactured of high strength Type 304 stainless steel with Type 316 stainless steel hexagonal nuts. Bolts and nuts shall conform dimensionally to ANI/AWWA C111, latest revision.

Couplings shall be Style 38 as manufactured by Dresser Industries, Inc. or an equal approved by the Engineer.

2.05 PVC BALL AND BALL CHECK VALVES

- A. PVC Ball Valves: All PVC ball valves 1/2-inch through 4 inch in size shall be of a one piece capsule type manufactured of Type 1, Grade 1 PVC. Ball valves shall be true union design with two-way blocking capability and shall have solvent welded socket or NPT threaded ends. Ball valves shall have Teflon seats with Viton backing cushions and Viton O-ring seals, and shall be designed for a 150 psi water working pressure at 120° F. Valves shall be supplied with ABS lever operating handles. PVC ball valves shall be manufactured by Asahi/America, or an equal approved by the Engineer.
- B. PVC Ball Check Valves: All PVC ball check valves 1/2-inch through 2 inch in size shall be of a solid thermoplastic construction manufactured of Type 1, Grade 1 PVC. Ball check valves shall be true union design with solvent welded socket or NPT threaded ends. Ball check valves shall be furnished with a solid thermoplastic ball. Ball seat shall be Teflon coated Viton. The same seal shall function as both the ball seat and the union seal. PVC ball check valves shall be designed for a 150 psi water working pressure at 120°F. Valves shall be manufactured by Asahi/America, or an equal approved by the Engineer.

2.06 GATE VALVES

- A. Iron gate valves shall open by turning to the left (counter-clockwise), when viewed from the stem. When fully open, gate valves shall have a clear waterway equal to the nominal diameter of the pipe. Operating nut or hand wheel shall have an arrow cast in the metal indicating the direction of opening. Each valve shall have the manufacturer's distinctive marking, pressure rating and year of manufacture cast on the body. Prior to shipment from the factory, each valve shall be tested by applying to it a hydrostatic pressure equal to twice the specified working pressure. Hydrostatic and leakage tests shall be conducted in strict accordance with ANSI/AWWA C500 or ANSI/AWWA C509, latest revisions, whichever is applicable.

- B. Gate valves installed underground with nominal sizes from 2 to 2-1/2 inches shall conform to ANSI/AWWA C500, latest revision, and shall be designed for a minimum working pressure of 200 psi. Valves shall be iron body, bronze-mounted, double disc, parallel seat, non-rising stem type with double, Buna-N, O-ring stem seals. Bronze items of construction shall include the stems, seat rings, stem nuts, wedge bushings and upper and lower wedges. Bronze used for construction of these items shall be zinc-free alloy bronze. Valve ends for underground installation shall be mechanical joint as specified herein above for ductile iron pipe and fittings. Interior ferrous surfaces of valve, except for finished or bearing surfaces, shall be coated with a fusion bonded or thermosetting epoxy coating in accordance with AWWA C550, latest revision. Coating shall be holiday-free with a minimum thickness of 12 mils. Surfaces shall be clean, dry, and free from rust and grease before coating. Exterior surfaces shall be coated as specified hereinafter. Gate valves for the size range shall be as manufactured by American-Darling Valve Company, Kennedy Valve Manufacturing Company, or Dresser Industries, Inc.
- C. Gate valves with nominal sizes from 3 to 12 inches shall conform to ANSI/AWWA C509, latest revision, and shall be designed for a minimum working pressure of 200 psi. Valves shall be iron body resilient seat type with O-ring stem seals. The valve stem, stem nut, glands and bushings shall be manufactured of zinc-free bronze. Valve disc shall be constructed to assure uniform seating pressure between disc seat ring and body seating surface. Resilient seat of valve shall be formed by a special corrosion and chloramine resistant, synthetic elastomer which is permanently bonded to and completely encapsulates a cast iron valve disc. Interior of valve body shall be coated with a fusion bonded, thermosetting epoxy coating in accordance with AWWA C550, latest revision. Coating shall be holiday-free with a minimum thickness of 12 mils. Surfaces shall be clean, dry and free from rust and grease before coating. Exterior surfaces shall be coated as specified hereinafter. Resilient-seated type gate valves shall be manufactured by American-Darling Valve Company, Kennedy Valve Manufacturing Company or Dresser Industries, Inc.
- D. Valve Joints: All gate valves shall have either mechanical joint, restrained joint or flanged ends to fit the pipe run in which they are to be used. Gate valves installed on push-on joint pipe shall have mechanical joint ends unless otherwise specified.
- E. Valve Operators: Gate valves shall open left (counter-clockwise) when viewed from the stem. Unless otherwise shown on the Drawings or specified herein, gate valves shall have non-rising stems. Buried gate valves shall be furnished with a 2 inch square AWWA standard nut operator with a valve box and cover. Gate valves located aboveground or inside structures shall be furnished with a handwheel operator which shall have an arrow cast in the metal indicating the direction of opening. Gate valves used as isolation valves for reduced pressure backflow preventers shall be of the open screw and yoke (OS&Y) design with a handwheel operator.

- F. Interior Valve Coating: Prior to shipment from the factory, the interior ferrous surfaces of the valve, except for finished, non-ferrous or bearing surfaces, shall be coated with a fusion bonded or thermosetting epoxy coating in accordance with AWWA C550, latest revision. Coating shall be holiday-free with a minimum thickness of 12 mils. Surfaces shall be clean, dry and free from rust and grease before coating.
- G. Exterior Valve Coatings: All exterior surfaces of iron body gate valves shall be clean, dry and free from rust and grease before coating. For buried service, the exterior ferrous parts of all valves shall be coated at the factory with coal tar epoxy with a minimum total finish dry film thickness of 20 mils. Prior to backfilling, all uncoated nuts, bolts, glands, rods and other parts of joints shall be coated in the field with coal tar epoxy equal to Kop-Coat Bitumastic No. 300-M. For valves installed aboveground, the exterior ferrous parts of all valves shall be shop primed at the factory with one coat, minimum dry film thickness 1.5 mils, of a primer with rust-inhibitive pigments and synthetic resins. Following installation, aboveground valves shall be finish painted in accordance with Section 09900 - Painting.

2.07 LARGE SWING CHECK VALVES

- A. Large swing check valves 2 inch through 12 inch in size shall conform to AWWA C508, latest revision, and shall be designed for a minimum water working pressure of 150 psi. Check valves shall have cast iron body, swing type and ends shall be flanged, Class 125 in accordance with ANSI B16.1. When open, the valve shall have a straight way passage with a minimum flow area equal to the full pipe area. Swing check valves shall be completely bronze fitted with renewable bronze seat ring and a rubber faced disc; valve hinge pin shall be stainless steel. Check valves shall be supplied with an outside lever and weight.
- B. Swing check valves shall absolutely prevent the return of water back through the valve when the inlet pressure decreases below the downstream pressure. The check valve shall be constructed such that the disc and body seat ring may be easily removed and replaced without removing the valve from the line. Each valve shall be hydrostatically tested at the factory, at a test pressure of 300 psi.
- C. Direct Burial Check Valves:
 - 1. Duckbill Type: Valves are to be of the flow operated type with flanged joint ends on both check sleeve and metal body. Port areas shall be 100% of the mating pipe port area. The port area shall contour down to a duckbill which shall allow passage in one direction of flow and prevent reverse flow. The flexible duckbill sleeve shall be one piece construction with one flange drilled to ANSI 125# standard. The duckbill check tube shall be Nylon reinforced. Valve body shall be drilled and tapped for a flushing connection on top and bottom of the housing.

Valve body shall be two piece split body construction. The two halves shall be sealed by diamond shaped cross section rubber gasket permanently locked by a groove machined in the valve body. Valves shall be series 39 as manufactured by Red Valve Co., Inc., Carnegie, Pa.

2. Swing Type: Valve shall provide an unrestricted, straight through passageway containing 100% full flow area. The disc shall have steel and nylon reinforcements, compression molded into the disc. The synthetic disc shall have an O-ring type seal design for positive seating at high and low working pressures. Valves shall be "Swing Flex" as manufactured by Val-Matic, Elmhurst, Il.

- D. Interior Valve Coating: Prior to shipment from the factory, the interior ferrous surfaces of the valve, except for finished, non-ferrous or bearing surfaces, shall be coated with a fusion bonded or thermosetting epoxy coating in accordance with AWWA C550, latest revision. Coating shall be holiday-free with a minimum thickness of 12 mils. Surfaces shall be clean, dry and free from rust and grease before coating.
- E. Exterior Valve Coating: All exterior surface of swing check valves shall be clean, dry and free from rust and grease before coating. For valves installed below ground or in valve vaults, the exterior ferrous parts of all valves shall be coated at the factory with coal tar epoxy with a minimum total finish dry film thickness of 20 mils. Following installation, all uncoated nuts, bolts, glands, rods and other parts of joints shall be coated in the field with coal tar epoxy equal to Carboline Bitumastic No. 300-M. For valves installed aboveground, the exterior ferrous parts of all valves shall be shop primed at the factory with one coat, minimum dry film thickness 1.5 mils, of a primer with rust-inhibitive pigments and synthetic resins. Following installation aboveground valves shall be finish painted in accordance with Section 09900 - Painting. Shop primer shall be compatible with the field finish paint.

2.08 PLUG VALVES

- A. General: Plug valves shall be non-lubricated eccentric type with flanged or mechanical joint ends as specified below. Valves shall open by turning to the left (counter-clockwise), when viewed from the stem. Port area of valves shall be a minimum of 80 percent of full pipe area. Valve pressure ratings, body flanges and wall thicknesses shall be in full conformance with ANSI B16.1, latest revision. Valves shall seal leak-tight against full rated pressure in both directions. Prior to shipment from the factory, each valve shall be hydrostatically tested as follows. Valve seats shall be tested to provide leak tight shut off to 175 psi for valves through 12 inch and 150 psi for valves 14 inches and larger, with pressure in either direction. In addition, a hydrostatic shell test shall be performed with the plug open to a pressure twice that of rating specified above to demonstrate overall pressure integrity of the valve body. Plug valves shall be eccentric plug valves.

- B. Eccentric Plug Valves: Eccentric plug valves shall be Series 100 as manufactured by DeZurik or approved equal. Valve bodies shall be constructed of high strength cast iron conforming to ASTM A126, Class B and AWWA C504, latest revisions. Valve bodies shall be cast with raised eccentric seats which have a corrosion resistant welded-in overlay of not less than 90 percent pure nickel on all surfaces contacting the plug face. Valve seats shall be in accordance with AWWA C504 and AWWA C507, latest revisions. Valves shall be furnished with resilient faced plugs with Neoprene facing, suitable for use with leachate. Valves shall be furnished with replaceable, permanently lubricated, stainless steel, sleeve-type bearings in the upper and lower plug stem journals. Plug stem bearings shall comply with AWWA C504 and C507, latest revisions. Valves shall be bolted bonnet design. Valves shaft seals shall be designed so that they can be repacked without removing the bonnet and the packing shall be adjustable. Packing material shall be Buna-Vee type packing. Valve shaft seals shall be in accordance with AWWA C504 and AWWA C507, latest revisions. All exposed valve nuts, bolts, springs, washers and the like shall be Type 304 stainless steel.
- C. Interior Valve Lining: All interior ferrous surfaces of the valve that will have contact with the leachate except the valve seating surfaces shall be coated with a factory applied, fusion bonded or thermosetting epoxy coating in accordance with AWWA C550, latest revision. Coating shall be holiday-free with a minimum thickness of 12 mils. Surfaces shall be clean, dry and free from rust, oil, and grease before coating.
- D. Exterior Valve Coating: All exterior surfaces of plug valves shall be clean, dry and free from rust and grease before coating. For buried service, the exterior ferrous parts of all valves shall be coated at the factory with coal tar epoxy with a minimum total finish dry film thickness of 20 mils. Prior to backfilling, all uncoated nuts, bolts, glands, rods and other parts of joints shall be coated in the field with coal tar epoxy equal to Kop-Coat Bitumastic No. 300-M. For valves installed aboveground, the exterior ferrous parts of all valves shall be shop primed at the factory with one coat, minimum dry film thickness 1.5 mils, of a primer with rust-inhibitive pigments and synthetic resins. Following installation aboveground valves shall be finish painted in accordance with Section 09900 - Painting.
- E. Valve Joints: All plug valves installed aboveground, in valve vaults or on flanged piping shall have flanged ends. Flanges shall comply with facing, drilling and thickness of ANSI Standards for Class 125 dimension. Nuts and bolts for flanged connections in valve vaults or corrosive atmospheres shall be Type 316 stainless steel in accordance with ASTM A320, Class 2. Nuts and bolts for aboveground installations or non-corrosive atmospheres shall be carbon steel in accordance with ASTM A307, Grade B. All buried plug valves shall have mechanical joint ends with dimensions, bolting patterns and assembly in strict accordance with ANSI/AWWA C111, latest revision. Tee head bolts and nuts for restrained mechanical joints shall be manufactured of CORTEN-A, high

strength, low allow, corrosion resistant steel as manufactured by NSS Industries, Plymouth, Michigan or an equal approved by the Engineer.

F. Mechanical Valve Actuators:

1. All plug valves installed in valve vaults or buried underground shall have actuators designed for buried and submerged service. Valve shall have seals on all shafts and gaskets on valve and actuator covers to prevent entry of water and dirt. Actuator mounting brackets for buried or submerged service shall be totally enclosed and shall have gasket seals. All exposed valve nuts, bolts, springs, washers and the like shall be Type 304 stainless steel.
2. All plug valves 6 inch in size and larger shall be furnished with mechanical gear actuators. Gear actuators shall be furnished with AWWA Standard 2 inch square operating nuts for buried valves, or handwheel, chainwheel or 2 inch square nut operators for aboveground or valve vault installation, as shown on the Drawings. Gear actuator shall be sized for the maximum pressure differential across the valve, equal to the pressure rating of the valve. All gearing shall be enclosed in a high strength cast iron housing, suitable for running in a lubricant. Housing shall be provided with seals on all shafts to prevent the entry of dirt and water into the actuator. Actuator shaft and quadrant shall be supported on permanently lubricated bronze bearings. Actuator shall clearly indicate valve position for aboveground and valve vault installations and an adjustable stop shall be provided to set closing torque. Actuator shall be capable of withstanding an over-torque without damage up to 450 foot-pounds for 2 inch square nut operators and to 300 foot-pounds for handwheel or chainwheel operators.
3. Four inch and smaller aboveground valves shall be furnished with manual actuators, one-quarter turn to open. Actuator shall be supplied with an AWWA Standard 2 inch operating nut with a standard valve operating lever.

2.09 AUTOMATIC AIR RELEASE VALVES

- A. Automatic air release valve shall have an elongated cast iron body and be designed to operate while pressurized to allow air from a leachate force main to escape through the air release orifice. After entrained air escapes through the orifice, the orifice shall be closed by a needle mounted on a compound lever mechanism attached to a float, preventing leachate from escaping. The air release orifice will then remain closed until enough air accumulates to open the valve and the cycle automatically repeats. The compound lever mechanism shall be manufactured of Delrin with 316 stainless steel linkage, the needle shall be Buna N and the float, float rod and other internal parts shall be 316 stainless steel. The valve shall be furnished with a 2 inch inlet shut off valve, a 1 inch blow off valve, a 1/2-inch outlet shut off valve, quick disconnect couplings for

backflushing and 20 feet of backflushing hose with a quick disconnect coupling. Above-ground valves shall be factory primed and field painted with Class 5 coating system as specified in Section 09900. Valves located in valve vaults shall be factory primed and field coated with Class 8 coating system as specified in Section 09900. The interior cast iron parts and the exterior of the valve shall be coated with 2 coats, 10 mils DFT each coat of coal tar epoxy. Coal tar epoxy shall be equal to Kop-Coat Bitumastic No. 300-M. Automatic air release valve shall be an APCO Model 400, a Crispin Model S20SB or an equal approved by the Engineer.

- B. The forcemains have been laid to minimize the high points. If the Contractor installs the pipe such that the number of high points on the forcemains increases beyond the high points shown on the Drawings, the Contractor shall install an air release valve in a manhole at each high point.

2.10 FLEXIBLE EXPANSION JOINTS

- A. Flexible expansion joints shall be of the molded wide arch design manufactured of chloroprene (neoprene) rubber with polyester reinforcement. Chloroprene (neoprene) body shall be supplied with a hypalon coating. Joints shall be flanged suitable for 150 psi water working pressure and in accordance with ANSI B16.1 dimensions and bolting patterns. Flanged ends shall be furnished with galvanized ductile iron retaining rings.
- B. Provide limit restraint bolts on all pump suction and discharge lines. Expansion joints 6 inches and larger in size shall have a minimum of four limit restraint bolts. Restraint bolts and nuts shall be Type 304 stainless steel.
- C. Minimum performance for flexible expansion joints shall be as follows:

| Size (In.) | Axial Compression (Inches) | Axial Elongation (Inches) | Lateral Deflection (Inches) | Angular Deflection (Degrees) |
|---------------|----------------------------------|---------------------------------|-----------------------------------|------------------------------------|
| 2 | 1-3/4 | 3/4 | 3/4 | 30 |
| 3 | 1-3/4 | 3/4 | 3/4 | 30 |
| 4 | 1-3/4 | 3/4 | 3/4 | 25 |
| 5 | 1-3/4 | 3/4 | 3/4 | 25 |
| 6 | 1-3/4 | 3/4 | 1 | 20 |
| 8 | 1-3/4 | 3/4 | 1 | 20 |

- D. Flexible expansion joints shall be Style 1015 Maxi-Joint as manufactured by General Rubber Corporation, Style 100 Metrasphere as manufactured by the Metraflex Company or an equal approved by the Engineer. Flexible joints for pump suction and discharge piping shall be designed for leachate service at 250 degrees F.

2.11 PRESSURE GAUGE ASSEMBLIES

- A. Pressure gauges shall have the following design features: glycerine filled, 4 1/2-inch dial, aluminum dial with black numerals on white background, Type 316 stainless steel bourdon tube and movement, 300 series stainless steel case and ring, safety glass lens, threaded lens retaining ring, adjustable pointer with over-pressure stop and zero pointer stop, blowout protection, 1/2-inch Type 316 stainless steel stem mounting and 1.0 percent accuracy based on full scale. Provide Type 316 stainless steel pressure snubbers on all gauges not protected by diaphragm seals. Provide a supply of replacement fill liquid for all gauges supplied for the entire Project. Pressure gauges shall be as manufactured by U.S. Gauge, Ashcroft, Marshalltown, Marsh, or approved equal.
- B. Pressure Gauge Service and Ranges: Pressure gauges shall be furnished for the following services with the indicated ranges. Diaphragm seals shall be furnished for gauges as indicated:

| Service | Number Required | Range (psig) | Diaphragm Seal |
|--|-----------------|--------------|----------------|
| 1. Leachate Truck Loading Pump Discharge/Suction | 1 | 0-30 | Yes |
| 2. Leachate Collection Pump Station | 2 | 0-30 | Yes |

- C. As indicated above, pressure gauges shall be furnished with diaphragm protection seals which shall be joined to the pressure gauges and filled at the manufacturer's factory. The seals shall be the removable design such that the bottom member can be removed for cleaning without disturbing the diaphragm. The diaphragm shall be Type 316 stainless steel. The top and bottom members of the seal shall be Type 316 stainless steel. Connections for both the gauge and the bottom connection shall be 1/2-inch female NPT threaded connections. The bottom member shall have a 1/4-inch plugged flushing connection with a Type 316 stainless steel plug. Liquid filling for the diaphragm seals shall be silicone. Provide a supply of replacement fill liquid for all diaphragm seals supplied for the entire Project. Diaphragm protection seals shall be supplied by the manufacturer of the gauge.
- D. Each pressure gauge assembly shall be furnished with an isolation ball valve. Body, stem and all other parts of valves shall be manufactured of Type 316 stainless steel. Valve packing shall be high-density TFE. Valve connections shall be 1/2-inch female NPT threaded connections. Ball valves for pressure gauge assembly isolation shall be 45 Series as manufactured by the Whitey Company, or an equal approved by the Engineer.

2.12 VALVE BOXES

- A. Furnish, assemble, and place a valve box over the operating nut for each buried valve. The valve box shall be designed so as to prevent the transmission of surface loads directly to the valve or piping.
- B. Valve boxes shall be of the adjustable slide-type of suitable length with an interior diameter of not less than 5 inches. The valve boxes shall be manufactured of cast iron and shall be of the two piece design including a bottom section and top section with cover. The cast iron cover shall be plain with no markings. The top section shall be adjustable for elevation and shall be set to allow equal movement above and below finished grade.

The castings shall be manufactured of clean, even grain, gray cast iron conforming to ASTM A48, Class 30B for Gray Iron Castings; and shall be smooth, true to pattern, free from blow holes, sand holes, projections and other harmful defects. The seating surfaces of both the cover and the top section shall be machined so that the cover will not rock after it has been seated.

The valve boxes shall be coated inside and outside with an asphaltic coating prior to machining, so that the machined seating surfaces will be free of any coating. Cast iron valve box assemblies shall be Clow Corp. No. F-2452, Tyler Corp. Series 6855 or 6865 or an approved equal.

- C. Valve extension stems shall be provided for all buried valves when operating nut is deeper than 3 feet below final grade.

2.13 PIPE AND VALVE IDENTIFICATION SYSTEMS

- A. Identification systems for aboveground and below ground piping and for valves shall be as specified under Section 09905 of these Specifications.

2.14 CAM-LOCK COUPLERS

- A. Cam-lock type couplers shall be provided where indicated on the Drawings. Couplers shall be flanged male adapters with a cam locking, rubber gasketed, dust cap. Flange for adapter shall have standard ANSI 150 lb drilling. The male adapter, flange and dust cap shall be manufactured of high tensile aluminum. A stainless steel chain with "S" hooks shall be provided to attach the dust cap to the coupler. Cam-lock type flanged male adapters and dust caps shall be as manufactured by Ever-Tite Coupling Co, Inc. New York N.Y. or an equal approved by the Engineer.

2.15 SWIVEL JOINT

- A. Swivel joint shall be provided at the leachate truck loading station as indicated on the Drawings. The swivel joint shall have a flanged Type 316 stainless steel body with teflon seals to provide leak free rotation. The flanges shall have standard ANSI 150 lb drilling. The ball bearing raceways shall be induction hardened to a minimum Rockwell Hardness of C 40 and the ball bearings shall be Type 316 stainless steel. The swivel joint shall be able to withstand a maximum moment arm of 71,000 inch-pounds. All bolts, nuts, screws, springs, washers and the like shall be Type 316 stainless steel. Flange bolts and nuts for the swivel joint shall be Type 316 stainless steel as specified above in Paragraph 2.01 E. The swivel joint shall be as manufactured by Emco Wheaton, Inc. Cary N.C. (V-Ring, Style 20), or an equal approved by the Engineer.

2.16 TIE RODS

- A. When prior approval is obtained from the Engineer, ductile iron pipe, fittings, and valves may be restrained using tie bolt joint restraint. Joint restraint materials for this method of restraint shall be the Super-Star SST Series Joint Restraint System as manufactured by Star National Products, a Division of Star Industries, Inc. Columbus, Ohio, or an equal approved by the Engineer.

All bolts, nuts, washers, tie rods and other fasteners for the joint restraint system shall be manufactured of CORTEN high strength, low alloy, corrosion resistant steel in conformance with ASTM A242. Tie bolts shall be manufactured of heat treated CORTEN steel. Tie rods and all fasteners for the system shall be galvanized in conformance with the requirements of ASTM A123. Tie rods shall have a minimum diameter of 3/4-inch. The number of tie rods required per joint shall be as recommended by the manufacturer.

Prior to backfilling after installation, all parts of the joint restraint system shall be coated with coal tar epoxy equal to Carboline Bitumastic No. 300-M, for a minimum dry film thickness of 20 mils.

2.17 REDUCED PRESSURE BACKFLOW PREVENTERS

- A. Standards of Construction: Backflow prevention devices shall be manufactured in accordance with AWWA C506, latest revision, American Society of Sanitary Engineering Standards, and the University of Southern California Foundation for Cross Connection Control and Hydraulic Research "Manual of Cross Connection Control", Latest Edition.
- B. Product Handling: Exercise care in transporting and handling backflow preventers to avoid damage. Inside of backflow preventers shall be kept free of dirt and debris.

- C. Reduced pressure principle backflow preventers shall include an integral sensing system that will automatically open a relief valve whenever the differential pressure between the inlet supply and the reduced pressure zone drops to 2 psi. The relief valve shall remain open until a positive pressure differential of 2 psi is re-established. If pressure upstream of the first check valve drops to atmospheric or below, the relief valve shall remain fully open providing an internal air gap between the first check valve and the water level in the reduced pressure zone. The unit shall also be constructed such that any minor leakage of the second check valve will result in visible flow from the relief valve, even if the first check valve is totally disabled.
- D. Reduced pressure principle backflow preventers shall have all bronze bodies for sizes 2 1/2-inches and smaller and all ductile iron bodies for sizes 3 inches and larger. Ductile iron bodies shall be coated with a fusion bonded thermosetting epoxy coating in accordance with AWWA C550 with a minimum, holiday-free, coating thickness of 12 mils. The reduced pressure backflow preventer shall consist of two independently operated, spring loaded, wye pattern, poppet type check valves designed for installation in a normal horizontal flow attitude. An independent spring loaded relief valve shall be located between the two check valves. Check valve assemblies, springs and seats, and all other internal parts shall be constructed of Type 316 stainless steel. Relief valve body and trim shall be constructed of bronze. Check valve and relief valve seats shall be field replaceable without removing the device from the service line. Backflow preventers shall be designed for a working pressure of 200 psi and a temperature range of 32°F to 140°F. The backflow preventer shall be manufactured as a complete unit including test cocks, and upstream and downstream isolation valves. The test cocks shall be manufactured of bronze and shall be arranged such that the unit can be tested without removing the unit from the line.
- E. Isolation Valves: Reduced pressure backflow preventers shall be furnished complete with isolation valves. For sizes 2 1/2-inches and smaller, the isolation valves shall be all bronze ball valves with Buna N O-rings and valve seats, and a lever operating handle. Ball valves shall be in accordance with AWWA C800, latest revision. For sizes 3 inches and larger, the isolation valves shall be resilient seated gate valves with flanged ends and OS&Y handwheel operators. Gate valves shall be as specified and described hereinbefore.
- F. Exterior Coating: The exterior ferrous surfaces of the reduced pressure backflow preventer and the isolation valves shall be shop primed at the factory with one coat, minimum dry film thickness 1.5 mils, of a primer with rust inhibitive pigments and synthetic resins compatible with the finish coats.

Following installation, the backflow preventer unit and aboveground piping shall be finish painted in accordance with Section 09900 - Painting. All surfaces to be coated shall be clean, dry and free of rust, oil and grease.

- G. Acceptable Manufacturers: Reduced pressure principle backflow preventers shall be Model FRP-II and Model 6CM as manufactured by Hersey Products, Inc., Model 825 as manufactured by Febco, Model 909 as manufactured by Watts Regulator Company or an equal approved by the Engineer.

2.18 SAFETY SHOWER AND EYE WASH

- A. Emergency Shower and Eye Wash: Provide a Haws Model 8330, all stainless steel free-standing shower and eye/face wash, or equal. Furnish complete with deluge shower head, 1 1/4-inch full flow ball valve actuated by pull rod and ring, hand and foot operated stainless steel, aerated eye/face wash stanchion, floor flange and interconnecting fittings. Provide a 1 1/4-inch supply inlet, and 1 1/4-inch waste tee.
- B. All exposed emergency shower piping to be insulated with 1/2-inch thick closed cell tubing insulating per ASTM C-534, Type 1. Paint insulation with 2 coats semigloss water base paint, specifically recommended for weather protection, Rubatex R-180FS Insulation, Rubatex 374 Coating, or equal. Install as shown on the Drawings.

2.19 MISCELLANEOUS ITEMS

- A. Other items necessary for the complete installation and not specified herein shall conform to the details and notes shown on the Drawings. All minor items implied, usually included, or required for the construction of a complete operating system shall be installed whether shown on the Drawings or not.

PART 3 - EXECUTION

3.01 INSPECTION

- A. All pipe, fittings, valves, and other material shall be subject to inspection and approval by the Engineer after delivery, and no broken, cracked, imperfectly coated, or otherwise damaged or unsatisfactory material shall be used. When a defect or crack is discovered, the injured portion shall not be installed. Cracked pipe shall have the defect cut off at least 12 inches from the break in the sound section of the barrel.

3.02 GENERAL INSTALLATION REQUIREMENTS

- A. Excavation, backfill, and compaction shall conform to the provisions of Section 02220.
 - 1. Pipe Cradle: Upon satisfactory installation of the pipe bedding material as specified in Section 02220, a continuous trough for the pipe barrel and recesses for the pipe bells or couplings shall be excavated by hand digging. When the pipe

is laid in the prepared trench, true to line and grade, the pipe barrel shall receive continuous, uniform support and no pressure will be exerted on the pipe joints from the trench bottom.

- B. Cover for underground piping shall not be less than that indicated on the Drawings. The minimum cover for pipe shall be 36 inches. In areas where other piping conflicts preclude the maximum cover desired, the piping shall be laid to provide the maximum cover obtainable.
- C. Pipe, fittings, valves and accessories shall be installed as shown or indicated on the Drawings.
- D. All connections to existing piping systems shall be made as shown or indicated on the Drawings after consultation and cooperation with authorities of the Owner.
- E. Pipe Joint Deflection: Whenever it is desirable to deflect pipe joints to avoid obstructions or to maintain required alignment, the amount of the joint deflection shall not exceed 80 percent of the maximum limits allowed by the pipe manufacturer.
- F. In preparation for pipe installation, placement (stringing) of pipe should be as close to the trench as practical on the opposite side of the trench from the excavated material. The bell ends of the pipe should point in the direction of the work progress.
- G. Pipe and fittings shall be laid accurately to the lines and grades indicated on Drawings or required. Where grades for the pipeline are not indicated on the Drawings, maintain a uniform depth of cover with respect to finish grade. Care shall be taken to insure a good alignment both horizontally and vertically and to give the pipe a firm bearing along its entire length. Any pipe which has its grade or joint disturbed after laying shall be taken up and relaid.
- H. All pipe and fittings shall be cleared of sand, dirt, and debris before laying. All precautions shall be taken to prevent sand, dirt or other foreign material from entering the pipe during installation. If necessary, a heavy, tightly woven canvas bag of suitable size shall be placed over each end of the pipe before lowering into the trench and left there until the connection is made to the adjacent pipe. Any sand, dirt, or other foreign material that enters the pipe shall be removed from the pipe immediately. Interior of all pipe and fittings shall be kept clean after installation until accepted in the complete work.
- I. Any time that pipe installation is not in progress, the open ends of pipe shall be closed by a watertight plug or other method approved by the Engineer. Plugs shall remain in pipe ends until all water is removed from the trench. No pipe shall be installed when trench conditions are unsuitable for such work, including standing water, excess mud, or rain.

- J. After pipe has been laid, inspected, and found satisfactory, sufficient backfill shall be placed along the pipe barrel to hold the pipe securely in place while conducting the preliminary hydrostatic test. No backfill shall be placed over the joints until the preliminary test is satisfactorily completed, leaving them exposed to view for the detection of visible leaks.
- K. Upon satisfactory completion of the hydrostatic test, backfilling of the trench shall be completed.
- L. Aboveground and Exposed Piping: Piping shall be cut accurately to measurements established at the job site and shall be worked into place without springing or forcing, properly clearing all equipment access areas and openings. Changes in sizes shall be made with appropriate reducing fittings. Pipe connections shall be made in accordance with the details shown and manufacturer's recommendations. Open ends of pipe lines shall be properly capped or plugged during installation to keep dirt and other foreign material out of the system. Pipe supports and hangers shall be provided where indicated or as required to insure adequate support of the piping.

3.03 INSTALLATION OF DUCTILE IRON PIPE

A. Handling and Cutting Pipe:

1. Care shall be taken in handling, cutting, and laying ductile iron pipe and fittings to avoid damaging the pipe and interior polyurethane or cement mortar lining, scratching or marring machined surfaces, and abrasion of the pipe coating. All cracked pipe and fittings shall be removed at once from the work at no additional cost to the Owner.
2. Pipe cutting shall be done in a neat workmanlike manner without creating damage to the pipe and interior coal tar epoxy or cement mortar lining. Ductile iron pipe may be cut using an abrasive pipe saw, rotary wheel cutter, guillotine pipe saw, milling wheel saw or oxyacetylene torch. Cut ends and rough edges of ductile iron pipe shall be ground smooth. For push-on joint connections, the cut end shall be beveled to prevent gasket damage during joint assembly. Interior lining shall be repaired at cut ends per the manufacturer's instructions prior to joint assembly.

B. Laying Pipe and Fittings:

1. Bedding for Ductile Iron Pipe: Minimum bedding requirements shall be Type 2 as defined in ANSI/AWWA C600, latest revision. Provide proper bedding required, in accordance with thickness class of pipe being laid and depth of cover. Proper pipe laying conditions shall be in accordance with ANSI/AWWA C150 and C151, latest revisions, and ANSI/AWWA C600, latest revision.

2. All ductile iron pipe and fittings shall be laid in accordance with American Water Works Association Standard ANSI/AWWA C600, latest revision, entitled "Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances", with the following sections specifically applying:

- a) Section 3.3 - Pipe Installation
- b) Section 3.4 - Joint Assembly

C. Ductile Iron Pipe Joints:

1. Type: The joints of all pipelines shall be made absolutely tight. The particular joint used shall be approved by the Engineer prior to installation. Where shown on the Drawings or where, in the opinion of the Engineer, settlement or vibration is likely to occur, all pipe joints shall be bolted mechanical type or restrained type as specified above, or as indicated on the Drawings.
2. Push-on Joints: Push-on joints shall be made in strict accordance with the manufacturer's recommendations. Lubricant, if required, shall be an inert, non-toxic, water soluble compound incapable of harboring, supporting, or culturing bacterial life. Manufacturer's installation recommendations shall be submitted to the Engineer for review and approval before commencing work. The bell of the pipe shall be cleaned of excess tar or other obstructions and wiped out before the cleaned and prepared spigot of the next pipe is inserted. The new pipe shall be shoved firmly into place until properly seated and held securely until the joint has been completed.
3. Mechanical Joints: All types of mechanical joint pipes shall be laid and jointed in full conformance with manufacturer's recommendations, which shall be submitted to the Engineer for review and approval before work is begun. Only specially skilled workmen shall be permitted to makeup mechanical joints. Torque wrenches, set as specified in AWWA Standard C111, shall be used; or spanner type wrenches not longer than specified therein may be used without the permission of the Engineer.
4. Flanged Joints: Flanged joints shall be made up by inserting the gasket between the flanges. The threads of the bolts and the faces of the gaskets shall be coated with suitable lubricant immediately before installation.
5. Restrained Joints: Restrained joints shall be provided where indicated on the Drawings. Joint assembly shall be made in strict accordance with the manufacturer's instructions, which shall be submitted to the Engineer for review and approval before commencing work.

3.04 INSTALLATION OF PVC PIPE

A. Storage and Handling:

1. PVC pipe shall be delivered to the site in unbroken bundles packaged in such manner as to provide protection against damage. When possible, pipe should be stored at the job site in the unit packages until ready for use. Packaged units shall be handled using a forklift or a spreader bar with fabric straps. Packaged units shall not be stacked at the job site higher than two units high.
2. When it is necessary to store PVC pipe for long periods of time, exposure to direct sunlight shall be prevented by covering the pipe with an opaque material. Adequate air circulation above and around the pipe shall be provided as required to prevent excessive heat accumulation. PVC pipe shall not be stored close to heat sources of hot objects such as heaters, fires, boilers or engine exhaust. Pipe gaskets shall be protected from excessive exposure to heat, direct sunlight, ozone, oil and grease. The interior and all sealing surfaces of pipe, fittings, and other appurtenances shall be kept clean and free of dirt and foreign matter.
3. Care shall be taken in handling and laying pipe and fittings to avoid severe impact blows, crushing, abrasion damage, gouging or cutting. Pipe shall be lowered, not dropped, from trucks or into trenches. All cracked, damaged, or defective pipe and fittings, or any length of PVC pipe having a gouge, scratch or other permanent indentation of more than 10 percent of the wall thickness in depth, shall be rejected and removed at once from the work and replaced with new acceptable pipe at no additional cost to the Owner.

B. Field Cutting PVC Pipe: Field cutting of pipe shall be done in a neat workmanlike manner without creating damage to the pipe. The pipe shall be cut square with a fine-toothed hand or power saw or other cutter or knife designed for use with plastic pipe. Prior to cutting, the pipe shall be marked around its entire circumference or a square-in vise shall be used to ensure the pipe end is cut square. Remove burrs by smoothing edges with a knife, file, or sandpaper.

1. Field Cutting Bell and Spigot PVC Pipe: Bevel the cut end of the pipe using a pipe beveling tool, wood rasp or portable sander to prevent damage to the gasket during joint assembly. A factory-finished beveled end should be used as a guide to ensure proper beveling angle and correct depth of bevel. Round off any sharp edges on the leading edge of the bevel with a knife or file.

C. Laying PVC Pipe:

1. Pipe Bedding: Bedding for PVC pipe shall be as specified in Section 02220 using granular pipe bedding material.
2. All PVC pipe shall be laid in accordance with the pipe manufacturer's published installation guide, the AWWA Manual of Practice No. M23 "PVC Pipe - Design and Installation" and the Uni-Bell Plastic Pipe Association installation recommendations.

D. PVC Pipe Joint Assembly for Rubber Gasketed Bell and Spigot Pipe:

1. The PVC bell and spigot joint shall be assembled in accordance with the pipe manufacturer's installation instructions. Clean the interior of the bell, the gasket, and the spigot of the pipe to be jointed with a rag to remove any dirt or foreign material before assembling. Inspect the gasket, pipe spigot bevel, gasket groove and sealing surfaces for damage or deformation.
2. Lubricate the spigot end of the pipe with a lubricant supplied or specified by the pipe manufacturer for use with gasketed PVC pipe in potable water systems. The lubricant should be supplied as specified by the pipe manufacturer. After the spigot end is lubricated, it must be kept clean and free of dirt and sand. If dirt and sand adhere to the lubricated end, the spigot must be wiped clean and relubricated.
3. Insert the spigot into the bell so that it contacts the gasket uniformly. Align the pipe sections and push the spigot end into the bell until the manufacturer's reference mark on the spigot is flush with the end of the bell. The pipe should be pushed into the bell using a bar and wood block. The joint shall not be assembled by "stabbing" or swinging the pipe into the bell, nor shall construction machinery be used to push the pipe into the bell.
4. If undue resistance to insertion of the spigot end is encountered or if the reference mark does not reach the flush position, disassemble the joint and check the position of the gasket. If the gasket is twisted or pushed out of its seat, inspect the components, repair or replace damaged items, clean the components and repeat the assembly steps. Be sure the pipe is in proper alignment during assembly. If the gasket was not out of position, check the distance between the spigot end and the reference mark and relocate the mark if it is out of position.

E. PVC Pipe Joint Assembly for Threaded and Solvent Welded Pipe:

1. All threaded and solvent welded joints shall be made watertight. All pipe cutting, threading and jointing procedures for threaded and solvent welded PVC pipe

joints shall be in strict accordance with the pipe and fitting manufacturer's printed installation instructions. Thread lubricant for threaded joints shall be Teflon tape only.

2. At threaded joints between PVC and metal pipes, the metal side shall contain the socket end and the PVC side the spigot. A metal spigot shall not, under any circumstances, be screwed into a PVC socket.

3.05 FITTING INSTALLATION FOR UNDERGROUND PIPING

- A. The weight of ductile iron fittings shall not be carried by the pipe on which they are installed. The fitting shall be supported by a concrete cradle as shown on the standard details. Concrete used for supports shall have a minimum compressive strength of 3,000 psi at 28 days. Concrete for the support cradle shall be poured against undisturbed soil.
- B. All glands, clamps, bolts, nuts, studs and other uncoated parts of fitting joints for underground installation shall be coated with two coats, 10 mils DFT per coat, of coal tar epoxy equal to Kop-Coat Bitumastic No. 300-M.

3.06 CONCRETE PIPE ENCASEMENT

- A. Concrete for concrete pipe encasement shall have a minimum strength of 3,000 psi at 28 days and encasement shall be constructed in accordance with details shown on the Drawings. Encasement shall be constructed where:
 1. Indicated on the Drawings.
 2. The Engineer shall order the pipeline encased.
- B. The points of beginning and ending of concrete pipe encasement shall be not more than 6 inches from a pipe joint to protect the pipe from cracking due to uneven settlement of its foundation or the effects of superimposed live loads.
- C. Pipe encasement shall provide a minimum coverage of 6 inches all around the pipe including pipe bells.

3.07 INSTALLATION OF PIPE SLEEVES, WALL CASTINGS AND COUPLINGS

- A. Pipe sleeves and wall castings shall be provided at the locations called for on the Drawings. These units shall be as detailed and of the material as noted on the Drawings. They shall be accurately set in the concrete or masonry to the elevations shown. All wall sleeves and castings required in the walls shall be in place when the walls are poured.

Ends of all wall castings and wall sleeves shall be of a type consistent with the piping to be connected to them.

- B. Link seals for wall sleeves shall be installed in strict accordance with the manufacturer's printed installation instructions. For watertight applications in tanks or treatment units, the link seal installation shall be tested hydrostatically for leaks at the same time as the tank or treatment unit. Any leaks that occur during the test period shall be repaired by checking the link seals for proper installation and replacement of unit(s) found to be defective at no additional cost to the Owner.
- C. Pipe couplings shall be installed in strict accordance with the manufacturer's published instructions and recommendations.

3.08 INSTALLATION OF VALVES

- A. Valves of the size and type shown on the Drawings shall be set plumb and installed at the locations indicated on the Drawings. Valves shall be installed in accordance with manufacturer's installation instructions and with the Details shown on the Drawings.
- B. Valves shall be installed such that they are supported properly in their respective positions, free from distortion and strain. Valves shall be installed such that their weight is not borne by pumps and equipment that are not designed to support the weight of the valve.
- C. Valves shall be carefully inspected during installation; they shall be opened wide and then tightly closed and the various nuts and bolts shall be tested for tightness. Special care shall be taken to prevent any foreign matter from becoming lodged in the valve seat. Check and adjust all valves for smooth operation.
- D. Install valves with the operating stem in either horizontal or vertical position.
- E. Allow sufficient clearance around the valve operator for proper operation.
- F. Clean iron flanges by wire brushing before installing flanged valves. Clean carbon steel flange bolts and nuts by wire brushing, lubricate threads with oil or graphite, and tighten nuts uniformly and progressively. Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound or Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.
- G. For buried valves, a valve box shall be centered accurately over the operating nut and the entire assembly shall be plumb. The tops of valve boxes shall be adjusted to the proper elevation as specified below and as shown on the Drawings.

1. In paved areas, tops of valve box covers shall be set flush with pavement. Following paving operations, a 30 inch square shall be neatly cut in the pavement around the box and the paving removed. The top of the box shall then be adjusted to the proper elevation and a 30-inch square by 6-inch thick concrete pad poured around the box cover. Concrete pads in traffic areas shall be reinforced with No. 4 reinforcement bars as shown on the Drawings. Concrete for the pad shall be 3,000 psi compressive strength.
 2. In unpaved areas, tops of valve box covers shall be set 2 inches above finished grade. After the top of the box is set to the proper elevation, a 30-inch square by 6-inch thick concrete pad shall be poured around the box cover. Concrete for the pad shall be 3,000 psi compressive strength.
 3. The concrete pad for the valve box cover shall have a 2-1/2 inch diameter, bronze identification disc embedded in the concrete surface as shown on the Drawings. The bronze identification disc shall be as specified in Section 09905 and shall have the information as shown on the Drawings neatly stamped on it.
- H. Valves shall be tested hydrostatically, concurrently with the pipeline in which they are installed. Protect or isolate any parts of valves, operators, or control and instrumentation systems whose pressure rating is less than the pressure test(s). If valve joints leak during pressure testing, loosen or remove the nuts and bolts, reseal or replace the gasket, reinstall or retighten the bolts and nuts and hydrostatically retest the joints.
- I. Following installation, all aboveground valves shall be painted in accordance with the painting system specified in Section 09900 - Painting. Following installation of buried valves or valves installed in valve vaults, repair any scratches, marks and other types of surface damage, etc., with a coating equal to the original coating supplied by the manufacturer. Prior to backfilling, all nuts, bolts and other parts of the valve joints shall be coated with two coats, 10 mils DFT per coat, of coal tar epoxy equal to Kop-Coat Bitumastic No. 300-M.
- 3.09 SEPARATION OF NON-POTABLE WATER MAINS AND POTABLE WATER MAINS
- A. Non-potable water mains shall be installed with at least a 10-foot horizontal separation from any potable water main. At crossings the installation shall provide for a minimum vertical separation distance of 18 inches between the outside of the crossing non-potable and potable water mains. This separation shall be provided where the potable water main is either below or above the non-potable water main. When the 18-inch minimum vertical separation distance cannot be maintained, the potable water main shall be encased in concrete. Concrete encasement shall be as specified above. The potable water main shall be encased for 10 feet each way of the crossing.

3.10 HYDROSTATIC PRESSURE AND LEAKAGE TESTING

- A. All components of pressure mains including pipe, fittings, and valves shall be tested following installation in accordance with applicable portions of ANSI/AWWA, C600, latest revision.
- B. All pumps, gauges and measuring devices shall be furnished, installed, and operated by the Contractor and all such equipment and devices and their installation shall be approved by the Engineer. All pressure and leakage testing shall be done in the presence of a representative of the Owner and the Engineer as a condition precedent to the approval and acceptance of the system.
- C. Water for testing and flushing shall be clean water provided by the Owner.
- D. Hydrostatic testing shall be completed before the joints have been backfilled, unless the backfilling has been authorized by the Engineer.
- E. Hydrostatic testing shall commence only after a minimum of 36 hours have elapsed after the last concrete reaction or thrust block has been cast using high early strength concrete, or at least 7 days after the last concrete reaction or thrust block has been cast using standard strength concrete.
- F. Pressure mains shall be hydrostatically tested to a pressure of 150 psig for a minimum duration of three hours. The test pressure shall not vary by more than ± 5 psig.
- G. Where isolation valves are not available, the Contractor shall isolate the piping to be tested from existing piping, equipment, etc.
- H. Procedure for Hydrostatic Testing:
 - 1. Each section of the pipeline to be tested shall be slowly filled with water.
 - 2. During filling of the pipeline and prior to testing, all air shall be expelled from the pipeline. If permanent automatic or manual air release valves are not located at all high points, the Contractor shall install temporary air vents at all high points, complete with tapping saddle, corporation stop, fittings and valves. Following completion of testing, the taps shall be tightly plugged unless otherwise specified.
- I. Apply the specified test pressure, measured at the point of highest elevation in the line, by means of a test pump connected to the pipeline in a manner approved by the Engineer and the Owner.

J. A leakage test shall be conducted concurrently with the hydrostatic pressure test. Leakage shall be defined as the measured quantity of water that must be supplied from a calibrated container into the newly laid pipe or any valved section thereof, to maintain pressure within ± 5 psig of the specified test pressure, after the air in the pipeline has been expelled and the pipe has been completely filled with water.

K. Allowable leakage shall be limited to the following formula as set forth in ANSI/AWWA C600, latest revision, or to Table 6 of ANSI/AWWA C600. The maximum allowable leakage shall be the minimum quantity of the two values as determined by the formula or obtained from Table 6. The allowable leakage formula is:

$$L = \frac{SD(P)^{1/2}}{133,200}$$

in which L is the allowable leakage, in gallons per hour; S is the length of pipeline tested, in feet; D is the nominal diameter of the pipe, in inches; and P is the average test pressure during the leakage test, in pounds per square inch gauge.

L. During the hydrostatic and leakage tests, all exposed pipe, fittings, valves, pipe couplings, and the like will be carefully examined. Acceptance of the pipeline shall be determined on the basis of the allowable leakage. If any test of the pipe laid indicates leakage greater than that allowed, the Contractor shall, at his own expense, repair by removing and replacing defective pipe, fittings, valves, pipe couplings, and the like, with materials that are free of defects, after which the pipeline shall be retested. Repair and retesting shall be done until the lines pass the specified test. All visible leaks and cracked pipe, fittings, valves, pipe couplings, and the like shall be repaired or replaced regardless of the amount of leakage.

3.11 INFILTRATION/EXFILTRATION TESTING FOR GRAVITY DRAIN LINES

A. All gravity drain lines shall be tested for infiltration and exfiltration. The infiltration/exfiltration test shall be performed in the presence of the Engineer and the Owner.

B. The allowable limits of infiltration or exfiltration or leakage for the drain lines, or any portion thereof shall not exceed a rate of 0.04 gallons/inch of diameter/hour/100 feet of line.

C. Any part, or all of the system may be tested for infiltration or exfiltration, as directed by the Engineer. Prior to testing for infiltration, the system shall be pumped out so that normal infiltration conditions exist at the time of testing. The amounts of infiltration or exfiltration shall be determined by pumping into or out of calibrated drums, measured by means of a calibrated V-notch, sharp crested weir constructed in a rigid sealed frame of the correct size for the drain line being tested, or by other approved methods.

- D. The water tightness of a drain line which has a crown lying below the normal groundwater level shall be tested by measuring the infiltration. The water tightness of drain lines having a crown 1-inch or more above groundwater level shall be tested by filling the pipe with water to produce a hydrostatic head of 2 feet or more above the crown of the sewer at the upper end of the test section or to a depth equal to the normal wet season groundwater table outside of the drain line, whichever is higher, and then measuring the exfiltration. For the exfiltration test, the trench excavation shall remain dewatered as required throughout the test.
- E. For the exfiltration test, the water level in the drain line section being tested shall be allowed to stabilize a minimum of one hour before beginning the test. Following the one hour stabilization period, water loss shall be measured from the drain line system for a continuous test period of two hours. Upon application of internal hydrostatic pressure for exfiltration testing, care shall be taken to preclude unseating the joint gaskets for a specific type of pipe by exceeding the pressure capability thereof.
- F. Where infiltration or exfiltration exceeds the allowable limits specified herein, the defective pipe, joints, or other faulty construction shall be located and repaired by the Contractor. If the defective portions cannot be located, the Contractor shall remove and reconstruct as much of the work as is necessary in order to conform to the specified allowable limits.
- G. The Contractor shall provide all labor, equipment, and materials and shall conduct all testing required, under the direction of the Engineer. No separate payment will be made for this work and the cost of this work shall be included in the prices quoted in the Bid.

3.12 MAIN CLEANING AND FLUSHING

- A. Following the hydrostatic and leakage tests, all the mains constructed under this contract shall be cleaned and flushed to remove sand, loose dirt and other debris. Flushing velocity shall be a minimum of 2.5 fps. Flushing shall continue until clean water flows from the main. However, the Contractor shall endeavor to use the minimum amount of flushing water required to complete the work. To increase the efficiency of the cleaning and flushing operation, the Contractor shall use a pipeline pigging device of the proper size and designed to clean the intended pipeline. The pigging device shall be capable of turning through a standard 90 degree MJ bend. The type of pipeline pigging device and the method of operation shall be approved by the Engineer.
- B. Upon completion of testing for the gravity drain line system, drain lines shall be flushed to remove dirt, sand, stones and other debris which may have entered the lines during construction and settled out in the lines and manholes. Materials and debris flushed from the drain lines shall be removed from a downstream manhole or basin and disposed of at an approved disposal area.

- C. Water for flushing shall be clean water provided by the Contractor from a source approved by the Engineer and the Owner prior to beginning connections for flushing operations.
- D. Temporary blowoffs may be required for the purpose of flushing mains. Temporary blowoffs shall be installed as close as possible to the ends of the main being flushed. Blowoffs installed on the main shall be the same diameter as the main. Temporary blowoffs shall be removed and plugged after the main is flushed. All costs for installing and removing temporary blowoffs shall be at no additional cost to the Owner.
- E. The Owner shall be notified at least 72 hours prior to flushing mains.
- F. Blowoffs and temporary drainage piping used for flushing shall not be discharged into any gravity sewer or pumping station wetwell. The Contractor shall obtain prior approvals from the Engineer and the Owner as to the methods and locations of flushing water discharge.

3.13 INSTALLATION OF AUTOMATIC AIR RELEASE VALVES

- A. Precast valve pits shall be constructed in a workmanlike manner at the locations and to the dimensions indicated on Drawings.
- B. Piping, fittings and the automatic air release valves shall be installed as shown on the Drawings.
- C. The automatic air release valve assemblies shall be installed so that they are properly supported and such that they will function properly and freely and no parts shall be strained.
- D. Frames and covers shall be installed for valve pits as indicated on drawings.
- E. Valve tests shall be performed with and part of tests on companion leachate force main.

3.14 INSTALLATION OF TIE RODS

- A. Tie rods shall be installed in strict accordance with the manufacturer's written installation requirements. Unless otherwise indicated on the Drawings, the size and number of tie rods for a joint or installation shall be as recommended by the manufacturer's design chart for a working pressure of 150 psi.
- B. Following installation and prior to backfilling, all parts of the tie rod joint restraint system, including tie rods, tie bolts, nuts, washers, and other fasteners, shall be coated

with two coats, 10 mils DFT per coat, of coal tar epoxy equal to Kop-Coat Bitumastic No. 300-M.

3.15 INSTALLATION OF REDUCED PRESSURE BACKFLOW PREVENTERS

- A. Backflow preventers shall be installed at the locations shown on the Drawings. Backflow preventers shall be installed in accordance with the manufacturer's written installation instructions and as shown on the Drawings.
- B. Reduced pressure principle backflow preventers shall be installed horizontally with an 18-inch minimum clearance between the finished grade and the lowest point on the bottom of the unit. Reduced pressure backflow preventers shall be installed with provisions for a suitable drain arrangement to drain off discharges from the relief valve, so that discharges are not objectionable. Backflow preventers shall be installed such that they are easily accessible for testing, maintenance and repair.
- C. Piping and fittings for units 3 inches and larger in size shall have flanged joints. Piping, fittings and valves shall be properly supported with pipe support stands as shown on the Drawings.
- D. Following installation of the reduced pressure backflow preventer, piping, fittings and valves, the entire aboveground assembly shall be finished painted in accordance with Section 09900 - Painting.

3.16 FINAL DISINFECTION FOR POTABLE WATER PIPELINES

- A. Before any portion of the potable water piping systems is to be placed in service, it shall be disinfected; and its disinfection shall be demonstrated by bacteriological tests conducted in accordance with "Standard Methods for Examination of Water and Sewage" for the coli-aerogenes group, by an approved laboratory, acceptable to the Engineer and the County Health Department.
- B. All pipe, fittings, valves and all other appurtenances installed for potable water lines shall be disinfected prior to being placed in service. Disinfection procedures shall be approved by the Engineer and shall be in conformance with ANSI/AWWA C651, latest revision.
- C. Pipe subjected to contaminating materials shall be treated as approved by the Engineer. Should such treatment fail to remove contaminants from the pipe, contaminated sections of pipe shall be replaced with new uncontaminated pipe at no additional cost to the Owner.

D. Disinfection of a completed line shall be accomplished using the following procedure:

1. All potable water piping, fittings, valves and appurtenances shall be disinfected with a chlorine solution with a sufficient concentration such that the initial chlorine concentration in the water line shall be a minimum of 50 mg/l available chlorine, at any point in the line.
2. Chlorine used for the purpose of disinfection shall be high test granular calcium hypochlorite which contains approximately 65 to 70 percent available chlorine by weight. The calcium hypochlorite shall be stored in a cool, dry, and dark environment, prior to its use, to minimize deterioration. The dry calcium hypochlorite will be used to makeup a high concentration chlorine solution which will be used for disinfection. Under no circumstances will undiluted, dry calcium hypochlorite be placed in the pipeline to be disinfected.
3. Water from the existing, in-service water line shall be made to flow at a constant, slow rate into the water line to be disinfected. Chlorine solution shall be injected or pumped at a regulated rate into the new main, at a point not more than 10 feet downstream from the beginning of the new water main. The method of tapping the water main for the chlorine injection point and the location of the tap shall be approved by the Engineer.
4. Chlorine solution shall be circulated in the water main by opening the water control valve and systematically manipulating hydrants, manual air release valves and blowoffs.
5. Water service lines shall be disinfected in a similar manner as that for water mains, including corrective measures, by methods acceptable to the Engineer.
6. Chlorine solution shall remain in the water lines for no less than 24 hours, but longer than 24 hours if directed by the Engineer.
7. Extreme care shall be exercised at all times to prevent concentrated chlorine solution from entering existing water mains.

E. After 24 hours, the free residual chlorine concentration in the water line at the pipe extremities shall be at least 10 mg/l; if not, the water lines shall be reinfected as described above.

F. Final flushing of lines may proceed after 24 hours, provided the free residual chlorine analysis is satisfactory. Flushing shall be continued until a chlorine residual test shows that lines contain only the normal chlorine residual. Prior to flushing water with high

chlorine concentrations, obtain approvals from the Engineer and the Owner as to the methods and locations of discharge.

- G. Following disinfection and thorough flushing of the water lines, as specified herein, the Contractor shall furnish all labor and materials required to obtain samples of water from established points of the water line in suitable sterilized containers obtained from the County Health Department or approved analytical laboratory. Two (2) series of successive samples shall be obtained at each established sampling point. Each test series will require two samples at each sampling point. The period between each series of samples shall be a minimum of 24 hours. Samples shall be delivered by the Contractor to the County Health Department or approved analytical laboratory for bacteriological examination. Samples shall be collected in conformance with the County Health Department standards and lab testing schedule. Prior to collecting samples, the Contractor shall notify the Engineer and the Owner who will have representatives present during sample collection.
- H. Bacteriological test results will be available approximately 48 to 72 hours after samples are submitted. If tests results are unsatisfactory, the Contractor shall immediately rechlorinate and retest the water lines and proceed with such corrective measures as are necessary to secure disinfected lines. All services shall be rechlorinated if the lines are rechlorinated. The water lines shall be redisinfected and retested, at the Contractor's expense, until approved by the Engineer, and the County Health Department.
- I. At satisfactory completion of the bacteriological test requirements, potable water lines shall be placed in service in a manner approved by the Engineer and the Owner. Contractor shall notify the Engineer and the Owner 72 hours prior to placing lines in service.

3.17 OBTAINING POTABLE WATER FOR TESTING, FLUSHING, AND DISINFECTION

- A. The potable water supply shall be protected with an air gap or a reduced pressure principle backflow preventer approved by the Owner.
- B. To obtain water service during construction, the Contractor shall be required to install a temporary construction water service to the Owner provided on site water well, complete with an approved backflow prevention device. The piping, fittings, backflow preventer and appurtenances required for the temporary construction water service shall be supplied by the Contractor.
- C. The Contractor shall coordinate with the Owner for temporary construction water service connection, usage, and flushing.

3.18 CONNECTION TO EXISTING WATER SYSTEMS

- A. The Contractor shall coordinate making connection of the new potable water mains to mains which are in service at the time of construction, with the Owner. The Contractor shall not connect to existing facilities unless the Engineer and a representative of the Owner are present. The Engineer and the Owner shall be notified at least 48 hours prior to the time connection is desired.
- B. Operation of all water system valves shall be the responsibility of the Owner's personnel only. At no time shall the Contractor operate any system valves. System valves shall be defined as any valve which has main pressure against either side of the valve. The Contractor shall notify the Owner to request that a valve be operated, at least 48 hours prior to the time operation is required.

END OF SECTION

SECTION 15126

HANGERS AND SUPPORTS

D.E.P.

PART 1 - GENERAL

APR 27 1998
SOUTHWEST DISTRICT
TAMPA

1.01 DESCRIPTION

- A. Furnish and install pipe hangers and supports to rigidly support pipes, maintain the necessary pitch, prevent vibration, and to allow expansion and contraction of the pipes installed in the location(s) shown on the drawings and specified herein.

1.02 QUALITY ASSURANCE

- A. Supporting devices shall be designed in accordance with the best practice and shall not be unnecessarily heavy. Sufficient hangers and supports shall be installed to provide a working safety factor of not less than 5 for each hanger. Hangers shall have a minimum spacing in accordance with ANSI 31.1.
- B. Point loading hangers are not acceptable. Hangers shall be sling or saddle type.
- C. Wherever possible, pipe attachments for horizontal piping shall be pipe clamp and structural attachments shall be beam clamps.
- D. All rigid hangers shall provide a means of vertical adjustments after erection.
- E. Generally, hangers shall be sized for supporting the pipe, excluding insulation.
- F. On pipes which are covered with insulation where hangers and supports are outside the insulation, proper pipe protection saddles shall be installed.
- G. Overhead hangers shall be supported by threaded rods properly fastened in-place by suitable screws, clamps, inserts or bolts, or by welding.
- H. Saddle stands shall be of the adjustable type. Each stand shall consist of a length of steel pipe fitted at the base with a standard threaded flange at the top with an adjustable saddle or roll. The base flanges shall be bolted to the floor, foundation, or concrete base.
- I. Anchors shall be furnished and installed when specified, shown or required for holding the pipelines and equipment in position or alignment. Anchors shall be designed for rigid fastening to the structures, either directly or through brackets. The design of all anchors shall be subject to approval by the Engineer. Materials shall be galvanized or stainless steel.

- J. Inserts for concrete shall be installed in concrete structures where required for fastening supporting devices. They shall be designed to permit the rods to be adjusted horizontally in one plane and to lock the rod nut or head automatically. Inserts shall be recessed near the upper flange to receive reinforcing rods. Inserts shall be so designed that they may be held in position during concrete pouring operation. Inserts shall be designed to safely carry the maximum load that can be imposed by the rod they engage.
- K. Concrete supports shall be placed wherever shown or required.
- L. Equipment shall be supported in accordance with manufacturer's recommendations.

PART 2 - PRODUCTS

2.01 MATERIALS

~~A. Wall and column supports: (Unless otherwise indicated on the drawings)~~

- ~~1. Welded steel brackets with anchor chairs.~~
- ~~2. Install additional wall bearing plates where required for wall brackets.~~
- ~~3. All hardware shall be type 316 stainless steel.~~
- ~~4. Acceptable Manufacturers:~~
 - ~~a) Grinnell Co.~~
 - ~~b) Eleen Metal Products Co.~~
 - ~~c) NPS Industries.~~
 - ~~d) Or equal.~~

~~A. B.~~ Pipe saddle supports: (Unless otherwise indicated on the Drawings)

- 1. Adjustable type with pipe and floor flanges.
- 2. When used under base fittings, substitute matching floor flanges for saddle sections.
- 3. All hardware shall be Type 316 stainless steel.
- 4. Acceptable Manufacturers:
 - a) Grinnell Co.

- b) Elcen Metal Products Co.
- c) NPS Industries.
- d) Or equal.

~~C. Overhead hangers: (Unless otherwise indicated on the Drawings)~~

~~1. For pipes 8 inches in diameter and smaller:~~

- ~~a) Adjustable split ring type.~~
- ~~b) All hardware shall be Type 316 stainless steel.~~
- ~~c) Acceptable manufacturers:~~
 - ~~1) Grinnell Co.~~
 - ~~2) Elcen Metal Products Co.~~
 - ~~3) NPS Industries~~
 - ~~4) Or equal.~~

~~2. For pipes larger than 8 inches in diameter:~~

- ~~a) Single pipe rolls and sockets.~~
- ~~b) All hardware shall be Type 316 stainless steel.~~
- ~~c) Acceptable Manufacturers:~~
 - ~~1) Grinnell Co.~~
 - ~~2) Elcen Metal Products Co.~~
 - ~~3) NPS Industries.~~
 - ~~4) Or equal.~~

~~3. Threaded hanger rods:~~

- ~~a) Right-hand and left-hand machine threads.~~
- ~~b) Suspended from beam clamps or galvanized inserts in concrete.~~
- ~~c) All hardware shall be Type 316 stainless steel.~~
- ~~d) Acceptable Manufacturers:~~
 - ~~1) Grinnell Co.~~
 - ~~2) Elcen Metal Products Co.~~
 - ~~3) NPS Industries.~~
 - ~~4) Or equal.~~

~~D. Plastic and FRP pipe hangers: (Unless otherwise indicated on the Drawings)~~

~~1. Plastic coated hangers:~~

2. ~~Acceptable Manufacturers:~~

- ~~a) Grinnell Co.~~
- ~~b) Eleen Metal Products Co.~~
- ~~c) NPS Industries.~~
- ~~d) Or equal.~~

~~B D~~ E. Trench Supports: (Unless otherwise indicated on the Drawings)

1. Supports for trench shall consist of a vertical "U" channel attached to each side of trench wall with an "H" channel mounted horizontally between each "U" channel using adjustable 90 degree angles.
2. All hardware shall be Type 316 stainless steel.
3. All channels, clamps and supports shall be electro-galvanized.
4. Supports shall be provided at each valve and pipe connection location.
5. Spacing between supports shall not exceed the spacing shown on the drawings, based on the smallest pipe diameter to be supported.
6. Acceptable Manufacturers:
 - a) Grinnell Co.
 - b) B-Line Systems, Inc.
 - c) Or equal.

~~E. F~~ ~~Brick and concrete piers: (Unless otherwise shown on the drawings)~~

- ~~1. Locate where shown on the drawings and/or where required for proper support.~~
- ~~2. Construct piers to accurately conform to the bottom one-third to one-half of the pipe as shown on the drawings.~~

~~C~~ G. Miscellaneous hangers: As shown on the drawings or as approved by the Engineer.

PART 3 - EXECUTION

3.01 GENERAL

- A. Spacing between hangers and supports with multiple pipes being supported shall be based on the recommended distance of the smallest pipe diameter.
- B. Install hangers or supports at all changes in direction and at the end of piping runs.
- C. Install all hangers, supports, rods, inserts, clamps, bolts and other supporting devices of sizes and spacings to prevent loads from exceeding the manufacturer's maximum recommended loading with a safety factor of 5.
- D. Secure hangers to beams or approved concrete insert where possible.
- E. When piping is installed on structural steel supports, provide blocking of pipe rolls to prevent lateral pipe movement.
- F. Do not support piping from other pipes or from stairs and walkways.
- G. Set all inserts before the concrete is placed.

3.02 EXPANSION AND CONTRACTION

- A. Rigidly support all piping with adequate provisions for expansion and contraction.
- B. Firmly anchor horizontal runs over 50 feet in length at the midpoint of the runs to force expansion equally toward the ends.

3.03 SUPPORTING PVC ~~AND FIBERGLASS~~ PIPING

- A. Support in strict accordance with the manufacturer's instructions and recommendations for the conditions of operation temperature and size of pipe.
- B. Support in a manner which will prevent subsequent visible sagging of the pipe between supports due to plastic deformation.

3.04 SPACING

- A. Install hangers and supports at sufficiently close intervals to maintain alignment and prevent sagging.

- B. Maximum spacing of hangers and supports shall be as shown on the drawings.

3.05 SUPPORTING VERTICAL PIPING

- A. Support at each floor level.
- B. Support at all points necessary to insure rigid installation with adequate provisions to allow expansion and contraction and prevent vibration.
- C. Support by approved pipe collars, clamps, brackets or wall rests.

3.06 VALVES, FITTINGS AND SPECIALTIES

- A. Independently support pipe valve and specialty connected to pumps, equipment and piping systems.

3.07 TEMPORARY PIPE SUPPORTS

- A. Lay out each section of pipeline and make connections while the pipe is held in temporary supports.
- B. After the completion of connections in each section of pipeline, hold the section in place with temporary clamps.
- C. Do not remove the temporary clamps until the piping is correctly installed on the permanent supports.

END OF SECTION

SECTION 15421

FLOOR DRAINS

PART 1 - GENERAL

- 1.01 Submit catalog information on each device.

PART 2 - MATERIALS

- 2.01 Drains:
- A. Drains shall be of the type and materials as scheduled on the drawings.
 - B. Provide all necessary bolts, clamping rings and appurtenances to effect a complete installation.

PART 3 - INSTALLATION

- 3.01 Drains:
- A. Install floor and area drains in accordance with manufacturer's written instructions and in locations indicated.
 - B. Coordinate flashing work with work of waterproofing and adjoining substrate work.
 - C. Install drains at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor.
 - D. Install drain flashing collar or flange so that no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes, where penetrated.
 - E. Position drains so that they are accessible and easy to maintain.
 - F. Protect drains during remainder of construction period, to avoid clogging with construction materials and debris, and to prevent damage from traffic and construction work.

END OF SECTION

DIVISION 16

ELECTRICAL

SECTION 16010

BASIC ELECTRICAL REQUIREMENTS

1.01 WORK INCLUDED

- A. The work included consists of all supervision, labor, materials, equipment, facilities and installation required for the complete, satisfactory and approved electrical system as indicated on the Drawings and called for in these Specifications, or as may be reasonably implied by either, for the installation of complete electrical systems.
- B. Install, complete and operating, electrical systems for complete distribution for power and lighting as shown on plans and make all final connections to equipment furnished by other trades. Provide all conduits and wires and miscellaneous items obviously required for a complete and operating system but not specifically called for on the drawings or in the specifications.

1.02 CODES AND STANDARDS

- A. Reference within these Specifications to standards, codes or reference specifications implies that any item, product, or material so identified must comply with all minimum requirements as stated therein, unless indicated otherwise. Only the latest revised editions are applicable.
- B. The Specifications, codes and standards listed below form a part of these Specifications:
 - 1. National Electrical Code (NEC)
 - 2. National Fire Protection Association (NFPA)
 - 3. Underwriters' Laboratories (UL)
 - 4. National Electrical Manufacturers Association (NEMA)
 - 5. American National Standards Institute (ANSI)
 - 6. Federal Specification (Fed. Spec.)
 - 7. Insulated Cable Engineers Association (ICEA)
 - 8. Standard Building Code (SBC)
 - 9. Institute of Electrical and Electronic Engineers (IEEE).

10. American Society for Testing and Materials (ASTM)

11. Additionally, designs, work practices and conditions must conform with the Occupational Safety and Health Act of 1970 (OSHA)

C. Where materials and equipment are available under the continuing inspection and labeling of UL, provide such material and equipment. Listing by Underwriters' Laboratories shall be evidenced by the label.

1.03 DRAWINGS

A. The Drawings indicate the extent and general arrangements of equipment and wiring systems. If any departures from the Drawings are deemed necessary by the Contractor, details of such departures and reasons therefor shall be submitted to the Engineer for approval within 30 days after award of the Contract. No such departures shall be made without the prior written approval of the Engineer. All items not specifically mentioned in the Specifications or noted on the Drawings but obviously necessary to make a complete working installation shall be included.

1.04 SHOP DRAWINGS

A. The submittal drawings shall include complete specifications for every item, including materials, finish, dimensions, fabrication details, installation instructions, standards compliance and UL approval. Where a data sheet contains details covering various sizes or ratings of equipment, clearly mark the items applicable to the project.

1.05 RULES OF LOCAL UTILITY COMPANIES

A. Rules of local Utility Companies shall be complied with. Before submitting his bid, Contractor shall check with the Utility Companies supplying service to this installation and shall determine equipment, etc., he will be required to install and shall include cost of same in Bid. No extra payment will be made for the installation of such items, except in cases where the requirements of the Utility Companies change after the Contractor has submitted his Bid.

1.06 COORDINATION WITH OTHER UTILITIES

A. Installation of underground ducts and conduits for power and telecommunications services shall be thoroughly coordinated with other utilities on the site. Duct and conduit sizes and material types shall be as shown on the Drawings. Details of routing, burial depth, size of bends and termination at each end of service shall be verified on the job site.

1.07 COORDINATION WITH OTHER TRADES

- A. Plan and layout the electrical work in order to be compatible with other trades. Where failure to coordinate the work with other trades results in equipment having to be removed and relocated, perform such removal and relocation at no cost to the Owner. Where equipment has to be moved, the Engineer shall determine which equipment has to be moved regardless of which equipment was installed first.

1.08 STORAGE

- A. All material shall be stored in a safe, orderly manner. Materials shall not be stored directly on the ground or floor and shall be kept clean, dry and free from damage or deteriorating elements. Damaged or rusted materials shall not be installed.

1.09 MATERIALS

- A. All equipment, materials and components shall be new, of standard current products of manufacturers regularly engaged in the production of such equipment and be the manufacturer's latest design. All components by same manufacturer shall be mechanically and electrically compatible with rating of apparatus in which installed. All materials shall bear the label of Underwriters Laboratory for the intended use in all cases where this labelling is available or shall be materials reviewed by the code enforcing authorities and Engineer. Equipment of a similar nature shall be identical.

1.10 ACCESSORIES

- A. All hardware and accessory fittings shall be of a type designed, intended or appropriate for the use, and complement the items with which they are used, and shall have corrosion protection suitable for the atmosphere in which they are installed. All such hardware shall be U.S. standard sizes.

1.11 INSTALLATION

- A. All materials shall be installed at the locations shown on the Drawings and in accordance with the specific manufacturer's recommended installation methods.
- B. All equipment shall be set level, at the correct heights, properly aligned and where in sections, shall be bolted together.
- C. Secure all materials and equipment firmly in place. Do not weld electrical materials for attachment and/or support.
- D. All screws, bolts, nuts, clamps, fittings or other fastening devices shall be made up tight.

- E. All materials and equipment shall be installed complete, including screws or bolts, covers, plates, fittings, etc.
- F. Follow the installation directions and recommendations of the materials and equipment manufacturers.
- G. Cutting, welding, or other weakening of structures to facilitate electrical equipment and materials installation shall not be permitted.
- H. Light fixtures shall be rigidly supported as required.
- I. In the case of panelboards, terminal cabinets and other equipment requiring wire and cable terminations, ascertain that wiring gutter sizes are as required by NEC Tables 373-6(a) and 373-6(b).
- J. Working clearance around equipment shall meet or exceed code requirements as per NEC Tables 110-16(a) and 110-34(a).

1.12 INTERFERENCES

- A. The plans are generally diagrammatic and the Contractor shall coordinate the electrical work with the work of other trades so that interferences between conduits, piping, equipment, architectural, and structural work will be avoided. All necessary offsets in raceways, fittings, etc., required to properly install the work shall be furnished so as to take up a minimum space and all such offsets, fittings, etc., required to accomplish this shall be furnished and installed by the Contractor without additional expense to the Owner. In the event of conflict, the Engineer will decide which equipment, piping, etc., must be relocated. Cutting and patching required to relocate work shall exactly match original finish, and shall be at the Contractor's expense.

1.13 IDENTIFICATION

- A. Electrical equipment shall be clearly and permanently labeled with a securely fastened nameplate. Nameplates shall be 1/16-inch thick engraved laminated plastic and shall have 1/4-inch high white letters on a black background. Plates shall be provided for all switches and disconnects, starters, panelboards, dry type transformers and lighting contractors.
- B. All conductors shall be permanently tagged at terminal boxes, equipment and control stations to indicate their control function. Feeders shall be identified at every accessible point with a permanent tag indicating circuit number. Conductor tags shall be non-conductive.

1.14 CUTTING AND PATCHING

- A. All openings through walls, ceilings, roadways and floor slabs required for the installation of electrical equipment shall be provided as required. Where existing walls, ceilings or floor slabs have to be cut the Contractor shall coordinate with the Engineer before making such cuts. The Contractor shall be held responsible for any damage done in the process of providing such openings. The Contractor shall patch and refinish the existing surface after making such required openings.

1.15 TESTING

- A. Upon completion of the Work, the Contractor shall energize, start-up and test operate all the systems and equipment in the presence of the Engineer and Owner. All testing and measuring instruments and equipment required to test each system shall be provided by the Contractor. Any defects or variances from standard or specified conditions found during these tests shall be corrected by the Contractor at no cost to the Owner. The following tests shall be performed:

1. The main service and all feeders and branch circuits shall be energized from the normal power source. Ammeter and voltmeter readings shall be made and recorded as follows:
 - a) Phase to phase and phase to ground voltage at each padmount (primary and secondary), at the service connection to each building, at each panelboard, at each dry type transformer (primary and secondary) and at each 3 phase motor.
 - b) Line and neutral current on each phase at each padmount (incoming and outgoing on each primary leg), each building secondary service, each panelboard feeder, at primary and secondary of each dry type transformer and each 3 phase motor.
 - c) These voltage and current readings shall be recorded, dated and signed by the Contractor and furnished to the Owner and Engineer.
2. All circuit breakers shall be manually tripped and reset.
3. Insulation resistance test shall be made on each 480-volt and 208-volt feeder conductor before and after installation. Test shall be made with a 500-volt DC megger. Readings shall be recorded and test reports furnished to the Owner and Engineer.

4. Raceway Continuity: Metallic raceway system as a component of the facilities grounding system shall be tested for electrical continuity. Resistance to ground throughout the system shall not exceed five (5) ohms.
 5. Ground resistance measurements shall be made of each grounding system utilized in the project. The ground resistance measurements shall include building structures steel, driven grounding system, and other approved systems as may be applicable. Ground resistance measurements shall be made in normally dry weather, not less than 24 hours after rainfall, and with the ground under test isolated from other grounds. Resistances measured shall not exceed specified limits. The resistance to ground shall be made by a low resistance type of "Megger." Measurements shall be made by Fall-of-Potential or 3 point method as described in James G. Biddle Publication No. 25-J-3. There shall be no treatment of soil around the ground rods to improve the resistance.
 6. All defective lamps found during test shall be immediately replaced.
 7. All receptacles and light switches shall be tested to verify they are connected properly.
- B. At completion of work, clean all fixtures and lenses, and install new lamps.
- C. Prior to the final test, continuity tests and insulation, resistance tests shall be performed to assure there are no shorts or unintentional grounds in the entire electrical system. Test readings shall be recorded and given to the Owner and Engineer.

1.16 TEST REPORTS

- A. Submit all test reports as specified.
- B. The Contractor shall notify the Engineer two weeks prior to commencement of all testing except for megger tests.
- C. The Contractor shall maintain a written record of all tests showing date, personnel making test, equipment or materials tested, tests performed, and results.

1.17 PERSONNEL AND EQUIPMENT

- A. The Contractor shall provide the following:
 1. Qualified personnel to conduct all testing.
 2. The services of the equipment manufacturer's representative to assist in testing their equipment, when the service is specified.

3. The services of the equipment manufacturer's representative to assist the Contractor in repair or trouble-shooting their equipment, in the event that said equipment fails to pass all tests.

4. All labor, temporary power, lighting, and wiring, and all materials required for testing.

B. The Contractor shall furnish all test equipment, which shall include the following:

1. Wet and dry bulb thermometer.

2. A 500-Volt megger by James G. Biddle Co., or Associated Research Inc., or equal.

3. Battery powered portable telephone sets and portable radios.

4. A Simpson Model 260-Volt Ohm Milliammeter, or equal.

5. A phase sequence and rotation meter, 60-300 Volts 30-60 Hz. by Knopp Inc., or equal.

C. The Contractor shall furnish and use safety devices such as rubber gloves and blankets, protective screens and barriers, danger signs, etc., to adequately protect and warn all personnel in the vicinity of the tests.

1.18 TOOLS

A. Use only tools designed for the particular operation. Tools shall be kept in good condition. Worn or broken tools shall not be used.

B. Special tools and spare parts provided with any equipment shall be turned over to the Owner's authorized personnel and the Contractor shall obtain signed and dated receipts for them.

1.19 CLEAN-UP AND PAINTING

A. After all systems and equipment have been installed, the Contractor shall clean-up all electrical equipment inside and outside the enclosures. All grease, dust, rust and chipped plaster and concrete shall be removed from the installed equipment. Each piece of equipment shall be thoroughly cleaned and left in brand new condition. Special attention shall be given to the interior of panelboards and other similar equipment. All light fixture lenses and reflectors shall be thoroughly cleaned. The project will not be accepted as being finished until all such dirt and contamination has been removed. The Contractor shall provide touch-up painting where finished surfaces have received minor scratches

during installation. Where electrical equipment with painted surfaces has been installed in finished areas, any such damage to the painted surfaces that cannot be corrected with minor touch-up painting shall be refinished at the factory at no cost to the Owner. Equipment installed in finished areas having noticeable damage to the finished surface will not be accepted.

PART 2 - PRODUCTS

2.01 GROUNDING CONDUCTORS

- A. All grounding conductors shall be copper conductor material only. Materials shall be in conformity with those specified elsewhere herein for electrical systems. Conductors within the raceway systems shall be identified as specified herein.
- B. Ground grid cable shall be bare, stranded, copper sized per the drawing and shall be buried not less than 30 inches below grade.

2.02 GROUND RODS

- A. Ground rods shall be copper-clad steel, 3/4-inch diameter, minimum 10 feet long, with hardened steel points.
- B. Top of grounding rods to be 30 inches below grade.

2.03 GROUND CONNECTIONS

- A. All subgrade connections to the grounding system shall be through isothermic welds, i.e., Cadweld or approved equal.
- B. Connections to building frame, motor frame, tanks, (i.e., above grade) shall be bolted type of brass composition. Burndy or equal.
- C. All surfaces to be grounded shall be thoroughly cleaned to bare metal before attaching ground connections.

2.04 RIGID ALUMINUM CONDUIT AND FITTINGS

- A. Extrude from 6063 alloy in temper designation T-1 with maximum .1 percent copper content and conform to ANSI C80.5 and UL-6. Provide insulated metallic bushings, except that sizes 2 inch and smaller may be nonmetallic type. Provide conduit manufactured by Alcoa, Kaiser, V.A.W. Aluminum or equal.

- B. Use copper-free cast aluminum conduit bodies equipped with threaded covers or gasketed covers secured with at least two captive screws. These are to be Crouse Hinds Form 7 type or equal.

2.05 PVC-COATED CONDUIT AND FITTINGS

- A. PVC-coated conduit and fittings shall be rigid steel or rigid aluminum with a .040-inch minimum thickness of PVC coating. Conduit and fittings shall be UL listed and shall conform to ANSI C80.1 or C80.5 and to UL-6. Conduit and fittings shall be Occidental, Robroy or equal.
- B. Supports, hangers, unistrut and clamps shall be PVC coated. Bolts and nuts shall be Type 304 stainless steel.

2.06 RIGID NON-METALLIC CONDUIT AND FITTINGS

- A. Type 80 - Polyvinyl Chloride (PVC) schedule 80 90° C rise rating. Conduit to conform to NEMA TC-2 and UL-651. Conduit and fittings shall be as manufactured by Carlon.

2.07 LIQUID-TIGHT FLEXIBLE CONDUIT AND CONNECTORS

- A. Single strip steel, hot-dipped galvanized on all four sides prior to conduit fabrication. Overall PVC plastic jacket. Conduit sizes 1 1/4-inches and smaller shall include an integral copper bonding conductor wound spirally in the space between each convolution on the inside of the conduit. Conform to UL-360.

2.08 OUTLET AND PULL BOXES

- A. Provide boxes for installation of electrical work, in compliance with codes and regulations.
- B. Boxes to be of same material as conduit used with applicable NEMA ratings for the environment they are installed in.

2.09 WIRES, CABLES, AND CONNECTORS

- A. Conductors (600 Volts and below):
 1. Conductors shall be rated at 600 Volts and conform to NEMA WC-7 and IECA S-61-402.
 2. Conductors shall be composed of 98 percent annealed copper only, stranded in size #8 AWG and larger. Furnish conductor sizes for circuits as shown on

drawings. Minimum size shall be #12 AWG except as otherwise specified for control wiring.

3. All conductors shall be 600 Volt minimum type THHN/THWN for #8 and smaller and XHHW for #6 and larger, rated 90 degrees C. maximum conductor temperature with polyvinyl chloride insulation, and shall comply with UL standard for thermoplastic insulated wire.
4. Conductors for isolated power systems shall be type XHHW with a dielectric constant of 3.5 or less.
5. All conductors shall be plainly marked on outer braid at least every two feet with name of manufacturer, size and grade of insulation.
6. Conductors shall be as manufactured by General Cable, Phelps Dodge or General Electric Company.

B. Color code all service, feeder and branch circuit wire as follows:

1. 120/208 Volt System:
White - Neutral
Black - Phase A
Red - Phase B
Blue - Phase C
2. 277/480 Volt System:
Light Gray - Neutral
Brown - Phase A
Orange - Phase B
Yellow - Phase C
3. Bonding conductor - green.
4. Solid colored insulation shall be used on all conductors #10 AWG and smaller and colored vinyl tape banding over black insulation at all accessible locations for #8 AWG and larger.

C. Control Wiring:

1. All control wiring conductors for 120V service shall be 600 Volt type TW. Minimum size shall be #14 AWG. Conductors for analog and dc circuits shall be 2/C shielded pairs, minimum #16 AWG.

2. Conductors for control wiring shall be color coded, using different color coding than for the power conductors specified above. Multiple-conductor control cables color coding shall conform to NEMA WC 5 and ICEA.

D. Conductor Bundling Straps:

1. Form from self-extinguishing nylon having a temperature range of plus 30 degrees F to plus 250 degrees F.
2. Equip each strap with a locking hub or head with a locking barb on one end and a taper on the other end.
3. Make wire and cable ties for installation outdoors and in exposed locations of black, ultraviolet resistant, nylon material.

E. Connectors, Terminals and Splices:

1. Provide connectors, terminals and splices for all power and lighting circuits using 600-Volt wire and cable as follows:
 - a) Provide connectors, terminals, and splices, for all wire, cable, and equipment and bus connections, that are designed and approved for the specific type and size of conductors being connected.
 - b) Connectors and terminals shall be designed and UL approved for use with the associated conductor material, and shall provide a uniform compression over the entire contact surface. Solderless terminal lugs shall be used on all stranded conductors.
 - c) Pressure-crimp type connectors, terminals and splices shall be applied with a mechanical or hydraulic tool with proper size crimping dies for making each connection. The tool shall be of the type that will not release until the correct pressure has been applied.
 - d) Splices and taps in wire #10 AWG, and smaller, shall be made with approved, wire-nut-type, patent spring connectors. Use 3M Scotchlocks or equal.
 - e) Provide Burndy, type YAV box, or equal, pressure-crimp ring-tongue terminals for termination of No. 8 stranded cable.
 - f) Provide Burndy type YSV box butt splices, or equal, for splicing #8 AWG stranded cable.

- g) For termination and splicing of cable of #6 AWG or larger, provide long-barrel, type YA pressure-crimp lugs and type YS tubular pressure-crimp splices by Burndy or equal. Use long-barrel pressure-crimp lugs wherever space conditions permit. Use long-barrel pressure crimp splices exclusively for splicing. Where space is inadequate for use of long-barrel lugs, provide Burndy Type YA-L, pressure-crimp, short barrel lugs, or equal. Use 2 hole lugs on cable of 250 MCM and larger.
 - h) For tap off #8 AWG cable and larger, provide Burndy type KS Split-bolt copper connectors (bugs), with Burndy type SC one-piece plastic split-bolt covers, or equal. Other types of connectors for tapping may be used subject to prior approval by the Engineer.
 - i) Use proper size bronze bolts, nuts, washers, and lock washers of Burndy Durium alloy, or equal, for bolting cable terminations to equipment terminals and bus bars.
 - j) Termination of solid wires of #10 AWG and smaller at terminal blocks shall be made by forming the wires in a ring to fit under a screwhead, thus requiring no terminal lug.
2. Provide terminals and splices and make connections in control, alarm and instrumentation system as follows:
- a) For stranded wiring provide type TP, vinyl-insulated, ring-tongue terminals by Burndy, or equal, for all terminations.
 - b) In locations where splicing of stranded wire is indicated or permitted by specifications, use type SP vinyl-insulated, butt splices by Burndy, or equal.
 - c) Wire terminals shall be installed with pressure tools equal to those manufactured by American Pamcor, one of which is No. 59072, which obliges the Contractor to apply the correct pressure required to produce a tight connection before the tool is released. Use a pressure tool designed for the specific size of connector and wire being terminated.
 - d) Taps in stranded wire may be made with 3M, Scotchlock wire nut, or equal, except that the conductor being tapped shall not be cut, and shall be twisted together with the tap conductor before wire nut application.

2.10 DISCONNECTS

- A. Safety switches shall conform to Fed. Spec. W-S-865, NEMA KS1 and ANSI C33.64, and shall be of heavy duty type, enclosed, of quick-make, quick-break construction. Rating shall be as indicated on Drawings. All switches shall be horsepower rated, UL listed and so labeled.
- B. Safety switch operating handle shall be of the insulated, box mounted type that directly drives the switch mechanism and shall be suitable for padlocking in OFF position.
- C. Defeatable, front accessible, "coin-proof" interlocks shall be provided to prevent opening of cover when switch is in ON position, and prevent turning switch ON when door is open. Securely fastened metallic nameplate shall include highly visible "ON- OFF" indication.
- D. Motor Disconnect Means: Provide each motor with a local disconnect switch whether shown on the Drawings or not.
- E. Provide fuses for all disconnect switches as indicated. Fuses shall be dual element type.
- F. Safety switch enclosure shall be Type 304 stainless steel rated NEMA 4X for outdoor use.

2.11 FUSES

- A. Fuses shall conform to Fed. Spec. WF-791, NEMA FU-1 and ANSI C33.42. Fuses shall have a label on the barrel giving the manufacturer's name, UL classification, current and voltage ratings and interrupting capacity. Fuses for motor circuits shall be class RK-5.
- B. Dual element fuses shall have low resistance and relatively low operating temperatures. Fuses shall be provided with thermal protection against damage from poor contact. Fuse shall open when temperature at thermal cutout reaches 280 degrees F, preventing damage to clips and switches before fuse opens. Dual element fuses shall combine high interrupting capacity (100,000 Amp. RMS symmetrical) with time, delay, holding 500 percent load for a minimum of ten seconds.
- C. Current limiting fuses shall be designed to provide high interrupting capacity (100,000 AIC SYM RMS) plus fast clearing time, restricting let-through current and energy to very low values. Clearing time on a severe short circuit shall be limited to less than 1/4 cycle. Fuse links shall be of silver construction.
- D. Fuses shall be as manufactured by Bussman or equivalent.

2.12 FLOW ELEMENT AND TRANSMITTER, ELECTROMAGNETIC

- A. Flow element shall be of the electromagnetic type utilizing the pulsed dc type coil excitation principle with high preamp input impedance. The flow measuring system, consisting of flow element, transmitter, and special cable, shall have an overall accuracy of plus or minus one percent of flow rate with a 10:1 turndown for all flows resulting from pipe velocities of 1 to 30 feet per second. Flows less than 1 ft/s shall still be measurable down to the low flow cutoff with decreasing accuracy as noted herein. Stream fluid, meter size, and flow range shall be as noted. System shall operate on 120-volt, 60 hertz power. Unit shall have zero stability feature thereby eliminating the need to stop flow to check zero alignment.
- B. The flow element shall be of watertight, NEMA 4X construction suitable for continuous operation while completely submerged. Meter shall consist of an epoxy-coated carbon steel Schedule 80 meter tube, ANSI carbon steel flat-faced flanges that match the pressure rating of the installed piping, food-grade neoprene liner for 12" and smaller meters and polyurethane liner for meters over 12", and 316/SST flush type electrodes. Ultrasonic electrode cleaning feature shall be supplied with each meter. Suitable covers shall be supplied to protect the tube liner during shipment. Grounding rings shall be provide if recommended by the manufacturer.
- C. The remote transmitter shall be a microprocessor-based instrument with backlit LCD display in Engineering units and suitable for mounting as shown on the Drawings. The transmitter output shall be an isolated 4 to 20 mA dc signal in linear proportion to 800 ohms without load adjustments. Output span and zero shall be manually adjustable. Transmitter shall be capable of communications utilizing HART protocol. Transmitter shall not require a separate calibration unit for programming and shall be programmable over the current loop. Transmitter shall have a low flow cutoff which shall hold the output at 4 mA when flow falls below 0.04 ft/s and shall still have an accuracy of plus or minus 0.005 ft/s at the low flow cutoff point.
- D. Sufficient cable shall be provided for interconnection between the flow element and the transmitter. Cable shall facilitate both signal and power for the flow element.
- E. Flow element shall be Rosemount 8700 Series; Fischer & Porter 10D1465; or equal. Transmitter shall be Rosemount Model 8712; Fischer & Porter 50XM1000 or equal.

| <u>Device</u> <u>Description</u> | <u>Fluid</u> <u>Metered</u> | <u>Meter</u> <u>Size</u> | <u>Range</u> |
|-------------------------------------|--------------------------------|-----------------------------|--------------|
| Leachate Flow Meter | Leachate | 3" | 0-500 gpm |

2.13 Level Element and Transmitter, Ultrasonic:

- A. Unit shall use a noncontact ultrasonic measurement technique to measure the liquid level in a vessel or basin for level output. The system shall consist of an ultrasonic sensor, interconnecting cable, and transmitter.
- B. Unit shall have an accuracy of plus or minus 0.25 percent of span (minimum of 0.2" resolution) over a sensor temperature range of -40 to 180 degrees F. Minimum distance of the sensor from the liquid surface shall be no more than 16 inches.
- C. The sensor shall have an explosion-proof housing and shall be suitable for conduit support mounting in wetwells and from a 4-inch flange nozzle above tanks. Tank applications shall compensate for closed vessel conditions. The transmitter shall utilize solid state integrated circuit technology and shall be housed in a NEMA 4X enclosure suitable for mounting as shown. The transmitter shall operate on 120 volt, 60 hertz power in temperature ranges of -40 to 140 degrees F, and produce a 4 to 20 mA dc signal in linear proportion to level. Signal shall be capable of driving loads of up to 500 ohms without load adjustments.
- D. Transmitter shall have an integral, 4-digit LCD indicator. Span, output, linearization and digital output scaling shall be adjustable at the transmitter. Echo status and loss indication shall be provided at the transmitter.
- E. Units for level service shall be Endress & Hauser Model LTU675; Milltronics Multirange Plus; or equivalent unit as manufactured by TN Technologies, or Bernard, Inc.

Description

Range

Leachate Storage Tank

0 - 20 feet

PART 3 - EXECUTION

3.01 GROUNDING CONDUCTOR IDENTIFICATION

- A. Grounding conductors within the raceway system shall be identified with a green color.

3.02 INSTALLATION AND METHODS - 120 THROUGH 480 VOLT SYSTEMS

- A. Except as otherwise indicated, each feeder raceway on the load side of the service entrance shall contain a grounding conductor sized as indicated and where not shown shall be sized in accordance with Table 250-95 of the NEC. Conductor shall be connected to the equipment grounding bus in switchboards and panel-boards, to the grounding bus

in all motor control centers and as specified, to lighting fixtures, motors and other types of equipment and outlets. The ground shall be in addition to the metallic raceway and be properly connected thereto, using a lug device located within item enclosure at point of electric power connections, to permit convenient inspection.

- B. Each feeder conduit shall be bonded at all discontinuities, including switchboards and all subdistribution and branch panel with conductor in accordance with Table 250-59 of NEC for parallel return with respective interior grounding conductor.
- C. Items to be grounded are as shown on the Drawings.
- D. All metallic conduit connections and joints shall be mechanically secure and electrically continuous so as to provide an uninterrupted grounding path. The conduit system shall be grounded to the plant grounding system with grounding bushings as approved by the Engineer.
- E. Grounding conductors in conduit leaving switchgear, motor control centers, switchboards, panels, etc., shall be connected to a ground bus in the equipment's enclosure.
- F. Ground conductors shall not be embedded in concrete.

3.03 MISCELLANEOUS GROUNDING CONNECTIONS

- A. Required connections to building steel shall be with approved terminals and bolted in accessible locations.
- B. All surfaces to which grounding connections are made shall be thoroughly cleaned to maximum conductive condition immediately before connections are made thereto. Exposed bare metal after termination point shall be painted.

3.04 CONDUIT USAGE

- A. Install the following types of raceway in the locations listed, unless otherwise indicated on the drawings.
- B. Exterior, Exposed: Schedule 80 PVC conduit.
- C. Embedded in Concrete or Masonry: (See Stub-ups)
 - 1. Schedule 80 PVC conduit.
 - 2. PVC-coated conduit.

D. Below Concrete Slabs:

1. Rigid nonmetallic conduit (Type 80). Provide PVC-coated conduit with long radius elbows for bends exceeding 45° (see requirement for conduit stub-ups),
2. PVC-coated conduit.

E. Final Connections to Motors or Vibrating Equipment: Liquid-tight flexible conduit.

F. Conduit Stub-ups: Provide PVC-coated conduit for stub-ups.

3.05 CONDUIT INSTALLATION

A. Conduit runs are shown schematically. Supports, pull boxes, junction boxes and other ancillary equipment are not usually shown. Provide pull boxes and junction boxes where shown. In addition, provide pull boxes and junction boxes to permit pulling of wires without damage to the conductors or insulation. No pull boxes or junction boxes are allowed unless approved by Engineer.

B. Install exposed conduits parallel to or at right angles to the conduit in straight lines of the building or at right angles. — Make right angle bends in exposed conduit runs with standard elbows, threaded conduit fittings, or conduit bent to radii not less than those of standard elbows.

C. Route exposed conduit to preserve headroom, access space and work space in a workman like manner.

D. Provide 30 inch minimum cover above top of buried conduits unless noted otherwise on drawings. Provide 2 inch minimum separation between conduits and 3 inch minimum concrete encasement under any floor slabs or equipment mounting pads to the point of raceway termination. This is to be done by pre-manufactured spacers not any other material.

E. Conduit in Concrete Slabs: Run conduits 2 inches clear from outside face of slab and 3 inches clear between other conduits.

F. Conduit in Concrete Walls: Run conduits in center of wall and 4 inches vertical clear between other conduits.

G. Underground Conduit: Where other utility piping systems are encountered or being installed along a raceway route, maintain a 6 inch minimum vertical separation between concrete duct banks and other systems at crossings. Maintain a 12 inch minimum separation between concrete duct banks and other systems in parallel runs. Do not place duct banks over valves or couplings in other piping systems. Refer conflicts with these requirements to the Owner's Representative for instructions before further work is done.

D. Below Concrete Slabs:

1. Rigid nonmetallic conduit (Type 80). Provide PVC-coated conduit with long radius elbows for bends exceeding 45° (see requirement for conduit stub-ups),
2. PVC-coated conduit.

E. Final Connections to Motors or Vibrating Equipment: Liquid-tight flexible conduit.

F. Conduit Stub-ups: Provide PVC-coated conduit for stub-ups.

3.05 CONDUIT INSTALLATION

A. Conduit runs are shown schematically. Supports, pull boxes, junction boxes and other ancillary equipment are not usually shown. Provide pull boxes and junction boxes where shown. In addition, provide pull boxes and junction boxes to permit pulling of wires without damage to the conductors or insulation. No pull boxes or junction boxes are allowed unless approved by Engineer.

B. Install exposed conduits parallel to or at right angles to the lines of the building. Make right angle bends in exposed conduit runs with standard elbows, threaded conduit fittings, or conduit bent to radii not less than those of standard elbows.

C. Route exposed conduit to preserve headroom, access space and work space in a workman like manner.

D. Provide 30 inch minimum cover above top of buried conduits unless noted otherwise on drawings. Provide 2 inch minimum separation between conduits and 3 inch minimum concrete encasement under any floor slabs or equipment mounting pads to the point of raceway termination. This is to be done by pre-manufactured spacers not any other material.

E. Conduit in Concrete Slabs: Run conduits 2 inches clear from outside face of slab and 3 inches clear between other conduits.

F. Conduit in Concrete Walls: Run conduits in center of wall and 4 inches vertical clear between other conduits.

G. Underground Conduit: Where other utility piping systems are encountered or being installed along a raceway route, maintain a 6 inch minimum vertical separation between concrete duct banks and other systems at crossings. Maintain a 12 inch minimum separation between concrete duct banks and other systems in parallel runs. Do not place duct banks over valves or couplings in other piping systems. Refer conflicts with these requirements to the Owner's Representative for instructions before further work is done.

- H. Terminate conduits with locknuts and bushings. Install conduit squarely and provide one locknut outside the box and a bushing inside the box. Install locknuts with dished side against the box.
- I. When terminating in threaded hubs, screw the conduit or fitting tight into the hub so that the end bears against the fire protection shoulder. When chase nipples are used, install the raceway and coupling square to the box and tighten the chase nipple with no exposed threads.

3.06 CONDUIT SUPPORTS

- A. Support conduit at intervals and at locations as required by the NEC. Do not use perforated strap, tie wire or plumbers tape for conduit supports.
- B. Conduit on Concrete or Masonry: Type 316 SS Unistrut and Clamp.
- C. Suspended Conduit: Use 316 stainless steel unistrut or angle and stainless steel all thread. Clamp each conduit individually to a cross member. Where rods are more than 2 feet long, provide rigid sway bracing.

3.07 WARNING TAPES

- A. Bury warning tapes approximately 12 inches above all underground duct banks, Align parallel to and within 3 inches of the centerline of the duct bank.
- B. Plastic tape shall be heavy gage, yellow, of 6 inch minimum width. Utilize tape made of material resistant to corrosive soil. Use tape with printed warning that an electric circuit is located below the tape. Manufacturers and types: ITT Blackburn Type YT, Griffoly Co., Terra-Tape or equal.

3.08 DAMAGED CONDUIT

- A. Repair or replace conduit damaged during or after installation. Replace crushed or clogged conduit or any conduit whose inner surface is damaged or not smooth.

3.09 MANDREL

- A. For raceways in concrete-encased duct banks, after the concrete envelope has set, pull a mandrel of a diameter approximately 1/4-inch less than the raceway inside diameter, through each raceway. Then pull a bristle brush through each raceway to remove debris.

3.10 EMPTY CONDUIT

- A. Provide 200 pound strength nylon pull cord in empty conduits.

3.11 WIRE AND CABLE INSTALLATION

- A. Conductors shall not be pulled into conduit until all mechanical work is complete.
- B. Pulling lubricants shall be of the type accepted for the particular cable insulation and as recommended by the cable manufacturer.
- C. Conductors in panelboards, junction boxes, pull boxes, etc., shall be formed, grouped and taped to present a neat and orderly appearance.
- D. Leading end of each conductor pulled shall be carefully examined for damage to jacket. If damaged, cable shall be extended and further checked for damage with good cable only to remain.
- E. At each outlet, allow not less than 6 inches slack for connection to load.
- F. Wire and Cable Supports:
 - 1. Provide support for all conductors within vertical raceways at intervals as required by, and using one or more of the support methods of, Article 300-19 of the NEC, and as follows:
 - a) For insulating wedge supports as described in (b)(1) of NEC Article 300-19, and where indicated, provide OZ Company, or equal, Type R, plug-type, canvas-bakelite cable supports of proper duct or conduit size, and number of holes.
 - b) Cable ties, where required, shall be Panduit Corporation Pany-Ty, or equal, nylon cable ties.
 - c) Except where otherwise indicated or specified, support for conductors shall be as per paragraphs (b)(2) and (b)(3) of NEC Article 300-19.
 - 2. Provide Kellems Grip supports for wire and cable where indicated.
 - 3. Support wire and cable within all enclosures and at each connection so that any strain on the wire or cable shall not be transmitted to the connection as follows:
 - a) With nylon cable ties.
 - b) With insulated cable clamps sized per O.D. of cable or wire bundle and bolted to equipment enclosure.
 - c) With Kellems grips where indicated.

G. Taping: Tape all connections in 600-Volt wire and cable as follows:

1. In dry locations, tape all connections, splices, taps and exposed barrels of terminal lugs with half-lapped layers of 3M Scotch 33, vinyl plastic tape, or equal, applied to a thickness equal to the conductor insulation.
2. In damp or wet locations, tape connections per paragraph G.1 above, and in addition, apply at least two half-lapped layers of 3M Scotch 88 vinyl plastic tape over the first layers of tape, and water proof the taped connection with a final overall application of an electrical varnish or sealer.
3. Insulated splices and wire-nut connections, in dry locations, and where not subject to vibration, need not be taped.

H. Wire and Cable Marking:

1. Identify each phase of all three phase feeder conductors with 3M Scotch 35, or equal, vinyl plastic marking tape. Use color groups, with three distinct colors in each group, for phase identification of feeders of different system voltage as per 2.02B above.
2. All feeders and branch circuit conductors, and all control, alarm and instrumentation wires, shall be identified at all terminations, junction boxes, pull boxes, handholes and manholes as follows:
 - a) Use Brady Company, or equal, self-sticking vinyl cloth, wire markers for all wire and cable identification.
 - b) Except as otherwise indicated, identify each feeder with name of panelboard it feeds.
 - c) Branch circuit conductors from panelboards shall be each marked with panelboard name, and circuit number.
 - d) Identify all conductors of control, alarm and instrumentation systems with wire numbers or terminal letters as indicated on the Drawings. Where markings are not indicated, the Contractor shall assign his own markings, and indicate them on the "Record Drawings" set of construction drawings.

I. Installation of 600-Volt Wire and Cable:

1. Install wire and cable in conduits, ducts, wireways, cable trays and other enclosures as indicated.

2. Except as otherwise indicated or specified, all wire and cable shall be installed in continuous runs between terminal points without splicing.
3. Make splices and taps only in junction boxes, from terminals in terminal boxes, in manholes, in handholes and other accessible enclosures.
4. Do not splice wire and cable in ducts or conduits.
5. Except as otherwise indicated, or specified, do not splice or tap control, alarm or instrumentation wiring in underground manholes and handholes.
6. When pulling wire or cable, do not subject the wire or cable to a tension greater than 50 percent of the yield strength of the conductor. Pulling lugs shall be attached to the conductor with a sleeve or grip over the cable sheath to prevent slipping the insulation.
7. Use a UL approved lubricant to decrease friction when pulling cable in ducts and conduits.
8. Do not subject cable to a bending radius less than 8 times the cable outside diameter during or after installation.
9. In wet locations, make splices first as for dry locations, then encapsulate them in an epoxy resin sealing and potting compound. Encapsulation of compression sleeve splices shall be with preformed molds.
10. Pulling of wires and cable into conduits shall be done in a manner which will in no way injure the insulation.
11. All wires in conduit shall be continuous between pull points without splices. No joints or splices in the conductors shall be permitted except at outlet or accessible junction boxes, or manholes.
12. Sufficient lengths of wire shall be left at pull boxes for connecting to equipment and apparatus without straining.
13. All wires passing through pull boxes shall have enough slack in each box so they may be pulled out of the box a distance of no less than 6 inches across the entire length of the box.
14. Pull together cables to be installed in a single conduit.

J. Wire Sizes: Drawings indicate wire and conduit sizes for typical equipment. If sizes shown on the Drawings are not appropriate for the equipment chosen by the Contractor,

wires and conduit shall be sized for the proper current-carrying capacity in accordance with the NEC, at no extra cost to the Owner.

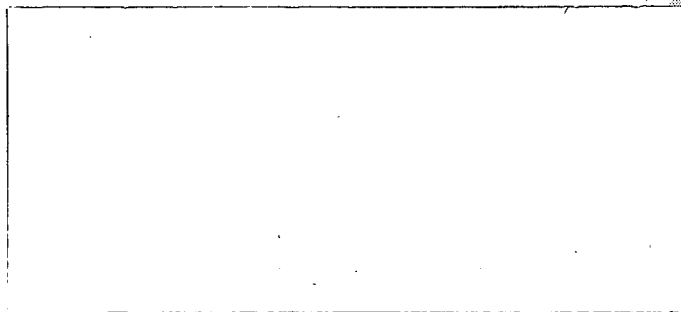
K. Terminations:

1. Terminate solid conductors on screw terminals or mechanical connectors furnished on devices and equipment.
2. Terminate stranded conductors on mechanical connectors furnished on equipment. Where no connectors are included, provide suitable mechanical connectors.
3. Termination of stranded conductors on screw terminals will not be permitted. Provide suitable size compression or mechanical type connector with spade tongue.

END OF SECTION



CQA Plan



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**Hardee County Regional Landfill
Lateral Expansion and
Leachate Storage Tank Facility**

CONSTRUCTION QUALITY ASSURANCE PLAN

June, 1997

**HARDEE COUNTY REGIONAL LANDFILL
LATERAL EXPANSION AND
LEACHATE STORAGE TANK FACILITY**

CONSTRUCTION QUALITY ASSURANCE PLAN

JUNE 1997

D.E.P.

JUN 27 1997

SOUTHWEST DISTRICT
TAMPA

Prepared for:

HARDEE COUNTY BOARD OF COUNTY COMMISSIONERS
Hardee County, Florida

Prepared by:

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REGISTERED ENGINEER

TABLE OF CONTENTS

| <u>SECTION</u> | <u>TITLE</u> | <u>PAGE</u> |
|----------------|--|-------------|
| | Table of Contents | i |
| | List of Tables | vii |
| | List of Figures | vii |
| | List of Attachments | viii |
| 1 | INTRODUCTION | |
| 1.1 | Purpose and Scope | 1-1 |
| 1.2 | Project Party Definitions and Responsibilities | 1-1 |
| 1.2.1 | Permitting Agency | 1-1 |
| 1.2.2 | Owner | 1-4 |
| 1.2.3 | Owner's Representative | 1-4 |
| 1.2.4 | Design Engineer | 1-4 |
| 1.2.5 | General Contractor | 1-5 |
| 1.2.6 | Support Personnel | 1-6 |
| 1.2.6.1 | Geomembrane Manufacturer | 1-6 |
| 1.2.6.2 | Geomembrane Installer | 1-7 |
| 1.2.6.3 | Earthwork Contractor | 1-9 |
| 1.2.6.4 | Geotextile Manufacturer | 1-9 |
| 1.2.7 | Construction Quality Assurance Manager (CQAM) | 1-9 |
| 1.2.8 | CQA Program Manager | 1-14 |
| 1.2.9 | CQA Certifying Engineer | 1-14 |

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APR 27 1998

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TAMPA

| | | |
|---------|---|---------|
| 1.2.10 | Independent Testing Laboratory | 1-15 |
| 1.3 | Site and Project Control | 1-15 |
| 1.3.1 | Project Coordination Meetings | 1-15 |
| 1.3.2 | Site Visits | 1-15 16 |
| 2 | LINER SYSTEM - MANUFACTURING AND DELIVERY | |
| 2.1 | Manufacturing/Supplier | 2-1 |
| 2.1.1 | Material Acceptability | 2-1 |
| 2.1.1.1 | Geomembrane | 2-1 |
| 2.1.1.2 | Common Fill | 2-3 |
| 2.1.1.3 | Select Common Fill | 2-3 |
| 2.1.1.4 | Filter Aggregate | 2-3 |
| 2.1.1.5 | Drainage Sand | 2-4 |
| 2.1.1.6 | Geotextile | 2-4 |
| 2.1.2 | Geomembrane Liner Roll Acceptability | 2-4 |
| 2.1.3 | Manufacturing Plant Visit | 2-6 7 |
| 2.1.3.1 | Geomembrane/Geotextile Plant | 2-6 7 |
| 2.1.3.2 | Filter Aggregate and Drainage Sand | 2-6 7 |
| 2.1.3.3 | Common Fill and Select Common Fill | 2-6 7 |
| 2.1.4 | Manufacturing Quality Control | 2-6 7 |
| 2.1.4.1 | Geomembrane Materials | 2-6 7 |
| 2.1.4.2 | Geotextile Materials | 2-10 |

TABLE OF CONTENTS
(Continued)

D.E.P.

| <u>SECTION</u> | <u>TITLE</u> | <u>PAGE</u> |
|----------------|---------------------------------------|-------------|
| 2.2 | Transportation, Handling, and Storage | 2-9 |
| 2.2.1 | Geomembrane/Geotextile | 2-9 |
| 2.2.2 | Common Fill | 2-10 |
| 2.2.3 | Select Common Fill | 2-10 |
| 3 | GEOMEMBRANE SYSTEM INSTALLATION | |
| 3.1 | Earthwork | 3-1 |
| 3.1.1 | Subgrade Preparation | 3-1 |
| 3.1.2 | Subgrade Protection | 3-1 |
| 3.1.3 | Anchor Trench | 3-3 |
| 3.2 | Geomembrane Roll Quality Assurance | 3-3 |
| 3.3 | Liner System Installation | 3-3 |
| 3.3.1 | Geomembrane Placement | 3-3 |
| 3.3.1.1 | Layout Drawings | 3-3 |
| 3.3.1.2 | Panel Identification | 3-5 |
| 3.3.1.3 | Field Panel Placement | 3-5 |
| 3.3.2 | Select Common Fill Placement | 3-6 |
| 3.4 | Field Seaming for Geomembranes | 3-8 |
| 3.4.1 | Seam Layout | 3-8 |
| 3.4.2 | Personnel Requirements | 3-8 |

TABLE OF CONTENTS (Continued)

| <u>SECTION</u> | <u>TITLE</u> | <u>PAGE</u> |
|----------------|---|-------------|
| | 3.4.3 Overlapping and Temporary Bonding | 3-8 |
| | 3.4.4 Seam Area Preparation | 3-8 |
| | 3.4.5 Seaming Equipment and Products | 3-9 |
| | 3.4.6 Weather Conditions for Seaming | 3-9 |
| | 3.4.7 Trial Seams | 3-10 |
| | 3.4.8 General Seaming Procedures | 3-11 |
| 3.5 | Materials in Contact With the Geomembrane | 3-13 |
| | 3.5.1 General | 3-13 |
| | 3.5.2 Cover Materials | 3-13 |
| 3.6 | Liner System Installation Quality Assurance | 3-15 |
| | 3.6.1 General | 3-15 |
| | 3.6.2 CQA Monitor Responsibilities | 3-15 |
| 3.7 | Liner System Acceptance and Completion | 3-15 |
| | 3.7.1 Liner System Acceptance | 3-15 |
| | 3.7.2 Certification of Completion | 3-16 |
| 4 | SAMPLING AND TESTING | |
| 4.1 | Soil Testing and Inspecting | 4-1 |
| | 4.1.1 Select Common Fill Testing | 4-1 |
| | 4.1.2 Filter Aggregate Testing | 4-1 |

D.E.P.
APR 27 1998
SOUTHWEST DISTRICT
TAMPA

TABLE OF CONTENTS (Continued)

| <u>SECTION</u> | <u>TITLE</u> | <u>PAGE</u> |
|----------------|--|-------------|
| | 4.1.3 Drainage Sand Testing | 4-1 |
| 4.2 | Geomembrane Field Seams | 4-1 |
| | 4.2.1 Observation | 4-1 |
| | 4.2.2 Non-Destructive Seam Continuity Testing | 4-1 |
| | 4.2.2.1 Vacuum Testing | 4-2 |
| | 4.2.2.2 Air Pressure Testing (Double Fusion Seam Only) | 4-3 |
| | 4.2.3 Destructive Seam Testing | 4-4 |
| | 4.2.3.1 Sampling Procedure | 4-4 |
| | 4.2.3.2 Geomembrane Testing Procedure | 4-5 |
| | 4.2.4 Defects and Repairs to Geomembrane | 4-6 |
| | 4.2.4.1 Identification | 4-6 |
| | 4.2.4.2 Evaluation | 4-6 |
| | 4.2.4.3 Repair Procedure | 4-6 |
| | 4.2.4.4 Verification of Repairs | 4-7 |
| | 4.2.4.5 Large Wrinkles | 4-8 |
| | 4.2.4.6 Bridging or Induced Tension | 4-8 |
| 5 | LEACHATE COLLECTION AND REMOVAL SYSTEM | |
| | 5.1 Slotted and Solid Wall Piping | 5-1 |
| | 5.2 Sumps, Manholes, and Pump Station | 5-1 |

D.E.P.
APR 27 1998
SOUTHWEST DISTRICT
TAMPA

TABLE OF CONTENTS
(Continued)

| <u>SECTION</u> | <u>TITLE</u> | <u>PAGE</u> |
|----------------|---|-------------|
| 5.3 | Leak Testing of Leachate Pumping System | 5-1 |
| 6 | DOCUMENTATION | |
| 6.1 | Report Forms and Logs | 6-1 |
| 6.2 | Construction Certification | 6-2 |
| 6.3 | Final Documentation | 6-2 |

D.E.P.
APR 27 1998
SOUTHWEST DISTRICT
TAMPA

LIST OF TABLES

| <u>TABLE</u> | <u>TITLE</u> | <u>PAGE</u> |
|--------------|--|-------------|
| 1-1 | Recommended Personnel Qualifications | 1-3 |
| 2-1 | Material Properties - High Density Polyethylene (HDPE) Geomembrane | 2-2 |
| 2-2 | Required Property Values Non-Woven Geotextile Applications | 2-5 |
| 2-2 3 | Geomembrane Seam Requirements | 2-5 6 |
| 2-3 4 | Geomembrane/Geotextile Manufacturing Process Observation Procedure | 2-7 8 |
| 3-1 | Earthwork Preparation Observation | 3-2 |
| 3-2 | Geomembrane Transportation/Handling/Storage Observation | 3-4 |
| 3-3 | Geomembrane Placement Observation | 3-7 |
| 3-4 | Geomembrane Field Seaming Observation | 3-12 |
| 3-5 | Cover Layer Placement Observation | 3-14 |

LIST OF FIGURES

| <u>FIGURE</u> | <u>TITLE</u> | <u>PAGE</u> |
|---------------|---|-------------|
| 1-1 | Organizational Structure of MQA/CQA Inspection Activities | 1-2 |

ATTACHMENTS

Attachment A:

Daily Field Report
On-Site Personnel Log
Panel Placement Log
Panel Repair and Test Log
Seaming Log
Seam Destructive Test Log
Seam Repair and Test Location Log
Non-Destructive Test Log
Synthetic Liner Approval Form
Certificate of Acceptance

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Section 1

INTRODUCTION**1.1 PURPOSE AND SCOPE**

This Construction Quality Assurance (CQA) Plan addresses the steps to be taken for the construction quality assurance of the southern leachate barrier and collection system installation for the Hardee County Regional Landfill Expansion. This CQA Plan is in compliance with all current FDEP regulations. The scope of this plan is to describe the quality assurance requirements applicable to the manufacture, fabrication, transportation, storage, handling, and installation of the geomembrane component of the liner system for the leachate barrier. This plan also covers the installation of the piping and pumping components of the leachate collection system.

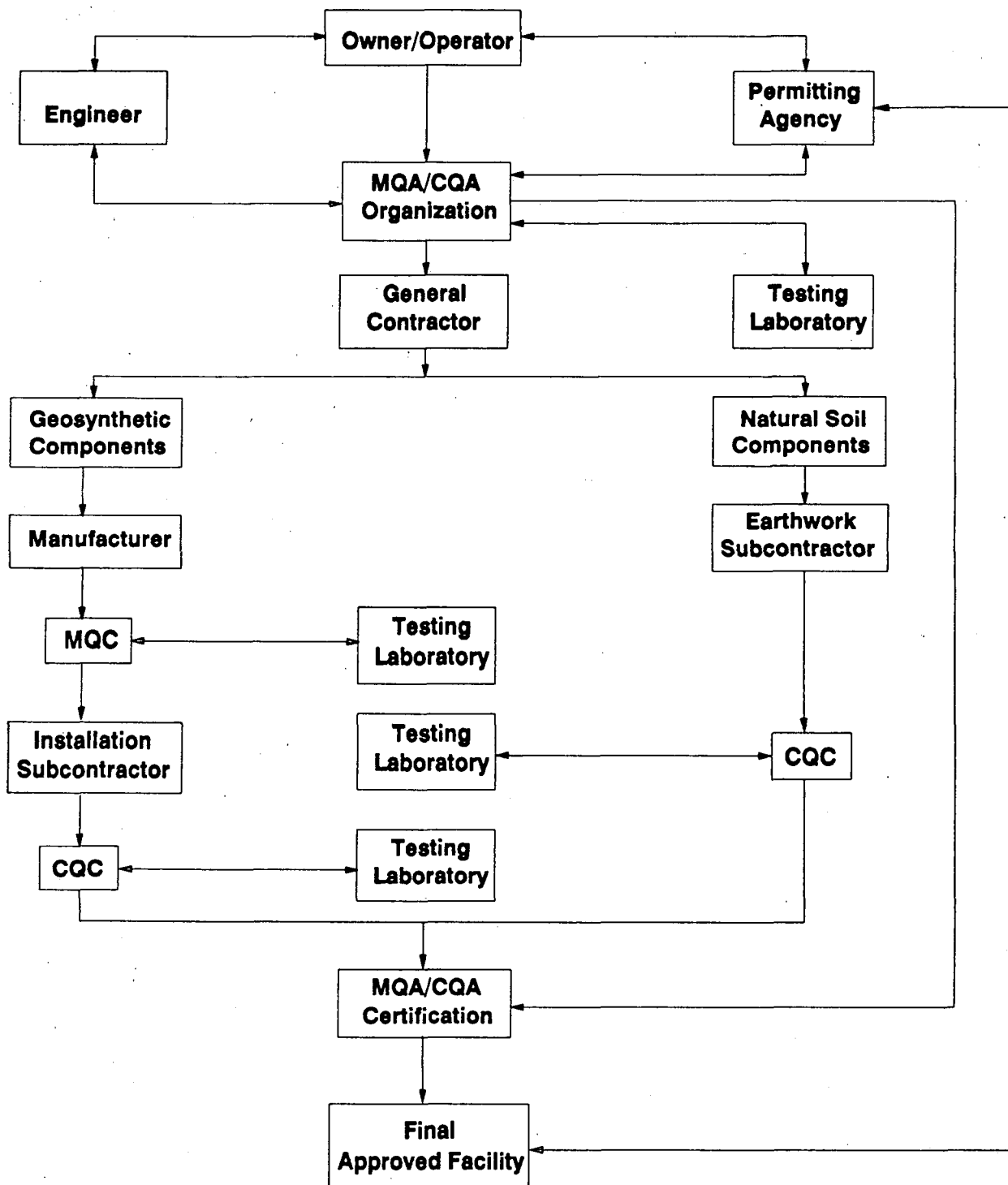
The CQA Plan is to be used only as a guidance document for CQA personnel in the observation of the construction of the liner and leachate collection systems. It does not take precedence over the contract specifications and construction drawings. The General Contractor is responsible only for the requirements of the contract specifications and construction drawings for this project. Wherever possible, this CQA Plan reflects the requirements of the contract specifications and construction drawings.

1.2 PROJECT PARTY DEFINITIONS AND RESPONSIBILITIES

The project will involve several parties, including the Permitting Agency, Owner's and Owner's Representative, Design Engineer, General Contractor, Support Personnel (Manufacturers, Suppliers, and Subcontractors), and CQA Personnel. The following text includes the required qualifications and responsibilities of these parties. The organizational structure of MQC/MQA and CQC/CQA inspection activities is shown in Figure 1-1. The recommended personnel qualifications for individuals comprising the project team are shown in Table 1-1.

1.2.1 Permitting Agency

It is the responsibility of the Permitting Agency to review the Owner's permit application, including the site-specific CQA Plan, for compliance with the respective agency's regulations and to issue or deny a permit based on this review. The Permitting Agency also has the responsibility to review all CQA documentation prior to issuing a permit to operate. This review may include visits to the manufacturing facility and construction site to confirm that the facility is constructed as specified in the design and approved CQA Plan.



(EPA, 1993)

Table 1-1

RECOMMENDED PERSONNEL QUALIFICATIONS

| INDIVIDUAL | MINIMUM PERSONNEL REQUIREMENTS |
|-------------------------|--|
| Design Engineer | Registered Professional Engineer. |
| Owner's Representative | Registered Professional Engineer, Engineer in Training or Certified CQA Inspector. |
| Manufacturer/Fabricator | Experience in manufacturing, or fabricating, at least 1,000,000 m ² (10,000,000 ft ²) of similar geosynthetic materials. |
| MQC Personnel | Manufacturer, or fabricator, trained personnel in charge of quality control of the geosynthetic materials to be used in the specific facility. |
| MQC Officer | The specific individual designated by a manufacturer or fabricator, in charge of geosynthetic material quality control. |
| CQC Personnel | Employed by the general contractor, installation contractor, or earthwork contractor involved in similar facilities. |
| CQA Manager/Monitor | Employed by an organization that operates separately from the contractor and owner/operator. |
| CQA Program Manager | Employed by an organization that operates separately from the contractor and owner/operator; registered Professional Engineer. |
| CQA Certifying Engineer | Employed by an organization that operates separately from the contractor and owner/operator; registered Professional Engineer in the state in which the facility is constructed. |

1.2.2 Owner

The Owner is responsible for design, construction, and operation of the facility. The Owner shall assume all duties and responsibilities for the project and has the authority to select and dismiss organizations charged with the design, construction, and CQA functions. The Owner is responsible for complying with the requirements of the permitting agency, the submission of CQA data, and assuring the permitting agency that the facility was constructed as specified in the approved construction plans and specifications. The Owner is responsible for providing in a timely manner any available data which pertains to the site, the general area, and the nature of the project, when requested by the Design Engineer. The Owner shall be responsible for final acceptance of the liner system with consideration of recommendations made by the Design Engineer and the Owner's Representative during the installation of the system.

1.2.3 Owner's Representative

The Owner usually has an official representative who is responsible for coordinating schedules, meetings, and field activities. The Owner's Representative serves as liaison to the permitting agency, material suppliers, general contractor, specialty subcontractors or installers, CQA Manager, and other members in the Owner's organization, .

1.2.4 Design Engineer (Engineer)

Generally, the Design Engineer's primary responsibility is to design a facility that meets the operational requirements of the Owner, complies with accepted design practices, and meets or exceeds the minimum requirements of the permitting agency. The Design Engineer may be requested to change some aspects of the design if unexpected conditions are encountered during construction (e.g., a change in site conditions, unanticipated logistical problems during construction, or lack of availability of certain materials). Because design changes during construction are not uncommon, the Design Engineer is often involved in the CQA process. The Design Engineer's duties and responsibilities include:

- Attendance at a one-day preconstruction conference to clarify objectives and goals to be achieved during installation of the liner system.
- Review of shop drawings submitted by the General Contractor that propose design changes, and recommendations to the Owner for approval or disapproval.

1.2.5 General Contractor

The General Contractor has overall responsibility for construction of the facility, ensuring that it is constructed in accordance with the contract plans and specifications developed by the Design Engineer and approved by the Permitting Agency, and for construction quality control (CQC) during construction. The General Contractor is also responsible for informing the Owner and the CQA Manager of the scheduling and occurrence of all construction activities.

The General Contractor shall provide for the services of manufacturers, fabricators, installers, and other subcontractors needed for construction and installation. The General Contractor arranges for purchase of materials that meet specifications, enters into contract with fabricators, if necessary, to supply those materials, and contracts with an installer (if separate from the General Contractor's organization). The General Contractor shall accept and retain full responsibility for quality control of all materials and installation and shall be held responsible for ensuring that the materials and the workmanship meet the requirements of the contract plans and specifications.

The General Contractor is required by the Contract Specifications to submit to the CQA Manager information related to the qualifications of any subcontractors providing services for construction and/or installation. Subcontractors to the General Contractor shall coordinate and communicate their activities through the General Contractor only. Information to be contained in the qualifications submittal for the geomembrane manufacturer, fabricator, and installer is detailed in the Contract Specifications.

Transportation, handling, storage, and care of liner system materials and components, prior to and following installation at the site, is the responsibility of the General Contractor. The contract specifications require that geosynthetic materials shall not be off-loaded unless an Owner Representative is present to observe the rolls for damage. The General Contractor shall be liable for all damages to the materials incurred prior to final acceptance of the lining system by the Owner.

The General Contractor shall guarantee the materials of all products supplied on a prorated basis for a minimum period of twenty (20) years following acceptance by the Owner. The General Contractor shall repair or replace, at his own expense, any defective materials.

The General Contractor shall guarantee the workmanship of all services supplied as part of this work for a minimum period of two (2) years following acceptance by the Owner. The General Contractor shall repair or replace, at his own expense, any defective work. Repair or replacement of such defective work shall be completed within thirty (30) calendar days of notification by the Owner.

Warranty conditions proposed by manufacturers, fabricators, installers, or other subcontractors concerning limits of liability will be evaluated upon receipt and must be acceptable to the Owner prior to construction and/or installation.

1.2.6 Support Personnel

1.2.6.1 Geomembrane Manufacturer

The geomembrane manufacturer is responsible for the manufacture of its materials and for manufacturing quality control (MQC). The geomembrane manufacturer is responsible for certifying that its materials conform to the minimum required specifications included in the contract of sale. Conformance will be based on MQC analyses and results.

Upon request, the geomembrane manufacturer shall provide for the Owner, Permitting Agency, Engineer, Fabricator, and/or Installer to observe the manufacturing process and quality control procedures. The geomembrane manufacturer should have a designated individual in charge of the MQC program to arrange for and answer questions during the plant visit. Random samples of materials should be available to the visitors for independent analysis and/or archiving. However, the geomembrane manufacturer retains the right to confidentiality of proprietary information.

Qualifications:

Written information required for review includes:

- Corporate background and information, including corporate annual report.
- Manufacturing capabilities including:
 - 1) Information on plant size, equipment, qualified personnel, number of shifts per day, and capacity per shift.
 - 2) Daily available production quantity with sufficient additional production capacity available to meet the demands of the project schedule for this contract.
 - 3) Quality control procedures (manual) for manufacturing.
 - 4) List of material properties including certified test results, to which liner samples are attached.
 - 5) Identification of the resin supplier, plant location, and brand name.

- A list of at least six (6) successfully completed facilities during the past five (5) years of similar scope and size totaling a minimum of 10,000,000 square feet, for which the manufacturer has manufactured a geomembrane liner. For each facility, the following information shall be provided:
 - 1) Name and location of the project, and date of installation.
 - 2) Contact name and phone number for each project.
 - 3) Liner, type, thickness and surface area of geomembrane manufactured.

1.2.6.2 Geomembrane Installer

The geomembrane installer is responsible for the handling, storage, placement, installation, seaming and restraint of the geomembrane against wind, and attending all site meetings. At the discretion of the General Contractor, the geomembrane installer may also be responsible for transportation to the site, and storing the liner rolls on site. The geomembrane installer should have a CQC plan to detail the proper manner in which materials are handled, placed, and installed.

Qualifications:

The geomembrane installer engaged by the General Contractor for transportation, field handling, storage, placement, seaming, temporary restraining (against wind), anchoring and other site aspects of the geomembrane shall be trained and qualified to install geomembrane and shall be approved and/or licensed by the geomembrane manufacturer and/or fabricator. The geomembrane installer's qualifications will require the Engineer's approval. Written information required includes:

- Description of installation capabilities, including:
 - 1) Information on equipment and personnel.
 - 2) Average daily production anticipated.
 - 3) Quality control procedures (manual).
 - 4) Samples of field seams and list of certified test results, seam properties, minimum values, and test methods employed.
- A list of at least six (6) successfully completed facilities during the past five (5) years of similar size and scope, totaling a minimum of 10,000,000 square feet, for which the installer has installed a geomembrane. Projects shall be

considered similar only if the manufacturer and/or installer had total responsibility for system manufacture and/or installation and the installed system has successfully fulfilled its primary function for a minimum of two (2) years. For each installation, the following information shall be provided:

- 1) Name and location of project and date of installation.
 - 2) Name and phone to contact at the facility who can discuss the project.
 - 3) Liner, type, thickness and surface area of the installed liner.
- Resume of the installer's "master seamer" to be assigned to this project, including dates and duration of employment. Resume of the field engineer or installation supervisor to be assigned to this project, including dates and duration of employment. All personnel performing seaming operations shall be qualified by experience or by successfully passing seaming tests. At least one seamer shall have experience seaming a minimum of 1,000,000 linear feet of liner seams using the same type of seaming apparatus in use at the site. The most experienced seamer, the "master seamer," shall provide direct supervision, as required, over less experienced seamers. No field seaming shall take place without the "master seamer" being present. Prior to commencement of the installation, the General Contractor shall submit to the Owner the following items:
 - Geomembrane installer pre-installation information completed in full by the geomembrane installer.
 - A drawing showing the installation layout identifying both fabricated (if applicable) and field seams, as well as any variance or additional details which deviate from the construction drawings. The layout shall be adequate for use as a construction plan and shall include dimensions, details, etc.
 - Installation schedule.
 - The "Quality Assurance Plan for the Production and Installation of the Geosynthetic Lining System" as specified in the Contract Specifications.
 - A list of personnel performing field-seaming operations along with pertinent experience information.
 - Initial subgrade acceptance certificates, signed by the geomembrane installer.

During the installation, the General Contractor shall be responsible for the timely submission of:

- The geomembrane installer's quality control documentation.
- The geomembrane installer's subgrade acceptance certificates for each area to be covered by the lining system, signed by the installer.

Upon completion of the installation, the General Contractor shall submit:

- Liner installation certification.
- The installation and product warranties.
- Record drawings showing seam locations, repair locations, and liner test sample locations.

1.2.6.3 Earthwork Contractor

The Earthwork Contractor is responsible for grading the site to elevations and grades shown on the plans and for constructing earthen components of the constructed facility, e.g., compacted clay liners and granular drainage layers according to the specifications. The Earthwork Contractor may be hired by the General Contractor or, in some cases, the General Contractor's personnel may serve as the Earthwork Contractor. The Earthwork Contractor is responsible not only for grading the site to proper elevations, but also for obtaining suitable earthen materials, transport and storage of those materials, preprocessing of materials (if necessary), placement and compaction of materials, and protection of materials during and (in some cases) after placement.

1.2.6.4 Geotextile Manufacturer

The geotextile manufacturer shall be a company, corporation, or firm regularly engaged in the development and manufacture of geotextile with a history of successful production for a minimum period of five (5) years. The manufacturer shall have supplied geotextile to a minimum of six (6) projects during the past five (5) years of similar size and scope totaling a minimum of ten million (10,000,000) square feet. Projects shall be considered similar only if the manufacturer had total responsibility for geotextile manufacture and the installed system has successfully fulfilled its primary function for a minimum of two (2) years.

1.2.7 Construction Quality Assurance Manager/Monitors (CQAM)

The CQAM, as the Owner's agent at the site, will act as directed by and under the supervision of the Owner and the Engineer. The CQA Program Manager will confer with the Owner regarding CQAM's actions. The CQAM's dealings in matters pertaining to the on-site work

shall be with Owner and General Contractor. The CQAM's dealings with subcontractors shall only be through, or with the full knowledge and approval of, the General Contractor. The CQA Program Manager shall communicate with the CQAM, with the knowledge of and under the direction of the Owner. The CQAM shall also have experience in the monitoring

of installation of the type of geosynthetic materials specified for this project and shall supervise all CQA Monitors (if needed) for the project.

Construction quality assurance personnel (manager/monitors) are responsible for making observations and performing field sampling and tests to ensure that a facility is constructed in accordance with the plans and specifications. CQA personnel are normally employed by the same firm as the CQA Program Manager, or by a firm hired by the firm employing the CQA Program Manager.

Duties and Responsibilities of CQA Manager:

1. Schedules:

Review the progress schedule, schedule of Shop Drawing submittals, and schedule of values prepared by General Contractor, and consult with Engineer concerning acceptability.

2. Conferences and Meetings:

Attend meetings with General Contractor, such as preconstruction conferences, progress meetings, job conferences, and other project-related meetings.

3. Liaison:

a. Serve as the Engineer's liaison with the General Contractor, working principally through the General Contractor's Superintendent, and assist in understanding the intent of the Contract Documents; and assist the Engineer in serving as the Owner's liaison with the General Contractor when the General Contractor's operations affect Owner's on-site operations.

b. Assist in obtaining from the Owner additional details or information, when required for proper execution of the work.

4. Shop Drawings and Samples:

a. Receive and record the date Shop Drawings and samples are received, and notify the Engineer.

- b. Advise the Engineer of the commencement of any work requiring a Shop Drawing or sample if the submittal has not been approved by the Design Engineer.
 - c. Receive samples which are furnished at the site by the General Contractor, and notify Engineer that the samples are available for inspection.
5. Review of Work, Rejection of Defective Work, Inspections and Tests:
- a. Observe the work in progress on site to assist the Engineer in determining if the work is proceeding in accordance with the Contract Documents.
 - b. Report to the Engineer any work which appears unsatisfactory, defective, or does not conform to the Contract Documents, or does not meet the requirements of any inspection, test or approval. Advise the Engineer of work that CQAM believes should be corrected, rejected, uncovered for observation, tested, inspected, or approved.
 - c. Verify that tests are conducted in presence of appropriate personnel, that all seam weld tests are witnessed under his supervision, and that the General Contractor maintains adequate records thereof; observe, record, and report to the Design Engineer appropriate details relative to the test procedures and start-ups.
 - d. Accompany visiting inspectors representing public or other agencies having jurisdiction over the project, record the results of these inspections, and report to the Engineer.
6. Interpretation of Contract Documents:
- Report to the Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to the General Contractor clarifications and interpretations as issued by the Engineer.
7. Modifications:
- Evaluate the General Contractor's suggestions for modifications in drawings or specifications and report recommendations to the Engineer. Transmit decisions to General Contractor as issued by the Engineer.
8. Records:
- a. Maintain orderly files at the job site for correspondence, reports of job

conferences, Shop Drawings and samples, copies of original Contract Documents including all Work Directive Changes, Addenda, Change Orders, Field Orders, additional Drawings issued subsequent to the execution of the

Contract, Engineer's clarifications and interpretations of the Contract Documents, progress reports, and other project-related documents.

- b. Prepare Daily Construction Reports, recording General Contractor hours on the job site, weather conditions, data relative to questions of Work Directive Changes, Change Orders, or changed conditions, list of job site visitors, daily activities, decisions, observations in general, and specific observations in more detail as the case of observing test procedures; and send three (3) copies to Engineer.
- c. Record names, addresses, and telephone numbers of all General Contractors, subcontractors, and major suppliers of materials and equipment.
- d. Ensure that the General Contractor maintains record drawings of panel seams, penetrations, and repairs.

9. Reports:

- a. Furnish Daily Construction Reports to Engineer, noting work progress and the General Contractor's compliance with the progress schedule, and schedule of Shop Drawings and sample submittals.
- b. Draft proposed Change Orders and Work Directive Changes, obtaining backup material from General Contractor and recommend to the Engineer Change Orders, Work Directive Changes, and Field Orders.
- c. Immediately report any accidents to the Engineer and the Owner.
- d. Report scheduled major tests, inspections, or start of important phases (i.e., primary liner installation and cover soil placement) of the work to the Engineer in advance.
- e. Immediately notify the Engineer, who will notify the Owner/Operator, of all test failures.

10. Payment Requisitions:

Review applications for payment with General Contractor for compliance with the established procedure for their submission and forward with recommendations to the

Engineer, noting particularly the relationship of the payment requested to the schedule of values, work completed and materials and equipment delivered at the site but not incorporated in the work.

11. Certificates:

Verify that certificates and other data required to be assembled and furnished by the General Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have this material delivered to the Engineer for review and forwarding to the Owner prior to final payment for the Work.

12. Completion:

- a. Before the Engineer issues a Certificate of Substantial Completion, submit to the General Contractor a list of items observed to require completion or correction.
- b. Conduct final inspection in the presence of the Engineer, the Owner, and the General Contractor and prepare a final list of items to be completed or corrected.
- c. Observe that the items on final list have been completed or corrected and make recommendations to the Engineer concerning acceptance.

13. Limitations of Authority:

The CQAM:

- a. Shall not authorize any deviations from the Contract Documents or substitution of materials or equipment, unless authorized by the Engineer.
- b. Shall not exceed limitations of the Engineer's authority as set forth in the Contract Documents.
- c. Shall not undertake any of the responsibilities of the General Contractor, subcontractors or the General Contractor's superintendent, or expedite the work.
- d. Shall not advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction unless such advise or directions are specifically required by the Contract Documents.

- e. Shall not advise on, issue directions regarding, or assume control over safety precautions and programs in connection with the work.
- f. Shall not accept Shop Drawings or sample submittals from anyone other than the General Contractor.
- g. Shall not authorize the Owner to occupy the project in whole or in part.
- h. Shall not participate in specialized field or laboratory tests (~~i.e., puncture resistance using construction equipment~~) or inspections conducted by others except as specifically authorized by Engineer.

1.2.8 CQA Program Manager

The CQA Program Manager has overall responsibility for construction quality assurance. The CQA Program Manager is an individual experienced in a variety of construction activities although in particular specializes in soil placement, polymeric materials and geosynthetic placement and will invariably be involved in a project. The CQA Program Manager is responsible for reviewing the CQA plan as well as general plans and specifications for the project so that the CQA plan can be implemented with no contradictions for unresolved discrepancies.

Other responsibilities of the CQA Program Manager include education and training of inspection personnel on CQA requirements and procedures and special construction methods that are needed on a particular project, scheduling and coordinating of CQA inspection activities, ensuring that proper procedures are followed, ensuring that testing laboratories are conforming to CQA requirements and procedures, ensuring that sample custody procedures are followed, confirming that test data are accurately reported and that test data are maintained for later reporting, and preparation of periodic reports.

The most important duty of the CQA Program Manager is overall responsibility for confirming that the facility was constructed in accordance with plans and specifications approved by the Permitting Agency. The CQA Program Manager is normally hired by the Owner and functions independently of the contractors and Owner. The CQA Program Manager must be a registered professional engineer who has shown competency and experience in similar projects. The CQA Program Manager is sometimes required to be at the construction site during all major construction operations to oversee CQA personnel. The CQA Program Manager is usually the CQA Certifying Engineer who certifies the completed project.

1.2.9 CQA Certifying Engineer

The CQA Certifying Engineer is responsible for certifying to the Owner/Operator and

Permitting Agency that, in his or her opinion, the facility has been constructed in accordance with plans and specifications and CQA documentation approved by the Permitting Agency. The certification statement is normally accompanied by a final CQA report that contains all the appropriate documentation including daily observation reports, sampling locations, test results, as-built drawings or sketches, and other relevant data. The CQA Certifying Engineer may be the CQA Program Manager or someone else in the CQA Program Manager's organization who is a registered professional engineer with experience and competency in certifying like installations.

1.2.10 Independent Testing Laboratory

A geosynthetic laboratory shall be retained by the Contractor, under the direction of the Engineer, to analyze samples obtained by the CQAM or CQAM support staff and to test on-site conditions. The testing laboratory shall have its own internal QA plan to ensure that laboratory procedures conform to the appropriate ASTM standards or other applicable testing standards. The testing laboratory is responsible for ensuring that tests are performed in accordance with the applicable methods and standards, for following internal QC procedures, for maintaining sample chain-of-custody records and for reporting data. Note: The soil and concrete testing shall be performed by a laboratory retained by the Contractor.

The laboratory must be willing to allow the owner, engineer, permitting agency, or installer to observe sample preparation and testing procedures, or record-keeping procedures, either announced or unannounced. The laboratory shall issue two copies of all results, certified by an officer of the testing laboratory, directly to the CQAM. Results provided shall include raw measurements and any intermediate calculations required to determine the final test results. The laboratory is also responsible for keeping accurate records of all tests conducted and retain collected samples for six months after acceptance of construction by the Engineer. All independent testing laboratories must be approved by the Engineer prior to testing.

1.3 SITE AND PROJECT CONTROL

To promote a high degree of quality control during the liner system installation, meetings shall be held prior to and during the liner system installation. Site visits shall also be conducted to ascertain the progress of the project.

1.3.1 Project Coordination Meetings

Project coordination meetings shall be used to coordinate tasks, relate lines of authority and provide for communication, and to discuss quality control/quality assurance issues.

Following the completion of the design, plans, specifications, and selection of the General Contractor, a preconstruction meeting will be held. Weekly progress meetings will also be held.

1.3.2 Site Visits

Site visits may include visits to manufacturing plants, soil borrow sources, and/or to the construction site. Plant visits may include the resin manufacturing plant, the geomembrane manufacturing plant, the geomembrane fabrication plant, and geotextile manufacturing plant. These plant visit(s) may be conducted by the Owner and/or by the Owner's representative at the Owner's discretion and by the Engineer.

Site visits to the construction site will also be conducted on a weekly basis or as needed by the principal engineer and other parties responsible for quality assurance and quality control. State and local regulatory officials may be informed of the dates of the visits.

Section 2

LINER SYSTEM - MANUFACTURING AND DELIVERY**2.1 MANUFACTURING/SUPPLIER****2.1.1 Material Acceptability****2.1.1.1 Geomembrane**

The geomembrane for this project shall consist of high density polyethylene (HDPE). The geomembrane shall be manufactured from virgin, first-quality resins, and shall be designed and manufactured specifically for use in liners. Reclaimed polymer shall not be used or added to the resin. The polyethylene resin shall meet the contract specifications for the following properties at minimum:

| | | |
|---------------------------------|---|------------------------------------|
| Density (g/cm ³) | ASTM D792, Method A or ASTM D1505 | 0.940 (minimum) |
| Melt Index (g/10 min.) | ASTM D1238 Condition E | $0.1 \leq \text{Melt Index} < 1.1$ |

The geomembrane shall meet the contract specifications for the properties shown in Table 2-1.

In addition, the geomembrane shall:

- Contain no more than 1 percent by weight of additives, fillers, or extenders (carbon black not included).
- Contain 2 percent to 3 percent carbon black for ultraviolet light resistance (ASTM D 1603).
- Not have striations, fold crimps, irregularities, pinholes, or bubbles on the surface.
- Be produced so as to be free of holes, blisters, undispersed raw materials, or any sign of contamination by foreign matter.
- Be manufactured in a single layer. Thinner layers shall not be welded together to produce the final required thickness.

Table 2-1

**MATERIAL PROPERTIES
HIGH DENSITY POLYETHYLENE (HDPE) LINER**

| PROPERTY | TEST METHOD | VALUE |
|-------------------------------|-------------------------|---|
| Thickness | ASTM D 751 | 60 mils, minimal average 57 mils, minimum individual |
| Density | ASTM D792 or ASTM D1505 | 0.940 g/cm ³ (minimum) |
| Melt Index | ASTM D1238, Condition E | 0.1 ≤ Melt Index ≤ 1.1 g/10 min |
| Minimum Tensile Properties | ASTM D638 | (each direction) |
| 1. Tensile Strength Yield | | 126 (lb./in width) |
| 2. Tensile Strength at Break | | 228 (lb./in width) |
| 3. Elongation at Yield | | 12% (minimum) |
| 4. Elongation at Break | | 560% (minimum) |
| Tear Resistance | ASTM D1004, Die C | 40 lb (minimum), |
| Puncture Resistance | FTMS 101 C, Method 2065 | 60 lb (minimum) |
| Carbon Black Content | ASTM D1603 | 2-3% |
| Carbon Black Dispersion | ASTM D3015 | A-1, A-2, and B-1 |
| Dimensional Stability | ASTM D1204 | 3% (each direction) 1 hour @ 100° C |
| Water Absorption | ASTM D570 | 0.1% (maximum) (% weight change) |
| Resistance to Soil Burial | ASTM D3083 | (maximum percent change in original value; as modified in NSF 54 Annex A) |
| 1. Tensile Strength Yield | | 10% |
| 2. Tensile Strength at Break | | 10% |
| 3. Elongation at Yield | | 10% |
| 4. Elongation at Break | | 10% |
| Environmental Stress Crack | ASTM D1693 | Minimum 2000 Hours |
| Water Vapor Transmission Rate | ASTM E 96 | 0.24 grams/square meter/day |

Source: NSF 54 - 1991

TABLE2-1.HR1

Revised 12/5/97

- Be supplied to the site in rolls.
- Be protected from excessive heat and cold, punctures, cutting, or any other damaging or deleterious conditions during shipment and storage. During storage the geomembrane shall be raised off the floor/ground.

The manufacturer shall be required to perform quality control testing to verify compliance with the specifications.

2.1.1.2 Common Fill

1. Common fill shall be sand obtained from the onsite excavation not containing stones, rock, concrete or other rubble larger than 2 inches in diameter. It shall have physical properties which allow it to be easily spread and compacted.
2. The Engineer shall advise the Contractor on the type of material allowed in certain sections of the earthwork operations.

2.1.1.3 Select Common Fill

The material used as protective cover soil for the liner:

1. Select common fill shall consist of common fill material with the additional requirements that it shall not contain any sharp or granular rock exceeding 1/4-inch in diameter, and be free from clay, loam, or organic matter. It shall have physical properties which allow it to be easily spread and compacted.
2. The Engineer shall advise the Contractor on the type of material allowed in certain sections of the earthwork operations.

2.1.1.4 Filter Aggregate

Filter aggregate shall consist of clean mineral aggregate with particle size limits as follows: This material shall come from off-site borrow sources and adequate quantities shall be stockpiled prior to placement.

| <u>U.S. Sieve Size</u> | <u>Percent Passing By Weight</u> |
|------------------------|----------------------------------|
| 3" | 100 |
| 3/8" | 80-100 |
| No. 4 | 60-90 |
| No. 10 | 30-70 |
| No. 20 | 0-40 |
| No. 40 | 0-15 |

The permeability of the material shall be a minimum of 1×10^{-3} cm/sec.

2.1.1.5 Drainage Sand

Drainage sand shall be well graded, clean quartz base sand, free from clay, loam or organic matter. The sand shall not contain any sharp or angular rock greater than 3/8-inch in diameter with maximum percentage of carbonates of calcium and magnesium of 3 percent with particle size limits as follows:

| <u>U.S. Sieve Size</u> | <u>Percent Passing By Weight</u> |
|------------------------|----------------------------------|
| No. 3 | 100 |
| No. 4 | 95 |
| No. 200 | Maximum 3 |

The saturated hydraulic conductivity of the in-place sand shall be a minimum 1×10^{-3} cm/sec. This material shall come from off-site borrow sources and adequate quantities shall be stockpiled prior to any drainage sand placement activities.

2.1.1.6 Geotextile

The non-woven material shall be comprised of yarns of polypropylene or polyester fibers, oriented into a stable network by needle punching which retains its structure during handling, placement, and long-term service. Geotextiles shall be capable of withstanding direct exposure to sunlight for 30 days with no measurable deterioration. The geotextile shall be chemically compatible with the leachate from a typical sanitary landfill, and inert to commonly encountered chemicals, hydrocarbons, mildew and rot resistant, and be insect and rodent resistant. The geotextile products shall conform to the properties of Table 2-2.

2.1.2 Geomembrane Liner Roll Acceptability

The geomembrane shall be supplied to the site in rolls. A field panel is the unit area of geomembrane which is to be seamed in the field.

Field panel sizes shall be determined by Engineer-approved plans showing the layout and dimensions of field panels. All seams shall conform to the contract specification for the properties shown in Table 2-2 3.

The manufacturer shall perform quality control testing to verify that the geomembrane complies with the contract specifications. Prior to shipping any material, geomembrane roll production documentation shall be submitted to the Engineer by the General Contractor. It shall include:

Table 2-2

REQUIRED PROPERTY VALUES NON-WOVEN GEOTEXTILE¹ APPLICATIONS

| Property | Units | Value ¹ | Test |
|-------------------------------------|--------------------|--------------------|-------------|
| Mass per unit area | oz/sy | 8 | ASTM D 5261 |
| AOS | U.S. Std. Sieve | 80 | ASTM D 4751 |
| Grab tensile strength | lb | 210 | ASTM D 4632 |
| Grab tensile elongation to break | % | 50 | ASTM D 4632 |
| Puncture strength | lb | 130 | ASTM D 4833 |
| Resistance Range | pH | 2-12 | |

¹Values represent minimum average roll values as defined by the Federal Highway Administration.

Manufacturers: Carthage Mille FX-80HS, or equal.

Table 2-2 3**GEOMEMBRANE SEAM REQUIREMENTS****HIGH DENSITY POLYETHYLENE (HDPE) LINER**

| Properties | Qualifiers | Units | Specified Values | Test Methods |
|---|-------------------|--------------|-----------------------------|---------------------|
| Gauge | Minimum average | mils | 60 | |
| Shear Strength ¹ (at yield point) | Minimum | lb/in. width | 120 and FTB ² | ASTM D4437 |
| Peel Adhesion | Minimum | lb/in. width | 85 and FTB ² | ASTM D4437 |

¹ - Minimum of 50 percent elongation of the test specimen will be required for the Shear test.

² - FTB - Film Tear Bond

Source: NSF 54 - 1991

- Test information and documentation to ensure that the geomembrane will be constructed of materials that have appropriate physical, chemical, and mechanical properties to prevent failure.
- Certification with attached quality control certificates that the geomembrane produced for this project is chemically compatible with leachate from a typical sanitary landfill.

2.1.3 Manufacturing Plant Visit

2.1.3.1 Geomembrane/Geotextile Plant

The Owner and/or Engineer may, at their option, visit the manufacturing plant when the geomembrane/geotextile rolls for the specific project are being manufactured. The Engineer will review the manufacturing process, quality control procedures, laboratory facilities, and testing procedures. The observations to be made by the Engineer during the plant visits are outlined in Table 2-3 4.

2.1.3.2 Filter Aggregate and Drainage Sand

The Owner/or Engineer may at their option visit the original source for the filter aggregate and drainage sand selected for the project. The Engineer will review the quality control, storage, and transportation procedures.

2.1.3.3 Common Fill and Select Common Fill

On-site material for common fill and select common fill will be used for this project.

2.1.4 Manufacturing Quality Control

2.1.4.1 Geomembrane Materials

Raw Materials:

Testing shall be carried out to demonstrate that the resin meets the contract specification and the General Contractor shall submit the manufacturer's written certification that it does. Any geomembrane manufactured from non-complying resin shall be rejected. At the Engineer's discretion, additional conformance testing may be carried out by the Engineer. If the results of the General Contractor's and the Engineer's testing differ, the testing shall be repeated by the Engineer and the General Contractor shall be allowed to monitor this testing. The results of this latter series of tests will prevail, provided that the applicable test methods have been followed. The additional test shall be at the General Contractor's expense if it is determined that the specifications have not been complied with.

Table 2-3 4

**GEOMEMBRANE/GEOTEXTILE MANUFACTURING PROCESS
OBSERVATION PROCEDURE**

- Prior to visit, review manufacturer's quality assurance program.
 - Conduct site visit (prior to or during manufacture of materials for project).
 - Inspect raw polymer materials; note packaging, labelling, storage.
 - Sample product from each of the raw material lots (retain for records). Verify that material properties meet specifications guaranteed by the manufacturer.
 - Observe manufacturing process, finished product.
 - Inspect quality control laboratory.
 - Check adherence with quality control procedures (sampling, testing, documentation).
 - Determine acceptability of packaging, labeling, storage, and transportation procedures.
 - Prepare site visit report, distribute, and incorporate into Contract Records.
-

The following documentation on raw materials shall be submitted by the General Contractor to the Engineer prior to shipping any material:

- Origin (resin supplier's name, resin production plant) identification, (brand name, number) and production date(s) of the resin.
- Copy of quality control certificates issued by the resin supplier.
- Reports on the tests conducted to verify the quality of the resin used to manufacture the geomembrane rolls assigned to the project.
- The documentation shall state that no reclaimed polymer is added to the resin during the geomembrane manufacturing process.

Geomembrane Rolls:

- The geomembrane shall be continuously monitored during the manufacturing process for inclusions, bubbles, or other defects, and no geomembrane shall be accepted which exhibits any defects. If such conditions are found to exist the Engineer shall reject the roll. Geomembrane thickness shall also be monitored continuously during the manufacturing process and no geomembrane shall be accepted which fails to meet the specified minimum thickness.
- The carbon black used to protect against ultraviolet rays shall be added to the pure polyethylene resin as part of the roll manufacturing process for stabilization purposes.
- The geomembrane shall be tested once every 40,000 square feet, at a minimum, to evaluate its stress-deformation characteristics. This testing shall be performed by the geomembrane manufacturer. Samples which do not satisfy the specifications shall be cause to reject the applicable rolls. If a geomembrane sample fails to meet specifications, subsequent tests shall be performed at random on additional geomembrane samples produced from the same resin batch to determine whether all rolls produced from the same batch shall be regarded as unsatisfactory. At the Manufacturer's discretion and expense, additional testing of individual rolls may be performed to more closely identify the rolls which do not comply, and/or do not qualify. The following tests shall be run:

Test

Density

Thickness

Yield Strength

Yield Elongation

Procedure

ASTM D 792

Method A or

ASTM D 1505

ASTM D 751

ASTM D 638

ASTM D 638

| | |
|-------------------------|-------------|
| Tensile Strength | ASTM D 638 |
| Tensile Elongation | ASTM D 638 |
| Carbon Black Content | ASTM D 1603 |
| Carbon Black Dispersion | ASTM D 5596 |

- The following tests need not be run at the 1 per 40,000 square-foot frequency. However, a written certification shall be submitted for each project to ensure that these tests have been run on geomembrane sheeting made from the particular resin and to provide the results from this testing.

| | |
|-------------------------------|------------------|
| <u>Test</u> | <u>Procedure</u> |
| Soil Burial | ASTM D 3083 |
| Water Absorption | ASTM D 570 |
| Puncture Resistance | ASTM D 4833 |
| Tear Resistance | ASTM D 1004 |
| Dimensional Stability | ASTM D 1204 |
| Water Vapor Transmission Rate | ASTM E 96 |

- Samples shall be taken across the entire width of the roll. Unless otherwise specified, samples shall be 3 feet long by the roll width. The machine direction shall be marked on the samples with an arrow. The average test results shall meet or exceed the specified values. As soon as possible, after the test completion, certification of the test values for the roll sampled obtained from the testing laboratory shall be provided to the Engineer.
- In addition, the manufacturer/installer shall provide to the Engineer, the manufacturer's certification on the quality of the rolls. At a minimum, the certifications shall include quality control certificates for each lot of resin and each shift's production of geomembrane and shall be signed by responsible parties employed by the manufacturer (such as the production manager) and shall be notarized. The quality control certificates shall also include:
 - 1) Roll numbers, identification, and production shift.
 - 2) Sampling procedures.
 - 3) Results of quality control tests, including description of test methods used.

2.1.4.2 Geotextile Materials

1. The geotextile shall be manufactured with a high degree of quality control and shall contain no needles from the manufacturing process. In most cases, however, sampling can be carried out on sacrificial portions of the material. Consequently, repair of sampled locations should not be required as long as the rest of requirements are met

in this CQA Plan. The following criteria are necessary for these components.

2. Rolls:

- a) All materials shall be tested, at a minimum, once every lot or once every 40,000 square feet, whichever is least, to evaluate the pertinent characteristics for quality control. This testing shall be performed and certified by the Contractor to show that the material samples meet the specifications described herein. Samples not satisfying the specifications shall result in the rejection of the applicable rolls. At the Contractor's discretion and expense, additional testing of individual rolls may be performed to more closely identify the noncomplying rolls and/or to qualify individual rolls.
- b) The Contractor shall provide to the Engineer the geotextile manufacturer's certification on the quality of the rolls of geotextiles. As a minimum, the certifications shall include quality control certificates for each shift's production and shall be signed by responsible parties employed by the manufacturer (such as the production manager), shall be notarized and supplied to the Engineer.
- c) The quality control certificate shall include:
 - 1) Roll numbers and identification.
 - 2) Sampling procedures.
 - 3) Results of quality control tests, including a description of test methods used.

- 3. Upon delivery to the site, samples of all geotextile materials shall be removed by the Engineer and sent to the Owner's independent specified laboratory for testing to ensure conformance to these specifications. Conformance tests by independent laboratory will be at Owner's expense. The Contractor shall be responsible for payment of any failed conformance tests. Samples shall be selected by the Engineer at a frequency of one (1) per 100,000 sf material delivered. The Engineer may increase the frequency of sampling at his discretion in the event that test results are negative. Any materials whose sample minimum average roll values do not meet these specifications shall be rejected and replaced, at the cost of the Contractor. The Contractor shall be responsible for the safe storage of rolls at the job site.

2.2 **TRANSPORTATION, HANDLING, AND STORAGE**

2.2.1 **Geomembrane/Geotextile**

Prior to final acceptance by the Owner, care shall be taken to ensure that transportation, handling,

and storage of geomembrane/geotextile include:

- Protection from excessive heat and cold, puncture, cutting, ultraviolet radiation, precipitation, dirt or other damaging or deleterious conditions.
- Labels for each roll identifying:
 - 1) Manufacturer and Product.
 - 2) Lot number.
 - 3) The length and width of the roll.
 - 4) Roll number.

2.2.2 Common Fill

On-site material for common fill will be used for this project. Material shall be visually inspected by the CQAM to ensure that suitable material is used in construction. Common fill shall be sand not containing stones, rock, concrete or other rubble larger than 2 inches in diameter. It shall have physical properties which allow it to be easily spread and compacted.

2.2.3 Select Common Fill

On-site material for select common fill will be used for this project. Material shall be visually inspected by the CQAM to ensure that suitable material is used in construction. It shall not contain any sharp or granular rock exceeding 1/4-inch in diameter, and be free from clay, loam, or organic matter. It shall have physical properties which allow it to be easily spread and compacted. All material used shall be free of sticks, roots, stumps, glass and any other objects which may damage the geomembrane.

Section 3

GEOMEMBRANE SYSTEM INSTALLATION

3.1 EARTHWORK

3.1.1 Subgrade Preparation

The General Contractor shall be responsible for preparing the supporting soil surface. Foreign objects such as rocks, sticks, glass, sharp objects, stones larger than 1/4-inch in diameter and any other harmful materials shall be removed from the surface. Soil at the surface of the subgrade shall be graded to a smooth, even surface. No abrupt changes in grade, standing water, or excessive moisture will be permitted. Perimeter anchor trenches shall be excavated to the lines and width shown on the plans prior to geomembrane placement. Visible vegetation shall be removed.

The installer shall be responsible for inspection of the soil surface integrity and shall certify his acceptability and responsibility for the area and suitability in writing to the General Contractor prior to beginning geomembrane installation. This certification of acceptance shall be given to the Engineer by the General Contractor prior to commencing geomembrane installation in the area being considered. The General Contractor shall furnish any topographic surveys to the Engineer within 48 hours after completion of the geomembrane subgrade.

Special care should be taken to maintain the prepared soil surface. No geomembrane shall be placed onto an area which has become softened by precipitation. Any damage to the subgrade caused by installation activities shall be repaired at the General Contractor's expense. Table 3-1 describes quality assurance observation activities to ensure, with a reasonable degree of certainty, that the subgrade meets or exceeds the contract specifications.

3.1.2 Subgrade Protection

The General Contractor shall protect the subgrade from desiccation and flooding. Protection, if required, may consist of a thin plastic protective cover (or other material as approved by the Engineer) installed over the completed subgrade until such time as the placement of geomembrane liner begins. Subgrades found to have desiccation cracks greater than 1/4-inch in width and/or depth, or which exhibit swelling, heaving, or other similar conditions shall be replaced or reworked by the General Contractor to remove these defects. The geomembrane subgrade must be approved by the Engineer before placement of geomembrane can begin.

Table 3-1

EARTHWORK PREPARATION OBSERVATION

-
- Review site investigation reports.
 - Measure depth and slope of excavation.
 - Ensure that the configuration of the anchor trench is as shown on the Drawings.
 - Observe placement of recessed areas for pipes, sumps.
 - Test and observe compacted fill (smooth, uniform, no abrupt changes in grade, no standing water).
 - Observe stripping and excavating operations to remove undesirable material and debris of any kind (organics, roots, rocks).
 - Review survey, checking dimensions, (boundaries), side slopes, bottom slope with respect to design.
 - Photograph the earthwork process for records.
-

3.1.3 Anchor Trench

The anchor trench shall be excavated prior to geomembrane placement to the lines and grades shown on the Drawings. The trench shall have a configuration as shown on the drawings. No loose soil shall be allowed beneath the geomembrane. The anchor trench shall be backfilled and compacted. Care shall be taken to prevent any damage to the geomembrane when back filling the trenches. Slightly rounded corners shall be provided in the trench where the geomembrane adjoins the trench so as to avoid sharp bends in the geomembrane.

3.2 GEOMEMBRANE ROLL QUALITY ASSURANCE

Upon delivery to the project site, the geomembrane shall be inspected by the CQA personnel to confirm that the proper transportation, handling, and storage procedures have been followed, as described in Section 2.2. The CQA Monitor or designee shall be responsible for the sampling of the geomembrane rolls delivered to the site to the General Contractor or the General Contractor's representative, to observe that the rolls conform to the contract specifications, and to review the quality control testing results provided by the geomembrane manufacturer. The transportation, handling, and storage observations to be conducted by the CQA Monitor are outlined in Table 3-2.

Any field panel, or portion thereof, which becomes seriously damaged (torn, twisted, or crimped) or that does not conform to the contract specifications shall be replaced at no cost to the Owner. Less serious damage may be repaired if approved by the Engineer and the Owner. Damaged panels, or portions of damaged panels, which have been rejected shall be removed from the work area at no cost to the Owner.

The CQA Monitor shall fully document the receipt of the geomembrane rolls at the construction site, the inspection procedure, and results in the Daily Field Report (see Attachment A).

3.3 LINER SYSTEM INSTALLATION

3.3.1 Geomembrane Placement

3.3.1.1 Layout Drawings

The General Contractor shall provide layout drawings to the Engineer prior to geomembrane placement. These drawings shall indicate the panel configuration and location of seams. The layout drawings must be approved by the Engineer prior to the installation of geomembrane.

Table 3-2

GEOMEMBRANE TRANSPORTATION/HANDLING/STORAGE OBSERVATION

- Observe geomembrane packaging.
 - Observe markings on geomembrane package to include: name of manufacturer/fabricator; product type/thickness; manufacturer's lot and roll numbers; date of manufacture; dimensions (length and width).
 - Observe geomembrane material upon delivery. Punctures from nails, tears, crumpling due to inadequate packaging shall be noted.
 - Observe storage in secure area (minimize exposure to wind, keep elevated off ground, temperature extremes, vandalism, other sources of damage).
 - Sample of each shipment received at the job site for compliance with specifications. Samples shall be properly labeled. Tests should determine density, carbon black content, thickness, and tensile characteristics (yield strength, elongation at yield, break strength, elongation at break). Thickness can also be checked in field using calipers or micrometer.
-

3.3.1.2 Panel Identification

Each field panel must be given an "identification code" (number or letter-number) consistent with the layout drawings. This identification code shall be agreed upon by the Engineer and General Contractor. The field panel identification code shall be related, through a table or chart, to the original resin, and the constituent rolls and factory panels.

3.3.1.3 Field Panel Placement

- The schedule of field panel installation and seaming shall be approved by the Engineer and shall be indicated in the layout drawings.
- Geomembrane shall not be placed during any precipitation, in the presence of excessive moisture (e.g., fog, dew), in standing water, or when excessive winds prevail.
- Unless authorized in writing by the Engineer, no seaming shall be attempted at ~~sheet surface ambient~~ temperatures below 40°F or above 104°F. At ~~sheet surface ambient~~ temperatures between 40°F and 50°F, seaming shall be allowed if the geomembrane is preheated by either the sun or hot air device, and if there is no excessive cooling resulting from the wind. At ~~sheet surface ambient~~ temperatures above 50°F, no preheating shall be required. In all cases, the geomembrane shall be dry and protected from wind damage. The sheet surface temperature shall be measured at the liner overlap to be welded.
- The General Contractor shall ensure that:
 - 1) No equipment shall damage the geomembrane through handling, traffic, leakage of hydrocarbons, or other means.
 - 2) No personnel working on the geomembrane shall engage in any activities which could damage the geomembrane (e.g., smoking, wearing improper shoes, disposing of harmful waste material).
 - 3) The panels shall be unrolled in a manner which precludes scratches or crimps in the geomembrane, and shall not disturb the supporting soil.
 - 4) Prepared surfaces underlying the geomembrane must remain acceptable up to the time of geomembrane placement.

- 5) All geosynthetic elements lying immediately beneath the geomembrane must be kept clean and free of debris.
- 6) The method used to place the panels shall minimize wrinkles (especially differential wrinkles between adjacent panels).
- 7) Adequate temporary loading and/or anchoring devices which are not likely to damage the geomembrane (e.g., sand bags, tires), shall be placed in a manner which prevents the geomembrane from being lifted by the wind (in case of high winds, continuous loading is recommended along the panel's edges to minimize risk of wind flow under the panels).
- 8) Direct contact with the geomembrane shall be minimized; i.e., geomembrane in excessively high traffic areas shall be protected by geotextiles, extra geomembrane, or other suitable materials. At no time during the geomembrane placement shall any vehicle be allowed directly on the exposed material.

Table 3-3 outlines the type of observations to be conducted by the CQA Monitor during the placement of the geomembrane. The Panel Placement Checklist shall be used in this phase of construction observation. Geomembrane seaming is addressed in the Section 3.4.

3.3.2 Select Common Fill Placement

The select common fill material shall be spread and fine graded in accordance with the contract specifications. The CQA Monitor and General Contractor shall inspect the placement of cover soil on a daily basis and shall recommend corrective action if the conditions of the soil deteriorates. Any area not meeting the requirements of the contract specifications shall be reworked at the General Contractor's expense.

Table 3-3

GEOMEMBRANE PLACEMENT OBSERVATION

-
- Check geomembrane delivery tickets (retain with Project Records) and manufacturer quality control certificate to observe compliance with specifications.
 - Observe geomembrane placement/compliance with layout drawing(s).
 - Observe proper temporary anchorage of geomembrane, and placement of geomembrane in non-stressed state.
 - Observe weather conditions for acceptability; suspend activities if weather is deemed unacceptable.
 - Observe lines and width of anchor trench; backfill, compaction, no voids.
 - Observe geomembrane penetrations and connections.
 - Observe geomembrane overlays for compliance with specifications.
 - When placement is complete, traverse entire geomembrane surface, observing geomembrane for tears, punctures, thin spots; mark and document defects.
 - Observe sampling/destructive testing of field seams as required in specifications; observe non-destructive testing of 100 percent of seams. Rejected seams should be fully documented, then repaired.
-

3.4 FIELD SEAMING FOR GEOMEMBRANES

3.4.1 Seam Layout

In general, seams shall be placed parallel to the line of maximum slope, i.e., along, not across, the slope. The number of field seams shall be minimized in corners and odd-shaped geometric locations. No horizontal seam (oriented parallel to the toe and crest of slope), shall be less than 5 feet from the toe of the slope. No seams shall be located in areas of maximum potential stress concentrations.

3.4.2 Personnel Requirements

All personnel performing seaming operations shall be qualified as indicated in Section 1.2.6.3.

3.4.3 Overlapping and Temporary Bonding

- Geomembrane panels shall overlap by a minimum of 3 inches for extrusion welding and 5 inches for thermal fusion welding. Overlap shall be sufficient to allow peel tests to be performed on the seam.
- The procedure used to temporarily bond adjacent panels together shall not damage the geomembrane; specifically, the air temperature at the nozzle of any spot-welding apparatus shall be controlled so that the geomembrane is not damaged.

3.4.4 Seam Area Preparation

- Prior to seaming, the seam area shall be clean and free of moisture, dust, dirt, debris of any kind, and foreign material.
- If seam overlap grinding is required, the process shall be completed according to the manufacturer's instructions within one hour of the seaming operation, and in a way that does not damage the geomembrane. If grind area is exposed over one hour, it must be reground prior to welding. All ground areas must be covered with extrudate.
- Seams shall be aligned with the fewest possible number of wrinkles and no "fish mouths."
- New Liner to In-Place Liner: The in-place liner edge must be thoroughly cleaned using detergent and water and be totally free of dust, dirt, oil, grease and moisture before it is joined with the new liner. If necessary, additional solvents must be used to thoroughly remove oil and grease.

3.4.5 Seaming Equipment and Products

Extrusion welding and thermal fusion welding are the processes approved for field seaming HDPE geomembranes. Proposed alternate processes shall be documented by the General Contractor and submitted to the Engineer for approval. See the construction plans and specifications for more detail.

- Extrusion Process:

The extrusion welding apparatus shall be equipped with gauges which register the temperatures both in the apparatus and at the nozzle. The General Contractor shall provide documentation regarding the extrudate to the Engineer, and shall certify that the extrudate meets the contract specifications, and comprises the same resins as the geomembrane. The General Contractor shall maintain at least one spare, operational seaming apparatus on site. Equipment used for seaming shall not damage the geomembrane, and the geomembrane shall particularly be protected from damage in heavy traffic areas. The extruder shall be cleaned until all heat-degraded extrudate has been removed from the barrel prior to beginning a seam. Whenever the extruder is stopped, the barrel shall be cleaned of all heat-degraded extrudate. All degraded extrudate must be removed from the geomembrane area. The electric generator shall be placed on a smooth base so that the geomembrane is not damaged. Also, a smooth insulation plate or fabric shall be placed beneath the apparatus after each use.

- Thermal Fusion Process:

The fusion-welding apparatus shall be a self-propelled hot wedge welding device and shall be equipped with gauges which register applicable temperatures and pressures. The General Contractor shall maintain at least one spare operational seaming apparatus on site. Seaming equipment shall not damage the geomembrane, and the geomembrane shall be protected from damage in heavy traffic areas. For cross seams associated with fusion welding, the edge of the cross seams shall be ground to a smooth incline (top and bottom) prior to welding. The electric generator shall be placed on a smooth base so that the geomembrane is not damaged. Similarly, a smooth insulating plate or fabric shall be placed beneath the hot welding apparatus after each use. A movable, protective layer may be used directly beneath where the geomembrane overlaps and is to be seamed to prevent moisture buildup between the geomembrane sheets.

3.4.6 Weather Conditions for Seaming

- Unless authorized in writing by the Engineer, no seaming shall be attempted at sheet surface temperatures below 40°F or above 104°F. Seaming shall be allowed at ambient temperatures between 40°F and 50°F, if the geomembrane is preheated (by

3.4.6 Weather Conditions for Seaming

- Unless authorized in writing by the Engineer, no seaming shall be attempted at ~~sheet surface ambient~~ temperatures below 40°F or above 104°F. Seaming shall be allowed at ambient temperatures between 40°F and 50°F, if the geomembrane is preheated (by either the sun or a hot air device), and if no excessive cooling results from the wind. At ambient temperatures above 50°F, no preheating shall be required. The geomembrane shall always be kept dry and protected from wind damage.
- If the General Contractor wishes to use methods which may allow seaming at ambient temperatures below 40°F or above 104°F, he shall demonstrate to the Engineer that the seam produced equals those produced under normally approved conditions, and that overall geomembrane quality is not adversely affected.
- All seaming operations shall cease upon the presence of any precipitation (drizzle, sprinkle, etc.).

3.4.7 Trial Seams

- Trial seams shall be made on geomembrane fragments to verify that seaming conditions are adequate. Such trial seams shall be made at the beginning of each seaming period, and at least once every four hours, for each seaming apparatus used that day. Also, each seamer shall make at least one trial seam each day. Trial seams shall be made under the same conditions as actual seams. The trial seam sample shall be at least 3 feet long by 1 foot wide (after seaming) with the seam centered lengthwise. Seam overlap shall be as previously indicated.
- Two adjoining specimens each 1-inch wide shall be cut from the trial seam by the General Contractor. The specimens shall be tested, in shear and peel respectively, using a field tensiometer. If a specimen fails, the entire operation shall be repeated. If the additional specimen fails, the seaming apparatus or seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two consecutive successful trial welds are achieved.
- When tests described above are completed, the remaining portion of the trial seam can be discarded. Alternatively, the remaining portion of the trial seam can be subjected to destructive testing. If a trial seam sample fails a test, then a destructive test seam sample taken from the seams completed by the seamer during the shift related to the considered trial seam shall be forwarded to the Engineer. If the samples fail the tests, the procedure indicated in Section 4.3.3.2 shall apply.

3.4.8 General Seaming Procedures

The general seaming procedure used by the General Contractor shall be as follows:

- For fusion welding, a movable protective layer of plastic may be placed directly below each overlap of geomembrane that is to be seamed. This is to prevent any moisture build-up between the sheets to be welded.
- Seaming shall extend the entire length of the panels including seams within the anchor trench
- If required, a firm removable substrate shall be provided directly under the seam overlap by using a flat board, a conveyor belt, or similar hard surface to achieve proper support.
- If seaming operations are carried out at night, adequate illumination shall be provided.
- Fishmouths or wrinkles at the seam overlaps shall be cut along the ridge of the wrinkle in order to achieve a flat overlap. The cut fishmouths or wrinkles shall be seamed and any portion where the overlap is inadequate shall be patched with an oval or round patch of the same geomembrane and shall extend a minimum of 6 inches beyond the cut in all directions.
- A width of 1 foot along the edge of the geomembrane shall be cleaned to remove all extraneous material (i.e., sand, silt, film, water, etc.) which could be detrimental to the seaming process. The extraneous material must be observed to be wiped, brushed, or blown free from each side of the geomembrane.
- The observation activities that shall be carried out during field seaming of geomembrane panels are listed in Table 3-4. To aid in the documentation of these field activities, the CQA Monitor shall complete the Panel Seaming Checklist, Seam Testing Checklist, Seam Repair and Test Location Log, in addition to filing a Daily Construction Report. All construction forms and checklists are contained in Attachment A.

Table 3-4

GEOMEMBRANE FIELD SEAMING OBSERVATION

-
- Observe geomembrane to ensure it is free from dirt, dust, moisture.
 - Observe seaming materials and equipment for conformance with specifications.
 - Observe whether foundation is firm enough for seaming.
 - Observe weather conditions.
 - Measure temperature, pressures, and speed of seaming to see that they meet specifications.
 - Observe destructive field testing of trial seams.
 - Observe geomembrane for damage by personnel or equipment during seaming.
 - Observe non-destructive testing for 100 percent of field seams. Mark and record locations of failed seams. Observe retesting after repair.
 - Observe destructive testing of field seams once per every on average 500 feet of seams, at suspicious locations (dirt, moisture, non-destructive test failures). Document locations, time, crew, etc. (Attachment A). Test one portion of the sample in field, remainder of sample sent out to laboratory.
 - Document (in writing and by photographing) repairs including location, type, method used.
-

3.5 MATERIALS IN CONTACT WITH THE GEOMEMBRANE

3.5.1 General

The following provisions require the General Contractor to take all necessary precautions so that the installation of these materials do not damage the geomembrane/geotextile. Installation on rough surfaces such as concrete shall be carefully performed to minimize damage.

3.5.2 Cover Materials

Placement of cover materials shall not proceed at an ambient temperature below 40°F or above 104°F, unless otherwise specified. Equipment used for placing cover material shall not be driven directly on the geomembrane. A minimum thickness of 1 foot of cover material is required for light equipment and vehicles (such as a wide pad Caterpillar D-3 or lighter). In heavy traffic areas such as access ramps, cover material should be at least 3 feet thick. In any case, the following table shall be complied with:

| Equipment Ground Pressure (psi) | Minimum Lift Thickness (inches) |
|---------------------------------|---------------------------------|
| < 4.6 | 12 |
| 4.6 - 8 | 18 |
| 8 - 16 | 24 |
| > 16 | 36 |

The cover layer shall be placed as soon as possible after installation to protect against damage from weather, equipment, and vandalism. Coverage shall not proceed prior to approval by the CQA Monitor. Observation activities associated with cover layer placement are listed in Table 3-5.

Table 3-5

COVER LAYER PLACEMENT OBSERVATION

-
- Immediately prior to covering the geomembrane/geotextile, conduct thorough visual observation for damage which may have occurred during installation. If damage is found, mark, document, repair, then observe non-destructive testing. Document (including photographs) in the Daily Report of Construction.
 - Observe cover material installation and test results for compliance with specifications.
 - Observe that cover material is free of objects (roots, sticks) that could damage the geomembrane.
 - Observe that equipment or procedures used to place cover do not damage the geomembrane.
 - Verify cover material thickness for compliance with specifications.
-

3.6 LINER SYSTEM INSTALLATION QUALITY ASSURANCE

3.6.1 General

Observations that shall be made by the CQA Monitor are delineated in Table 3-6. The objective of these observations is to prevent, detect, and correct the following: the use of unspecified materials; incomplete seams; inadequate compaction of backfill; geomembrane damage due to contact with rough edges, sharp corners; and improper location of seams.

3.6.2 COA Monitor Responsibilities

The CQA Monitor shall observe a maximum of two (2) geomembrane seaming crews. If the General Contractor and/or Subcontractors choose to use more than two seaming crews simultaneously, then additional monitors will be required. Additional monitors shall be paid for by the General Contractor in the form of a credit to the Owner.

The General Contractor shall bear the cost of the CQA Monitors over and above the contract installation calendar day period in the form of liquidated damages (and not as a penalty). The General Contractor and/or subcontractors shall not install, seam, or cover any geomembrane material without the presence of at least one CQA Monitor.

3.7 LINER SYSTEM ACCEPTANCE AND COMPLETION

3.7.1 Liner System Acceptance

The General Contractor shall retain all ownership and responsibility for the composite lining system until acceptance by the Owner. The composite lining system shall be accepted by the Owner when:

- The installation is finished.
- All documentation of installation is completed including the Engineer's final report.
- The adequacy of all field seams and repairs, including associated testing, has been verified.
- Written certification documents, including record drawings, sealed by a Registered Professional Engineer have been received by the Owner.

3.7.2 Certification of Completion

Upon completion of the covering operation for each construction sequence, the General Contractor shall certify the following to the Owner:

- The liner system has been constructed in accordance with the approved project plans and specifications.
- The cover material meets all requirements of the approved project plans and specifications. The geomembrane has not been damaged during the covering operation or construction.
- Receipt of the final geomembrane warranties.

Section 4

SAMPLING AND TESTING

D.E.P.

APR 27 1998

SOUTHWEST DISTRICT
TAMPA

4.1 SOIL TESTING AND INSPECTION

4.1.1 Clay Backfill Testing

The clay excavated for the liner tie-in shall be replaced in 12-inch lifts after liner placement. It shall be compacted for stability in the presence of the CQA Monitor. ~~No soil compaction testing shall be required.~~ The clay backfill shall be compacted to 90% Standard Proctor density (ASTM D-698). The testing frequency shall be every 100 linear feet.

4.1.1

4.1.2 Select Common Fill Testing

Select common fill directly beneath and overlaying the geomembrane liner shall undergo one soil compaction test ~~per acre of installed material after installation and compaction~~ every 100 feet, alternating between near the top of slope and near the toe of slope.

4.1.2

4.1.3 Filter Aggregate Testing

Two initial gradation tests shall be made for the filter aggregate material and one additional gradation test shall be made for each 500 tons of material delivered, by the Contractor's independent testing laboratory.

4.1.3

4.1.4 Drainage Sand Testing

Two initial gradation tests shall be made for the drainage sand material and one additional gradation test shall be made for each additional 500 tons of material by the Contractor's independent testing laboratory.

4.2 GEOMEMBRANE FIELD SEAMS

4.2.1 Observation

Observation of geomembrane field seaming operations shall follow the procedures outlined in Section 3.3.2. The Panel Seaming Log, Seam Testing Log, and Daily Field Report, all

found in Attachment A, shall be used to document the observations.

4.2.2 Non-Destructive Seam Continuity Testing

The General Contractor shall non-destructively test all field seams over their full length using a vacuum test unit, air pressure (for double fusion seams only), or other approved method. Continuity testing shall be carried out as the seaming work progresses, not at the completion of all field seaming. Any repairs required shall be completed in accordance with Section 4.3.4. The following procedures shall apply to locations where seams cannot be non-destructively tested:

- All such seams shall be cap-stripped with the same HDPE geomembrane.
- If the seam is accessible to testing equipment prior to final installation, the seam shall be non-destructively tested prior to final installation.
- If the seam cannot be tested prior to final installation, the seaming and cap-stripping operations shall be observed by the CQA Monitor for uniformity and completeness.
- All fabricated boots shall be hydrostatically or spark tested, or equivalent, prior to or after installation. The test must be detailed to and approved by the CQA Program Manager prior to the performance of the testing.

4.2.2.1 Vacuum Testing

The equipment shall comprise the following:

1. A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft neoprene gasket attached to the bottom of the box, a port hole or valve assembly, and a vacuum gauge. The viewing window must give an unobstructed view of the seam being tested at all times.
2. A steel or aluminum vacuum tank and pump assembly equipped with a pressure controller and pipe connections.
3. A rubber pressure/vacuum hose with fittings and connections.
4. A bucket and wide paint brush or applicator.
5. A soapy solution.

The following procedure shall be followed:

1. Start the vacuum pump and reduce the tank pressure to approximately 10 inches of mercury (i.e., 5 psi gauge). All gauges shall read zero (0) psi when the vacuum pump is turned on. Gauges not reading zero (0) psi shall be replaced.
2. Wet a strip of geomembrane (approximately 4 in. by 24 in. in size) with the soapy solution.
3. Place the box over the wetted area.
4. Close the bleed valve and open the vacuum valve.
5. Ensure that a leak-tight seal is created.
6. For a period of not less than 15 seconds, examine the geomembrane through the viewing window for the presence of soap bubbles along the seam.
7. If no bubbles appear on the seam after 15 seconds, close the vacuum valve and open the bleed valve, move the box to the next adjoining area with a minimum 3-inch overlap, and repeat the process.
8. All areas where soap bubbles appear shall be marked and repaired in accordance with Section 4.3.4.

4.2.2.2 Air Pressure Testing (for Double Fusion Seam Only)

The following procedures apply to those processes which produce a double wedge seam with an enclosed space.

The equipment shall comprise the following:

1. An air pump (manual or motor driven) equipped with a pressure gauge which is capable of generating and sustaining a pressure of between 25 and 30 psi, and which is mounted on a cushion to protect the geomembrane.
2. A rubber hose with fittings and connections.
3. A sharp, hollow needle, or other approved pressure-feed device.

The following procedure shall be followed:

1. Seal both ends of the seam to be tested.
2. Insert needle or other approved pressure-feed device into the channel created by the fusion weld.
3. Insert a protective cushion between the air pump and the geomembrane.
4. Start the air pump and increase to a pressure of between 25 and 30 psi, close the valve, and sustain pressure for approximately 5 minutes.
5. If pressure loss exceeds 2 psi or does not stabilize, locate faulty area and repair in accordance with Section 4.3.4.
6. After a seam has passed a pressure test, release pressure at the end of seam that is opposite the air pump and pressure gauge assembly so as to ensure that the seam is continuous and has been completely tested.
7. Remove needle or other approved pressure-feed device and repair in accordance with Section 4.3.4.

4.2.3 Destructive Seam Testing

Destructive seam tests shall be performed for seams at locations designated by the CQA Monitor. The purpose of these tests is to evaluate seam strength and quality. Seam strength testing shall be done as the seaming work progresses, not at the completion of all field seaming.

4.2.3.1 Sampling Procedure

- Location and Frequency:

Destructive test samples shall be collected at an average frequency of one test location per 500 feet of seam length. Samples, in addition to the minimum average frequency, shall be taken by the General Contractor as required by the CQA Monitor. Test locations shall be determined during seaming, and may be prompted by suspicion of excess crystallinity, contamination, offset welds, or any other potential cause of imperfect welding. The CQA Monitor shall choose the locations. The General Contractor will not be informed in advance of the locations where the seam samples will be taken. The Engineer

reserves the right to increase sampling frequency in accordance with actual performance results of samples taken.

Samples shall be cut by the General Contractor at locations designated by the CQA Monitor as the seaming progresses. The purpose of this is to allow the CQA Monitor to obtain laboratory test results before the liner is covered by another material. Each sample shall be numbered, and the sample number and location shall be identified on the panel layout drawing. All holes in the geomembrane resulting from the destructive seam sampling shall be repaired immediately in accordance with the procedures described in Section 4.3.4. The continuity of the new seams in the repaired area shall be tested according to Section 4.3.2.

- **Size of Samples:**

The samples shall be 12 inches wide by 44 inches long with the seam centered lengthwise. One 1-inch wide strip shall be cut from each end of the sample and these shall be tested in the field. The remaining portion of the sample shall be cut into three parts and distributed as follows:

- 1) One portion to the General Contractor for laboratory testing, 12 inches by 12 inches.
- 2) One portion for the Engineer for testing, 12 inches by 18 inches.
- 3) One portion to the Engineer for archive storage, 12 inches by 12 inches.

4.2.3.2 Geomembrane Testing Procedure

- **Field Testing:**

The two 1-inch wide strips shall be tested in the field, by hand or tensiometer, for peel and shear (respectively) and shall not fail in the seam. When field samples fail to pass the tests, then the procedures outlined for destructive test failure shall be followed.

- **Laboratory Testing:**

Testing by the Engineer will include shear strength and peel adhesion. Testing procedures and minimum acceptable values obtained in these tests

are listed in Table 2-4. At least 5 specimens will be tested for each test method. The Engineer will provide test results no more than 24 hours after the samples are received at the laboratory. The Engineer shall establish procedures for reporting test results with the selected laboratory.

- **Procedures for Destructive Test Failure:**

The following procedures shall apply whenever a sample fails the destructive test, whether the test is conducted by the Engineer's specified laboratory, the General Contractor's laboratory, or by field tensiometer. The General Contractor shall have two options, which shall be at his expense:

- 1) The General Contractor can reconstruct the seam between any two passing test locations, which bound the failing sample.
- 2) The General Contractor can trace the welding path to an intermediate location (at 10 feet minimum from the location of the failed test in each direction) and take a small sample at each location for an additional field test. If these additional samples pass the tests, then full laboratory samples shall be taken. If the laboratory samples pass the tests, then the seam shall be reconstructed between these locations. If either sample fails, then the process shall be repeated in the failing direction to establish the zone in which the seam should be reconstructed. In any case, all unacceptable seams must be bounded by two locations from which samples which passed laboratory destructive tests have been taken. In cases exceeding 150 feet of reconstructed seam, a sample taken from within the reconstructed zone must pass destructive testing. Whenever a sample fails, additional testing may be required for seams that were welded by the same welder and/or welding apparatus or welded during the same time shift. Such additional testing shall be at the General Contractor's expense.

4.2.4 Defects and Repairs to Geomembrane

4.2.4.1 Identification

All seams and non-seam areas of the geomembrane will be observed by the CQA Monitor for identification of defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. The geomembrane surface shall be clean at the time of examination. If any amount of dust or mud inhibits examination,

the geomembrane surface shall be broomed or washed by the General Contractor. The General Contractor shall ensure that this geomembrane examination precedes any seaming of that section.

4.2.4.2 Evaluation

Each suspect location both in the seam and non-seam areas shall be non-destructively tested using the methods described in Section 4.3.2, as appropriate. Each location which fails the non-destructive testing shall be marked by the Engineer and repaired by the General Contractor. Work shall not proceed with any materials which will cover locations which have been repaired until laboratory test results are available with passing values and final walkover has been performed.

4.2.4.3 Repair Procedure

Any portion of the geomembrane which exhibits a flaw, or fails a destructive or non-destructive test, shall be repaired by the General Contractor. Several procedures exist for the repair of these areas. The final decision as to the appropriate repair procedure shall be agreed upon between the Engineer and the General Contractor. The available procedures include:

1. Patching:
Used to repair large holes, tears, undispersed raw materials, and contamination by foreign matter. The patch shall be made of the same material as the geomembrane.
2. Grinding and rewelding:
Used to repair small sections of extruded seams.
3. Spot welding or seaming:
Used to repair small tears, pinholes, or other minor, localized flaws.
4. Capping (Cap Strip):
Used to repair portions of failed seams.
5. Topping:

Used to repair inadequate seam areas.

In addition, the following provisions shall be satisfied:

1. Geomembrane surfaces which require grinding prior to repair shall be abraded no more than one hour prior to the repair.
2. All surfaces must be clean and dry at the time of repair.
3. Repair procedures, materials, equipment, and techniques shall be approved in advance of the specific repair by the Engineer and General Contractor.
4. Patches or caps shall extend at least 6 inches beyond the edge of the defect, and all corners of patches shall be rounded with a radius of at least 3 inches.
5. The geomembrane material below large caps should be cut appropriately to avoid water or gas collections between the two sheets.

4.2.4.4 Verification of Repairs

Each repair shall be identified and logged. Each repair shall be non-destructively tested using the methods described in Section 4.3.2, as appropriate. Repairs which pass the non-destructive test shall indicate an adequate repair. Large caps may be of sufficient extent to require destructive test sampling, at the discretion of the Engineer. Failed tests indicate that the repair shall be redone and retested until a passing test results.

4.2.4.5 Large Wrinkles

When seaming of the geomembrane is completed (or when seaming of a large area of the geomembrane is completed) and prior to placing overlying materials, the CQA Monitor shall identify excessive geomembrane wrinkles. The General Contractor shall cut and reseam all wrinkles so identified. The seam thus produced shall be tested like any other seam.

4.2.4.6 Bridging or Induced Tension

Bridging or Induced Tension: Bridging is defined as areas where the geomembrane is not in contact with the subgrade due to a void in the subgrade or the sheet is pulled in tension so as to span over depressions in the subgrade. Areas likely to promote bridging, i.e. trenches, toe of slopes, etc., shall be loaded with sandbags after deployment and after seaming.

Induced tension is stress introduced into the geomembrane during installation or covering. These areas will likely result in bridging. Areas bridging excessively shall be identified and repaired by either of the following methods:

- 1) The geomembrane shall be cut, by the Installer, so the tension is relieved and the geomembrane conforms to the subgrade contours. The cut geomembrane shall be repaired and tested according to the specifications regarding repairs and testing.
- 2) The geomembrane shall be cut, by the Installer, and subgrade material shall be added and placed, in accordance with the contract specifications, so as bring the geomembrane in contact with the subgrade. The cut geomembrane shall be repaired and tested according to the specifications regarding repairs and testing.

Section 5

LEACHATE COLLECTION AND REMOVAL SYSTEM

5.1 SLOTTED AND SOLID WALL PIPING

Slotted leachate collection piping shall be installed on a bed of filter aggregate as shown in the construction plans. Prior to final backfill of the leachate collection pipe trench, non-woven geotextile shall be placed on top of the filter aggregate layer. No backfill soils shall be placed in the trench prior to placement of the geotextile. Contamination of the filter aggregate with backfill soils shall not be permitted. Solid wall pipelines shall be leak tested. Slotted and solid wall pipelines shall be maintained within plus or minus 5 percent of the design slope 1/10 of one foot of the design grades indicated on the contract plans and specifications. Compaction of bedding and cover material will prevent damage to the collection piping. No machinery shall be driven over the buried piping until it has been completely installed and the cover material is in place. The cover material layers shall be compacted by light machinery to avoid damage to the buried pipe.

5.2 INSTALLATION OF GEOTEXTILE

5.2.1 Handling and Placement

The Contractor shall handle all geotextiles in such a manner as to ensure they are not damaged in any way, and the following shall be complied with:

1. The geotextile shall be installed as shown on the plans with the required overlap of a minimum of 24 inches if the seams are to be thermally bonded and 6 inches if sewn. The surface on which the geotextile is placed shall be free of sharp protruding objects that might puncture the geotextile. Care should be taken during installation to prevent damage to the geotextile. The geotextile shall be loosely laid to prevent unnecessary stretching of the material.
2. In the presence of wind, geotextiles shall be weighted with sandbags or the equivalent. Such sandbags shall be installed during placement and shall remain until replaced with earth cover material.
3. Geotextiles shall be cut using a tool capable of obtaining a clean cut, unstressed sample. If in place, special care must be taken to protect other materials from damage which could be caused by the cutting of the geotextiles.
4. During placement, care shall be taken not to entrap in the geotextile stones,

excessive dust, or moisture that could generate clogging of drains or filters, or hamper subsequent seaming. At no time during geotextile placement shall any vehicle be allowed directly on the exposed geotextile.

5. An examination of the geotextile after installation, shall be conducted to ensure that no potentially harmful foreign objects, such as needles, are present. Any foreign objects so encountered shall be removed by the installer or the geotextile shall be replaced.
6. If white colored geotextile is used, precautions shall be taken against "snowblindness" of personnel.

5.2.2 Seams and Overlaps

1. Geotextiles shall be continuously thermally bonded or sewn (i.e., spot sewing is not allowed). Geotextiles shall be overlapped a minimum of 24 inches prior to seaming if thermally bonded and 6 inches if sewn.

5.2.3 Repair

1. Any holes or tears in the geotextile shall be repaired as follows:
 - a) A patch made from the same geotextile shall be thermally bonded into place with a 24-inch overlap in all directions. Should any tear exceed 10 percent of the width of the roll, that roll shall be removed from the slope and replaced.
2. Care shall be taken to remove any soil or other material which may have penetrated the torn geotextile.

5.2.2 Placement of Soil Materials

1. The Contractor shall place all soil materials located on top of a geotextile, in such a manner as to ensure:
 - a) No damage of the geotextile.
 - b) Minimal slippage of the geotextile on underlying layers.
 - c) No excess tensile stresses in the geotextile.

2. Care shall be taken during filling operations to ensure that the geotextile is not damaged by earth-moving or other equipment. Any damage to the geotextile caused by the Contractor's equipment shall be repaired at no cost to the Owner.

5.3 MANHOLES, AND PUMP STATION

Manholes and pump station shall be constructed in conformance with the contract plans and specifications. Where duplex pumps are used, each of the pumps shall be capable of handling the design flow. Each pump, after installation and testing, shall be disconnected and removed entirely from the structure and set aside. The pumps shall then be reinstalled and retested.

5.4 LEAK TESTING OF LEACHATE PUMPING SYSTEM

Hydrostatic leak testing of the solid wall piping and manholes shall be conducted prior to backfilling around the structures. Manholes shall be filled with no more than 36 inches of water depth per day and allowed to sit for 48 hours prior to the test. After the 48-hour preparation period, the system shall be topped off, and leakage shall be monitored for 24 hours. Once filled to the maximum level measure the change in water surface each day for a five day period. The total leakage rate shall not exceed 1/10 of 1% of the normal volume of liquid contained in the structure. Pressure mains shall be hydrostatically tested to a pressure of 150 psig for a minimum duration of three hours. The test pressure shall not vary by more than ± 5 psig. All piping, pump station exteriors, and joints shall be visually inspected during the test and any leaks marked. Leaking sections of pipe and joints shall be repaired or replaced.

Section 6

DOCUMENTATION

6.1 REPORT FORMS AND LOGS

The strength of a liner system installation quality assurance plan depends on recognizing and observing all critical aspects of construction. This can be effectively accomplished by documenting quality assurance activities. The reports and checklists supplied with this quality assurance plan are provided to remind the CQA Monitor of the items to be observed, and will document through required responses and checklist items, that observation activities have been accomplished and that details have not been overlooked.

A Daily Record of Work Progress, as shown in Attachment A, will be prepared each day by the CQA Monitor. This report will provide the chronological framework for identifying and referencing sampling events and all other attached checklists. All samples taken by the CQA Monitor shall be marked or tagged. All sampling events will be noted in the Daily Field Report.

The checklists which will be completed by the CQA Monitor in the course of construction activities include:

| | |
|-----------------------------------|-------------------------------|
| Daily Field Report | Non-Destructive Test Log |
| On-Site Personnel Log | Panel Placement Log |
| Seaming Log | Panel Repair and Test Log |
| Seam Destructive Test Log | Synthetic Liner Approval Form |
| Seam Repair and Test Location Log | Certificate of Acceptance |

In the event that the CQA Monitor has identified material or workmanship that does not meet the design criteria, plans, or specifications, he shall notify the Engineer; who shall notify the Owner. Based on the magnitude of the problem, the Engineer may choose to issue a Field Order. (The need for repairs to the geomembrane and/or seams should be, in most instances, verbally expressed by the CQA Monitor to the Contractor).

6.2 CONSTRUCTION CERTIFICATION

The CQA Monitor will prepare a Completeness of Construction Report using FDEP form number 62-701.900(2) and applicable CQA information from the liner installation records, inspection reports, and geotechnical information for submission to FDEP. The report will include the following:

- Certification of Construction Completion (FDEP Form 62-701.900).
- Copy of Permit to Construct.
- Geomembrane Construction Specifications.
- Geomembrane CQA Plan.
- Inspection Reports.
- Geomembrane Approval/Installation Forms.
- Geomembrane Test Results.
- Geotechnical Testing Results.
- Installation Photographs.
- As-Builts of the Liner Installation

Items in the report shall be placed in chronological order.

6.3 FINAL DOCUMENTATION

The final report, which includes original reports, checklists, laboratory test results, certifications, etc., shall be retained by the Owner. Copies of the final report shall be held by the Engineer, the State permitting agency, and, at the installation site, by the landfill supervisor.

ATTACHMENT A

REPORT FORMS AND LOGS

PROJECT: _____
LOCATION: _____
OWNER: _____
OWNER REP.: _____
CQA MANAGER: _____
PROJECT NO.: _____

DATE: _____
DAY: S M T W TH F S
WEATHER: clear overcast rain
TEMP: 55-70 70-85 85-90 90-100
WIND: still moderate high
HUMIDITY: dry moderate humid

DAILY FIELD REPORT

© 1990 - PBS&J, Inc.

CHECKED BY: _____

SIGNATURE: _____

DAILY FIELD REPORT
(con't.)

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

© 1990 - PBS&J, Inc.

CHECKED BY: _____

SIGNATURE: _____

PROJECT NO.: _____

CQA MANAGER: _____

ON-SITE PERSONNEL LOG

[illegible]

PROJECT NAME: _____

PROJECT NO.: _____

DATE: _____

PANEL PLACEMENT LOG

[illegible]

COMMENTS:

CHECKED BY: _____ SIGNATURE: _____

SIGNATURE:

PANEL REPAIR AND TEST LOGPROJECT: _____
LOCATION: _____CQA MANAGER: _____
PROJECT NO.: _____

| | PATCH | CAP | BEAD | SAMPLE | COMMENTS: |
|----------|-------|-----|------|--------|-----------|
| REPAIR | | | | | |
| REPAIRED | | | | | |
| TESTED | | | | | |

North: _____
Panel #: _____Completed: _____
Date: _____
Time: _____
CQA ID: _____North: _____
Panel #: _____Completed: _____
Date: _____
Time: _____
CQA ID: _____North: _____
Panel #: _____Completed: _____
Date: _____
Time: _____
CQA ID: _____

SHEET OF

PROJECT NO.: _____

DATE: _____

[illegible]

SIGNATURE: _____

SEAM REPAIR AND TEST LOCATION LOGPROJECT: _____
LOCATION: _____CQA MANAGER: _____
PROJECT NO.: _____

| | PATCH | CAP | BEAD | SAMPLE | COMMENTS: |
|----------|-------|-----|------|--------|-----------|
| REPAIR | | | | | |
| REPAIRED | | | | | |
| TESTED | | | | | |

North: _____
Seam #: _____

| | |
|--|--|
| | |
|--|--|

Completed: _____
Date: _____
Time: _____
CQA ID: _____North: _____
Seam #: _____

| | |
|--|--|
| | |
|--|--|

Completed: _____
Date: _____
Time: _____
CQA ID: _____North: _____
Seam #: _____

| | |
|--|--|
| | |
|--|--|

Completed: _____
Date: _____
Time: _____
CQA ID: _____

| | |
|--|--|
| PROJECT: _____ LOCATION: _____ DATE: _____ | PROJECT NO.: _____ CQA MANAGER: _____ |
|--|--|

NON-DESTRUCTIVE TEST LOG

[illegible]

VACUUM TEST PRESSURE: _____ (PSI)

DURATION:

AIR TEST PRESSURE: _____ (PSI)

DURATION:

POST, BUCKLEY, SCHUH & JERNIGAN, INC.

SHEET OF

PROJECT NAME: _____

PROJ. LOCATION: _____

PROJECT NO. _____

CONTRACTOR: _____

SYNTHETIC LINER APPROVAL FORM
FOR ALLOWANCE OF SAND DRAINAGE LAYER INSTALLATION

Post, Buckley, Schuh & Jernigan hereby gives approval of the synthetic liner installation at _____ in the cell/pond area. This approval allows the Contractor to place the sand drainage layer and leachate collection piping and ballast rock in the grid area listed above. This approval does not relieve the Contractor of his responsibilities to meet the clay and synthetic liner performance requirements of the Contract Specifications.

Synthetic liner seams tested, repaired, and passed.

Large wrinkles and bridges removed.

Liner panels visually inspected and defects repaired.

As-built survey completed and checked

Other: _____

Comments: _____

If PBS&J observes any deviations of the requirements listed above or the Contractor damages the liner system during the installation of the leachate collection and removal system, work in contact with the liner will be halted in the designated grid area and repairs will be made by the Contractor to the satisfaction of PBS&J.

POST, BUCKLEY, SCHUH & JERNIGAN, INC.

DATE

CONTRACTOR

DATE

**CERTIFICATE OF ACCEPTANCE
OF SOIL SUBGRADE BY INSTALLER**

INSTALLER: _____

PROJECT NAME: _____

ADDRESS: _____

PROJECT LOCATION: _____

OWNER: _____

I the Undersigned, duly authorized representative of _____
shall be responsible for the Soil Subgrade's acceptability, integrity, and suitability, in accordance with the contract documents from this date to completion and acceptance by owner of the installation. This acceptability, integrity, and suitability considers at the time of placement that the structure of the subgrade, which is the responsibility of others, meets or exceeds the requirements of the contract documents.

Name Title

Signature Date

CERTIFICATION ACCEPTED BY PBS&J'S CQA MANAGER:

Name Title

Signature Date

SC 0038414

D.E.P.

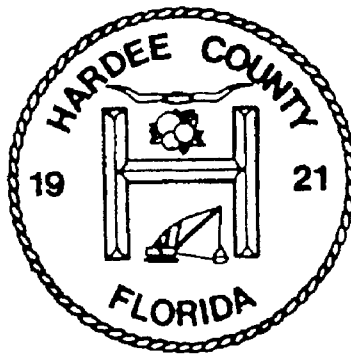
JUN 27 1997

HARDEE COUNTY REGIONAL LANDFILL

COUNTY ENGINEER
TAMPA

HARDEE COUNTY, FLORIDA

APPLICATION FOR CONSTRUCTION PERMIT



*Construction Permit
Engineering Report*

JUNE 1997

Prepared for:

HARDEE COUNTY BOARD OF COUNTY COMMISSIONERS

Room A-203, Courthouse Annex
412 West Orange Street
Wauchula, FL 33873-2867

Prepared by:

POST, BUCKLEY, SCHUH & JERNIGAN, INC.

Winter Park Plaza
1560 Orange Avenue, Suite 700
Winter Park, Florida 32789



June 26, 1997

Ms. Susan J. Pelz, P.E.
Division of Waste Management
Florida Department of Environmental Protection
3804 Coconut Palm Drive
Tampa, FL 33619-8318

D.E.P.
JUN 27 1997
SOUTHWEST DISTRICT
TAMPA

RE: Hardee County Regional Landfill Construction Permit Application

Dear Ms. Pelz:

On behalf of Hardee County, Post, Buckley, Schuh & Jernigan, Inc. (PBS&J) respectfully submits four (4) sets of the Hardee County Regional Landfill Construction Permit application and a check for the appropriate application fee of \$100 (Hardee County is allowed a permit fee reduction on the basis of fiscal hardship, pursuant to Florida State Law 94-278). Each set of the permit application package is comprised of the following components:

- Application for Construction Permit - Form and Engineering Report
- Construction Plans
- Technical Specifications (additional specifications regarding the contract documents and construction administration will be developed upon receiving the construction permit approval)
- Construction Quality Assurance Plan

Additionally, an Environmental Resource Permit (ERP) is being submitted concurrently with this construction permit application to address the stormwater permitting criteria required for the construction area.

This construction application is for the following items of work:

- Lateral Expansion of the Class I Landfill;
- Construction of the Southern Leachate Barrier (Liner System);
- Expansion of the Leachate Collection and Removal System;
- Construction of Leachate Storage and Pumping Facilities; and
- Abandonment of the Existing Leachate Management System (Spray Field and Dewatering Ditch).

As a result of the proposed construction activities, the Operations Plan for this facility, which is currently being reviewed by your Department as part of the Operations Permit Renewal Application, will require modification. These modifications regarding the leachate collection and removal system and the lateral expansion of the landfill have been addressed herein.

WASTE MANAGEMENT DIVISION

1560 Orange Avenue, Suite 700, Winter Park, Florida 32789 • Telephone: 407/647-7275 • Fax: 407/647-8945

Ms. Susan J. Pelz, P.E.
June 26, 1997
Page 2

The construction permit application has been prepared in accordance with applicable sections of Rule 62-701, FAC, and provides the required facility information for agency review and approval. Design and operational modifications to bring the facility into compliance with the current regulations are included in this permit application package. Required information that has been previously submitted, but has not changed, has not been resubmitted. Those portions of the application not resubmitted have been marked "No Substantial Change" on the application form, and the location within prior submittals has been documented in the text section of the report.

If you have any questions regarding this submittal, please do not hesitate to call me at (407) 647-7275 ext. 167.

Sincerely,



Maureen Mauriello, P.E.
Project Engineer

c: B. Butera, FDEP
J. Prestridge, Hardee County
C. Ed Hilton, PBS&J

G:\COMMON\WASTEMAN\HARDEE\CONST\PERMIT\HARTRANS



Maureen Mauriello
6/26/97

PBS&J

**APPLICATION FOR CONSTRUCTION PERMIT
HARDEE COUNTY REGIONAL LANDFILL**

TABLE OF CONTENTS

| <u>SECTION</u> | <u>TITLE</u> | <u>PAGE</u> |
|-----------------------|--|--------------------|
| | Transmittal Letter | |
| | Table of Contents | i |
| | List of Figures | vii |
| | List of Appendices | vii |
| | Application Form | |
| 1 | PERMIT APPLICATION CHECKLIST | |
| 1.1 | Executive Summary | 1-1 |
| 1.2 | Application Checklist | 1-3 |
| 1.2.1 | Part A-General Information | 1-3 |
| 1.2.2 | Part B-Disposal Facility General Information | 1-3 |
| 1.2.3 | Part C-Materials Recovery/Volume Reduction Facility General Information | 1-3 |
| 1.2.4 | Part D-Solid Waste Management Facility Permit General Requirements | 1-3 |
| 1.2.5 | Part E-Landfill Permit General Requirements | 1-3 |
| 1.2.6 | Part F-General Criteria for Landfills | 1-3 |
| 1.2.7 | Part G-Landfill Construction Requirements | 1-4 |
| 1.2.8 | Part H-Hydrogeological Investigation Requirements | 1-4 |
| 1.2.9 | Part I-Geotechnical Investigation Requirements | 1-4 |
| 1.2.10 | Part J-Vertical Expansion of Landfills | 1-4 |
| 1.2.11 | Part K-Landfill Operation Requirements | 1-4 |
| 1.2.12 | Part L-Water Quality and Leachate Monitoring Requirements | 1-4 |
| 1.2.13 | Part M-Special Waste Handling Requirements | 1-5 |
| 1.2.14 | Part N-Landfill Closure Requirements | 1-5 |
| 1.2.15 | Part O-Closure Procedures | 1-5 |
| 1.2.16 | Part P-Long-Term Care Requirements | 1-5 |
| 1.2.17 | Part Q-Financial Responsibility Requirements | 1-5 |
| 1.2.18 | Part R-Closure of Existing Landfill Requirements | 1-5 |
| 1.2.19 | Part S-Materials Recovery Facility Requirements | 1-5 |
| 1.2.20 | Part T-Certification by Applicant and Engineer or Public Officer | 1-5 |

**APPLICATION FOR CONSTRUCTION PERMIT
HARDEE COUNTY REGIONAL LANDFILL**

TABLE OF CONTENTS

| <u>SECTION</u> | <u>TITLE</u> | <u>PAGE</u> |
|-----------------------|---|--------------------|
| 2 | PART D - SOLID WASTE MANAGEMENT FACILITY PERMIT GENERAL REQUIREMENTS | |
| 2.1 | Permit Application Copies | 2-1 |
| 2.2 | Certifications | 2-1 |
| 2.3 | Transmittal Letter | 2-1 |
| 2.4 | Permit Application Form | 2-1 |
| 2.5 | Permit Application Fee | 2-1 |
| 2.6 | Engineering Report | 2-1 |
| 2.7 | Operation Plan | 2-2 |
| 2.8 | Contingency Plan | 2-2 |
| 2.9 | Solid Waste Management Facility Plans | 2-2 |
| | 2.9.1 Regional Map | 2-2 |
| | 2.9.2 Vicinity Map / Aerial Photograph | 2-2 |
| | 2.9.3 Site Plan | 2-2 |
| | 2.9.4 Details | 2-2 |
| 2.10 | Proof of Property Ownership | 2-2 |
| 2.11 | Recycling Activities | 2-3 |
| 2.12 | History of Department Enforcement Activities | 2-3 |
| 2.13 | Proof of Publication of Notice of Application | 2-3 |
| 2.14 | Airport Safety Requirements | 2-3 |

**APPLICATION FOR CONSTRUCTION PERMIT
HARDEE COUNTY REGIONAL LANDFILL**

TABLE OF CONTENTS

| <u>SECTION</u> | <u>TITLE</u> | <u>PAGE</u> |
|-----------------------|---|--------------------|
| 3 | PART E - LANDFILL PERMIT GENERAL REQUIREMENTS | |
| 3.1 | Land Use and Zoning Map | 3-1 |
| 3.2 | Airport Location Plan | 3-1 |
| 3.3 | Plot Plan | 3-1 |
| 3.4 | Topographic Maps | 3-2 |
| 3.5 | Report | 3-2 |
| | 3.5.1 Current and Projected Population of Area Served | 3-2 |
| | 3.5.2 Anticipated Type, Quantity, and Source of Solid Waste | 3-3 |
| | 3.5.3 Anticipated Facility Life | 3-3 |
| | 3.5.4 Source and Type of Cover Material | 3-4 |
| 3.6 | Water Quality Laboratory Requirements | 3-4 |
| 3-7 | Closure and Long-Term Care Financial Responsibility | 3-4 |
| 4 | PART F - GENERAL CRITERIA FOR LANDFILLS | |
| 4.1 | Location in 100-Year Flood Plain | 4-1 |
| 4.2 | Minimum Horizontal Separation | 4-1 |
| 4.3 | Landfill Screening | 4-1 |
| 5 | PART G - LANDFILL CONSTRUCTION REQUIREMENTS | |

**APPLICATION FOR CONSTRUCTION PERMIT
HARDEE COUNTY REGIONAL LANDFILL**

TABLE OF CONTENTS

| <u>SECTION</u> | <u>TITLE</u> | <u>PAGE</u> |
|-----------------------|--|--------------------|
| 5.1 | Construction and Closure Phasing | 5-1 |
| 5.2 | Landfill Liner Requirements | 5-2 |
| 5.2.1 | General Construction Requirements | 5-2 |
| 5.2.2 | Composite Liners | 5-3 |
| 5.2.3 | Double Liners | 5-4 |
| 5.2.4 | Standards for Geomembranes | 5-4 |
| 5.2.5 | Geosynthetic Specification Requirements | 5-4 |
| 5.2.6 | Standards for Soil Components | 5-5 |
| 5.3 | Leachate Collection and Removal System (LCRS) | 5-5 |
| 5.3.1 | Primary and Secondary LCRS Requirements | 5-5 |
| 5.3.2 | Primary LCRS Requirements | 5-5 |
| 5.4 | Leachate Recirculation | 5-6 |
| 5.5 | Leachate Storage Tanks | 5-6 |
| 5.5.1 | Surface Impoundment Requirements | 5-6 |
| 5.5.2 | Aboveground Leachate Storage | 5-6 |
| 5.5.3 | Underground Leachate Storage | 5-7 |
| 5.5.4 | LCRS Maintenance Schedule | 5-7 |
| 5.6 | Liner Systems Construction Quality Assurance (CQA) | 5-8 |
| 5.7 | Soil Liner CQA | 5-8 |
| 5.8 | Surface Water Management System | 5-8 |
| 5.8.1 | Stormwater Control Within Lined Disposal Cell | 5-8 |
| 5.8.2 | Stormwater Control Design | 5-8 |
| 5.9 | Gas Control System | 5-9 |
| 5.10 | Landfill Gas Recovery Facilities | 5-9 |
| 5.11 | Landfill Designed in Ground Water Documentation | 5-9 |

**APPLICATION FOR CONSTRUCTION PERMIT
HARDEE COUNTY REGIONAL LANDFILL**

TABLE OF CONTENTS

| <u>SECTION</u> | <u>TITLE</u> | <u>PAGE</u> |
|-----------------------|---|--------------------|
| 6 | PART I - GEOTECHNICAL INVESTIGATION REQUIREMENTS | |
| 6.1 | Geotechnical Investigation Requirements | 6-1 |
| 7 | PART K - LANDFILL OPERATIONS REQUIREMENTS | |
| 7.1 | Trained Operating Personnel Documentation | 7-1 |
| 7.2 | Landfill Operation Plan | 7-1 |
| | 7.2.1 Designated Responsible Operating and Maintenance Personnel | 7-1 |
| | 7.2.2 Contingency Operations | 7-1 |
| | 7.2.3 Controlling Types of Waste Received | 7-1 |
| | 7.2.4 Weighing Incoming Waste | 7-1 |
| | 7.2.5 Vehicle Traffic Control | 7-2 |
| | 7.2.6 Method and Sequence of Filling Waste | 7-2 |
| | 7.2.7 Waste Compaction and Cover Procedures | 7-2 |
| | 7.2.8 Operations of Gas, Leachate, and Storm Water Controls | 7-2 |
| | 7.2.9 Water Quality Monitoring | 7-2 |
| 7.3 | Landfill Operating Record | 7-2 |
| 7.4 | Waste Records | 7-3 |
| 7.5 | Methods of Access Control | 7-3 |
| 7.6 | Load Checking Program | 7-3 |
| 7.7 | Waste Spreading and Compaction Procedures | 7-3 |
| 7.8 | Leachate Management Procedures | 7-3 |
| | 7.8.1 Leachate Level Monitoring, Sampling, Analysis and Data Results | 7-3 |
| | 7.8.2 Operation and Maintenance of Leachate Collection and Removal System | 7-4 |

**APPLICATION FOR CONSTRUCTION PERMIT
HARDEE COUNTY REGIONAL LANDFILL**

TABLE OF CONTENTS

| <u>SECTION</u> | <u>TITLE</u> | <u>PAGE</u> |
|-----------------------|---|--------------------|
| | 7.8.3 Procedures for Managing Leachate if Regulated as a Hazardous Waste | 7-4 |
| | 7.8.4 Off-Site Discharge and Treatment Agreements | 7-4 |
| | 7.8.5 Contingency Plan for Managing Leachate | 7-4 |
| | 7.8.6 Procedures for Recording Quantities of Leachate Generated in Gallons Per Day | 7-5 |
| | 7.8.7 Procedures for Comparing Precipitation with Leachate Generation Rates | 7-5 |
| | 7.9 Routine Gas Monitoring Program | 7-5 |
| | 7.10 Stormwater Management System Operation and Maintenance | 7-5 |
| | 7.11 Equipment and Operation Feature Requirements | 7-6 |
| | 7.12 Site Access Roads | 7-6 |
| | 7.13 Additional Record Keeping and Reporting Requirements | 7-6 |
| 8 | PART L - WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS | |
| | 8.1 Water Quality and Leachate Monitoring Requirements | 8-1 |
| | 8.1.1 Groundwater Monitoring Requirements | 8-1 |
| | 8.1.2 Surface Water Monitoring Requirements | 8-1 |
| | 8.1.3 Leachate Sampling Locations | 8-1 |
| | 8.1.4 Routine Sampling Frequency and Requirements | 8-1 |
| | 8.1.5 Assessment Monitoring and Corrective Action | 8-2 |
| | 8.1.6 Water Quality Monitoring Report Requirements | 8-2 |

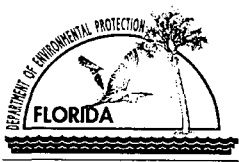
**APPLICATION FOR RENEWAL OF OPERATIONS PERMIT
HARDEE COUNTY REGIONAL LANDFILL**

LIST OF FIGURES

| <u>FIGURE</u> | <u>TITLE</u> | <u>PAGE</u> |
|----------------------|---------------------|--------------------|
| 1-1 | Vicinity Map | 1-2 |

LIST OF APPENDICES

| <u>APPENDIX</u> | <u>TITLE</u> |
|------------------------|-----------------------------------|
| A | Existing Permits |
| B | Certification of Fiscal Hardship |
| C | Geotechnical Investigation |
| D | Water Quality Plan Modification |
| E | Revised Operation Permit Drawings |



Florida Department of Environmental Protection

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, FL 32399-2400

| |
|--|
| DEP Form # <u>62-701.900(1)</u> |
| Form Title <u>Solid Waste Management Facility Permit</u> |
| Effective Date <u>May 19, 1994</u> |
| DEP Application No. _____ (Filled by DEP) |

D.E.P.

JUN 27 1997

TAMPA

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

SOLID WASTE MANAGEMENT FACILITY PERMIT

APPLICATION INSTRUCTIONS AND FORMS

INSTRUCTIONS TO APPLY FOR A SOLID WASTE MANAGEMENT PERMIT

I. General

Solid Waste Management Facilities shall be permitted pursuant to Section 403.707, Florida Statutes, (FS) and in accordance with Florida Administrative Code (FAC) Chapter 62-701. A minimum of six copies of the application shall be submitted to the Department District Office having jurisdiction over the facility. The appropriate fee in accordance with Chapter 62-4, FAC, and Rule 62-701.320(5)(c), FAC, shall be submitted with the application by check made payable to the Department of Environmental Regulation (DEP).

Complete appropriate sections for the type of facility for which application is made. Entries shall be typed or printed in ink. All blanks shall be filled in or marked "not applicable" or "no substantial change". Information provided in support of the application shall be marked "submitted" and the location of this information in the application package indicated. The application shall include all information, drawings, and reports necessary to evaluate the facility. Information required to complete the application is listed on the attached pages of this form.

II. Application Parts Required for Construction and Operation Permits

- A. Landfills and Ash Monofills - Submit parts A,B, D through R, and T
- B. Asbestos Monofills - Submit parts A,B,D,E,F,I,K, M through Q, and T
- C. Industrial Solid Waste Facilities - Submit parts A,B, D through Q, and T
- D. Volume Reduction Facilities - Submit parts A,C,D,S, and T
- E. Materials Recovery Facilities - Submit parts A,C,D,S, and T

NOTE: Portions of some parts may not be applicable.

NOTE: For facilities that have been satisfactorily constructed in accordance with their construction permit, the information required for A,B,C,D, and E type facilities does not have to be resubmitted for an operation permit if the information has not substantially changed during the construction period. The appropriate portion of the form should be marked "no substantial change".

III. Application Parts Required for Closure Permits

- A. Landfills and Ash Monofills - Submit parts A,B, N through R, and T
- B. Asbestos Monofills - Submit parts A,B, M through Q, and T
- C. Industrial Solid Waste Facilities - Submit parts A,B, N through Q, and T
- D. Volume Reduction Facilities - Submit parts A,C,S, and T
- E. Materials Recovery Facilities - Submit parts A,C,S, and T

NOTE: Portions of some parts may not be applicable.

IV. Permit Renewals

The above information shall be submitted at time of permit renewal in support of the new permit. However, facility information that was submitted to the Department to support the expiring permit, and which is still valid, does not need to be re-submitted for permit renewal. Portions of the application not re-submitted shall be marked "no substantial change" on the application form.

V. Application Codes

| | | |
|----------|---|---|
| S | - | Submitted |
| LOCATION | - | Physical location of information in application |
| N/A | - | Not Applicable |
| N/C | - | No Substantial Change |

VI. LISTING OF APPLICATION PARTS

| | | |
|--------|---|--|
| PART A | - | GENERAL INFORMATION |
| PART B | - | DISPOSAL FACILITY GENERAL INFORMATION |
| PART C | - | MATERIALS RECOVERY / VOLUME REDUCTION FACILITY GENERAL INFORMATION |
| PART D | - | SOLID WASTE MANAGEMENT FACILITY PERMIT GENERAL REQUIREMENTS |
| PART E | - | LANDFILL PERMIT GENERAL REQUIREMENTS |
| PART F | - | GENERAL CRITERIA FOR LANDFILLS |
| PART G | - | LANDFILL CONSTRUCTION REQUIREMENTS |
| PART H | - | HYDROGEOLOGICAL INVESTIGATION REQUIREMENTS |
| PART I | - | GEOTECHNICAL INVESTIGATION REQUIREMENTS |
| PART J | - | VERTICAL EXPANSION OF LANDFILLS |
| PART K | - | LANDFILL OPERATION REQUIREMENTS |
| PART L | - | WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS |
| PART M | - | SPECIAL WASTE HANDLING REQUIREMENTS |
| PART N | - | LANDFILL CLOSURE REQUIREMENTS |
| PART O | - | CLOSURE PROCEDURES |
| PART P | - | LONG TERM CARE REQUIREMENTS |
| PART Q | - | FINANCIAL RESPONSIBILITY REQUIREMENTS |
| PART R | - | CLOSURE OF EXISTING LANDFILL REQUIREMENTS |
| PART S | - | MATERIALS RECOVERY FACILITY REQUIREMENTS |
| PART T | - | CERTIFICATION BY APPLICANT AND ENGINEER OR PUBLIC OFFICER |

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

APPLICATION FOR PERMIT TO CONSTRUCT, OPERATE, MODIFY OR CLOSE
A SOLID WASTE MANAGEMENT FACILITY

Please Type or Print

A. GENERAL INFORMATION

1. Type of facility:

Disposal ☒

| | | | |
|--------------------|-------------------------------------|------------------------|--------------------------|
| Class I Landfill | <input checked="" type="checkbox"/> | Ash Monofill | <input type="checkbox"/> |
| Class II Landfill | <input type="checkbox"/> | Asbestos Monofill | <input type="checkbox"/> |
| Class III Landfill | <input type="checkbox"/> | Industrial Solid Waste | <input type="checkbox"/> |
| Other | <input type="checkbox"/> | | |

Volume Reduction ☒

| | | | |
|--------------------|-------------------------------------|------------------------|---|
| Incinerator | <input type="checkbox"/> | Pulverizer / Shredder | <input checked="" type="checkbox"/> (Tires) |
| Composting | <input type="checkbox"/> | Compactor/Baling Plant | <input checked="" type="checkbox"/> |
| Materials Recovery | <input checked="" type="checkbox"/> | Energy Recovery | <input type="checkbox"/> |
| Other | <input type="checkbox"/> | | |

2. Type of application:

| | | | |
|--------------|-------------------------------------|------------------------|--------------------------|
| Construction | <input checked="" type="checkbox"/> | Construction/Operation | <input type="checkbox"/> |
| Operation | <input type="checkbox"/> | Closure | <input type="checkbox"/> |

3. Classification of application:

| | | | |
|---------|--------------------------|--------------------------|-------------------------------------|
| New | <input type="checkbox"/> | Substantial Modification | <input checked="" type="checkbox"/> |
| Renewal | <input type="checkbox"/> | Minor Modification | <input type="checkbox"/> |

4. Facility name: Hardee County Regional Landfill

5. DEP ID number: SO25-096551 County: Hardee

6. Facility location (main entrance): 675 Airport Rd. (Approx. 1 mile North of SR 636),
Wauchula, Florida

7. Location coordinates:

Section: 35 Township: 33S Range: 25E

UTMs: Zone --- --- km E --- km N

Latitude: 27 ° 34 ' 10 " Longitude: 81 ° 47 ' 01 "

8. Applicant name (operating authority): Hardee County Solid Waste Department

Mailing address: 675 Airport Rd. Wauchula Florida 33873
Street or P.O. Box City State Zip

Contact person: J.R. Prestridge Telephone: (941) 773-5089

Title: Solid Waste Superintendent/Assistant County Manager

9. Authorized agent/Consultant: Post, Buckley, Schuh & Jernigan, Inc.
Mailing address: 1560 Orange Ave., Suite 700, Winter Park, Florida 32789
Street or P.O. Box City State Zip
Contact person: C. Edward Hilton P.E. Telephone: (407) 647-7275
Title: Project Manager
10. Landowner(if different than applicant): Same
Mailing address: Same
Street or P.O. Box City State Zip
Contact person: Same Telephone: ()
11. Cities, towns and areas to be served: Hardee County, including its municipalities
12. Population to be served:
Current: 23,147 Five-Year Projection: 23,802
13. Volume of solid waste to be received: 55.9 yds³/day tons/day gallons/day
14. Date site will be ready to be inspected for completion: 04/98
15. Estimated life of facility: 10.5 years
16. Estimated costs:
Total Construction: \$ 944,610 Closing Costs: \$ N/A
17. Anticipated construction starting and completion dates:
From: 10/97 To: 01/98

B . DISPOSAL FACILITY GENERAL INFORMATION

1. Provide brief description of disposal facility design and operations planned by this application:

Proposed construction of southern boundary of the Class I Landfill, expansion of the leachate collection system along the southern boundary, construction of leachate storage tanks and truck loading facility, placement of groundwater and LFG monitoring wells and modification of the operating permit for Hardee County's Class I Landfill.

2. Facility site supervisor: J. R. Prestridge

Title: Solid Waste Superintendent Telephone: (941) 773-5089

3. Disposal area: Total 12.5 acres; Used 12.5 acres; Available 2.6 acres

4. Weighing scales used: Yes ☒ No ☐

5. Security to prevent unauthorized use: Yes ☒ No ☐

6. Charge for waste received: _____ \$/yds³ \$32.00 \$/ton

7. Surrounding land use, zoning:

| | | | |
|--------------|-------------------------------------|------------|--------------------------|
| Residential | <input type="checkbox"/> | Industrial | <input type="checkbox"/> |
| Agricultural | <input checked="" type="checkbox"/> | None | <input type="checkbox"/> |
| Commercial | <input type="checkbox"/> | Other | <input type="checkbox"/> |

8. Types of waste received:

| | | | |
|------------------------|-------------------------------------|--------------------|--------------------------|
| Residential | <input checked="" type="checkbox"/> | C & D debris | <input type="checkbox"/> |
| Commercial | <input checked="" type="checkbox"/> | Shredded/cut tires | <input type="checkbox"/> |
| Incinerator / WTE ash | <input type="checkbox"/> | Yard trash | <input type="checkbox"/> |
| Treated biohazardous | <input type="checkbox"/> | Septic tank | <input type="checkbox"/> |
| Water treatment sludge | <input type="checkbox"/> | Industrial | <input type="checkbox"/> |
| Air treatment sludge | <input type="checkbox"/> | Industrial sludge | <input type="checkbox"/> |
| Agricultural | <input checked="" type="checkbox"/> | Domestic sludge | <input type="checkbox"/> |
| Asbestos | <input checked="" type="checkbox"/> | | |
| Other | <input type="checkbox"/> | | |

9. Salvaging permitted: Yes ☐ No ☒

10. Attendant: Yes ☒ No ☐ Trained operator: Yes ☒ No ☐

11. Spotters: Yes ☒ No ☐ Number of spotters used: Varies

12. Site located in: Floodplain ☐ Wetlands ☐ Other ☒ Uplands

13. Property recorded as a Disposal Site in County Land Records: Yes ☒ No ☐

14. Days of operation: Monday thru Saturday (Variable Holidays)

15. Hours of operation: 7:30 a.m. - 5:15 p.m.

16. Days Working Face covered: 312

17. Elevation of water table: 80.0 Ft. NGVD

18. Number of monitoring wells: 7 See Appendix D

19. Number of surface monitoring points: 0 See Appendix D

20. Gas controls used: Yes ☒ No ☐ Type controls: Active ☐ Passive ☒
 Gas flaring: Yes ☐ No ☒ Gas recovery: Yes ☐ No ☒

21. Landfill Unit - liner type:

| | | | |
|--------------------|-------------------------------------|-------------------------|--------------------------|
| Natural soils | <input checked="" type="checkbox"/> | Double geomembrane | <input type="checkbox"/> |
| Single clay liner | <input type="checkbox"/> | Geomembrane & composite | <input type="checkbox"/> |
| Single geomembrane | <input checked="" type="checkbox"/> | Double composite | <input type="checkbox"/> |
| Single composite | <input type="checkbox"/> | None | <input type="checkbox"/> |
| Slurry wall | <input type="checkbox"/> | | |
| Other | <input type="checkbox"/> | | |

22. Leachate collection method:

| | | | |
|------------------|-------------------------------------|---------------------|--------------------------|
| Collection pipes | <input type="checkbox"/> | Sand layer | <input type="checkbox"/> |
| Geonets | <input type="checkbox"/> | Gravel layer | <input type="checkbox"/> |
| Well points | <input type="checkbox"/> | Interceptor trench | <input type="checkbox"/> |
| Perimeter ditch | <input type="checkbox"/> | None | <input type="checkbox"/> |
| Other | <input checked="" type="checkbox"/> | <u>French drain</u> | |

23. Leachate storage method:

| | | | |
|-------|-------------------------------------|----------------------|--------------------------|
| Tanks | <input checked="" type="checkbox"/> | Surface impoundments | <input type="checkbox"/> |
| Other | <input type="checkbox"/> | | |

24. Leachate treatment method:

| | | | |
|-----------|--------------------------|--------------------|-------------------------------------|
| Oxidation | <input type="checkbox"/> | Chemical treatment | <input type="checkbox"/> |
| Secondary | <input type="checkbox"/> | Settling | <input type="checkbox"/> |
| Advanced | <input type="checkbox"/> | None | <input checked="" type="checkbox"/> |
| Other | <input type="checkbox"/> | | |

25. Leachate disposal method:

| | | | |
|---------------------|-------------------------------------|-----------------------------|--------------------------|
| Recirculated | <input type="checkbox"/> | Pumped to WWTP | <input type="checkbox"/> |
| Transported to WWTP | <input checked="" type="checkbox"/> | Discharged to surface water | <input type="checkbox"/> |
| Injection well | <input type="checkbox"/> | Evaporation (ie: Perc Pond) | <input type="checkbox"/> |
| Other | <input type="checkbox"/> | | |

26. For leachate discharged to surface waters:

Name and Class of receiving water: N/A

27. Storm Water:

Collected: Yes ☒ No ☐ Type of treatment: Detention

Name and Class of receiving water: Peace River, Class III

28. Management and Storage of Surface Waters (MSSW) Permit number or status: 407767.01

NOT APPLICABLE

C. MATERIALS RECOVERY / VOLUME REDUCTION FACILITY GENERAL INFORMATION

1. Provide brief description of materials recovery / volume reduction facility design and operations planned by this application:

2. Facility site supervisor: _____

Title: _____ Telephone: (____) _____

3. Disposal area: Total _____ acres; Used _____ acres; Available _____ acres

4. Security to prevent unauthorized use: Yes ☐ No ☐

5. Site located in: Floodplain ☐ Wetlands ☐ Other ☐ _____

6. Days of operation: _____

7. Hours of operation: _____

8. Number of operating staff: _____

9. Expected useful life: _____ Years

10. Weighing scales used: Yes ☐ No ☐

1. Normal processing rate: _____ yd³/day _____ tons/day _____ gal/day

12. Maximum processing rate: _____ yd³/day _____ tons/day _____ gal/day

13. Charge for waste received: _____

14. Type of facility (check one or more):

| | | | |
|-----------------------|--------------------------|--------------------|--------------------------|
| Incinerator | <input type="checkbox"/> | Composting | <input type="checkbox"/> |
| Pulverizer / shredder | <input type="checkbox"/> | Materials recovery | <input type="checkbox"/> |
| Compactor/baling | <input type="checkbox"/> | Energy recovery | <input type="checkbox"/> |
| Sludge concentration | <input type="checkbox"/> | Pyrolysis | <input type="checkbox"/> |
| Other | <input type="checkbox"/> | | |

15. Material recovered, tons/week:

| | |
|----------------------|--------------------------|
| _____ Paper | _____ Glass |
| _____ Ferrous metals | _____ Non-ferrous metals |
| _____ Aluminum | _____ Plastics |
| _____ Other: | |

16. Energy recovery, in units shown:

| | |
|----------------------------------|-----------------------------|
| _____ High pressure steam, lb/hr | _____ Chilled water, gal/hr |
| _____ Low pressure steam, lb/hr | _____ Oil, gal/hr |
| _____ Electricity, kw/hr | _____ Oil, BTU/hr |
| _____ Gas, ft ³ /hr | _____ Gas, BTU/hr |
| _____ Other: | |

NOT APPLICABLE

17. Process water management:
- Recycled: Yes ☐ No ☐
- Treatment method used: _____
- Discharged to: Surface waters ☐ Underground ☐ Other ☐
- Name and Class of receiving water: _____
18. Storm Water:
- Collected: Yes ☐ No ☐ Type of treatment: _____
- Name and Class of receiving water: _____
19. MSSW Permit number or status: _____
20. Final residue produced:
- _____ % of normal processing rate
- _____ % of maximum processing rate
- Disposed of at (Site name): _____
21. Supplemental fuel used:
- Type: _____ Quantity used/hour: _____
22. Costs:
- Estimated operating costs (material-energy revenue): \$ _____
- Total cost/ton: \$ _____ Net cost/ton: \$ _____
23. State pollution control bond financing amount: \$ _____
24. Estimated amount of tax exemptions that will be requested: \$ _____

D. SOLID WASTE MANAGEMENT FACILITY PERMIT GENERAL REQUIREMENTS (62-701.320, FAC)

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> | |
|----------|--------------------------|------------|------------|--|
| <u>X</u> | | | | 1. Six copies, at minimum, of the completed application form, all supporting data and reports; (62-701.320(5) (a), FAC) |
| <u>X</u> | Front end of document | | | 2. Engineering and/or professional certification (signature, date and seal) provided on the applications and all engineering plans, reports and supporting information for the application; (62-701.320(6), FAC) |
| <u>X</u> | Front end of document | | | 3. A letter of transmittal to the Department; (62-701.320(7) (a), FAC) |
| <u>X</u> | Front end of document | | | 4. A completed application form dated and signed by the applicant; (62-701.320(7) (b), FAC) |
| <u>X</u> | Front end of document | | | 5. Permit fee specified in Rule 62-4.050, FAC and Rule 62-701.320(5) (c), FAC in check or money order, payable to the Department; (62-701.320(7) (c), FAC) |
| <u>X</u> | | | | 6. An engineering report addressing the requirements of this rule and with the following format: a cover sheet, text printed on 8 1/2 inch by 11 inch consecutively numbered pages, a table of contents or index, the body of the report and all appendices including an operation plan, contingency plan, illustrative charts and graphs, records or logs of tests and investigations, engineering calculations; (62-701.320(7) (d), FAC) |
| <u>X</u> | Sec. 7.2 | | | 7. Operation Plan; (62-701.320(7) (e) 1, FAC) |
| | | | <u>X</u> | 8. Contingency Plan; (62-701.320(7) (e) 2, FAC) |
| | | | | 9. Plans or drawings for the solid waste management facilities in appropriate format (including sheet size restrictions, cover sheet, legends, north arrow, horizontal and vertical scales, elevations referenced to NGVD) showing; (62-702.320(7) (f), FAC) |
| <u>x</u> | Fig. 1-1 | | | a. A regional map or plan with the project location; |
| | | | <u>x</u> | b. A vicinity map or aerial photograph no more than 1 year old; |
| | | | <u>x</u> | c. A site plan showing all property boundaries certified by a registered Florida land surveyor; |
| <u>x</u> | | | | d. Other necessary details to support the engineering report. |
| | | | <u>x</u> | 10. Proof of property ownership or a copy of appropriate agreements between the facility operator and property owner authorizing use of property; (62-701.320(7) (g), FAC) |

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> | |
|----------|------------------|------------|------------|---|
| — | — | — | <u>x</u> | 11. For facilities owned or operated by a county, provide a description of how, if any, the facilities covered in this application will contribute to the county's achievement of recycling goals contained in Section 403.706,FS; (62-701.320(7)(h),FAC) |
| — | — | — | <u>x</u> | 12. Provide a history and description of any enforcement actions taken by the Department against the applicant for violations of applicable statutes, rules, orders or permit conditions relating to the operation of any solid waste management facility in this state; (62-701.320(7)(i),FAC) |
| <u>x</u> | <u>Sec. 2.13</u> | — | — | 13. Proof of publication in a newspaper of general circulation of notice of application for a permit to construct or substantially modify a solid waste management facility; (62-702.320(8),FAC) |
| — | — | — | <u>x</u> | 14. Provide a description of how the requirements for airport safety will be achieved including proof of required notices if applicable; (62-701.320(12),FAC) |

E. LANDFILL PERMIT GENERAL REQUIREMENTS (62-701.330, FAC)

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> | |
|----------|--|------------|------------|--|
| | | | <u>x</u> | 1. Vicinity map or aerial photograph no more than 1 year old and of appropriate scale showing land use and local zoning within one mile of the landfill and of sufficient scale to show all homes or other structures, water bodies, roads, and other significant features of the vicinity. All significant features shall be labeled; (62-701.330(4)(a), FAC) |
| | | | <u>x</u> | 2. Vicinity map or aerial photograph no more than 1 year old showing all airports that are located within five miles of the proposed landfill; (62-701.330(4)(b), FAC) |
| <u>x</u> | Construction dwg. <u>Sheet C-1</u> | | | 3. Plot plan with a scale not greater than 200 feet to the inch showing; (62-701.330(4)(c), FAC) |
| | | | <u>x</u> | a. Dimensions; |
| <u>x</u> | Construction dwg. <u>Sheet C-1</u> | | | b. Locations of proposed and existing water quality monitoring wells; |
| <u>x</u> | Construction dwg. <u>Sheet C-1</u> | | | c. Locations of soil borings; |
| <u>x</u> | (Appendix E) <u>Sheets 5-7</u> | | | d. Proposed plan of trenching or disposal areas; |
| <u>x</u> | (Appendix E) <u>Sheets 7-8</u> | | | e. Cross sections showing original elevations and proposed final contours which shall be included either on the plot plan or on separate sheets; |
| | | | <u>x</u> | f. Any previously filled waste disposal areas; |
| | | | <u>x</u> | g. Fencing or other measures to restrict access. |
| | | | | 4. Topographic maps with a scale not greater than 200 feet to the inch with 5-foot contour intervals showing; (62-701.330(4)(d), FAC): |
| <u>x</u> | (Appendix E) <u>Sheets 5-8</u> | | | a. Proposed fill areas; |
| | | | <u>x</u> | b. Borrow areas; |
| | | | <u>x</u> | c. Access roads; |
| <u>x</u> | (Appendix E) <u>Sheets 6-8</u> | | | d. Grades required for proper drainage; |
| <u>x</u> | (Appendix E) <u>Sheet 8</u> | | | e. Cross sections of lifts; |
| <u>x</u> | Construction dwg. <u>Sheet C-3</u> | | | f. Special drainage devices if necessary; |
| | | | <u>x</u> | g. Fencing; |
| <u>x</u> | Construction dwg. <u>Shts C-1,2,3</u> | | | h. Equipment facilities. |

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> | |
|----------|-------------------|------------|------------|--|
| | | | | 5. A report on the landfill describing the following; (62-701.330(4)(e), FAC) |
| | | | <u>X</u> | a. The current and projected population and area to be served by the proposed site; |
| | | | <u>X</u> | b. The anticipated type, annual quantity, and source of solid waste, expressed in tons; |
| <u>X</u> | <u>Sec. 3.5.3</u> | | | c. The anticipated facility life; |
| | | | <u>X</u> | d. The source and type of cover material used for the landfill. |
| <u>X</u> | <u>Sec. 3.6</u> | | | 6. Provide evidence that an approved laboratory shall conduct water quality monitoring for the facility in accordance with Rule 62-160, FAC; (62-701.330(4)(h), FAC) |
| <u>X</u> | <u>Sec. 3.7</u> | | | 7. Provide a statement of how the applicant will demonstrate financial responsibility for the closing and long-term care of the landfill; (62-701.330(4)(i), FAC) |

F. GENERAL CRITERIA FOR LANDFILLS (62-701.340, FAC)

| | | | | |
|----------|-----------------|--|----------|---|
| | | | <u>X</u> | 1. Describe (and show on a Federal Insurance Administration flood map, if available) how the landfill or solid waste disposal unit shall not be located in the 100-year floodplain where it will restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain unless compensating storage is provided, or result in a washout of solid waste; (62-701.340(4)(b), FAC) |
| <u>X</u> | <u>Sec. 4.2</u> | | | 2. Describe how the minimum horizontal separation between waste deposits in the landfill and the landfill property boundary shall be 100 feet, measured from the toe of the proposed final cover slope; (62-701.340(4)(c), FAC) |
| <u>X</u> | <u>Sec. 4.3</u> | | | 3. Describe what methods shall be taken to screen the landfill from public view where such screening can practically be provided; (62-701.340(4)(d), FAC) |

G. LANDFILL CONSTRUCTION REQUIREMENTS (62-701.400,FAC)

| S | LOCATION | N/A | N/C |
|---|----------|-----|-----|
|---|----------|-----|-----|

| | | | | |
|---|----------|--|--|---|
| x | Sec. 5.1 | | | 1. Describe how the landfill shall be designed so that solid waste disposal units will be constructed and closed at planned intervals throughout the design period of the landfill; (62-701.400(2),FAC) |
|---|----------|--|--|---|

2. Landfill liner requirements; (62-701.400(3),FAC)

a. General construction requirements; (62-701.400(3)(a),FAC):

| | | | | |
|---|------------|--|--|---|
| x | Sec. 5.2.1 | | | (1) Provide test information and documentation to ensure the liner will be constructed of materials that have appropriate physical, chemical, and mechanical properties to prevent failure; |
|---|------------|--|--|---|

| | | | | |
|---|------------|--|--|---|
| x | Sec. 5.2.1 | | | (2) Document foundation is adequate to prevent liner failure; |
|---|------------|--|--|---|

| | | | | |
|---|------------|--|--|---|
| x | Sec. 5.2.1 | | | (3) Constructed so bottom liner will not be adversely impacted by fluctuations of the ground water; |
|---|------------|--|--|---|

| | | | | |
|---|------------|--|--|---|
| x | Sec. 5.2.1 | | | (4) Designed to resist hydrostatic uplift if bottom liner located below seasonal high ground water table; |
|---|------------|--|--|---|

| | | | | |
|---|------------|--|--|--|
| x | Sec. 5.2.1 | | | (5) Installed to cover all surrounding earth which could come into contact with the waste or leachate. |
|---|------------|--|--|--|

b. Composite liners; (62-701.400(3)(b),FAC)

| | | | | |
|--|--|---|--|---|
| | | x | | (1) Upper geomembrane thickness and properties; |
|--|--|---|--|---|

| | | | | |
|--|--|---|--|--|
| | | x | | (2) Design leachate head for primary LCRS including leachate recirculation if appropriate; |
|--|--|---|--|--|

| | | | | |
|--|--|---|--|---|
| | | x | | (3) Design thickness in accordance with Table A and number of lifts planned for lower soil component. |
|--|--|---|--|---|

c. Double liners; (62-701.400(3)(c),FAC)

| | | | | |
|--|--|---|--|---|
| | | x | | (1) Upper and lower geomembrane thicknesses and properties; |
|--|--|---|--|---|

| | | | | |
|--|--|---|--|--|
| | | x | | (2) Design leachate head for primary LCRS to limit the head to one foot above the liner; |
|--|--|---|--|--|

| | | | | |
|--|--|---|--|--|
| | | x | | (3) Lower geomembrane sub-base design; |
|--|--|---|--|--|

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> |
|----------|-------------------|------------|------------|
| — | — | <u>x</u> | — |
| <u>x</u> | <u>Sec. 5.2.4</u> | — | — |
| — | — | <u>x</u> | — |
| <u>x</u> | <u>Sec. 5.2.4</u> | — | — |
| <u>x</u> | <u>Sec. 5.2.5</u> | — | — |
| <u>x</u> | <u>Sec. 5.2.5</u> | — | — |
| <u>x</u> | <u>Sec. 5.2.5</u> | — | — |
| <u>x</u> | <u>Sec. 5.2.5</u> | — | — |
| — | — | <u>x</u> | — |
| — | — | <u>x</u> | — |

(4) Leak detection and secondary leachate collection system minimum design criteria ($k \geq 1$ cm/sec, head on lower liner ≤ 1 inch, head not to exceed thickness of drainage layer);

d. Standards for geomembranes; 62-701.400(3)(d), FAC)

- (1) Field seam test methods to ensure all field seams are at least 90 percent of the yield strength for the lining material;
- (2) Design of 24-inch-thick protective layer above upper geomembrane liner;
- (3) Describe operational plans to protect the liner and leachate collection system when placing the first layer of waste above 24-inch-thick protective layer.

e. Geosynthetic specification requirements; 62-701.400(3)(e), FAC)

- (1) Definition and qualifications of the designer, manufacturer, installer, QA consultant and laboratory, and QA program;
- (2) Material specifications for geomembranes, geotextiles, geogrids, and geonets;
- (3) Manufacturing and fabrication specifications including geomembrane raw material and roll QA, fabrication personnel qualifications, seaming equipment and procedures, overlaps, trial seams, destructive and nondestructive seam testing, seam testing location, frequency, procedure, sample size and geomembrane repairs;
- (4) Geomembrane installation specifications including earthwork, conformance testing, geomembrane placement, installation personnel qualifications, field seaming and testing, overlapping and repairs, materials in contact with geomembrane and procedures for lining system acceptance;
- (5) Geotextile and geogrid specifications including handling and placement, conformance testing, seams and overlaps, repair, and placement of soil materials;
- (6) Geonet specifications including handling and placement, conformance testing, stacking and joining, repair, and placement of soil materials;

| S | LOCATION | N/A | N/C |
|---|----------|-----|-----|
|---|----------|-----|-----|

f. Standards for soil components (62-701.400(3)(f), FAC):

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>x</u> | _____ |
| _____ | _____ | <u>x</u> | _____ |
| _____ | _____ | <u>x</u> | _____ |
| _____ | _____ | <u>x</u> | _____ |
| _____ | _____ | <u>x</u> | _____ |
| _____ | _____ | <u>x</u> | _____ |
| _____ | _____ | <u>x</u> | _____ |
| _____ | _____ | <u>x</u> | _____ |
| _____ | _____ | <u>x</u> | _____ |
| _____ | _____ | <u>x</u> | _____ |

- (1) Description of construction procedures including overexcavation and backfilling to preclude structural inconsistencies and procedures for placing and compacting soil component in layers;
- (2) Demonstration of compatibility of the soil component with actual or simulated leachate in accordance with EPA Test Method 9100 or an equivalent test method;
- (3) Procedures for testing in-situ soils to demonstrate they meet the specifications for soil liners;
- (4) Specifications for soil component of liner including at a minimum:
 - (a) Allowable particle size distribution, Atterberg limits, shrinkage limit;
 - (b) Placement moisture and dry density criteria;
 - (c) Maximum laboratory-determined saturated hydraulic conductivity using simulated leachate;
 - (d) Minimum thickness of soil liner;
 - (e) Lift thickness;
 - (f) Surface preparation (scarification);
 - (g) Type and percentage of clay mineral within the soil component;
- (5) Procedures for constructing and using a field test section to document the desired saturated hydraulic conductivity and thickness can be achieved in the field.

3. Leachate collection and removal system (LCRS); (62-701.400(4), FAC)

a. The primary and secondary LCRS requirements; (62-701.400(4)(a), FAC)

| | | | |
|----------|-------------------|-------|-------|
| <u>x</u> | <u>Sec. 5.3.1</u> | _____ | _____ |
| <u>x</u> | <u>Sec. 5.3.1</u> | _____ | _____ |

- (1) Constructed of materials chemically resistant to the waste and leachate;
- (2) Have sufficient mechanical properties to prevent collapse under pressure;

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> | |
|-------------|-------------------|-------------|-------------|---|
| <u>x</u> | <u>Sec. 5.3.1</u> | <u> </u> | <u> </u> | (3) Have granular material or synthetic geotextile to prevent clogging; |
| <u>x</u> | <u>Sec. 5.3.1</u> | <u> </u> | <u> </u> | (4) Have method for testing and cleaning clogged pipes or contingent designs for rerouting leachate around failed areas; |
| | | | | b. Primary LCRS requirements; (62-701.400(4)(b), FAC) |
| <u>x</u> | <u>Sec. 5.3.2</u> | <u> </u> | <u> </u> | (1) Bottom 12 inches having hydraulic conductivity $\geq 1 \times 10^{-3}$ cm/sec; |
| <u>x</u> | <u>Sec. 5.3.2</u> | <u> </u> | <u> </u> | (2) Total thickness of 24 inches of material chemically resistant to the waste and leachate; |
| <u>x</u> | <u>Sec. 5.3.2</u> | <u> </u> | <u> </u> | (3) Bottom slope design to accomodate for predicted settlement; |
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> | (4) Demonstration that synthetic drainage material, if used, is equivalent or better than granular material in chemical compatibility, flow under load and protection of geomembrane liner. |
| | | | | 4. Leachate recirculation; (62-701.400(5), FAC) |
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> | a. Describe general procedures for recirculating leachate; |
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> | b. Describe procedures for controlling leachate runoff and minimizing mixing of leachate runoff with storm water; |
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> | c. Describe procedures for preventing perched water conditions and gas buildup; |
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> | d. Describe alternate methods for leachate management when it cannot be recirculated due to weather or runoff conditions, surface seeps, wind-blown spray, or elevated levels of leachate head on the liner; |
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> | e. Describe methods of gas management to control odors and migration of methane; |
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> | f. If leachate irrigation is proposed, describe treatment methods and standards for leachate treatment prior to irrigation over final cover and provide documentation that irrigation does not contribute significantly to leachate generation. |

| S | LOCATION | N/A | N/C |
|---|----------|-----|-----|
|---|----------|-----|-----|

5. Leachate storage tanks and leachate surface impoundments; (62-701.400(6), FAC)

a. Surface impoundment requirements; (62-701.400(6)(b), FAC)

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

(1) Documentation that the design of the bottom liner will not be adversely impacted by fluctuations of the ground water;

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

(2) Designed in segments to allow for inspection and repair as needed without interruption of service;

(3) General design requirements;

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

(a) Double liner system consisting of an upper and lower 60-mil minimum thickness geomembrane;

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

(b) Leak detection and collection system with hydraulic conductivity ≥ 1 cm/sec;

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

(c) Lower geomembrane placed on subbase ≥ 6 inches thick with $k \leq 1 \times 10^{-5}$ cm/sec;

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

(d) Design calculation to predict potential leakage through the upper liner;

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

(e) Daily inspection requirements and notification and corrective action requirements if leakage rates exceed that predicted by design calculations;

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

(4) Description of procedures to prevent uplift, if applicable;

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

(5) Design calculations to demonstrate minimum two feet of freeboard will be maintained;

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

(6) Procedures for controlling vectors and off-site odors.

b. Above-ground leachate storage tanks; (62-701.400(6)(c), FAC)

| | | | |
|----------|-------------------|-------|-------|
| <u>X</u> | <u>Sec. 5.5.2</u> | _____ | _____ |
|----------|-------------------|-------|-------|

(1) Describe tank materials of construction and ensure foundation is sufficient to support tank;

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

(2) Describe procedures for cathodic protection if needed for the tank;

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> |
|-------------|-------------------|-------------|-------------|
| <u>x</u> | <u>Sec. 5.5.2</u> | <u> </u> | <u> </u> |
| <u>x</u> | <u>Sec. 5.5.2</u> | <u> </u> | <u> </u> |
| <u>x</u> | <u>Sec. 5.5.2</u> | <u> </u> | <u> </u> |
| <u>x</u> | <u>Sec. 5.5.2</u> | <u> </u> | <u> </u> |
| <u>x</u> | <u>Sec. 5.5.2</u> | <u> </u> | <u> </u> |
| <u>x</u> | <u>Sec. 5.5.2</u> | <u> </u> | <u> </u> |
| <u>x</u> | <u>Sec. 5.5.2</u> | <u> </u> | <u> </u> |
| <u>x</u> | <u>Sec. 5.5.2</u> | <u> </u> | <u> </u> |
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> |
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> |
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> |
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> |
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> |
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> |
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> |

- (3) Describe exterior painting and interior lining of the tank to protect it from the weather and the leachate stored;
- (4) Describe secondary containment design to ensure adequate capacity will be provided and compatibility of materials of construction;
- (5) Describe design to remove and dispose of stormwater from the secondary containment system;
- (6) Describe an overfill prevention system such as level sensors, gauges, alarms and shutoff controls to prevent overfilling;
- (7) Inspections, corrective action and reporting requirements;
 - (a) Overfill prevention system weekly;
 - (b) Exposed tank exteriors weekly;
 - (c) Tank interiors when tank is drained or at least every three years;
 - (d) Procedures for immediate corrective action if failures detected;
 - (e) Inspection reports available for department review.

c. Underground leachate storage tanks; (62-701.400 (6) (d), FAC)

- (1) Describe materials of construction;
- (2) A double-walled tank design system to be used with the following requirements;
 - (a) Interstitial space monitoring at least weekly;
 - (b) Corrosion protection provided for primary tank interior and external surface of outer shell;
 - (c) Interior tank coatings compatible with stored leachate;
 - (d) Cathodic protection inspected weekly and repaired as needed;
- (3) Describe an overfill prevention system such as level sensors, gauges, alarms and shutoff controls to prevent overfilling and provide for weekly inspections;

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> | |
|----------|-------------------|------------|------------|---|
| | | <u>x</u> | | (4) Inspection reports available for department review. |
| <u>x</u> | <u>Sec. 5.5.4</u> | | | d. Schedule provided for routine maintenance of LCRS; (62-701.400(6)(e), FAC) |
| | | | | 6. Liner systems construction quality assurance (CQA) : (62-701.400(7), FAC) |
| <u>x</u> | <u>Sec. 5.6</u> | | | a. Provide CQA Plan including: |
| <u>x</u> | <u>Sec. 5.6</u> | | | (1) Specifications and construction requirements for liner system; |
| <u>x</u> | <u>Sec. 5.6</u> | | | (2) Detailed description of quality control testing procedures and frequencies; |
| <u>x</u> | <u>Sec. 5.6</u> | | | (3) Identification of supervising professional engineer; |
| <u>x</u> | <u>Sec. 5.6</u> | | | (4) Identify responsibility and authority of all appropriate organizations and key personnel involved in the construction project; |
| <u>x</u> | <u>Sec. 5.6</u> | | | (5) State qualifications of CQA professional engineer and support personnel; |
| <u>x</u> | <u>Sec. 5.6</u> | | | (6) Description of CQA reporting forms and documents; |
| <u>x</u> | <u>Sec. 5.6</u> | | | b. An independent laboratory experienced in the testing of geosynthetics to perform required testing; |
| | | | | 7. Soil Liner CQA (62-701.400(8) FAC) |
| | | <u>x</u> | | a. Documentation that an adequate borrow source has been located with test results or description of the field exploration and laboratory testing program to define a suitable borrow source; |
| | | <u>x</u> | | b. Description of field test section construction and test methods to be implemented prior to liner installation; |
| | | <u>x</u> | | c. Description of field test methods including rejection criteria and corrective measures to insure proper liner installation. |
| | | | | 8. Surface water management systems; (62-701.400(9), FAC) |
| <u>x</u> | <u>Sec. 5.8.1</u> | | | a. Design of surface water management system to isolate surface water from waste filled areas and to control stormwater run-off; |
| <u>x</u> | <u>Sec. 5.8.2</u> | | | b. Details of stormwater control design including retention ponds, detention ponds, and drainage ways; |

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> |
|----------|-----------------|------------|------------|
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9. Gas control systems; (62-701.400(10), FAC)

| | | | |
|----------|-----------------|-------------|-------------|
| <u>x</u> | <u>Sec. 5.9</u> | <u> </u> | <u> </u> |
|----------|-----------------|-------------|-------------|

a. Design details for gas control system including collection pipes and vents, and passive venting or vacuum extraction details;

| | | | |
|----------|-----------------|-------------|-------------|
| <u>x</u> | <u>Sec. 5.9</u> | <u> </u> | <u> </u> |
|----------|-----------------|-------------|-------------|

b. Documentation that the gas control system will not impact the liner or leachate control system;

| | | | |
|-------------|-------------|-------------|----------|
| <u> </u> | <u> </u> | <u> </u> | <u>x</u> |
|-------------|-------------|-------------|----------|

c. Proposed methods of odor control including flaring designs in accordance with Chapter 62-296, FAC;

d. Description of a routine gas monitoring program to ensure gas control system is operating properly including:

| | | | |
|-------------|-------------|-------------|----------|
| <u> </u> | <u> </u> | <u> </u> | <u>x</u> |
|-------------|-------------|-------------|----------|

(1) Location of monitoring points;

| | | | |
|-------------|-------------|-------------|----------|
| <u> </u> | <u> </u> | <u> </u> | <u>x</u> |
|-------------|-------------|-------------|----------|

(2) Requirements for quarterly sampling of all monitoring points;

| | | | |
|-------------|-------------|-------------|----------|
| <u> </u> | <u> </u> | <u> </u> | <u>x</u> |
|-------------|-------------|-------------|----------|

(3) Description of corrective measures to be completed within 60 days of detection of elevated levels of explosive gases;

| | | | |
|-------------|-------------|----------|-------------|
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> |
|-------------|-------------|----------|-------------|

e. Description of condensate collection and disposal methods.

10. Landfill gas recovery facilities; (62-701.400(11), FAC)

| | | | |
|-------------|-------------|----------|-------------|
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> |
|-------------|-------------|----------|-------------|

a. Information required in Rules 62-701.320(7) and 62-701.330(4), FAC supplied;

| | | | |
|-------------|-------------|----------|-------------|
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> |
|-------------|-------------|----------|-------------|

b. Information required in Rule 62-701.600(4), FAC supplied where relevant and practical;

| | | | |
|-------------|-------------|----------|-------------|
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> |
|-------------|-------------|----------|-------------|

c. Estimate of current and expected gas generation rates and description of condensate disposal methods provided;

| | | | |
|-------------|-------------|----------|-------------|
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> |
|-------------|-------------|----------|-------------|

d. Description of procedures for condensate sampling, analyzing and data reporting provided;

| | | | |
|-------------|-------------|----------|-------------|
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> |
|-------------|-------------|----------|-------------|

e. Closure plan provided describing methods to control gas after recovery facility ceases operation;

| | | | |
|-------------|-------------|----------|-------------|
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> |
|-------------|-------------|----------|-------------|

f. Performance bond provided to cover closure costs if not already included in other landfill closure costs.

| | | | |
|-------------|-------------|----------|-------------|
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> |
|-------------|-------------|----------|-------------|

11. For landfills designed in ground water, provide documentation that the landfill will provide a degree of protection equivalent to landfills designed with bottom liners not in contact with ground water; (62-701.400(12), FAC)

H. HYDROGEOLOGICAL INVESTIGATION REQUIREMENTS (62-701.410, FAC)

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> | |
|----------|-----------------|------------|------------|---|
| | | | | 1. Submit a hydrogeological investigation and site report including at least the following information: |
| — | — | — | <u>x</u> | a. Regional and site specific geology and hydrogeology; |
| — | — | — | <u>x</u> | b. Direction and rate of ground water and surface water flow including seasonal variations; |
| — | — | — | <u>x</u> | c. Background quality of ground water and surface water; |
| — | — | — | <u>x</u> | d. Any on-site hydraulic connections between aquifers; |
| — | — | — | <u>x</u> | e. Site stratigraphy and aquifer characteristics for confining layers, semi-confining layers, and all aquifers below the landfill site that may be affected by the landfill; |
| — | — | — | <u>x</u> | f. Site topography and soil characteristics; |
| — | — | — | <u>x</u> | g. Inventory of all public and private water wells within a one-mile radius of the landfill including well top of casing and bottom elevations, name of owner, age and usage of each well, stratigraphic unit screened, well construction technique and static water level; |
| — | — | — | <u>x</u> | h. Description of topography, soil types and surface water drainage systems; |
| — | — | — | <u>x</u> | i. An inventory of all public and private water wells within one mile of the landfill. |
| — | — | — | <u>x</u> | j. Existing contaminated areas on landfill site. |
| — | — | <u>x</u> | — | 2. Report signed, sealed and dated by PE or PG. |

I. GEOTECHNICAL INVESTIGATION REQUIREMENTS (62-701.420, FAC)

| S | LOCATION | N/A | N/C |
|---|----------|-----|-----|
|---|----------|-----|-----|

1. Submit a geotechnical site investigation report defining the engineering properties of the site including at least the following:

| | | | |
|---|----------|---|---|
| x | Sec. 6.1 | — | — |
|---|----------|---|---|

a. Description of subsurface conditions including soil stratigraphy and ground water table conditions;

| | | | |
|---|----------|---|---|
| x | Sec. 6.1 | — | — |
|---|----------|---|---|

b. Investigate for the presence of muck, previously filled areas, soft ground, lineaments and sink holes;

| | | | |
|---|----------|---|---|
| x | Sec. 6.1 | — | — |
|---|----------|---|---|

c. Estimates of average and maximum high water table across the site;

d. Foundation analysis including:

| | | | |
|---|----------|---|---|
| x | Sec. 6.1 | — | — |
|---|----------|---|---|

(1) Foundation bearing capacity analysis;

| | | | |
|---|----------|---|---|
| x | Sec. 6.1 | — | — |
|---|----------|---|---|

(2) Total and differential subgrade settlement analysis;

| | | | |
|---|---|---|---|
| — | — | — | x |
|---|---|---|---|

(3) Slope stability analysis;

| | | | |
|---|----------|---|---|
| x | Sec. 6.1 | — | — |
|---|----------|---|---|

e. Description of methods used in the investigation and includes soil boring logs, laboratory results, analytical calculations, cross sections, interpretations and conclusions;

| | | | |
|---|---|---|---|
| — | — | — | x |
|---|---|---|---|

f. An evaluation of fault areas, seismic impact zones, and unstable areas as described in 40 CFR 258.13, 40 CFR 258.14 and 40 CFR 258.15.

| | | | |
|---|----------|---|---|
| x | Sec. 6.1 | — | — |
|---|----------|---|---|

2. Report signed, sealed and dated by PE or PG.

J. VERTICAL EXPANSION OF LANDFILLS (62-701.430,FAC)

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> | |
|----------|-----------------|------------|------------|---|
| — | — | <u>x</u> | — | 1. Describe how the vertical expansion shall not cause or contribute to leachate leakage from the existing landfill or adversely affect the closure design of the existing landfill; |
| — | — | <u>x</u> | — | 2. Describe how the vertical expansion over unlined landfills will meet the requirements of Rule 62-701.400, FAC with the exceptions of Rule 62-701.430(1)(c), FAC; |
| — | — | <u>x</u> | — | 3. Provide foundation and settlement analysis for the vertical expansion; |
| — | — | <u>x</u> | — | 4. Provide total settlement calculations demonstrating that the final elevations of the lining system, that gravity drainage, and that no other component of the design will be adversely affected; |
| — | — | <u>x</u> | — | 5. Minimum stability safety factor of 1.5 for the lining system component interface stability and deep stability; |
| — | — | <u>x</u> | — | 6. Provide documentation to show the surface water management system will not be adversely affected by the vertical expansion; |
| — | — | <u>x</u> | — | 7. Provide gas control designs to prevent accumulation of gas under the new liner for the vertical expansion. |

K. LANDFILL OPERATION REQUIREMENTS (62-701.500,FAC)

| | | | | |
|----------|-------------------|---|----------|--|
| — | — | — | <u>x</u> | 1. Provide documentation that landfill will have at least one trained operator during operation and at least one trained spotter at each working face; 62-701.500(1), FAC) |
| | | | | 2. Provide a landfill operation plan including procedures for: (62-701.500(2), FAC) |
| — | — | — | <u>x</u> | a. Designating responsible operating and maintenance personnel; |
| — | — | — | <u>x</u> | b. Contingency operations for emergencies; |
| — | — | — | <u>x</u> | c. Controlling types of waste received at the landfill; |
| — | — | — | <u>x</u> | d. Weighing incoming waste; |
| — | — | — | <u>x</u> | e. Vehicle traffic control and unloading; |
| <u>x</u> | <u>Sec. 7.2.6</u> | — | — | f. Method and sequence of filling waste; |
| — | — | — | <u>x</u> | g. Waste compaction and application of cover; |
| <u>x</u> | <u>Sec. 7.2.8</u> | — | — | h. Operations of gas, leachate, and stormwater controls; |
| <u>x</u> | <u>Sec. 7.2.9</u> | — | — | i. Water quality monitoring. |

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> | |
|----------|-----------------|------------|------------|---|
| — | — | — | <u>x</u> | 3. Provide a description of the landfill operation record to be used at the landfill; details as to location of where various operational records will be kept (i.e. FDEP permit, engineering drawings, water quality records, etc.) (62-701.500(3), FAC) |
| — | — | — | <u>x</u> | 4. Describe the waste records that will be compiled monthly and provided to the Department quarterly; (62-701.500(4), FAC) |
| — | — | — | <u>x</u> | 5. Describe methods of access control; (62-701.500(5), FAC) |
| — | — | — | <u>x</u> | 6. Describe load checking program to be implemented at the landfill to discourage disposal of unauthorized wastes at the landfill; (62-701.500(6), FAC) |
| | | | | 7. Describe procedures for spreading and compacting waste at the landfill that include: (62-701.500(7), FAC) |
| — | — | — | <u>x</u> | a. Waste layer thickness and compaction frequencies; |
| — | — | — | <u>x</u> | b. Special considerations for first layer of waste placed above liner and leachate collection system; |
| — | — | — | <u>x</u> | c. Slopes of cell working face and side grades above land surface, planned lift depths during operation; |
| — | — | — | <u>x</u> | d. Maximum width of working face; |
| | | | | e. Description of type of initial cover to be used at the facility that controls: |
| — | — | — | <u>x</u> | (1) Disease vector breeding/animal attraction |
| — | — | — | <u>x</u> | (2) Fires |
| — | — | — | <u>x</u> | (3) Odors |
| — | — | — | <u>x</u> | (4) Blowing litter |
| — | — | — | <u>x</u> | (5) Moisture infiltration |
| — | — | — | <u>x</u> | f. Procedures for applying initial cover including minimum cover frequencies; |
| — | — | — | <u>x</u> | g. Procedures for applying intermediate cover; |
| — | — | — | <u>x</u> | h. Time frames for applying final cover; |
| — | — | — | <u>x</u> | i. Description of litter policing methods; |
| — | — | — | <u>x</u> | j. Erosion control procedures. |

| S | LOCATION | N/A | N/C |
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| | | | | 8. Describe operational procedures for leachate management including; (62-701.500(8), FAC) |
| x | Sec. 7.8.1 | | | a. Leachate level monitoring, sampling, analysis and data results submitted to the Department; |
| x | Sec. 7.8.2 | | | b. Operation and maintenance of leachate collection and removal system, and treatment as required; |
| | | | x | c. Procedures for managing leachate if it becomes regulated as a hazardous waste; |
| | | | x | d. Agreements for off-site discharge and treatment of leachate; |
| x | Sec. 7.8.5 | | | e. Contingency plan for managing leachate during emergencies or equipment problems; |
| x | Sec. 7.8.6 | | | f. Procedures for recording quantities of leachate generated in gal/day; |
| x | Sec. 7.8.7 | | | g. Procedures for comparing precipitation experienced at the landfill with leachate generation rates. |
| | | | x | 9. Describe routine gas monitoring program for the landfill as required by Rule 62-701.400(10), FAC; (62-701.500(9), FAC) |
| | | | x | 10. Describe procedures for operating and maintaining the landfill stormwater management system to comply with the standards of Chapters 62-3, 62-302 and 62-25, FAC; (62-701.500(10), FAC) |
| | | | | 11. Equipment and operation feature requirements; (62-701.500(11), FAC) |
| | | | x | a. Sufficient equipment for excavating, spreading, compacting and covering waste; |
| | | | x | b. Reserve equipment or arrangements to obtain additional equipment within 24 hours of breakdown; |
| | | | x | c. Communications equipment; |
| | | | x | d. Personnel shelter and sanitary facilities, first aid equipment; |
| | | | x | e. Dust control methods; |
| | | | x | f. Fire protection capabilities and procedures for notifying local fire department authorities in emergencies; |
| | | | x | g. Litter control devices; |
| | | | x | h. Signs indicating operating authority, traffic flow, hours of operation, disposal restrictions. |

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> |
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|----------|------------------|-------------|-------------|
| <u>x</u> | <u>Sec. 7.12</u> | <u> </u> | <u> </u> |
|----------|------------------|-------------|-------------|

12. Provide a description of all-weather access road, inside perimeter road and other roads necessary for access which shall be provided at the landfill;
(62-701.500(12), FAC)

13. Additional record keeping and reporting requirements;
(62-701.500(13), FAC)

| | | | |
|-------------|-------------|-------------|--------------|
| <u> </u> | <u> </u> | <u> </u> | <u> x </u> |
|-------------|-------------|-------------|--------------|

a. Records used for developing permit applications and supplemental information maintained for the design period of the landfill;

| | | | |
|-------------|-------------|-------------|--------------|
| <u> </u> | <u> </u> | <u> </u> | <u> x </u> |
|-------------|-------------|-------------|--------------|

b. Monitoring information, calibration and maintenance records, copies of reports required by permit maintained for at least 10 years;

| | | | |
|-------------|-------------|-------------|--------------|
| <u> </u> | <u> </u> | <u> </u> | <u> x </u> |
|-------------|-------------|-------------|--------------|

c. Background water quality records shall be maintained for the design period of the landfill;

| | | | |
|-------------|-------------|-------------|--------------|
| <u> </u> | <u> </u> | <u> </u> | <u> x </u> |
|-------------|-------------|-------------|--------------|

d. Maintain annual estimates of the remaining life of constructed landfills and of other permitted areas not yet constructed and submit this estimate annually to the Department.

L. WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS (62-701.510, FAC)

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> | |
|-------------|-------------------|-------------|-------------|--|
| <u>x</u> | <u>Sec. 8.1</u> | <u> </u> | <u> </u> | 1. Water quality and leachate monitoring plan shall be submitted describing the proposed ground water, surface water and leachate monitoring systems and shall meet at least the following requirements; |
| <u>x</u> | <u>Appendix D</u> | <u> </u> | <u> </u> | a. Based on the information obtained in the hydrogeological investigation and signed, dated and sealed by the PG or PE who prepared it; (62-701.510(2)(a), FAC) |
| <u>x</u> | <u>Sec. 8.1</u> | <u> </u> | <u> </u> | b. All sampling and analysis performed by organizations having Department approved Comprehensive Quality Assurance Plans; (62-701.510(2)(b), FAC) |
| | | | | c. Ground water monitoring requirements; (62-701.510(3), FAC) |
| <u>x</u> | <u>Appendix D</u> | <u> </u> | <u> </u> | (1) Detection wells located downgradient from and within 50 feet of disposal units; |
| <u>x</u> | <u>Appendix D</u> | <u> </u> | <u> </u> | (2) Downgradient compliance wells as required; |
| <u>x</u> | <u>Appendix D</u> | <u> </u> | <u> </u> | (3) Background wells screened in all aquifers below the landfill that may be affected by the landfill; |
| <u>x</u> | <u>Appendix D</u> | <u> </u> | <u> </u> | (4) Location information for each monitoring well; |
| <u>x</u> | <u>Appendix D</u> | <u> </u> | <u> </u> | (5) Well spacing no greater than 500 feet apart for downgradient wells and no greater than 1500 feet apart for upgradient wells unless site specific conditions justify alternate well spacings; |
| <u>x</u> | <u>Appendix D</u> | <u> </u> | <u> </u> | (6) Well screen locations properly selected; |
| <u>x</u> | <u>Appendix D</u> | <u> </u> | <u> </u> | (7) Procedures for properly abandoning monitoring wells; |
| <u>x</u> | <u>Appendix D</u> | <u> </u> | <u> </u> | (8) Detailed description of detection sensors if proposed. |
| | | | | d. Surface water monitoring requirements; (62-701.510(4), FAC) |
| <u>x</u> | <u>Sec. 8.1.2</u> | <u> </u> | <u> </u> | (1) Location of and justification for all proposed surface water monitoring points; |
| <u> </u> | <u> </u> | <u>x</u> | <u> </u> | (2) Each monitoring location to be marked and its position determined by a registered Florida land surveyor; |
| <u>x</u> | <u>Sec. 8.1.3</u> | <u> </u> | <u> </u> | e. Leachate sampling locations proposed; (62-701.510(5), FAC) |

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> |
|---------------|-----------------------------|---------------|---------------|
| <u> </u> | <u> </u> | <u> </u> | <u> x </u> |
| <u> </u> | <u> </u> | <u> </u> | <u> x </u> |
| <u> </u> | <u> </u> | <u> </u> | <u> x </u> |
| <u> </u> | <u> </u> | <u> </u> | <u> x </u> |
| <u> </u> | <u> </u> | <u> </u> | <u> x </u> |
| <u> </u> | <u> </u> | <u> </u> | <u> x </u> |
| <u> x </u> | <u>Sec. 8.1.6</u> | <u> </u> | <u> </u> |
| <u> x </u> | <u>Sec. 8.1.6</u> | <u> </u> | <u> </u> |
| <u> x </u> | <u>Sec. 8.1.6</u> | <u> </u> | <u> </u> |

- f. Routine sampling frequency and requirements;
(62-701.510(6), FAC)
- (1) Background ground water and surface water sampling and analysis requirements;
 - (2) Leachate semi-annual and annual sampling and analysis requirements;
 - (3) Detection well semi-annual sampling and analysis requirements;
 - (4) Compliance well sampling and analysis requirements;
 - (5) Surface water sampling and analysis requirements.
- g. Describe procedures for implementing assessment monitoring and corrective action as required;
(62-701.510(7), FAC)
- h. Water quality monitoring report requirements;
(62-701.510(9), FAC)
- (1) Semi-annual report requirements;
 - (2) Biennial report requirements signed, dated and sealed by PG or PE.

M. SPECIAL WASTE HANDLING REQUIREMENTS (62-701.520, FAC)

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> | |
|----------|-----------------|------------|------------|---|
| — | — | <u>x</u> | — | 1. Describe procedures for managing motor vehicles; (62-701.520(1), FAC) |
| — | — | <u>x</u> | — | 2. Describe procedures for landfilling shredded waste; (62-701.520(3), FAC) |
| — | — | — | <u>x</u> | 3. Describe procedures for asbestos waste disposal; (62-701.520(4), FAC) |
| — | — | — | <u>x</u> | 4. Describe procedures for contaminated soil disposal; (62-701.520(5), FAC) |

N. LANDFILL FINAL CLOSURE REQUIREMENTS (62-701.600, FAC)

| | | | | |
|---|---|----------|---|--|
| | | | | 1. Closure schedule requirements; (62-701.600(2), FAC) |
| — | — | <u>x</u> | — | a. Documentation that a written notice including a schedule for closure will be provided to the Department at least one year prior to final receipt of wastes; |
| — | — | <u>x</u> | — | b. Notice to user requirements within 120 days of final receipt of wastes; |
| — | — | <u>x</u> | — | c. Notice to public requirements within 10 days of final receipt of wastes. |
| | | | | 2. Closure permit general requirements; (62-701.600(3), FAC) |
| — | — | <u>x</u> | — | a. Application submitted to Department at least 90 days prior to final receipt of wastes; |
| | | | | b. Closure plan shall include the following: |
| — | — | <u>x</u> | — | (1) Closure report; |
| — | — | <u>x</u> | — | (2) Closure design plan; |
| — | — | <u>x</u> | — | (3) Closure operation plan; |
| — | — | <u>x</u> | — | (4) Closure procedures; |
| — | — | <u>x</u> | — | (5) Plan for long term care; |
| — | — | <u>x</u> | — | (6) A demonstration that proof of financial responsibility for long term care will be provided. |

| S | LOCATION | N/A | N/C |
|---|----------|-----|-----|
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3. Closure report requirements; (62-701.600(4), FAC)

a. General information requirements;

- (1) Identification of landfill;
- (2) Location, description and vicinity map;
- (3) Total acres of disposal areas and landfill property;
- (4) Legal property description;
- (5) History of landfill;
- (6) Identification of types of waste disposed of at the landfill.

b. Geotechnical investigation report and water quality monitoring plan required by Rule 62-701.330(4), FAC;

c. Land use information report indicating: identification of adjacent landowners; zoning; present land uses; and roads, highways right-of-way, or easements.

d. Report on actual or potential gas migration at landfills containing biodegradable wastes including detailed description of test and investigation methods used;

e. Report assessing the effectiveness of the landfill design and operation including results of geotechnical investigations, surface water and storm water management, gas migration and concentrations, condition of existing cover, and nature of waste disposed of at the landfill;

4. Closure design requirements to be included in the closure design plan: (62-701.600(5), FAC)

a. Plan sheet showing phases of site closing;

b. Drawings showing existing topography and proposed final grades;

c. Provisions to close units when they reach approved design dimensions;

d. Final elevations before settlement;

e. Side slope design including benches, terraces, down slope drainage ways, energy dissipators and discussion of expected precipitation effects;

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> |
|----------|-----------------|------------|------------|
| — | — | <u>x</u> | — |
| — | — | <u>x</u> | — |
| — | — | <u>x</u> | — |
| — | — | <u>x</u> | — |
| — | — | <u>x</u> | — |
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| — | — | <u>x</u> | — |
| — | — | <u>x</u> | — |
| — | — | <u>x</u> | — |
| — | — | <u>x</u> | — |
| — | — | <u>x</u> | — |
| — | — | <u>x</u> | — |
| — | — | <u>x</u> | — |
| — | — | <u>x</u> | — |
| — | — | <u>x</u> | — |

- f. Final cover installation plans including:
- (1) CQA plan for installing and testing final cover;
 - (2) Schedule for installing final cover after final receipt of waste;
 - (3) Description of drought-resistant species to be used in the vegetative cover;
 - (4) Top gradient design to maximize runoff and minimize erosion;
 - (5) Provisions for cover material to be used for final cover maintenance.

- g. Final cover design requirements:
- (1) Protective soil layer design;
 - (2) Barrier soil layer design;
 - (3) Erosion control vegetation;
 - (4) Geomembrane barrier layer design.

h. Proposed method of stormwater control;

i. Proposed method of access control;

j. Description of proposed final use of the closed landfill, if any;

5. Closure operation plan shall include: (62-701.600(6), FAC)

- a. Detailed description of actions which will be taken to close the landfill;
- b. Time schedule for completion of closing and long term care;
- c. Describe proposed method for demonstrating financial responsibility;
- d. Indicate any additional equipment and personnel needed to complete closure.
- e. Development and implementation of the water quality monitoring plan required in Rule 62-701.510, FAC.
- f. Development and implementation of routine gas monitoring program required in Rule 62-701.400(10)(c), FAC.

6. Justification for and detailed description of procedures to be followed for temporary closure of the landfill, if desired; (62-701.600(7), FAC)

O. CLOSURE PROCEDURES (62-701.610, FAC)

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> | |
|----------|-----------------|------------|------------|---|
| _____ | _____ | <u>x</u> | _____ | 1. Survey monuments; (62-701.610(2), FAC) |
| _____ | _____ | <u>x</u> | _____ | 2. Final survey report; (62-701.610(3), FAC) |
| _____ | _____ | <u>x</u> | _____ | 3. Certification of closure construction completion; (62-701.610(4), FAC) |
| _____ | _____ | <u>x</u> | _____ | 4. Declaration to the public; (62-701.610(5), FAC) |
| _____ | _____ | <u>x</u> | _____ | 5. Official date of closing; (62-701.610(6), FAC) |
| _____ | _____ | <u>x</u> | _____ | 6. Use of closed landfill areas; (62-701.610(7), FAC) |

P. LONG TERM CARE REQUIREMENTS (62-701.620, FAC)

| | | | | |
|-------|-------|----------|-------|--|
| _____ | _____ | <u>x</u> | _____ | 1. Right of property access requirements; (62-701.620(4), FAC) |
| _____ | _____ | <u>x</u> | _____ | 2. Successors of interest requirements; (62-701.620(5), FAC) |
| _____ | _____ | <u>x</u> | _____ | 3. Requirements for replacement of monitoring devices; (62-701.620(7), FAC) |
| _____ | _____ | <u>x</u> | _____ | 4. Completion of long term care signed and sealed by professional engineer (62-701.620(8), FAC). |

Q. FINANCIAL RESPONSIBILITY REQUIREMENTS (62-701.630, FAC)

| | | | | |
|-------|-------|-------|----------|--|
| _____ | _____ | _____ | <u>x</u> | 1. Provide cost estimates for closing, long term care, and corrective action costs estimated by a PE for a third party performing the work, on a per unit basis, with the source of estimates indicated; (62-701.630(3)&(7), FAC). |
| _____ | _____ | _____ | <u>x</u> | 2. Describe procedures for providing annual cost adjustments to the Department based on inflation and changes in the closing, long-term care, and corrective action plans; (62-701.630(4)&(8), FAC). |
| _____ | _____ | _____ | <u>x</u> | 3. Describe funding mechanisms for providing proof of financial assurance and include appropriate financial assurance forms; (62-701.630(5), (6), &(9), FAC). |

R. CLOSURE OF EXISTING LANDFILLS (62-701.640, FAC)

| | | | | |
|-------|-------|----------|-------|---|
| _____ | _____ | <u>x</u> | _____ | 1. Demonstration that facility does not pose a bird hazard to aircraft as specified in Rule 62-701.320(12)(b), FAC. |
| _____ | _____ | <u>x</u> | _____ | 2. Demonstration that facility does not restrict the flow of the 100-year flood, reduce water storage capacity or result in wash-out of solid waste as specified in Rule 62-701.340(4)(b), FAC. |

| S | LOCATION | N/A | N/C |
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|---|----------|-----|-----|

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| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

3. Demonstration that facility is not located in a fault area, seismic zone or unstable area as specified in Rule 62-701.420(1)(c), FAC.

4. Request for extension of closure criteria as specified in Rule 62-701.640(2)(a) & (2)(b), FAC.

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

a. Demonstration of no alternative disposal capacity.

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

b. Demonstration of no threat to human health or the environment.

S. MATERIALS RECOVERY FACILITY REQUIREMENTS (62-701.700, FAC)

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

1. Proof of posting a performance bond payable to the Department to cover closing costs, if required; (62-701.700(4), FAC)

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

2. Materials recovery facility requirements; (62-701.700, FAC)

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

a. Submit information required in Rule 62-701.320, FAC

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

b. Submit an engineering report including the following:

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

(1) Description of the solid waste proposed to be collected, stored, processed or disposed;

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

(2) Projection with assumptions for waste types and quantities expected in future years;

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

(3) Description of operation and functions of all processing equipment with design criteria and expected performance;

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

(4) Description of flow of solid waste, expected regular facility operations, procedures for start up and shut down, potential safety hazards and control methods including fire protection;

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

(5) Description of loading, unloading, and processing areas;

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

(6) Identification and capacity of temporary on-site storage areas for materials handled and provisions for solid waste and leachate containment;

| | | | |
|-------|-------|----------|-------|
| _____ | _____ | <u>X</u> | _____ |
|-------|-------|----------|-------|

(7) Identification of potential ground water and surface water contamination;

| <u>S</u> | <u>LOCATION</u> | <u>N/A</u> | <u>N/C</u> |
|----------|-----------------|------------|------------|
| — | — | <u>X</u> | — |
| — | — | <u>X</u> | — |
| — | — | <u>X</u> | — |
| — | — | <u>X</u> | — |
| — | — | <u>X</u> | — |
| — | — | <u>X</u> | — |
| — | — | <u>X</u> | — |

(8) Plan for disposal of unmarketable recyclables and residue and contingencies for waste handling during breakdowns.

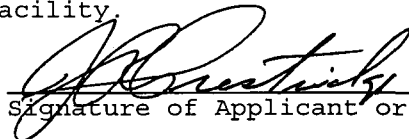
c. Submit the following operational information:

- (1) Operation and maintenance manual;
- (2) Waste control plan to manage unauthorized wastes;
- (3) Contingency plan for emergencies;
- (4) Closure plan including the following:
 - (a) Notification to Department 180 days prior to closure;
 - (b) Procedures for removal of all waste within 30 days of receipt of final waste;
 - (c) Completion of closure activities within 180 days of receipt of final waste and notification to the Department that closure is complete.

T. CERTIFICATION BY APPLICANT AND ENGINEER OR PUBLIC OFFICER

A. Applicant

The undersigned applicant or authorized representative of The Hardee County Solid Waste Department is aware that statements made in this form and attached information are an application for an construction Permit from the Florida Department of Environmental Regulation and certifies that the information in this application is true, correct and complete to the best of his knowledge and belief. Further, the undersigned agrees to comply with the provisions of Chapter 403, Florida Statutes, and all rules and regulations of the Department. It is understood that the Permit is not transferable, and the Department will be notified prior to the sale or legal transfer of the permitted facility.


Signature of Applicant or Agent

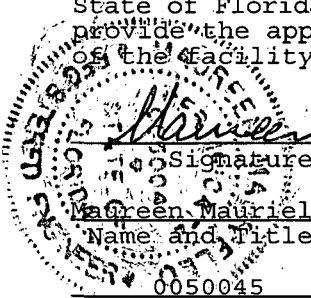
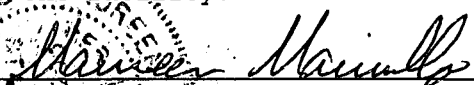
J.R. Prestridge, Assistant County Manager
Name and Title

Date: 6-24-97

Attach letter of authorization if agent is not a governmental official, owner, or corporate officer.

B. Professional Engineer Registered in Florida or Public Officer as required in Section 403.707 and 403.707(5), Florida Statutes.

This is to certify that the engineering features of this solid waste management facility have been designed/examined by me and found to conform to engineering principals applicable to such facilities. In my professional judgement, this facility, when properly maintained and operated, will comply with all applicable statutes of the State of Florida and rules of the Department. It is agreed that the undersigned will provide the applicant with a set of instructions of proper maintenance and operation of the facility.



Signature /
Margaret Mauriello, P.E. Project Engineer
Name and Title (please type)
0050045
Florida Registration Number
(please affix seal)

1560 Orange Avenue, Suite 700
Mailing Address

Winter Park, Florida 32789
City, State, Zip Code

(407) 647-7275
Telephone Number

Date: 6/26/97

Section 1

PERMIT APPLICATION CHECKLIST

1.1 EXECUTIVE SUMMARY

Hardee County owns and operates the Hardee County Regional Landfill (FDEP Permit Number SO25-214306), which is located on Airport Road, approximately one mile north of State Road 636, in Wauchula, Florida. The site location is shown in Figure 1-1. The facility serves Hardee County. This application is for new construction within the 12.5-acre \pm Class I bale fill-type landfill.

This permit application has been prepared in accordance with applicable sections of Rule 62-701 F.A.C., and provides the required facility information for agency review and approval. Required information which has previously been submitted and is applicable to this permit has been noted on the application form and in the appropriate sections. These portions of the application have been marked "No Change" on the application form.

A copy of the existing permit with all previous modifications is included in Appendix A.

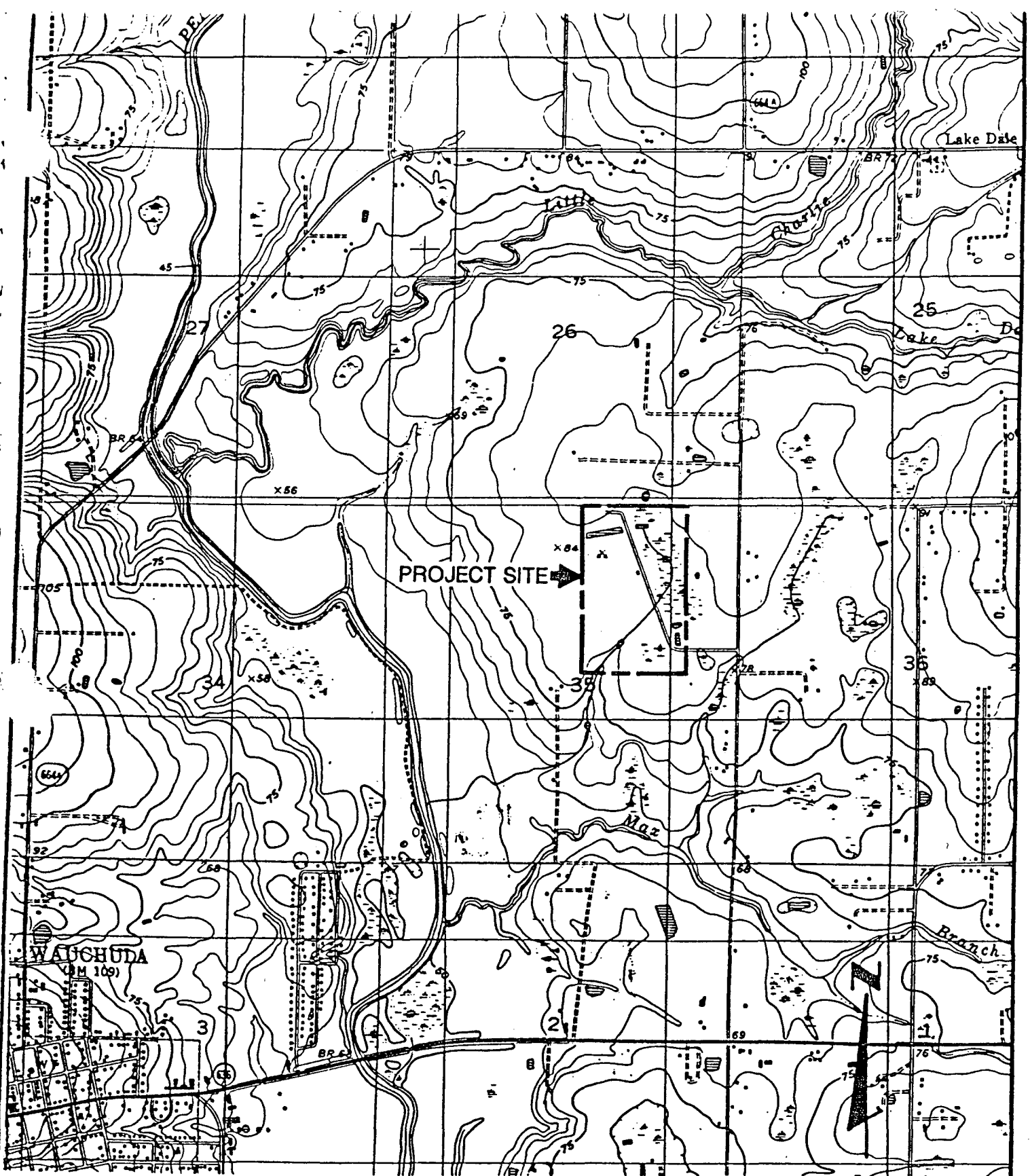
This application is for new construction within the Hardee County Class I Landfill, which includes the following:

- Lateral Expansion of the Class I Landfill;
- Construction of the Southern Leachate Barrier (Liner System);
- Expansion of the Leachate Collection and Removal System.
- Construction of Leachate Storage and Pumping Facilities; and
- Abandonment of the Existing Leachate Management System (Spray Field and Dewatering Ditch).

Additionally, an Environmental Resource Permit (ERP) is being submitted to address the stormwater permitting criteria for the construction area. Other permits held, or formerly held, by the county for this facility are listed below. These permits are not being modified as part of this permit application package.

| <u>Permit Designation</u> | <u>Permit Number</u> | <u>Expiration Date</u> |
|-----------------------------|----------------------|------------------------|
| Materials Recovery Facility | SC25-179573 | 09-01-2000 |
| MSSW | 407767.01 | Not Applicable |

As a result of the proposed construction activities, the Operations Plan for this facility, which is currently being reviewed by FDEP as part of the Operations Permit Renewal Application, will require modification. These modifications regarding the leachate collection and removal system and the lateral expansion of the landfill are addressed herein in Section 7. The Site Plan, Sheet 5 of the Permit Drawings, has been revised and is included in Appendix E. The Sequence Plans and Cross



SOURCE: U.S.G.S. TOPOGRAPHIC MAP OF
WAUCHULA, FL QUADRANGLE (1954-55, PHOTOREVISED 1987)

SCALE: 1"=2000'

U.S.G.S. QUAD MAP
HARDEE COUNTY REGIONAL LANDFILL
OPERATION PERMIT RENEWAL

FIGURE 1-1

Sections, Sheets 6 through 8 of the Permit Drawings, have been revised and are also included in Appendix E.

Modifications to the current groundwater monitoring plan, resulting from the proposed construction, are included in Appendix D.

1.2 APPLICATION CHECKLIST

This application checklist has been prepared to delineate the location of information required in the Permit Application Form. The format follows the alphabetical sequence of the application.

1.2.1 PART A - General Information

The required information for Part A is included on the application form, which is attached at the beginning of this permit application report.

1.2.2 PART B - Disposal Facility General Information

The required information for Part B is included on the application form, which is attached at the beginning of this permit application report.

1.2.3 PART C - Materials Recovery / Volume Reduction Facility General Information

Part C does not apply and is designated as "Not Applicable" on the application form.

1.2.4 PART D - Solid Waste Management Facility Permit General Requirements

The required information for Part D of the application is included in Section 2 of this permit application report. The specific location of the information is documented on the application form. Information which does not apply is designated as "Not Applicable" on the application form. Information which did not change from prior submittals to FDEP is designated as "No Change" on the application form.

1.2.5 PART E - Landfill Permit General Requirements

The required information for Part E is included in Section 3 of this permit application report. The specific location of the information is documented on the application form. Information which does not apply is designated as "Not Applicable" on the application form. Information which did not change from prior submittals to FDEP is designated as "No Change" on the application form.

1.2.6 PART F - General Criteria for Landfills

The required information for Part F is included in Section 4 of this permit application report. The specific location of the information is documented on the application form. Information which does not apply is designated as "Not Applicable" on the application form. Information

which did not change from prior submittals to FDEP is designated as "No Change" on the application form.

1.2.7 PART G - Landfill Construction Requirements

The required information for Part G is included in Section 5 of this permit application report. The specific location of the information is documented on the application form. Information which does not apply is designated as "Not Applicable" on the application form. Information which did not change from prior submittals to FDEP is designated as "No Change" on the application form.

1.2.8 PART H - Hydrogeological Investigation Requirements

The information for Part H has not changed from information previously submitted to the FDEP. The information for Part H is included in Section 5 of the "Response To Request For Additional Information dated May 28, 1997 for The Renewal Of Operations Permit," dated June 26, 1997 and has been noted as "No Change" on the application form.

1.2.9 PART I - Geotechnical Investigation Requirements

The required information for Part I is included in Section 6 of this permit application report. The specific location of the information is documented in the text of this report. Information which does not apply is designated as "Not Applicable" on the application form. Information which did not change from prior submittals to FDEP is designated as "No Change" on the application form.

1.2.10 PART J - Vertical Expansion of Landfills

Part J does not apply and is designated as "Not Applicable" on the application form.

1.2.11 PART K - Landfill Operation Requirements

The required information for Part K is included in Section 7 of this permit application report. The specific location of the information is documented in the text of this report. Information which does not apply is designated as "Not Applicable" on the application form. Information which did not change from prior submittals to FDEP is designated as "No Change" on the application form.

1.2.12 PART L - Water Quality and Leachate Monitoring Requirements

The required information for Part L is included in Section 8 of this permit application report. The specific location of the information is documented in the text of this report. Information which does not apply is designated as "Not Applicable" on the application form. Information which did not change from prior submittals to FDEP is designated as "No Change" on the application form.

1.2.13 PART M - Special Waste Handling Requirements

The information for Part M has not changed significantly from information previously submitted to the FDEP. The information for Part M is included in Section 9 of the "Response To Request For Additional Information dated May 28, 1997 for The Renewal Of Operations Permit," dated June 26, 1997 and has been noted as "No Change" on the application form.

1.2.14 PART N - Landfill Closure Requirements

Part N does not apply and is designated as "Not Applicable" on the application form.

1.2.15 PART O - Closure Procedures

Part O does not apply and is designated as "Not Applicable" on the application form.

1.2.16 PART P - Long-Term Care Requirements

Part P does not apply and is designated as "Not Applicable" on the application form.

1.2.17 PART Q - Financial Responsibility Requirements

The information for Part Q has not changed from previous submittals and has been noted as "No Change" on the application form.

1.2.18 PART R - Closure of Existing Landfill Requirements

Part R does not apply and is designated as "Not Applicable" on the application form.

1.2.19 PART S - Materials Recovery Facility Requirements

Part S does not apply and is designated as "Not Applicable" on the application form.

1.2.20 PART T - Certification by Applicant and Engineer or Public Officer

The required information for this section is included on the application form.

Section 2

PART D - SOLID WASTE MANAGEMENT FACILITY PERMIT GENERAL REQUIREMENTS (62-701.320 F.A.C.)

2.1 PERMIT APPLICATION COPIES

Four (4) copies of the completed Permit Application form, including all supporting data, are submitted to FDEP for approval.

2.2 CERTIFICATIONS

The appropriate professional certifications are provided on the application packages submitted to FDEP.

2.3 TRANSMITTAL LETTER

The transmittal letter is included in the front of this permit application report.

2.4 PERMIT APPLICATION FORM

A copy of the completed application form is included in the front of this permit application report.

2.5 PERMIT APPLICATION FEE

In accordance with Rule 62-4.050(4)(h)14, F.A.C., an application fee of \$10,000 is required. Pursuant to Florida State Law 94-278, Hardee County requests a permit fee reduction to be granted on the basis of fiscal hardship. Therefore, a check in the amount of \$100 is included in this permit application package. See Appendix B for certification of fiscal hardship.

2.6 ENGINEERING REPORT

The information requested on the application form which is applicable to this permit application have been discussed herein or included as appendices to this report.

2.7 OPERATION PLAN

The Operation Plan has been submitted in the revised Section 7 of the "Response To Request For Additional Information dated May 28, 1997 for The Renewal Of Operations Permit", dated June 26, 1997. The majority of this information has not changed. Modifications to the Operation Plan resulting from the proposed construction is discussed in Section 7 of this report.

2.8 CONTINGENCY PLAN

Contingency Operations information has been submitted in Section 7.2.2 of the "Response To Request For Additional Information dated May 28, 1997 for The Renewal Of Operations Permit", dated June 26, 1997. The information has not changed.

2.9 SOLID WASTE MANAGEMENT FACILITY PLANS

2.9.1 Regional Map

A regional map showing the project location is included as Figure 1-1 in Section 1.1.

2.9.2 Vicinity Map / Aerial Photograph

Aerial Photographs have been submitted as Sheets 2-A/2-B and 3-A/3-B of the Permit Drawings for the "Response To Request For Additional Information dated April 2, 1997 for The Renewal Of Operations Permit", dated April 29, 1997. The information has not changed.

2.9.3 Site Plan

A Site Plan has been submitted as Sheet 4 of the Permit Drawings for the the "Response To Request For Additional Information dated May 28, 1997 for The Renewal Of Operations Permit", dated June 26, 1997. The information has not changed.

2.9.4 Details

Engineering details necessary for this permit application are shown in the revised Permit Drawings included in Appendix E and Construction Drawings submitted separately with this permit application.

2.10 PROOF OF PROPERTY OWNERSHIP

Proof of Property Ownership has been submitted in Attachment 2-2 of the "Response To Request For Additional Information dated April 2, 1997 for The Renewal Of Operations Permit", dated April 29, 1997. The information has not changed.

2.11 RECYCLING ACTIVITIES

Recycling Activities information has been submitted in Section 2.11 of the "Response To Request For Additional Information dated May 28, 1997 for The Renewal Of Operations Permit", dated June 26, 1997. The information has not changed.

2.12 HISTORY OF DEPARTMENT ENFORCEMENT ACTIVITIES

History of Department Enforcement Activities has been submitted in Section 2.12 of the "Response To Request For Additional Information dated May 28, 1997 for The Renewal Of Operations Permit", dated June 26, 1997. The information has not changed.

2.13 PROOF OF PUBLICATION OF NOTICE OF APPLICATION

Notice of application for a construction permit for the Hardee County Regional Landfill shall be published in a local newspaper of general circulation in accordance with Rule 62-701.320(8), F.A.C., upon FDEP instruction. Proof of publication will be forwarded to the Department.

2.14 AIRPORT SAFETY REQUIREMENTS

Airport Safety Requirements have been submitted in Attachment 2-3 of the "Response To Request For Additional Information dated April 2, 1997 for The Renewal Of Operations Permit", dated April 29, 1997. The information has not changed.

**PART E - LANDFILL PERMIT GENERAL REQUIREMENTS
(62-701.330 F.A.C.)**

3.1 LAND USE AND ZONING MAP

Land Use and Zoning Maps have been submitted as Sheets 2-A/2-B and 3-A/3-B of the Permit Drawings for the "Response To Request For Additional Information Dated April 2, 1997 For The Renewal Of Operations Permit", dated April 29, 1997. The information has not changed.

3.2 AIRPORT LOCATION PLAN

An Airport Location Plan has been submitted in Figure 2-1 of the "Response To Request For Additional Information dated May 28, 1997 for The Renewal Of Operations Permit", dated June 26, 1997. The information has not changed.

3.3 PLOT PLAN

The site's boundary and dimensions have been submitted as Sheet 4 of the Permit Drawings of the "Response To Request For Additional Information dated May 28, 1997 for The Renewal Of Operations Permit", dated June 26, 1997. The information has not changed.

The locations of existing groundwater monitoring wells have been submitted as Sheet 4 of the "Response To Request For Additional Information dated May 28, 1997 for The Renewal Of Operations Permit", dated June 26, 1997.

The locations of proposed groundwater monitoring wells is included as part of the revised groundwater monitoring plan, submitted with this permit application as Appendix D and shown on Sheet C-1 of the Construction Drawings.

Information regarding soil borings is included in geotechnical investigations performed by Ardaman & Associates (1987) and Envisors, Inc. (1982). Additionally, a report entitled "Feasibility Study On Use Of Mobil Site As A Class I Sanitary Landfill", dated February 1982 was submitted in support of the application to construct the landfill facility. Soil boring profiles and seismic survey results were provided on Sheet 3 of 14 and Sheet 4 of 14 of the Envisors Record Drawings for the facility, dated 10/82. These reports are on file with the FDEP.

Soil boring information, including locations, is also included in the geotechnical investigation prepared by Professional Services, Inc. (PSI), PSI Project No. 757-75054, March 10, 1997. This geotechnical investigation was performed in support of the proposed modifications outlined in this permit application report. See Section 6 and Appendix C for more boring information.

Previously filled waste disposal areas of the Class I landfill have been submitted as Sheet 4 of the Permit Drawings of the "Response To Request For Additional Information dated May 28, 1997 for The Renewal Of Operations Permit", dated June 26, 1997. The information has not changed.

Cross sections showing the original elevations and the proposed final fill contours resulting from the lateral expansion are provided on Sheet 8 in Appendix E. Sheets 6 and 7, included in Appendix E, show the new sequencing plan for the proposed landfill expansion.

The locations of fencing and gates used to restrict site access have been submitted as Sheet 4 of the Permit Drawings of the "Response To Request For Additional Information dated May 28, 1997 for The Renewal Of Operations Permit", dated June 26, 1997. The information has not changed.

3.4 TOPOGRAPHIC MAPS

Sheets 6 and 7 of the revised Permit Drawings show the new sequencing plan for the proposed landfill expansion.

The location of the Borrow Area is depicted on Sheet 4 of the Permit Drawings of the "Response To Request For Additional Information dated May 28, 1997 for The Renewal Of Operations Permit", dated June 26, 1997. The information has not changed.

The locations of the access roads, fences, and gates are depicted on Sheet 4 of the Permit Drawings of the "Response To Request For Additional Information dated May 28, 1997 for The Renewal Of Operations Permit", dated June 26, 1997. Proposed access roads for the leachate storage tank facility are depicted on Sheets C-3 and C-4 of the Construction Drawings.

The grades required for proper drainage of the Class I cell's surface water management system will be constructed during the sequencing of the landfill. Sheets 6 and 7 of the revised Permit Drawings, included in Appendix E, show the grades required for proper drainage of the surface water management system for the proposed landfill expansion. No changes in the height of the landfill or the steepness of the sideslopes were made. Sheet 8 of the revised Permit Drawings shows the new cross sections.

Equipment facilities locations, both existing and proposed, are shown on Sheets C-1 and C-2 of the Construction Drawings.

3.5 REPORT

3.5.1 Current and Projected Population and Area Served

The Current and Projected Population and Area Served has been submitted as Section 3.5.1 in the "Response To Request For Additional Information dated May 28, 1997 for The Renewal Of Operations Permit", dated June 26, 1997. The information has not changed.

3.5.2 Anticipated Type, Annual Quantity, and Source of Solid Waste

The Anticipated Type, Annual Quantity, and Source of Solid Waste has been submitted as Section 3.5.1 in the "Response To Request For Additional Information dated May 28, 1997 for The Renewal Of Operations Permit", dated June 26, 1997. The information has not changed.

3.5.3 Anticipated Facility Life

The anticipated facility life estimate is based on the design capacity of the landfill, current capacity available for landfill operations, and the capacity utilized per year. The capacity utilized per year is computed from the actual waste tonnage landfilled in fiscal year 1996, average bale density, and a percentage allowance for cover volume.

The county's records show that 12,366 tons of waste were landfilled during fiscal year 1996. Based on an average density of 1,750 lbs/bale and an assumed 35% cover volume, this tonnage is equivalent to approximately 28,240 cubic yards of airspace. Based on projected population values and the current per capita rate of solid waste disposal, the capacity utilized will increase, on average, by approximately 161 cubic yards/year over the life of the landfill.

The design capacity of the landfill was previously estimated to be 630,000 cubic yards. As of September 30, 1996, it was estimated that 239,360 cubic yards of capacity remained. The proposed landfill expansion will increase the remaining capacity to 322,655 cubic yards. At the projected rate of capacity utilization, the remaining anticipated facility life is approximately 10.5 years.

The time frame for each sequence, with estimated dates of beginning and completion, is as follows:

| Sequence | Duration (months) | Waste Disposed (cubic yards) | Airspace Used (cubic yards) | Estimated Start Date | Estimated End Date |
|------------|-------------------|------------------------------|-----------------------------|----------------------|--------------------|
| Sequence 2 | 10/96 to 09/97 | 21,673 | 29,232 | ----- | 09/97 |
| Sequence 3 | 11 | 19,425 | 26,200 | 10/97 | 08/98 |
| Sequence 4 | 43 | 76,597 | 103,314 | 09/98 | 03/01 |
| Sequence 5 | 41 | 75,061 | 101,243 | 04/01 | 08/05 |
| Sequence 6 | 12 | 21,444 | 28,923 | 09/05 | 08/06 |
| Sequence 7 | 14 | 25,017 | 33,743 | 09/06 | 10/07 |
| Totals | 133 | 239,217 | 322,655 | ----- | ----- |

3.5.4 Source and Type of Cover Material

The Source and Type of Cover Material has been submitted as Section 3.5.4 in the "Response To Request For Additional Information dated May 28, 1997 for The Renewal Of Operations Permit", dated June 26, 1997. The information has not changed.

3.6 WATER QUALITY LABORATORY REQUIREMENTS

All water quality sampling and testing for the Hardee County Regional Landfill is currently being conducted by Short Environmental Laboratories, Inc. The laboratory is authorized under FDEP CompQAP #880516.

3.7 CLOSURE AND LONG TERM CARE FINANCIAL RESPONSIBILITY

Closure and Long Term Care Financial Responsibility information has been submitted in Section 10 of the "Hardee County Regional Landfill Application for Renewal of Operation Permit", dated March 1997 and in Section 11 (Attachment K) of the "Response To Request For Additional Information dated April 2, 1997 for The Renewal Of Operations Permit", dated April 29, 1997. The information has not changed. However, if the proposed landfill expansion is approved, the Closure and Long Term Care Financial Responsibility information previously submitted to FDEP will be updated in the next annual financial assurance submittal.

Section 4

PART F - GENERAL CRITERIA FOR LANDFILLS (62-701. 340 F.A.C.)

4.1 LOCATION IN 100-YEAR FLOOD PLAIN

A Flood Insurance Rate Map (FIRM) for Hardee County has been submitted as Figure 4-1 of the "Response To Request For Additional Information Dated April 2, 1997 For The Renewal Of Operations Permit", dated April 29, 1997. The information has not changed.

4.2 MINIMUM HORIZONTAL SEPARATION

Information concerning the minimum horizontal separation between the toe of the proposed final cover slope of the Class I Landfill and the site's property line has been submitted as Section 4.2 of the "Response To Request For Additional Information Dated April 2, 1997 For The Renewal Of Operations Permit", dated April 29, 1997.

The proposed landfill expansion will provide for a minimum horizontal separation of approximately 800 feet between the toe of the proposed final cover slope of the Class I Landfill and the site's property line to the East and approximately 1,325 feet to the South. The horizontal separation between the toe of the proposed final cover slope of the Class I Landfill and the site's property line to the North and West will remain unchanged. Sheets 5 through 7 of the revised Permit Drawings, included in Appendix E, and Sheets C-1 through C-3 of the attached Construction Drawings show the location of the existing and proposed liner systems and the property boundary.

4.3 LANDFILL SCREENING

The Hardee County Regional Landfill is located in a remote area, approximately 1 mile north of S.R. 636. The Class I landfill is located in the northeast corner of the 100-acre site. Screening from public view is provided by the existing vegetation surrounding the property, as well as the Class I landfill's location within the site. The proposed (horizontal) landfill expansion is not expected to significantly affect the landfill's visibility to the public.

APR 27 1998

PART G - LANDFILL CONSTRUCTION REQUIREMENTS
(62-701.400 FAC)SOUTHWEST DISTRICT
TAMPA**5.1 CONSTRUCTION AND CLOSURE PHASING**

The current landfill was originally designed in 6 sequences until final buildout. The proposed phasing plan has 7 sequences until final buildout and is shown on Sheets 6 and 7, included in Appendix E. Each sequence is designed for leachate and stormwater management. The landfill is currently operating in Sequence 2. The working area is comprised of a Baled Waste Disposal Area and a Loose Waste Disposal Area. The Loose Waste Disposal Area is located along the southern edge of the Baled Waste Disposal Area. Loose Wastes are wastes that have not been processed by, or are non-recoverable materials from, the Materials Recovery Facility (MRF). Asbestos is disposed of in the southwest corner of the landfill, just north of the existing dewatering ditch.

Leachate from the Baled and Loose Waste Disposal Areas is currently collected in a leachate dewatering ditch for sprayfield irrigation disposal. Currently, berms located along the east and west edges of the working area direct runoff to the south into a swale that runs along the southern edge of the working area. The slope of the swale bottom directs the flow to temporary leachate collection pipes located in the southeast and southwest corners, which convey the runoff to the dewatering ditch.

The proposed leachate collection and removal system will eliminate the use of the dewatering ditch and sprayfield irrigation disposal. After the proposed construction activities are complete, the existing dewatering ditch will be used for the disposal of C&D. During the construction activities, incoming pure C&D loads will be temporarily stockpiled just north of the dewatering ditch, east of the asbestos disposal area. Upon completion of the construction activities, these stockpiled materials will be disposed of in the ditch. This area is separate from the Class I cell and no wastes have previously been disposed of. Runoff from the working area will continue to be directed to temporary collection pipes via the east and west berms and the southern swale. The southern ends of the collection pipes will be connected to new manholes which will direct the flow through the improved existing leachate pump station to the proposed storage tanks. Leachate generated from stormwater infiltration and moisture in the wastes will continue to be collected by underdrains surrounding the landfill and conveyed by below-ground pipes to the proposed leachate pump station and storage tanks. With the proposed landfill expansion, the remaining landfill life is approximately 10.5 years.

In Sequences 3 through 7, berms will be constructed along the east and west edges of the working area to direct runoff to a leachate swale that is constructed along the south side of the Working Area. Two, 12-inch diameter (minimum) temporary leachate collection pipes will convey leachate from the southeast and southwest corners of the southern leachate swale to the pump station. As the landfill sequences progress, the east and west berms are extended and a new southern leachate swale

is constructed to accommodate the new working area. The berms adjacent to completed areas and the existing swale are removed. Sections of the temporary leachate collection pipes between the existing and new swales are removed, and the upstream pipe inverts adjusted, to maintain a positive outfall to the pump station. The new swale, berms, and non-working areas are fully sodded for erosion and sediment control.

The time frame for each sequence, with estimated dates of beginning and completion, is as follows:

| Sequence | Duration (months) | Waste Disposed (cubic yards) | Airspace Used (cubic yards) | Estimated Start Date | Estimated End Date |
|------------|-------------------|------------------------------|-----------------------------|----------------------|--------------------|
| Sequence 2 | 10/96 to 09/97 | 21,673 | 29,232 | ----- | 09/97 |
| Sequence 3 | 11 | 19,425 | 26,200 | 10/97 | 08/98 |
| Sequence 4 | 43 | 76,597 | 103,314 | 09/98 | 03/01 |
| Sequence 5 | 41 | 75,061 | 101,243 | 04/01 | 08/05 |
| Sequence 6 | 12 | 21,444 | 28,923 | 09/05 | 08/06 |
| Sequence 7 | 14 | 25,017 | 33,743 | 09/06 | 10/07 |
| Totals | 133 | 239,217 | 322,655 | ----- | ----- |

5.2 LANDFILL LINER REQUIREMENTS

The liner system to be installed along the southern perimeter of the proposed landfill expansion, connecting to the existing sidewall liner along the east and west perimeter, is shown on Sheet C-2 of the attached Construction Drawings.

5.2.1 General Construction Requirements

The proposed liner system will connect to the existing sidewall liner along the east and west perimeter of the landfill. The proposed liner will consist of 60 mil HDPE. The proposed HDPE liner will be fusion welded to the existing polyethylene sidewall liner, and continue across the southern perimeter of the landfill.

The proposed HDPE liner has the appropriate physical, chemical, and mechanical properties to prevent failure due to physical contact with the leachate, climatic conditions, the stress of installation, and other applied stresses and hydraulic pressures which are anticipated during operation and closure. Test information and documentation are to be provided by the liner material supplier prior to construction. Liner material property requirements and the

responsibilities of the liner material supplier are outlined in the "Hardee County Regional Landfill Lateral Expansion and Leachate Storage Tank Facility Construction Quality Assurance Plan" and the Technical Specifications prepared by Post, Buckley, Schuh & Jernigan, Inc., included separately with this permit application report.

The liner subgrade will be constructed so as to be free of rocks, sticks, and other debris capable of puncturing the liner. Foreign objects such as rocks, sticks, glass, sharp objects, stones larger than 3/8-inch in diameter and any other harmful materials shall be removed from the surface. Soil at the surface of the subgrade shall be graded to a smooth, even surface. No loose soil shall be allowed beneath the geomembrane. No abrupt changes in grade, standing water, or excessive moisture will be permitted. Perimeter anchor trenches shall be excavated to the lines and width shown on the plans prior to geomembrane placement. Visible vegetation shall be removed. The General Contractor shall protect the subgrade from desiccation and flooding. Protection, if required, may consist of a thin plastic protective cover (or other material as approved by the Engineer) installed over the completed subgrade until such time as the placement of geomembrane liner begins. The subgrade slope and anchor trench will provide sufficient support and stability to the deployed liner.

The liner system will be constructed so as to withstand the impact of groundwater fluctuations. The subgrade, protective sand, and anchor trench will provide sufficient protection, support, and stability to the deployed liner. The liner will also be anchored into the in-situ clay layer located 10 to 15 feet below ground. The liner also ties into the existing, previously permitted liner system, which has performed adequately to withstand the impact of groundwater fluctuations.

The liner system is designed to intercept ground water and resist hydrostatic uplift if ground water rises to the liner system at any time. The liner will be anchored into the in-situ clay layer located 10 to 15 feet below ground, and extend above the seasonal high groundwater table (SHGWT) elevation. The subgrade, depth of protective cover soil, and anchor trench will provide sufficient protection, support, and stability to the deployed liner. The liner also ties into the existing, previously permitted liner system, which has performed adequately to intercept ground water and resist hydrostatic uplift.

The liner system will be installed so as to provide a continuous barrier to protect against having waste or leachate come into contact with the surrounding environment. The liner will be anchored into the in-situ clay layer located 10 to 15 feet below ground, and extend above the SHGWT elevation. The clay layer beneath the landfill is permitted as, and considered part of, the liner system providing a continuous barrier.

5.2.2 Composite Liners

This section does not apply and is designated as "Not Applicable" on the application form.

5.2.3 Double Liners

This section does not apply and is designated as "Not Applicable" on the application form.

5.2.4 Standards for Geomembranes

Field seam test methods to ensure all field seams are at least 90 percent of the yield strength for the lining material include destructive and non-destructive tests. These methods are outlined in the "Hardee County Regional Landfill Lateral Expansion and Leachate Storage Tank Facility Construction Quality Assurance Plan" and the Technical Specifications prepared by Post, Buckley, Schuh & Jernigan, Inc. and included separately with this permit application report.

Methods for non-destructive tests of all field seams, over their full length, include vacuum test, air pressure test (for double fusion seams only), or other approved methods.

Field destructive seam tests shall be performed for seams at locations designated by the CQA Monitor. Two 1-inch wide strips shall be tested in the field, by hand or tensiometer, for peel and shear (respectively) and shall not fail in the seam. When field samples fail to pass the tests, then the procedures outlined in the CQA plan for destructive test failure shall be followed.

The liner cover material shall consist of the material excavated for the anchor and liner trenches. At the bottom of the liner trench, material from the excavated clay layer will be used as cover material where the bottom of the liner ties into the clay layer. The liner cover material shall not contain any sharp or angular rock, roots, tree limbs, or other natural or man-made materials which may damage the liner. The installation of the liner cover material will be monitored to confirm that no damage occurs to the liner below. Grades shall be returned to their original elevations.

The proposed configuration of the liner cover material, liner, and leachate collection system is designed to minimize the possibility of damage to the liner and leachate collection system. The liner will be installed with the anchor trench towards, and the liner sloping away from, the landfill. The leachate collection system is installed adjacent to the liner system. The first layer of waste shall be landfilled at natural ground, or in the previously excavated dewatering ditch. Therefore, the risk of damage to the liner from waste placement will be minimal. Please refer to Sheets C-2 and C-4 of the attached Construction Drawings for more detail.

5.2.5 Geosynthetic Specification Requirements

A list of the recommended qualifications of the parties involved in the design, installation, CQA program, and testing of the liner system are presented in the "Hardee County Regional Landfill Lateral Expansion and Leachate Storage Tank Facility Construction Quality

Assurance Plan" and the Technical Specifications prepared by Post, Buckley, Schuh & Jernigan, Inc., included separately with this permit application report.

5.2.6 Standards for Soil Components

This section does not apply and is designated as "Not Applicable" on the application form.

5.3 LEACHATE COLLECTION AND REMOVAL SYSTEM (LCRS)

The leachate collection and removal system (LCRS) consists of above-ground and below-ground systems. Leachate generated from stormwater runoff coming into contact with the waste is collected in the above-ground system; leachate from stormwater infiltration and moisture in the landfilled wastes is collected in the below-ground system. In both systems, leachate is to be conveyed to the pump station for removal to leachate storage tanks. Leachate is then pumped from the storage tanks to tanker trucks for transport to the Wauchula Municipal Wastewater Treatment Plant.

In the below-ground leachate collection system, leachate is collected by an underdrain system installed adjacent to the sidewall liner. An HDPE liner, and adjacent underdrains, will be constructed along the southern perimeter, connecting the east and west liner and underdrain systems. Leachate flows by gravity to the pump station, where it will be pumped into the proposed leachate storage tanks. The pump station location will remain in the same place as the existing pump station shown on the site plan. The concrete wet well will remain; the pumps, pipes, and valves will be replaced. See the construction drawings for details on the proposed equipment.

5.3.1 Primary and Secondary LCRS Requirements

The existing and proposed underdrain system consists of 8" corrugated outer wall/smooth inner wall, slotted, high density polyethylene (HDPE) piping, encased in a clean filter aggregate. The underdrain system, upon completion of construction, will tie into the existing underdrain system and encircle the landfill. HDPE is chemically resistant to the waste, and the leachate generated, at the Class I landfill. The filter aggregate shall be a quartz or granite based sand that is historically resistant to the waste and leachate. The pipes are situated below-ground, away from the proposed landfill toe of slope, minimizing the potential for collapse under pressure or damage from landfill operations. The filter aggregate surrounding the pipe will help prevent clogging. The pipes will connect to manholes located around the perimeter of the landfill.

There is no secondary LCRS.

5.3.2 Primary LCRS Requirements

The pipes and filter aggregate are protected by a minimum of 12 inches of drainage sand and cover material. The filter aggregate, drainage sand, and overlying cover material are

chemically resistant to the waste, and the leachate generated, at the Class I landfill. The filter aggregate has a hydraulic conductivity greater than or equal to 1×10^{-3} cm/sec.

To maintain a positive outfall of leachate to the proposed pump station, the slope of the underdrain pipe system is set at ~~0.3%~~ 0.2%.

5.4 LEACHATE RECIRCULATION

This section does not apply and is designated as "Not Applicable" on the application form.

5.5 LEACHATE STORAGE TANKS

The leachate storage and removal system is designed with above-ground leachate storage tanks and a truck loading facility. The following describes the leachate storage and removal system.

5.5.1 Surface Impoundment Requirements

The proposed leachate collection and removal system will eliminate the use of the existing dewatering ditch (surface impoundment). Therefore, this section does not apply and is designated as "Not Applicable" on the application form.

5.5.2 Above-ground Leachate Storage

Leachate storage will consist of two bolted steel above-ground tanks having a nominal 29-foot diameter and capacity of 70,000 gallons each. A geotechnical evaluation has been performed (PSI 1997, included in Appendix C) in the area of the storage tanks to establish soil bearing capacities to be used in the design. Results of the evaluation indicate that the subsurface materials have adequate shear strength to support fully loaded tanks. Furthermore, the foundations are designed for a bearing pressure of 3,000 pounds per square foot resulting in a factor of safety of greater than three against a bearing capacity failure.

The bottoms of the storage tanks will not rest on earthen materials. Therefore, cathodic protection is not required.

The exterior material of the storage tanks are steel. They will be factory coated with polyamide epoxy. This should provide sufficient protection from the weather.

The interior material of the storage tanks are steel. They will be factory coated with Thermo Thane 7000 (polyurethane), a proprietary protective coating material. This should provide sufficient protection from the stored leachate. All bolts, washers, nuts, and joints in contact with stored liquid shall be provided with corrosion resistant encapsulating material. Gaskets and sealants shall also be corrosion resistant. Additional details regarding materials and construction of the leachate storage tanks is included in the construction drawings and

technical specifications prepared by PBS&J included separately with this permit application.

Each storage tank will be contained within a secondary containment tank capable of retaining 110% (83,000 gallons, nominal) of the primary tank volume. The material of the secondary containment tanks are steel. They will be coated with polyamide epoxy. This should provide sufficient protection from the weather and leachate. The materials of the secondary containment structures are compatible with the rest of the construction.

The annular floor space of the containment area will be provided with a sump for collection of any accumulated precipitation. A sump pump will be installed in the sump for precipitation removal. ~~Collected precipitation will be pumped into the adjacent stormwater management system. The sump pump will be manually started only. If there is any question as to the quality of the accumulated liquid in the containment area, it will be treated as leachate and pumped directly into tanker trucks for disposal.~~ The accumulated water will be discharged to a gravel pad outside the secondary containment structure where it can infiltrate through the gravel and into the underlying soil. The LSTF is within the liner system, therefore the quality of this accumulated water does not require special consideration.

The tanks will be interconnected to protect against over-filling of either tank. Ultrasonic level sensing will be provided on each storage tank. It will also be used in collection pump operation logic and for high or low level tank alarms. Alarm annunciation will be visual via a light on the control panel and audible via a horn also mounted on the control panel.

County staff will inspect the tank exterior on a weekly basis and will inspect the tank interior whenever a tank is drained, or at least every three years. The exterior inspection will focus on any damage to the tank or containment area coating systems, any structural damage or cracking of the tank, and any visible leaks. The interior tank inspection will include those items mentioned above for exterior inspection and will also include observation of any accumulated sludge. Any noted damage shall be repaired as quickly as operations allow. A manway provides access to the inside of each storage tank. Records of inspections and reports of any remedial measures will be maintained at the site.

5.5.3 Underground Leachate Storage

This section does not apply and is designated as "Not Applicable" on the application form.

5.5.4 LCRS Routine Maintenance Schedule

Routine maintenance of the LCRS will consist of daily monitoring of leachate and precipitation volumes to aid in the detection of pipe leaks or obstructions.

Routine maintenance of the LCRS will include weekly inspection of the underdrain system for quantity of flow, accumulation of sediment, and biological clogging that could hinder the

flow of leachate from the landfill. The leachate collection lines are designed with manholes to allow for normal cleaning operations and/or removal of an obstruction. When necessary, cleaning and obstruction removal will be accomplished by forcing jets of water or hydraulically propelled devices through the system.

5.6 LINER SYSTEMS CONSTRUCTION QUALITY ASSURANCE (CQA)

A list of the recommended qualifications of the parties involved in the installation, CQA program, and testing of the synthetic liner system, is presented in the "Hardee County Regional Landfill Lateral Expansion and Leachate Storage Tank Facility Construction Quality Assurance Plan" and the Technical Specifications prepared by Post, Buckley, Schuh & Jernigan, Inc. and included separately with this permit application report.

5.7 SOIL LINER CQA

This section does not apply and is designated as "Not Applicable" on the application form.

5.8 SURFACE WATER MANAGEMENT SYSTEM

5.8.1 Stormwater Control Within Lined Disposal Cell

Information concerning Stormwater Control is included in Section 5.1, Construction And Closure Phasing. See also Appendix E, Sheets 6 and 7, Sequencing Plan, of the revised Permit Drawings. The sequencing plan depicts the system of berms, swales, and leachate collection pipes that isolate surface water from waste filled areas and control stormwater runoff.

5.8.2 Stormwater Control Design

Stormwater features include a swale around the north, east, and west sides of the Class I landfill. The east and west swales extend the length of the proposed landfill expansion. Other berms, swales, and culverts continue to direct stormwater from other areas to the existing stormwater retention pond. See Section 5.1 and Appendix E, Sheets 6 and 7 of the revised Permit Drawings.

The leachate storage tank facility (LSTF) has its own stormwater management system. The 1.48-acre LSTF area (project area) includes the proposed leachate tanks and pump station, ~~proposed stormwater pond~~, existing maintenance building, shed, and parking lot, and the existing and proposed access roads which surround them. ~~The proposed access road is super-elevated to contain and direct stormwater runoff from a 0.10 acre on-line retention pond will be constructed to the south of the facility to the 0.33 acre stormwater pond-LSTF outside the liner system.~~

The pond will receive discharge from the LSTF area through a FDOT Type C ditch bottom inlet 57', 18-inch RCP culvert. A 75', 18" RCP culvert will carry the water under the southern portion of the LSTF access road. The pond discharges to the downstream FDOT Type C ditch bottom inlet a swale through a 5-foot wide trapezoidal weir with sediment sump and weep hole 3H:1V sides. An inlet was necessary to discharge stormwater from the pipe, at invert elevation 80.0, to the existing ditch with bottom elevation See Sheet C-3 of 81.0 the Revised Construction Drawings submitted with the ERP application report, "Hardee County Landfill Leachate Storage Tank Facility SWMS", submitted to FDEP October 7, 1997, for more detail on the stormwater system, pipe invert elevations, and the ditch bottom inlets. The weep hole was necessary to drain the pipe and inlets. The sediment sumps keep the pipe free-flowing. See sheets C-2 through C-4 of the attached Construction Drawings for more detail on the stormwater system, pipe invert elevations, and the ditch bottom inlets. Refer also to Section 7.10 of this report.

Based on approved SWFWMD methodology and models, the pond will recover the treatment volume within the required 72 hours (47.44 56.0 hours). Flood routing of the 25-year, 24-hour storm predicted the maximum stage would be 83.33 82.51 ft., NGVD, based on an initial pond elevation of 82.00 81.3 ft., NGVD. The maximum post-development off-site discharge, 6.74 cfs, which is less than the maximum pre-development off-site discharge of 7.38 cfs. See Revised Appendix C and D of the ERP application report, "Hardee County Landfill Leachate Storage Tank Facility SWMS", submitted to FDEP concurrently with this application (June October 7, 1997).

5.9 GAS CONTROL SYSTEM

Information concerning the Gas Control System has been submitted as Section 5 in the "Response To Request For Additional Information dated May 28, 1997 for The Renewal Of Operations Permit", dated June 26, 1997. See also Appendix E, Sheet 5, of the Permit Drawings. The locations of gas vents and piping and necessary details are provided.

5.10 LANDFILL GAS RECOVERY FACILITIES

This section does not apply and is designated as "Not Applicable" on the application form.

5.11 LANDFILL DESIGNED IN GROUND WATER DOCUMENTATION

This section does not apply and is designated as "Not Applicable" on the application form.

**PART I - GEOTECHNICAL INVESTIGATION REQUIREMENTS
(62-701. 420 F.A.C.)**

6.1 GEOTECHNICAL INVESTIGATION REQUIREMENTS

Past geotechnical investigations on the Hardee County Regional Landfill site were performed by Ardaman & Associates (1987) and Envisors, Inc. (1982). Additionally, a report entitled "Feasibility Study On Use Of Mobil Site As A Class I Sanitary Landfill", dated February 1982 was submitted in support of the application to construct the existing landfill facility and referenced in the last operating permit renewal. These reports are on file with FDEP.

The most recent geotechnical investigation is submitted with this permit application as Appendix C. It was prepared by Professional Services, Inc. (PSI), PSI Project No. 757-75054, March 10, 1997. This geotechnical investigation was performed in support of the proposed modifications outlined in this permit application report. The following were included in the geotechnical report:

- a. Description of subsurface conditions.
- b. Investigation for the presence of soils unsuitable for construction.
- c. Estimate of current and high groundwater elevations.
- d. Foundation Analysis, not including slope stability (not applicable).
- e. Boring logs, lab results, cross-sections, interpretations and conclusions.

An Evaluation of Fault Areas and Seismic Zones has been submitted in Section 6.1.1 of the "Response To Request For Additional Information Dated April 2, 1997 For The Renewal Of Operations Permit", dated April 29, 1997. The information has not changed.

Also submitted was the "Seismic Risk Map Of The United States", from the Uniform Building Code, 1985 Edition, included as Figure 6-1 of the "Response To Request For Additional Information Dated April 2, 1997 For The Renewal Of Operations Permit", dated April 29, 1997. The information has not changed.

Section 7

PART K - LANDFILL OPERATION REQUIREMENTS (62-701.500 F.A.C.)

7.0 INTRODUCTION

The Hardee County Regional Landfill is located east of the town of Wauchula on Airport Road. This Operations Plan addresses the regulatory requirements for the operation of the Class I facility and ancillary operations on the site, other than the MRF. The MRF Operations Plan is included herein as Attachment 7-1 for reference. This landfill operations plan will be kept at the administrative offices and shall be accessible to landfill operators. The facilities on the site include:

- Scalehouse and Administrative offices,
- Class I Landfill,
- Construction and Demolition (C&D) Debris disposal area (currently being closed),
- Materials Recovery Facility (MRF),
- Waste Tire Storage and Processing Facility,
- Yard Trash Mulching Facility,
- Scrap Metal Site,
- Household Hazardous Waste Collection Facility , and
- Maintenance Facility
- Borrow Area

These facilities are described below and shown on Sheet 4 of the Permit Drawings. Another facility present at the site is the County's Animal Control Kennel, located west of the MRF.

7.0.1 Scalehouse and Administrative Offices

The scalehouse and administrative offices are located just inside the entrance to the site. All incoming vehicles must stop at the scalehouse to register. Records, reports, analytical results, and modifications to the operating plan are maintained and kept on file at the administrative offices.

7.0.2 Class I Landfill

The Class I Landfill is located in the northwest corner of the site and comprises approximately 12.5-acres. The landfill is predominantly a bale fill type operation, with some "loose waste" disposal activities occurring on the south end. The majority of incoming solid waste is baled at the on-site MRF and transported to the Class I landfill for placement at the bale fill working face. During certain periods of time, the MRF may not be operational due to planned or unplanned maintenance.

activities. During those periods the waste is taken to the area of the Class I landfill designated for "loose waste" which represents un-baled waste. Additionally, asbestos and any incoming burned wastes are also disposed of in the loose waste disposal area. Therefore, two working faces are maintained at the landfill, one for bale filling disposal activities, and one for "loose waste" disposal activities. The Class I waste disposal area is currently operating under Permit No. SO59-214306.

7.0.3 C&D Debris Disposal Area

A C&D debris disposal area is currently located in the southwest corner of the site. This disposal area is being closed in accordance to the provisions of the existing permit per Rule 62-701.730(1)(c). Until the proposed southern leachate barrier is constructed, C&D debris will be temporarily stockpiled just north of the existing dewatering ditch, east of the asbestos disposal area. Once the barrier is constructed, this C&D debris will be disposed of in the ditch which is an area separate from the Class I cell where no wastes have previously been disposed of. The current dewatering ditch will, at that time, no longer be directly connected to the leachate management system, however some volume of water may remain in the ditch until the County can transport it to a treatment facility. If this is the case, a separation clay dam will be placed in the ditch. The westerly zone will be pumped dry prior to placement of any C&D material.

7.0.4 MRF Facility

The MRF is operating under Permit No. SC25-179573. The MRF is equipped with a HI Density/2 ram baler. Wastes, excessively dirty and/or contaminated recyclables, non-recyclables, plastic bags and other residuals are baled at the MRF and then transported to the Class I landfill for disposal. Large items such as mattresses and other furniture, such as sofas, chairs, tables, etc. are baled, with no special handling requirements. These large items are not separated from the waste prior to being baled, and the baled waste is disposed of in the Class I cell. Small appliances such as microwaves, VCR's and televisions are also baled with other wastes and disposed of in the Class I cell. Should electronic items be found in the incoming waste loads, their batteries are removed and taken to the on-site Household Hazardous Waste Collection Facility, and then the item is processed with the rest of the waste load. See Attachment 7-1 for additional information on the MRF operational activities.

7.0.5 Waste Tire Storage and Processing Facility

A shredder is located inside the MRF for the processing of incoming waste tires from cars. The facility is currently permitted to process up to 500 waste tires per month at the on-site shredder. When processing tires, a worker is stationed on a platform located beside the shredder. Other workers pass tires, one at a time, to the person located at the platform who in turn drops the tires into the shredder. The shredded tires are deposited onto the tipping floor. A bobcat loader is used to pick up the shredded tires and load them onto a truck. The truck transports the tire shreds to the Class

I Landfill for use as an alternative cover. Incoming large waste tires and tires with rims are temporarily stored on-site in a designated area southeast of the Class I Landfill. These tires are collected by a contractor on an as-needed basis for removal from the site for processing. Per the existing permit, no more than 1,000 waste tires are stored at the facility. Additionally, at least 75% of both the waste tires and processed tires that are delivered to or are contained at the waste tire storage facility at the beginning of each calendar year are removed for processing and disposal or recycled during the year. A report on the operations of the waste tire facility is submitted annually to the FDEP.

7.0.6 Yard Trash Mulching Facility

The yard trash mulching area is located just north of the scalehouse and administrative offices. An independent contractor processes the material on-site. The minimum frequency for processing yard trash is 6 months. The mulch is provided free to Hardee County residents.

7.0.7 Scrap Metal Site

A scrap metal and white goods storage site is located just south of the waste tire storage area, southeast of the Class I Landfill. Incoming loads of scrap metal, appliances, and white goods (with and without freon) are temporarily stored in this area on an impervious base comprised of compacted shell. Bi-metal cans baled at the MRF are also transported to the scrap metal site for temporary storage. Propane tanks are accepted only if they are empty and the valves has been removed. Lawnmowers are also stored at the scrap metal site. However, lawn mowers are not accepted at the facility unless any oil or gasoline has been removed prior to their delivery. If a lawnmower is spotted by the scalehouse attendant, the attendant will question the driver about if the lawnmower still has gasoline or oil in it. If it does, the scalehouse attendant will not accept it. If a lawnmower is found in a load delivered to the MRF for processing, the operating personnel inspect the lawnmower to ensure that it is free of gasoline and oil prior to taking it to the scrap metal site. White goods and appliances with freon are stored separately from the rest of the scrap pile. These items are stored in an upright position to prevent the freon from discharging to the atmosphere. An independent contractor is hired to remove the scrap metal and white goods from the site on an as needed basis. The contractor is required to provide a letter stating that he will be responsible for the removal of any chloro-fluoro-hydrocarbons (i.e., freon or CFCs) from the white goods. The minimum frequency for scrap metal removal is 6 months.

7.0.8 Household Hazardous Waste Collection Facility

A household hazardous waste collection facility is located southeast of the MRF. The facility is used for the temporary storage of special wastes such as used oil, lead acid batteries, and household hazardous wastes. Used oil is consolidated in two 350 gallon tanks. Lead acid batteries are stacked

three high on pallets, with cardboard placed between each layer, and then shrink wrapped. Private contractors are hired for the removal of the recyclable special wastes such as the used oil, lead acid batteries, and fluorescent light bulbs. The minimum frequency for removing these recyclables from the site is as follows: used oil is removed monthly, batteries are removed quarterly, and light bulbs are removed within 180 days of exceeding the accumulation of 400 lamps.

Household hazardous waste is defined as discarded, small quantity residential waste (less than 220 lbs.) which is either listed by the U.S. Environmental Protection Agency (EPA) in its hazardous waste regulations or exhibits one of the four (4) following hazardous characteristics:

- Ignitability - It may catch fire.
- Corrosivity - It can damage other materials (including human tissue) on contact.
- Reactivity - It reacts violently with water and may catch fire or explode.
- Toxicity - It may cause illness or health problems if handled incorrectly.

Amnesty days are held two times per year in which residents can deliver their household hazardous wastes (including cans of paint) at no charge. These wastes are removed from the site by the contractor that same day. ~~Gasoline tanks are not accepted at this facility. Only empty dried out paint cans are accepted throughout the year. If a can of paint is found by landfill personnel, and it is determined to be oil-based or of unknown composition, it is taken to the household hazardous waste facility for temporary storage on pallets until removed from the site by the qualified contractor. If the found paint is latex, then it is dried out on a piece of plastic and disposed of in the landfill.~~ Gasoline tanks are not accepted at this facility. Propane tanks are only accepted if they are empty and the valve has been removed (they are stored at the ~~searp~~ scrap metal storage facility). The facility is also used to temporarily hold any unacceptable wastes found at any of the other on-site facilities. Currently, Laidlaw Environmental is contracted to remove and properly dispose of the household hazardous wastes.

7.0.9 Maintenance Facility

The on-site maintenance facility is located southeast of the Class I Landfill. Landfill equipment are maintained and fueled at this facility. The routine inspection of landfill equipment is performed at this facility. Fuel and fluids (engine oil, transmission oil, hydraulic oil, radiator, battery) are provided as needed. If repairs on the equipment are necessary, the equipment is sent to the County's central maintenance shop, located off-site, or to the dealer's authorized maintenance facility.

7.0.10 Borrow Area

A borrow area is located northeast of the MRF. The County utilizes this on-site borrow area as well as an off-site County borrow pit for cover material. County personnel conduct portions of the

excavation with the dozer and loader, however the majority of the excavation and on-site hauling is contracted out to an independent contractor.

7.1 TRAINED OPERATING PERSONNEL DOCUMENTATION

Currently, four (4) landfill personnel are trained landfill operators in accordance with prior Rule 62-703 F.A.C. While Rule 62-703 F.A.C. has been repealed and FDEP has not issued the new policy statement, the current certified employees are maintaining the continuing educational standards originally required in 62-703, anticipating that FDEP will re-institute the requirements. The record of their successful completion of the training is included in Attachment 7-2, and records of their continuing education credits are on file at the landfill. Those individuals currently trained include the following:

- J.R. Prestridge
- Janice Williamson
- Jerry Hutto
- Steve Strickland

At least one of these trained operators is on-site at all times when the facility is receiving waste.

The following staff positions, along with the names of the current staff, are designated for the landfill operation.

- Solid Waste Superintendent - J.R. Prestridge
- Recycling Coordinator/Executive Secretary - Janice Williamson
- Crew Chief, Spotter - Jerry Hutto
- Heavy Equipment Operator, Spotter - Harold Crooms
- Heavy Equipment Operator, Spotter - Steve Strickland
- Resource Recovery Operator, Leachate Tanker Driver, Spotter, Data Collector-Paul Knarr
- Weighmaster - Teresa Carver
- Weighmaster - Ofelia Reyna

Job descriptions are provided in Attachment 7-3. As part of the solid waste management operations, trained spotters (scalehouse attendant, recycling crew chief, resource recovery operators, etc.) visually check for unacceptable materials. Additionally, at least one trained spotter is stationed at the working face of the Class I landfill.

The normal schedule for the landfill operations personnel are as follows:

| | |
|---------------------|-----------------------------------|
| J.R. Prestridge - | Monday-Friday - 8:00 am-5:00 pm |
| Janice Williamson - | Monday-Friday - 7:30 am-4:30 pm |
| Jerry Hutto - | Monday-Saturday - 7:30 am-5:30 pm |

Steve Strickland - Week One: Monday-Thursday - 7:30 am-5:30 pm
Week Two: Wednesday-Saturday - 7:30 am-5:30 pm
Harold Crooms- Week One: Wednesday-Saturday - 7:30 am-5:30 pm
Week Two: Monday-Thursday - 7:30 am-5:30 pm

Normal landfill operating hours are Monday-Saturday 7:30 am-5:00 pm.

7.2 LANDFILL OPERATION PLAN

7.2.1 Designation of Responsible Operating and Maintenance Personnel

The designated person responsible for operations and maintenance at the Hardee County Regional Landfill is:

Mr. J. R. Prestridge,
Solid Waste Superintendent/Assistant County Manager
Hardee County Solid Waste Department
675 Airport Road
Wauchula, FL 33873
Phone: (941) 773-5089

Any inquiries concerning the management and operation of the Hardee County Regional Landfill facility should be submitted to his attention.

7.2.2 Contingency Operations

The landfill site has sufficient space that in the event that a portion of the site had to be closed due to some emergency, another area could remain open for waste disposal. Furthermore, there is currently space to accommodate additional waste in the event of a hurricane or severe storm.

There is sufficient equipment on-site so that landfill operations would not cease in the event of an equipment failure. If the MRF ceases to operate, the waste will be disposed of in the loose waste disposal area of the landfill.

The county also has budgeted enough funds for one month's leasing or rental of heavy equipment for contingency purposes. Furthermore, equipment from the Hardee County Public Works Road and Bridge Section is available to the Solid Waste Department for use during an emergency.

In the event of fire, the responding agency is the Hardee County Fire and Rescue Service, located approximately three miles west of the site, in Wauchula, FL. Additionally, the landfill site is equipped with a dry fire hydrant for the filling of pumper trucks. Three fire hydrants are located along the east side of Class I landfill, on the east side of the entrance road. Fire extinguishers are located in the equipment and at the maintenance barn for use in the event of small fires. There are also six fire extinguishers and five hose bibs located in the on-site MRF.

If a fire is discovered on the working face, the Solid Waste Superintendent is notified immediately. Landfill equipment is used to pull the burning waste away from the working area and smother it with soil. The area is closed and another area opened to allow landfill operations to continue. If necessary, the Hardee County Fire and Rescue Service is called for assistance. This service is equipped with self contained breathing devices. While the service does not receive formal training on fighting landfill fires, the Fire Chief is experienced in dealing with landfill fires and has informed his crew of the proper procedures should a landfill fire occur. Should additional help be necessary, the Division of Forestry is contacted. In the event that a fire is observed or reported when the landfill is closed, the Sheriff's Office is instructed to contact the Solid Waste Superintendent.

All fires occurring at the landfill are reported to FDEP by letter, within five days, explaining the cause, remedial actions, and measures taken to prevent a recurrence.

The following phone numbers can be used to notify the appropriate individual or agency:

| | |
|---------------------------------------|-----------------------|
| Landfill Superintendent: | 941-773-5089 (Office) |
| (After hours, Call Central Dispatch): | 941-773-4144 |
| Police: | 911 |
| Fire and Rescue: | 911 |
| FDEP, Tampa: | 813-744-6100 |
| Public Works: | 941-773-6272 |
| Equipment Rental/GHC Construction: | 941-494-4147 |

7.2.3 Controlling Types of Waste Received

The landfill operators and scalehouse personnel are responsible for inspecting loads received at the landfill to detect and discourage attempts to dispose of unauthorized wastes. Each vehicle entering the landfill must stop at the scalehouse and have its load weighed in and classified in one of the following categories:

1. Residential
2. Commercial
3. Wood and Yard Waste

4. Horticultural
5. Agricultural
6. Institutional
7. Industrial
8. Appliances/Scrap Metal
9. Construction and Demolition Debris
10. Mixed Loads
11. Special Handling
12. Pre-tested Contaminated Soil
13. Tires without Rims
14. Tires with Rims
15. Tires Mixed

After classification, the loads are assigned one of the following destinations:

1. Class I Landfill
2. Construction and Demolition Debris Site in the Class I Landfill
3. Wood and Yard Waste Site
4. Scrap Metal Site
5. Material Recovery Facility
6. Waste Tire Site

The scalehouse attendant visually checks each load and, depending on the type of material, directs the driver to the appropriate on-site facility. Waste loads directed to the MRF for processing are inspected by personnel on the tipping floor prior to being baled for disposal in the Class I landfill. All facility employees are trained to look for liquid waste, drums, waste in sealed containers and unusual odors or fumes. If any material is found to be suspicious to the personnel, it is not processed through the MRF until the Solid Waste Superintendent comes to identify the material and determine its suitability. If the material is determined to be unsuitable, it is separated out and if the generator cannot be determined, it is taken to the on-site Household Hazardous Waste Collection Facility for temporary storage prior to being removed from the site and disposed of properly. If the generator can be identified, they are contacted to retrieve the unacceptable material.

As a standard operating procedure, at the working face of the loose waste disposal area of the Class I Landfill, equipment operators and spotters visually inspect loads for unacceptable wastes. If this inspection reveals any unauthorized or potentially hazardous wastes, the Solid Waste Superintendent is notified immediately. If so directed by the Landfill Superintendent the working face will be shut down, and another area within the landfill will be opened to allow continuing landfill operations.

The landfill does not accept closed or sealed containers; all drums, tanks and cans must have one end open and have been flushed. Other unacceptable wastes include septic tank sludge;

paint thinners; contaminated gasoline or like liquids; human waste from hospitals, doctor's offices or clinics or personal homes as a result of surgery or contamination. The facility does not accept any materials that the hauler cannot identify the composition of nor supply certification that the material is non-hazardous waste. No solid waste generated from outside the borders of Hardee County are accepted without prior written approval from the Board of County Commissioners or their designee.

In addition to the measures taken at the landfill, the County is involved with several programs which should reduce the risk of receiving hazardous wastes. Hardee County contracts with the Central Florida Regional Planning Council to participate in their Site Notification and Verification Program. In this program, the Council inspects all businesses in the County, once every five years, to verify the types of wastes generated by each facility and their procedures for handling any hazardous wastes. The County also has a Household Sharps Collection Program permitted through HRS. This program is used to prevent the unauthorized disposal of non-regulated household biohazardous waste. The collected materials (i.e. needles, etc.) are temporary stored in a designated room at the on-site County Animal Control Kennel. The operating procedures for this program are provided in Attachment 7-5.

7.2.4 Weighing Incoming Waste

All waste hauling vehicles entering and exiting the landfill are required to pass over the scales located at the facility entrance. Upon entering the facility, the scalehouse attendant weighs the vehicle and classifies each load, as described in Section 7.2.3. The load weights are printed on tickets and recorded on computer. Residents who transport their own garbage to the landfill are not charged for the delivery of recyclables. Residents are instructed by the scalehouse attendant to drop off recyclables, in an orange drop off trailer that is located at the right of the landfill entrance, prior to weighing in their wastes at the scalehouse. When the bin is filled, a facility employee retrieves the materials and weighs it prior to taking it to the MRF.

7.2.5 Vehicle Traffic Control

Signs posted at the gate describe disposal cost, materials accepted, hours of operation, and other information to educate disposers of on-site restrictions. Upon entering the site, all vehicles are required to stop at the scalehouse for weighing. The scalehouse attendant directs the driver to the appropriate on-site facility for unloading. All site roads are adequate for two-way traffic, and the speed limits are clearly marked. At each on-site facility, landfill personnel direct traffic to unload at the proper area. Additionally, signs are posted at each on-site facility to inform the public of acceptable and unacceptable materials.

7.2.6 Method and Sequence of Filling Waste

Incoming waste loads are deposited on the tipping floor of the MRF for processing. After being inspected for unacceptable materials, a bobcat loader is used to push the waste onto a steel belt conveyor which transports the material to an elevated sorting belt. Trustees from the Hardee County Jail are stationed along each side of the sorting belt and instructed to recover the recyclable materials. The recyclables are dropped down the appropriate chute where they are deposited into the appropriate recycling container. Non-recyclables, excessively dirty and/or contaminated recyclables, plastic bags and other wastes continue down the conveyor belt and into the baler where they are baled for volume reduction. The bales are loaded onto a flatbed truck and transported to the Class I landfill for disposal. Front end loaders with forks unload the flatbed and stack the bales. Waste loads not suitable for the MRF are directly routed to the Class I landfill and deposited at the loose working face of the landfill.

~~Sequencing Plans on file with the FDEP provide the current filling plan of the Class I landfill. These plans include Sheet 1, titled "Proposed Stormwater Design Final Buildout and Details" and Sheet 2, titled "Proposed Stormwater Design Operational Sequencing Plan". These plans were submitted by PBS&J to the Department on April 3, 1996 and are hereby referenced for this item.~~

~~For information concerning the Sequence of Filling Waste, please refer to Sheets 6 and 7 of the revised Permit Drawings included in the "Response To Request For Additional Information Dated May 28, 1997 for the Application for an Operations Permit", dated June 26, 1997. With the proposed landfill expansion, the remaining landfill life is approximately 10.5 years. The proposed sequence of construction is discussed in Section 5.1 of the Construction Permit application.~~

7.2.7 Waste Compaction and Cover Procedures

Waste compaction and cover procedures are discussed in Section 7.7 of this report.

7.2.8 Operations of Gas, Leachate, and Stormwater Controls

The Hardee County Regional Landfill's existing gas management system consists of six (6) passive gas vents installed at approximately five hundred-foot intervals around the perimeter of the site, inside the side wall. The location of the existing gas vents are shown on Sheet 5 of the Permit Drawings. The passive gas vent system requires only minimal maintenance and periodic inspection.

Once full landfill height is achieved, the complete gas management system, including horizontal collection pipes and additional passive gas vents, will be installed. The proposed gas management system components will be installed as part of closure activities, which will commence at the end of the landfill's active life which is currently anticipated at 8.5 years. The proposed piping configuration and vent locations are shown on Sheet 5 of the Permit Drawings. The location of proposed gas probes to be installed around the north and west sides of the landfill perimeter for use in the monitoring of potential gas migration are also shown. The gas probes will be installed during construction activities for the proposed southern barrier.

Operation of the leachate management system is discussed in Section 7.8 of this report and Sections 5.3 and 5.5 of the Construction Permit application.

Operation of the stormwater control system is discussed in Section 7.10.

7.2.8.1 Title V Applicability

On December 20, 1996, an Initial Design Capacity Report was submitted to FDEP's Division of Air Resources Management in Tallahassee, Florida (to the attention of Mr. Venkata Panchakarla). The report stated that the design capacity of the landfill is approximately 335,590 Mg. Since the facility did not exceed the threshold limit of 2.5 million Mg, the requirements of Title V are not applicable.

7.2.9 Water Quality Monitoring

The water quality monitoring information and requirements are addressed in Section 8.1.

7.3 LANDFILL OPERATING RECORD

Copies of all operating records, reports, engineering drawings, training records, etc. are kept on file at the landfill. Upon request, the records will be made available for FDEP inspection. All records pertaining to the operation of the facility will be retained throughout the design life of the landfill. All monitoring records, calibration and maintenance records, and reports required by the operating permit will be retained for at least ten years.

7.4 WASTE RECORDS

Waste reports that include waste type and quantity are compiled monthly and submitted quarterly to FDEP. Previous reports are on file with FDEP. Reports include: (a) types of solid waste

received, and (b) quantities of solid waste received by category. The landfill operator also estimates the amount of the following waste categories:

| | | |
|--------------|------------|-------------|
| Household | C&D Debris | Yard Trash |
| Commercial | Asbestos | Used Oil |
| Agricultural | Batteries | White Goods |
| Industrial | Tires | |

Additionally, the County maintains all manifests provided by the contractors for the recyclable special wastes on file. These manifests are available for FDEP inspection upon request.

7.5 METHODS OF ACCESS CONTROL

To prevent unauthorized waste disposal and to prevent unauthorized access to and use of the landfill, the entire site is surrounded by a fence. The entrance/exit to the facility is controlled by the scalehouse attendant. All vehicles entering the site must pass by the scalehouse. All visitors or customers must stop at the scalehouse either to have their vehicle weighed or to register by signing a "visitor log". When the facility is closed, the gates are locked.

7.6 LOAD CHECKING PROGRAM

As described in Section 7.2.3 of this report, load inspections at the MRF tipping floor occur daily as part of the facility's normal operating procedures. Of these daily inspections, a minimum of three (3) random load inspections are recorded each week in accordance with 62-701.500(6)(a)(1), FAC. Each inspection is completed by personnel trained to recognize regulated hazardous waste or PCB waste. If prohibited wastes are discovered, the Solid Waste Superintendent is notified and the waste generator is identified. The waste generator is contacted to retrieve the prohibited waste and instructed on the proper disposal procedures. Violations are recorded and reported to the Solid Waste Enforcement Section of the Department of Environmental Protection.

7.7 WASTE SPREADING AND COMPACTION PROCEDURES

As previously discussed in Section 7.0.2, both baled waste and loose waste are disposed of in the Class I landfill. The majority of incoming waste is baled for volume reduction. Waste that is not baled at the on-site MRF is disposed of at the "loose waste" disposal area located on the south end of the landfill. Typically, waste is not baled during down time at the MRF when the baler is not operating due to scheduled or unscheduled maintenance activities. Some wastes, such as asbestos and burned wastes, are never baled and are taken directly to the loose waste fill area for disposal.

7.7.1 Waste Layer Thickness and Compaction Frequencies

At the baled waste disposal area, bales are stacked with a front end loader equipped with a fork attachment. Each bale measures approximately 4-feet (width) by 5-feet (length) by 2.5-feet (height). Bales are stacked three wide across the southern face, sixteen long towards the south, and two high per lift. When stacking the bales, they are positioned so that their joints are offset. The typical stacking plan is shown on Figure 7.1. Wastes that are baled have already been compacted prior to delivery to the disposal area, therefore no additional compaction is required in the bale fill area of the landfill.

At the loose waste disposal area, the waste is deposited at the working face and spread in layers approximately two feet thick and compacted with a dozer to a depth of one foot. This usually requires two to three passes.

7.7.2 First Layer of Waste

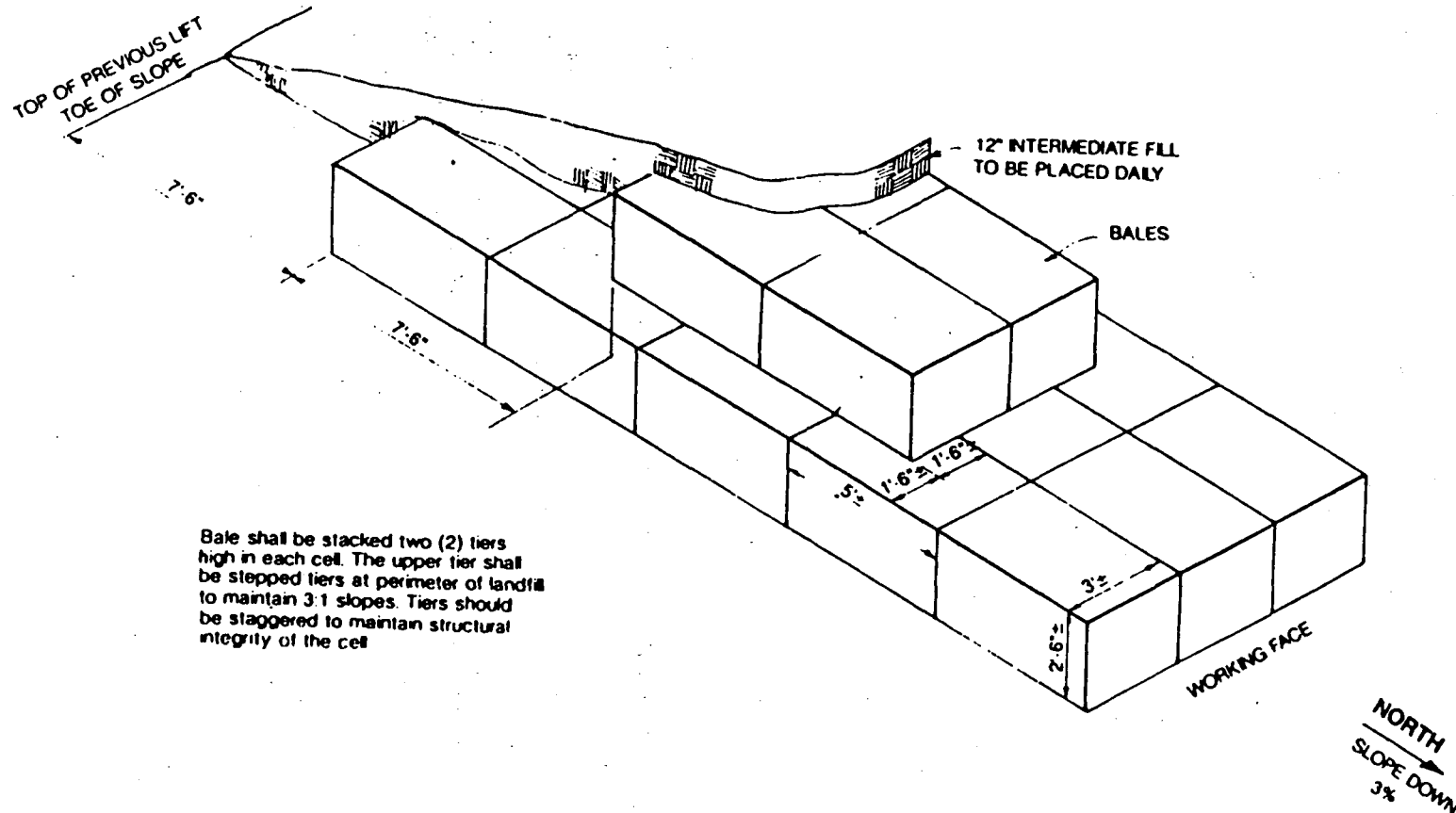
Since the first layer of waste has been placed over the entire landfill footprint and there is not a synthetic bottom liner system to protect, this section does not apply. "Not Applicable" has been noted on the application form.

7.7.3 Slopes of Cell Working Face, Side Grades, and Lift Depths

The exterior side slopes of the landfill above grade do not exceed three horizontal to one vertical (3:1). To control erosion on completed side slopes, intermediate cover and sod is placed to establish a grass cover.

At the loose waste disposal area, the side slopes of the working face are maintained at no greater than three horizontal to one vertical (3:1). The lift depth for waste placed in this area is approximately ten feet. Initial cover is placed once this lift depth is reached. Initial cover is also placed on the waste at the end of each working day.

At the baled waste disposal area, the interior working face of the bale fill area is sloped at approximately 1.5 horizontal to 2.5 vertical since bales are stacked one on top of the other in a staggered formation (see Figure 7-1). Bales are stacked two high per lift. When the lift height is reached, intermediate cover is placed. Intermediate cover is also placed on the bales at the end of each working day.



7.7.4 Maximum Width of Working Face

The maximum width of the working face in the baled waste area is approximately one hundred feet. The working face of the bale fill area of the landfill is kept only wide enough to accommodate the maneuvering room required by the front end loaders with forks that are used to stack the bales.

At the loose waste disposal area, the working face is kept at a maximum width of approximately fifty feet.

7.7.5 Initial Cover Type

Initial cover is used to control disease vector/animal attraction, fires, odors, blowing litter, and moisture infiltration. The initial cover used at the Class I landfill consists of 6-inches of soil obtained from the on-site or off-site borrow pit, or shredded tire chips from the on-site tire processing facility. Plastic tarps are used as a temporary daily cover on the exposed side of working face of the bale fill area.

7.7.6 Initial Cover Application Procedures

At the loose waste fill area, the working face is covered with six inches of initial cover that consists of either soil or chipped tires at the end of each working day. The quantity of loose waste to be disposed of each day varies. During periods when the baler is inoperable, all incoming municipal solid wastes will be delivered directly to the loose waste fill area for disposal. When the baler is in operation, the incoming waste loads will be baled and only specific waste loads, such as burned waste, will be delivered directly to the loose waste fill area. On average, the monthly quantity of loose waste landfilled is approximately 66 tons, which is equivalent to 5% of the incoming waste stream.

Also at loose waste disposal area, when the waste lift reaches its maximum height a dozer is used to spread initial cover over the surface. The cover material placed between lifts consists of either soil or chipped tires.

7.7.7 Intermediate Cover Application Procedures

At the baled waste disposal area, at the end of each working day the top of the working face is covered with 1-foot of soil and plastic tarps are hung over the exposed side of the working face. The tarps remain until more baled waste, or intermediate cover, is placed against that side of the working face. Also, when a waste lift reaches its maximum height a dozer is used to spread intermediate soil cover over the surface.

At both the baled waste and loose waste disposal areas, intermediate cover is also applied within seven days after completion of each lift over areas which will not receive additional waste within 180 days. Intermediate cover consists of compacted soil. Areas with intermediate cover are inspected weekly to insure that all waste is covered and that the proper depth of one foot is present. Any damage to the intermediate layer is repaired as quickly as operations permit.

When waste is to be placed on areas with intermediate cover, all or part of the intermediate cover is removed for future use prior to the additional waste placement. The intermediate cover is removed by pushing the cover material into a stockpile on the side with a front end loader. After additional waste is placed, the stockpiled cover material is used as cover by pushing the material back with the loader. Previously used cover material is not used on exterior sideslopes.

7.7.8 Final Cover Application Time Frame

The Class I landfill will be closed when the entire landfill reaches its final design grades. Currently, the facility's remaining life is estimated at 8.5 years. As areas of the landfill reach their design elevations they will receive intermediate cover prior to final closure. These areas will be sodded as necessary to establish a grass cover which will prevent erosion and promote runoff. Currently the north, east and west sideslopes of the Class I landfill have reached their design elevations, have received intermediate cover, and have grass cover. The landfill area exterior side slopes are maintained at a ratio of three horizontal to one vertical (maximum).

7.7.9 Litter Policing Methods

On a weekly basis, landfill personnel and/or county jail trustees collect litter along the entrance and access roads, at buildings, in the parking areas, and in the vicinity of the working face. Litter control fences are used near the working face to lessen the amount of blown litter.

7.7.10 Erosion Control Procedures

Erosion of the protective cover material on landfill areas is repaired as soon as possible to maintain the required depth of cover. The exact time frame is dependent on weather conditions and available materials, however, the repairs should be completed within 48 hours. The establishment and maintenance of a good stand of grass on the finished slopes is important to maintaining erosion control. In addition, it may be necessary to use silt

fences, straw bales, ditches or berms to help prevent erosion. The landfill operator will take appropriate measures to prevent and correct erosion problems on the site.

7.8 LEACHATE MANAGEMENT PROCEDURES

7.8.1 Leachate Level Monitoring, Sampling, Analysis and Data Results

The landfill operator is responsible for maintenance and monitoring of the leachate collection system. This includes daily level monitoring, biannual sampling and analysis of the landfill leachate.

~~Water quality and leachate monitoring is handled via a network of seven monitoring wells and one leachate collection point in the dewatering ditch. Leachate level monitoring is performed with a staff gauge located in the ditch. Leachate sampling is conducted at the south end of the dewatering ditch.~~ Leachate monitoring is to be handled via a network of six monitoring wells (MW-1, MW-2, MW-4, MW-5, MW-8, MW-9) and ten piezometers (P1, P2, P3, P4, P5, P9, P10, P11, P15, P16) that will encompass the landfill and lateral expansion, and one leachate collection point at the existing pump station. Leachate level monitoring is to be accomplished using the piezometers for within the landfill cell and liquid level monitors for the leachate storage tanks. Leachate sampling is to be conducted at the pump station. Sample collection and analysis is performed by Short Environmental Laboratories, Inc. of Sebring, Florida. ~~The leachate analysis parameters are outlined in the Groundwater Monitoring Plan included in Section 8.~~ The leachate analysis parameters are discussed in Section 8 and Appendix D of the Construction Permit application. The Solid Waste Superintendent is responsible for reviewing all data reports and submitting them to the FDEP.

7.8.2 Operation and Maintenance of Leachate Collection and Removal System

The leachate collection and removal system consists of an above-ground and below-ground system. Leachate from stormwater runoff is collected in the above-ground system; leachate from stormwater infiltration and moisture in the landfilled wastes is collected in the below-ground system. In both systems, leachate is conveyed to a dewatering ditch for removal by evaporation, spray irrigation, and/or transport to a wastewater treatment plant.

~~The landfill is constructed with plastic PVC sidewall liners, tied to a natural clay base, on the east, west, and north sides of the landfill. Leachate is collected by underdrains adjacent to the sidewall liner. This configuration serves to effectively isolate the landfill from groundwater infiltration while providing for leachate collection and removal.~~

The above-ground portion of the leachate collection and removal system consists of a series of ditches and pipes that divert stormwater runoff leachate from the working face of the bale fill area to the dewatering ditch on the southern end of the landfill. Leachate from the loose waste disposal area (adjacent to, and northeast of, the dewatering ditch) is conveyed by overland sheetflow to the dewatering ditch. A pump station is located adjacent to the dewatering ditch to convey the liquid from the ditch to the spray irrigation field and/or a tanker truck.

The spray irrigation field is comprised of approximately 6.1 acres surrounding and including the dewatering ditch. Leachate is conveyed via one of two pumps, as follows:

| Pump No. | Flow | Head * | H.P. |
|----------|---------|----------|------|
| 1 | 370 gpm | 164 Feet | 25 |
| 2 | 90 gpm | 164 Feet | 6 |

* At pump discharge

The sprayfield has been designed to discharge into four zones, layed out as follows:

| Zone | Location | Area (acres) | Capacity |
|------|---------------------------|--------------|-----------|
| 1 | South of dewatering ditch | 3.3 | 76.34 gpm |
| 2 | Over dewatering ditch | 0.8 | 84 gpm |
| 3 | Over dewatering ditch | 0.85 | 88 gpm |
| 4 | North of dewatering ditch | 1.46 | 27.20 gpm |

The spray head information for each zone is as follows:

| Zone | Head Type | Nozzle Size | Flow Rate | No. of Heads |
|------|-----------|-------------|-----------|--------------|
| 1 | Impact | 8/64" | 4.0 gpm | 24 |
| 2 | Mist | 8/64" | 4.0 gpm | 22 |
| 3 | Mist | 8/64" | 4.0 gpm | 23 |
| 4 | Impact | 8/64" | 3.3 gpm | 9 |

The record drawings on the construction of the spray irrigation system were developed by Briley, Wild & Associates, Inc. In March 1987, titled "Hardee County Sanitary Landfill Improvements", and are on file with the FDEP. The spray field layout is provided on Sheet 3 of 8 of these drawings and is titled "Leachate Collection and Spray Irrigation System".

The system was designed to allow the operation of any zone alone or all zones together. The typical operating schedule for the system is as follows:

| Zone | Suggested Running Time for Maximum Evaporation | Hours of Operation | Quantity Sprayed (gallons per day) |
|------|--|--------------------|------------------------------------|
| 1 | 12:00 pm to 5:00 pm | 5 | 24,984 |
| 2 | 8:00 am to 5:00 pm | 9 | 47,520 |
| 3 | 8:00 am to 5:00 pm | 9 | 49,680 |
| 4* | 12:00 pm to 5:00 pm | 5 | 9,180 |

*When operating in Zone 4, area should be monitored for surface runoff, and system shut down earlier if surface ponding observed.

The daily length of operation may vary depending on the liquid level in the dewatering ditch. If necessary, in addition to running the spray irrigation system, the leachate will be removed by truck for disposal at the treatment facility.

The configuration of the leachate collection and recovery system inside the Class I disposal area changes in accordance with the existing Sequencing Plans submitted by PBS&J to the FDEP on April 3, 1996. These plans are on file with the FDEP and include Sheet 1, titled "Proposed Stormwater Design Final Buildout and Details" and Sheet 2, titled "Proposed Stormwater Design Operational Sequencing Plan". In sequences 1-4, a leachate swale is constructed around the west, south, and east sides of the working area to capture stormwater runoff leachate. Two twelve-inch diameter (minimum) leachate collection pipes convey leachate from the southeast and southwest corners of the southern leachate swale to the dewatering ditch. As the landfill sequence progresses, existing leachate swales are removed and new leachate swales are constructed to accommodate the new working area. Sections of the leachate collection pipes are removed, and the upstream pipe inverts adjusted, to maintain a positive outfall to the dewatering ditch.

Berms along the northeast edge of the loose waste disposal area and along the north edge of the dewatering ditch divert stormwater runoff from the non-working areas of the landfill to swales and culverts which discharge into the stormwater pond. The berms and non-working areas have grass cover for erosion and sediment control.

In Sequence 5, the loose waste disposal area is part of the working area of the landfill. The berm along its northeast edge is removed to allow leachate to flow into the dewatering ditch. Leachate flows overland, either directly to the dewatering ditch, or to the new leachate swales on the east and west sides of the working area. In the non-working areas, sections of the berm along the north edge of the dewatering ditch remain to prevent stormwater from draining into the dewatering ditch.

In Sequence 6, the working area adjacent to the dewatering ditch is closed. The working area is moved to the north, and a leachate collection swale is constructed to the east, west, and south sides of the new working area. Two twelve-inch diameter (minimum) leachate collection pipes convey leachate from the southeast and southwest corners of the southern leachate swale to the dewatering ditch. The non-working areas are fully sodded for erosion and sediment control. Prior to closure (final build out), the leachate collection swales and pipes are covered or removed.

The leachate collection and removal system consists of above-ground and below-ground systems. Leachate generated from stormwater runoff in contact with the waste is collected in the above-ground system; leachate from stormwater infiltration and moisture in the landfilled wastes is collected in the below-ground system. In both systems, leachate is to be conveyed to a submersible leachate pump station for removal to leachate storage tanks. Leachate is then pumped from the storage tanks to tanker trucks for transport to the Wauchula Municipal Wastewater Treatment Plant.

The submersible leachate pump station will be a duplex system having a nominal capacity of approximately 130 gallons per minute (gpm). This pump station will be operated by float control using the following five floats:

- lead pump on,
- lag pump on,
- pump(s) off,
- high level alarm, and
- low level shut-off.

The wet well for the submersible leachate pump station shall utilize the existing concrete structure with a new concrete top slab and aluminum access hatch.

The submersible leachate pump station will discharge into a 4-inch force main flowing to the leachate storage tanks. If the level sensor in the storage tanks indicates high leachate levels, the submersible leachate pumps will either not be allowed to start or will automatically turn off if they are already in operation. For additional reliability, the submersible leachate pump station will also be furnished with an emergency pump out connection.

Any storage tank overflow will be retained within the secondary containment area. The longest period that the leachate will be stored in the containment area is expected to be three days (a long weekend).

Each submersible leachate pump will be furnished with a high motor temperature sensor. If this condition occurs, an alarm signal will be annunciated. In addition to an alarm, high motor temperature will also cause pump shut-down. As noted above, alarm annunciation for high level in the submersible leachate pump station will also be provided.

The submersible leachate pump station control panel and the truck loading pump station control panel will be furnished with an emergency generator receptacle.

One truck loading pump will take suction from the leachate storage tanks(s) and discharge into a truck loading chute. The truck loading pump will have a duty point of approximately 600 to 700 gallons per minute, which will fill a tanker in approximately ten minutes.

Truck loading will be a manual operation with relay logic control located in the pump control panel. Two local on/off push buttons will be provided on the truck loading piping such that the truck loading pump can be started or stopped by the truck driver while directly observing the discharge onto the truck. The truck loading pump will also be able to be started and stopped from the control panel.

Low levels in any on-line storage tank will trigger a switch, thereby turning the truck loading pump off. Flow metering will also be provided for record keeping purposes. Provisions will be made to take any storage tank off-line without interrupting truck loading operations.

Any spillage, washdown, or other flow collected in the truck loading area or loading pump containment area will be routed back to the submersible leachate pump station which will pump into the storage tanks.

A 3-inch magnetic flow meter will be connected to the forcemain leading from the submersible leachate pump station to the leachate storage tanks. Daily readings of leachate generated, in gallons per day, will be read directly from the meter. As a backup to the magnetic flow meter, an estimate of leachate removed from the landfill can be calculated in one of the two following ways:

- 1) The elapsed time meter for each submersible leachate pump can be read to establish the change in total pump run time. This value can then be multiplied by the nominal pump discharge rate to estimate the leachate volume removed.
- 2) The ultrasonic level sensor for each leachate storage tank can be read and any change in the tank liquid level can be translated to volume of leachate

removed. The net effect of precipitation or evaporation would need to be accounted for in this methodology.

Precipitation data is recorded daily by landfill personnel on one of the sample leachate management recordkeeping forms provided in Attachment 7-6. Rainfall quantity is obtained at a rain gauge located on-site. This data will be used to calculate quantity of possible leachate generated by multiplying the rainfall quantity by the area of landfill not capped, and converted to gallons of leachate generated.

Leachate that has accumulated in, and is removed from, the storage tanks will be recorded at the time of loading the leachate hauling vehicle. Leachate generation data is recorded by landfill personnel on one of the sample leachate management recordkeeping forms provided in new Attachment 7-6. It is the County's goal to keep the leachate level in the storage tanks as low as possible. This will be accomplished by hauling the leachate regularly to the treatment facility, as part of the daily operations. The County will determine the frequency of hauling based on the level in the tanks, however, the minimum hauling frequency will be once every seven (7) days. Hauling will increase should the level in the tanks reach half full.

The secondary containment structure around each of the leachate storage tanks is not closed to the weather. Rainfall cannot escape from this area and therefore can accumulate. The secondary containment area will be equipped with a sump area and electric sump pump for removal of this water.

County personnel will visually check the secondary containment area after each rain event for accumulation of rainfall. Rainfall accumulation resulting in standing water in this area will require removal. The accumulated water can be discharged by an electrical sump pump, included in the design of the secondary containment area, to a gravel pad outside the secondary containment structure where it can infiltrate through the gravel and into the underlying soil. The LSTF is within the liner system, therefore, the quality of this accumulated water does not require special consideration.

The above-ground portion of the leachate collection and removal system consists of a series of ditches and pipes that divert stormwater runoff leachate off the working face. Berms located along the east and west edges of the working area direct runoff to the south into a swale that runs along the southern edge of the working area. The slope of the swale bottom directs the flow to two 12-inch diameter (minimum) temporary leachate collection pipes, located in the southeast and southwest corners, which currently conveys the runoff to the southern dewatering ditch. The proposed leachate collection and removal system construction will eliminate the use of the dewatering ditch and sprayfield irrigation disposal. Runoff from the working area will continue to be directed to temporary collection pipes via the east and west berms and the southern swale. The southern ends of the collection pipes will be connected to new manholes which will direct the flow through the improved existing leachate pump station to the proposed storage tanks.

As the landfill sequences progress, the east and west berms will be extended and a new southern leachate swale will be constructed to accommodate the new working area. The berms adjacent to completed areas and the existing swale will be removed. Sections of the temporary leachate collection pipes between the existing and new swales will be removed, and the upstream pipe inverts adjusted, to maintain a positive outfall to the pump station. The new swale, berms, and non-working areas will be fully sodded for erosion and sediment control.

Leachate generated from stormwater infiltration and moisture in the wastes will continue to be collected by underdrains surrounding the landfill and conveyed by below-ground pipes to the proposed leachate pump station and storage tanks.

7.8.3 Procedures for Managing Leachate if Regulated as a Hazardous Waste

If at any time the leachate is determined to be hazardous, it will be managed in accordance with Rule 62-730, F.A.C.

7.8.4 Off-Site Discharge and Treatment Agreements

An agreement between Hardee County ("the County") and the City of Wauchula ("the City") provides for off-site discharge and treatment of leachate. The County retains the City to provide for treatment and disposal of leachate on an as-needed basis. The County is responsible for testing and reporting, and for transportation of leachate to the City's wastewater treatment plant. The services to be performed and the terms of the agreement are subject to FDEP rules and regulations.

A copy of the agreement between Hardee County and the City of Wauchula for leachate treatment and disposal is included in Attachment 7-4.

7.8.5 Contingency Plan for Managing Leachate

Currently, during emergencies or spray field equipment failure, leachate is trucked to the City of Wauchula Wastewater Treatment Plant for treatment.

Backup systems have been designed throughout the proposed leachate collection and removal system. At the Waste Disposal Area, two pipes convey leachate to the pump station. If one pipe is damaged, it may be closed off and all leachate conveyed through the other pipe. Leachate may be pumped and stored into either of two leachate storage tanks, increasing storage capacity and allowing for maintenance without disrupting operations. Leachate may also be pumped from either storage tank, or directly from the pump station, to tanker trucks.

for transport to the Wauchula Municipal Wastewater Treatment Plant. Should this plant become unavailable to the County, arrangements will be made to take the leachate to another treatment facility within seven (7) days.

7.8.6 Procedures for Recording Quantities of Leachate Generated in Gallons per Day

Currently, a staff gauge located at the southern dewatering ditch is used to measure the leachate level which in turn is used to compute leachate generation in gallons per day. Leachate generation data is recorded daily by landfill personnel.

Upon completion of construction activities, a 3-inch magnetic flow meter will be connected to the forcemain leading from the submersible leachate pump station to the leachate storage tanks. Daily readings of leachate generated, in gallons per day, will be read directly from the meter. As a backup, to the magnetic flow meter, an estimate of leachate removed from the landfill can be calculated in one of the two following ways:

- 1) The elapsed time meter for each submersible leachate pump can be read to establish the change in total pump run time. This value can then be multiplied by the nominal pump discharge rate to estimate the leachate volume removed.
- 2) The ultrasonic level sensor for each leachate storage tank can be read and any change in the tank liquid level can be translated to volume of leachate removed. The net effect of precipitation or evaporation would need to be accounted for in this methodology.

Leachate generation data is recorded daily by landfill personnel.

7.8.7 Procedures for Comparing Precipitation with Leachate Generation Rates

A rain gauge, currently located at the southern dewatering ditch is used to compare precipitation with leachate generation. Rain data, in excess of one tenth of an inch, is recorded daily by landfill personnel. The rain gauge will be relocated during construction activities.

7.9 ROUTINE GAS MONITORING PROGRAM

Gas meter readings are taken inside all buildings on the landfill site (maintenance building, MRF, scalehouse/administrative offices, kennel, household hazardous waste collection center). All monitoring points are sampled quarterly, and the results reported to FDEP. If methane gas levels

exceed twenty five percent of the lower explosive limit for gases in structures, excluding gas control or recovery components, the landfill operator shall:

- Immediately take all necessary steps to ensure protection of human health and notify FDEP;
- Within seven days of detection, submit to FDEP for approval a remediation plan for the methane gas releases. The plan shall describe the nature and extent of the problem and the proposed remedy. The remedy shall be completed within sixty days of detection unless otherwise approved by FDEP.

7.10 STORMWATER MANAGEMENT SYSTEM OPERATION AND MAINTENANCE

The stormwater management system at the Hardee County Regional Landfill consists of a series of swales and pipes that divert stormwater from the non-working areas of the landfill to the stormwater pond. Throughout sequences 1-6, swales and berms divert stormwater runoff leachate from the working face of the bale fill area and the loose waste disposal area to the dewatering ditch. All other stormwater runoff, from the non-working areas, flows toward swales surrounding the landfill. The swales discharge into pipes and/or other swales, or directly into the stormwater pond. Runoff from the detention pond ultimately discharges into the Peace River.

The newly proposed stormwater management system for the leachate storage tank facility (LSTF) will consist of a proposed 0.10 acre on-line retention pond located south of the LSTF. It will receive stormwater from the access roads and from the existing maintenance area and proposed LSTF. The pond receives discharge from the LSTF area through a culvert. The pond discharges to a swale through a trapezoidal weir. The treatment volume will recover through percolation into the soil. See Revised Sheet C-3 (revised permit, October, 1997) and Sheet C-4 (original permit, June, 1997) of the Construction Drawings submitted with the environmental resource permit (ERP) application for more detail. See also the LSTF stormwater management system ERP application, "Hardee County Landfill Leachate Storage Tank Facility SWMS", submitted to FDEP October 7, 1997.

Certain procedures have been implemented at the landfill to minimize maintenance requirements and to ensure efficient performance of the stormwater system operation. These procedures include:

- No excavated material is stockpiled in such a manner as to direct sediment laden runoff outside the project site property limits or into any adjacent stormwater collection facility;
- All drainage ditches are inspected periodically for erosion and reshaped and re-sodded as required;

- Erosion and siltation control devices are cleaned and repaired as required; any temporary erosion control features or measures incorporated into any work conducted at the site (i.e. intermediate cover placement areas, borrow area) are removed after the work has been completed; any permanent erosion control features damaged by such removal are repaired;
- After vegetation has been established, all swales, channels, and detention ponds are mowed regularly; Minimum mowing frequency is once per year.
- The plant types in the littoral zone are checked periodically and any intruding vegetation is removed if required;
- Drainage sumps are cleaned out at least once per year and the storm sewer lines checked for plugging;
- The area in front of the control structure is checked at least quarterly to remove any excess plants or debris that could cause the structure to plug.
- Additional erosion control measures are implemented when field conditions warrant (i.e. cover material stockpiling, on-site construction activities, etc.).

7.11 EQUIPMENT AND OPERATION FEATURE REQUIREMENTS

7.11.1 Sufficient Equipment for Operations

The following equipment is owned by the county and is currently available at the landfill:

Front End Loader, CAT 950F, multi-functional bucket, rake, and forklift w/enclosed cab
 Dozer, Cat D7H w/enclosed cab (for landfilling activities, i.e. compacting loose waste)
 Pickup Truck, Ford F150
 Tanker Truck and 5000 gallon tanker (for leachate transport)
 Flatbed Truck (for bale transport)

7.11.2 Reserve Equipment

The existing equipment on site, listed in the section above, is sufficient to handle the incoming waste stream. Should unforeseen circumstances require more equipment than is currently available, the county also has budgeted enough funds for one month's leasing or rental of heavy equipment. Additionally, equipment from the Hardee County Public Works Road and Bridge Section is available to the Solid Waste Department for use during an emergency.

7.11.3 Communication Equipment

The scalehouse and on-site landfill office are equipped with telephones. Supervisory personnel are assigned vehicles with radios that communicate with the county's Public Works Division. Public Works Division personnel can then relay messages to the Sheriff's Office and other emergency services.

7.11.4 Personnel Shelter, Sanitary Facilities and First Aid Equipment

Sanitary facilities are provided at the on-site landfill office, the maintenance building and the scale house. Fire extinguishers are housed in all equipment used at the landfill site. The front end loader and dozer have fully enclosed cabs for roll over protection. The front end loader and dozer are equipped with air conditioning and heaters. Site employees are equipped with safety boots, rain gear, gloves, and goggles for personal protection while working at the landfill. First aid kits have been strategically placed throughout the landfill site.

7.11.5 Dust Control Methods

During dry periods haul roads will be sprayed with water if dust control is necessary. Water from the on-site stormwater pond will be pumped into a 1,000-gallon tanker truck equipped with a spray bar and nozzles to use for wetting the roads. The tanker truck will be provided through the Hardee County Public Works Department.

7.11.6 Litter Control Devices

On a weekly basis, landfill personnel collect litter along the entrance and access roads, at buildings, in the parking areas, and in the vicinity of the working face. Litter control fences are used along the perimeter hill of the working face to lessen the amount of blown litter. The fences are erected at the beginning of each work day and removed at the end of the day. Litter control is also obtained by baling most of the landfilled wastes.

7.11.7 Signs

A large sign on S.R. 636 indicates that the landfill is run by Hardee County and displays the days and hours of operation. Signs posted at the scalehouse state the rates and fee schedules. Signs posted throughout the facility indicate traffic flow, types of waste that are not acceptable, speed limits, and under ground liner location. All manholes are marked with a

warning sign stating "This Manhole Contains Toxic and Explosive Gasses. Do Not Enter Without Proper Ventilation".

7.12 SITE ACCESS ROADS

The entrance and on-site roads are paved with a shell base. The roads are crowned and slightly elevated above the surrounding grades with drainage swales on both sides to promote drainage. The roads are routinely graded by the Hardee County Public Works Department. The access ramp to the working faces is compacted soil with pea gravel or shell placed over it. This access ramp is adequate for landfill operating equipment to reach the working area during almost all weather conditions. Should conditions prevent the flatbed truck carrying baled waste from accessing the top of the landfill, the loader can be used to carry the bales to the working face of the bale fill area.

7.13 ADDITIONAL RECORD KEEPING AND REPORTING REQUIREMENTS

7.13.1 Records for Development of Permit Applications

In addition to waste and operating records, supplemental information from the permit applications and information pertaining to the landfill's construction and maintenance are on file at the facility. These records will be retained at the site for the remainder of the landfill's life.

7.13.2 Copies of Reports Maintained for 10 Years

Records of all monitoring information, including calibration and maintenance records, and copies of reports required by the permit will be retained for at least 10 years.

7.13.3 Background Water Quality Reports

Background water quality records will be kept on file for the design life of the landfill.

7.13.4 Annual Estimates of Remaining Life

Hardee County will maintain an annual estimate of the remaining solid waste disposal capacity (in cubic yards) and life of the existing Class I landfill. The estimate will be based on the geometry of the solid waste disposal area and the scalehouse waste records. These estimates will be reported to the FDEP annually.

D.E.P.

JAN - 2 1998

NOT

EXISTING STAFF GAUGE AT
HARDEE COUNTY SANITARY LANDFILL

DATE: _____

TIME: _____

STAFF GAUGE READING: _____

ELEVATION: _____

WEATHER CONDITIONS: _____

RAIN FALL: _____

AIR TEMP.: _____

WIND SPEED: _____

HUMIDITY: _____

| | | 84.83 ACTUAL STAFF GAUGE |
|-------|-------|-------------------------------|
| | | <u>84.50 ACTUAL ELEVATION</u> |
| 13.00 | _____ | |
| 12.00 | _____ | 83.50 |
| 11.00 | _____ | 82.50 |
| 10.00 | _____ | 81.50 |
| 9.00 | _____ | 80.50 |
| 8.00 | _____ | 79.50 |
| 7.00 | _____ | 78.50 |
| 6.00 | _____ | 77.50 |
| 5.00 | _____ | 76.50 |
| 4.00 | _____ | 75.50 |
| 3.00 | _____ | 74.50 |
| 2.00 | _____ | 73.50 |
| 1.00 | _____ | 72.50 |
| 0.00 | _____ | 71.50 |

D.E.P.
JAN - 2 1998
SOUTHERN DISTRICT
TAMPA

COMMENTS: _____

OPERATOR: _____

HARDEE COUNTY SANITARY LANDFILL
AND RECYCLING CENTER
P.O. BOX 246, AIRPORT ROAD
WAUCHULA, FLORIDA 33873

OFFICE: (813) 773-5089 FAX: (813) 773-3907

DAILY SUMMARY OF LEACHATE WATER
HAULED TO THE CITY OF WAUCHULA WASTE WATER TREATMENT PLANT

DATE: _____

DRIVER: _____

D.E.P.
JAN - 2 1998

| | |
|-------|--------------------|
| TIME: | AMOUNT IN GALLONS: |
| TIME: | AMOUNT IN GALLONS: |
| TIME: | AMOUNT IN GALLONS: |
| TIME: | AMOUNT IN GALLONS: |
| TIME: | AMOUNT IN GALLONS: |
| TIME: | AMOUNT IN GALLONS: |
| TIME: | AMOUNT IN GALLONS: |
| TIME: | AMOUNT IN GALLONS: |
| TIME: | AMOUNT IN GALLONS: |
| TIME: | AMOUNT IN GALLONS: |

TOTAL AMOUNT HAULED: _____

**PART L - WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS
(62-701.510 F.A.C.)**

8.1 WATER QUALITY AND LEACHATE MONITORING REQUIREMENTS

The water quality and leachate monitoring plan submitted in this section describes the proposed groundwater, surface water, and leachate monitoring systems based on information obtained from current and prior hydrogeological investigations. Sampling and analysis is currently performed by Short Environmental Laboratories, Inc. of Sebring, FL. The laboratory is authorized under FDEP CompQAP #880516.

8.1.1 Groundwater Monitoring Requirements

A revised groundwater monitoring plan is submitted with this permit application, as Appendix D, to reflect the proposed lateral expansion of the landfill and the changes to the leachate collection and removal system.

8.1.2 Surface Water Monitoring Requirements

Previously, the only surface water monitoring was conducted at the dewatering ditch. No other sampling locations have been specified in the current permit conditions or the approved Water Quality and Leachate Monitoring Plan. With the proposed changes to the leachate collection and removal system, the dewatering ditch will no longer be used. Until the dewatering ditch is removed from service permanently, surface water monitoring will continue as specified in the current Water Quality and Leachate Monitoring Plan.

8.1.3 Leachate Sampling Locations

At present, leachate sampling is conducted at the dewatering ditch. With the proposed changes to the leachate collection and removal system, the dewatering ditch will no longer be used. Leachate sampling is to be conducted at the pump station. See the Construction Drawings for more detail.

8.1.4 Routine Sampling Frequency and Requirements

Routine Sampling Frequency and Requirements information has been submitted in Section 8.1.4 of the "Response To Request For Additional Information dated April 2, 1997 for The Renewal Of Operations Permit", dated April 29, 1997. ~~The information has not changed and there are no changes proposed.~~ At present, leachate sampling is conducted at a sump in the southeast corner of the landfill which is accessed through a leachate collection system manhole (MH #1). This manhole is located at the southern end of the current dewatering

ditch. Leachate sampling will continue to be conducted in the same manner. See Sheet C-4, Site Plan, of the construction drawings submitted in March 1997, for more detail.

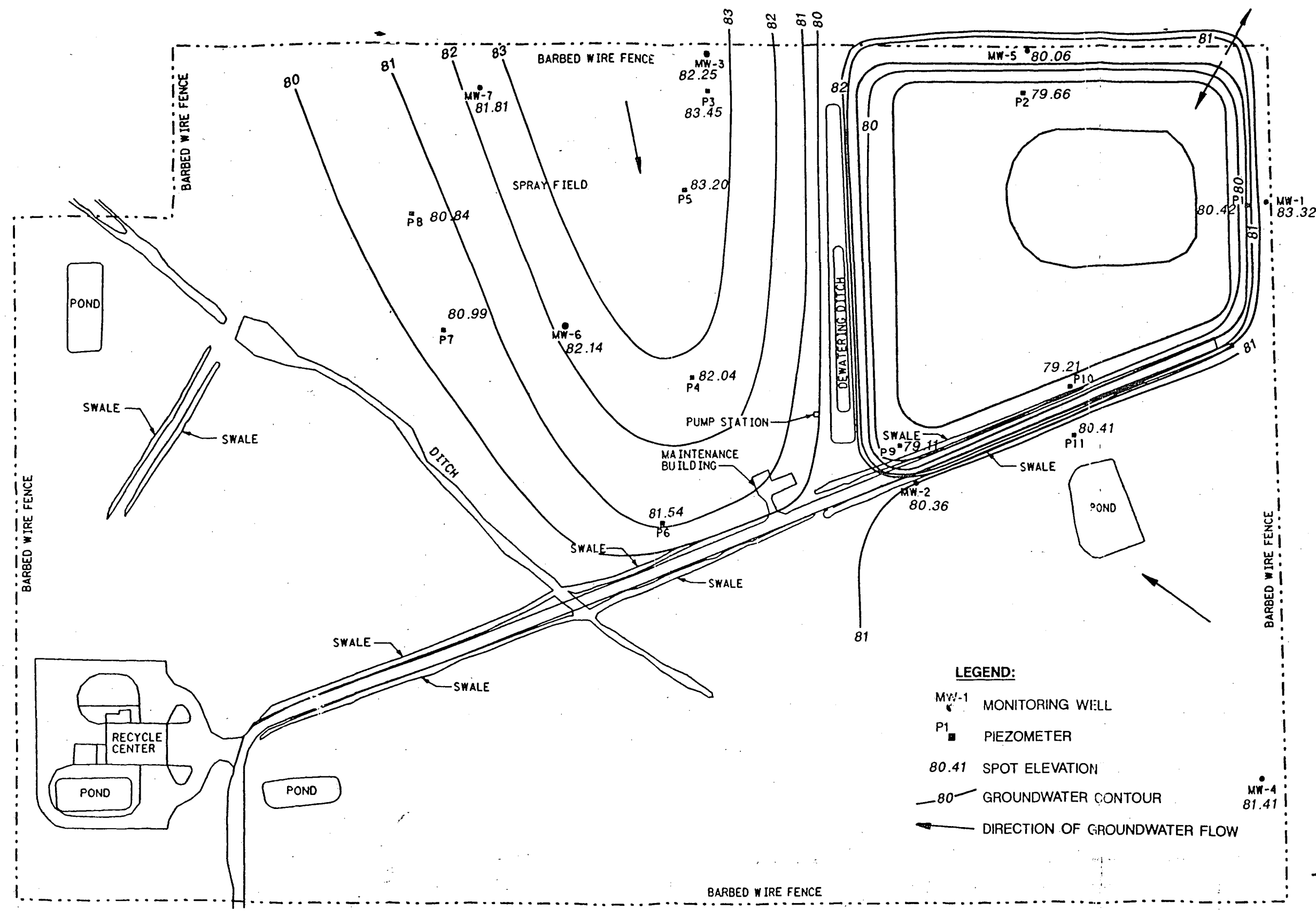
8.1.5 Assessment Monitoring and Corrective Action

Assessment Monitoring and Corrective Action procedures have been submitted as part of the "Response To Request For Additional Information dated April 2, 1997 for The Renewal Of Operations Permit", dated April 29, 1997. The information has not changed and there are no changes proposed.

8.1.6 Water Quality Monitoring Report Requirements

As required by FAC 62-701.510 (9) the landfill owner or operator will report all water quality monitoring results to the Department on a semi-annual basis. The operator of the landfill will notify the Department at least 14 days before the sampling is scheduled to occur so that the Department may collect split samples.

A technical report, prepared, signed and sealed by a professional geologist or professional engineer with experience in hydrogeologic investigations, will be submitted to the Department on a biennial basis and shall be updated at the time of permit renewal. The report shall summarize and interpret the water quality data and water level measurements collected during the preceding two years. The Biennial Groundwater Technical Report was submitted to the FDEP for review March 1997.

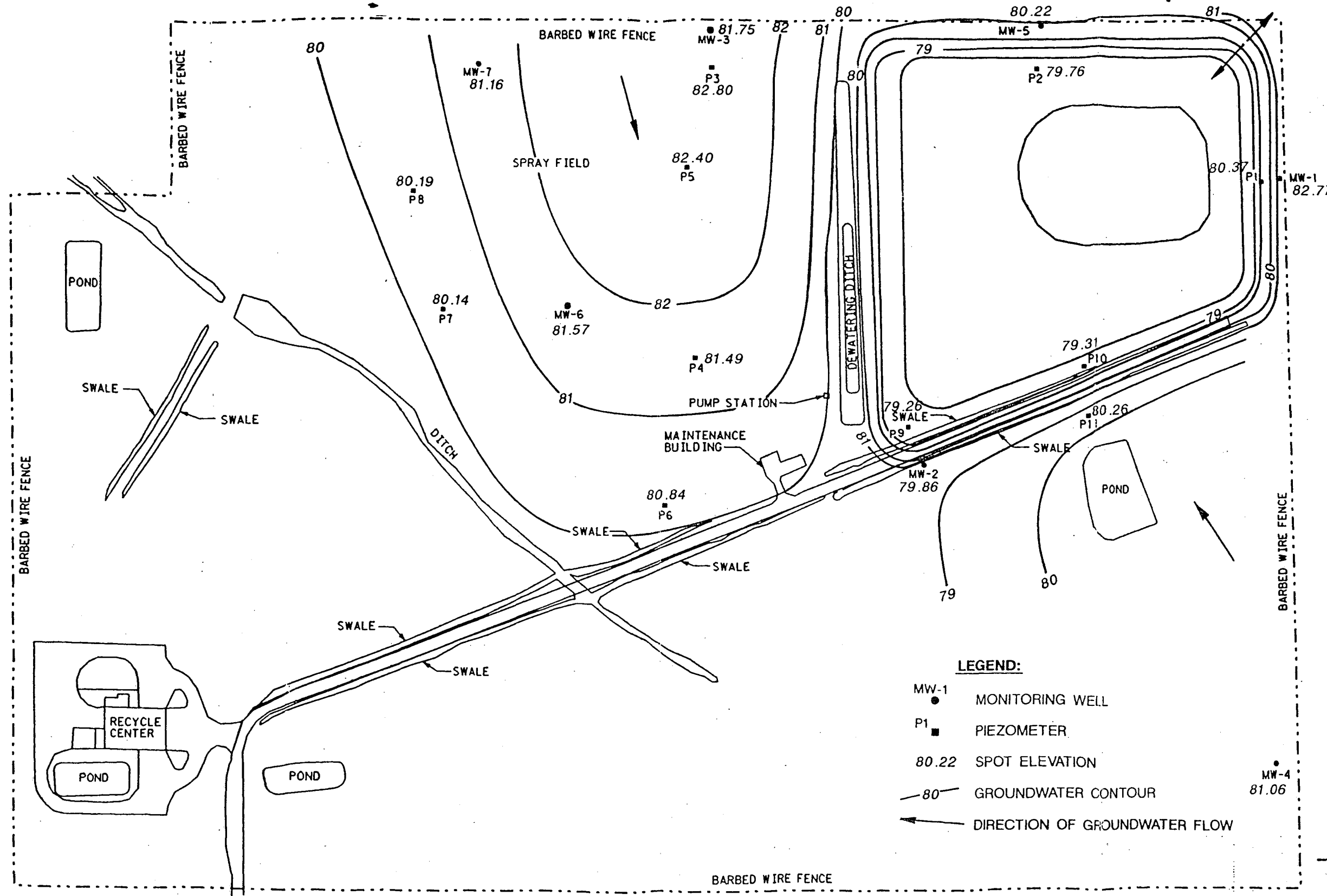


D.E.P.
JAN - 2 1998
SOUTHWEST DISTRICT
TAMPA

LEGEND:

- MW-1 MONITORING WELL
- P1 ■ PIEZOMETER
- 80.41 SPOT ELEVATION
- 80— GROUNDWATER CONTOUR
- ➔ DIRECTION OF GROUNDWATER FLOW

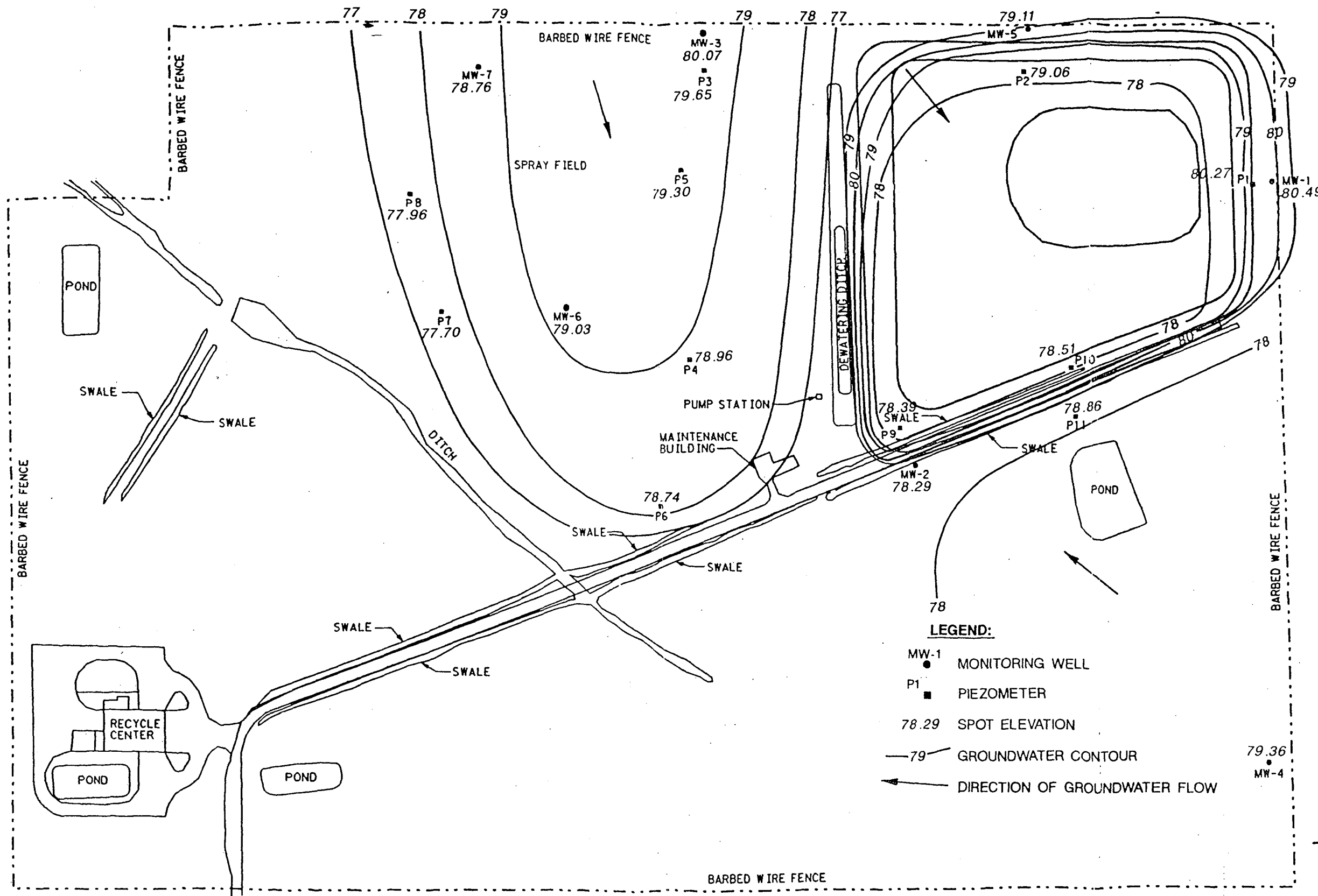
SCALE: 1"=200'



D.E.P.
 JAN - 2 1998
 COUNTY DISTRICT
 TAMPA

SCALE: 1"=200'

HARDEE COUNTY WASTE RECYCLING CENTER
 GROUNDWATER CONTOURS
 SECOND QUARTER 1994: 2/9/94

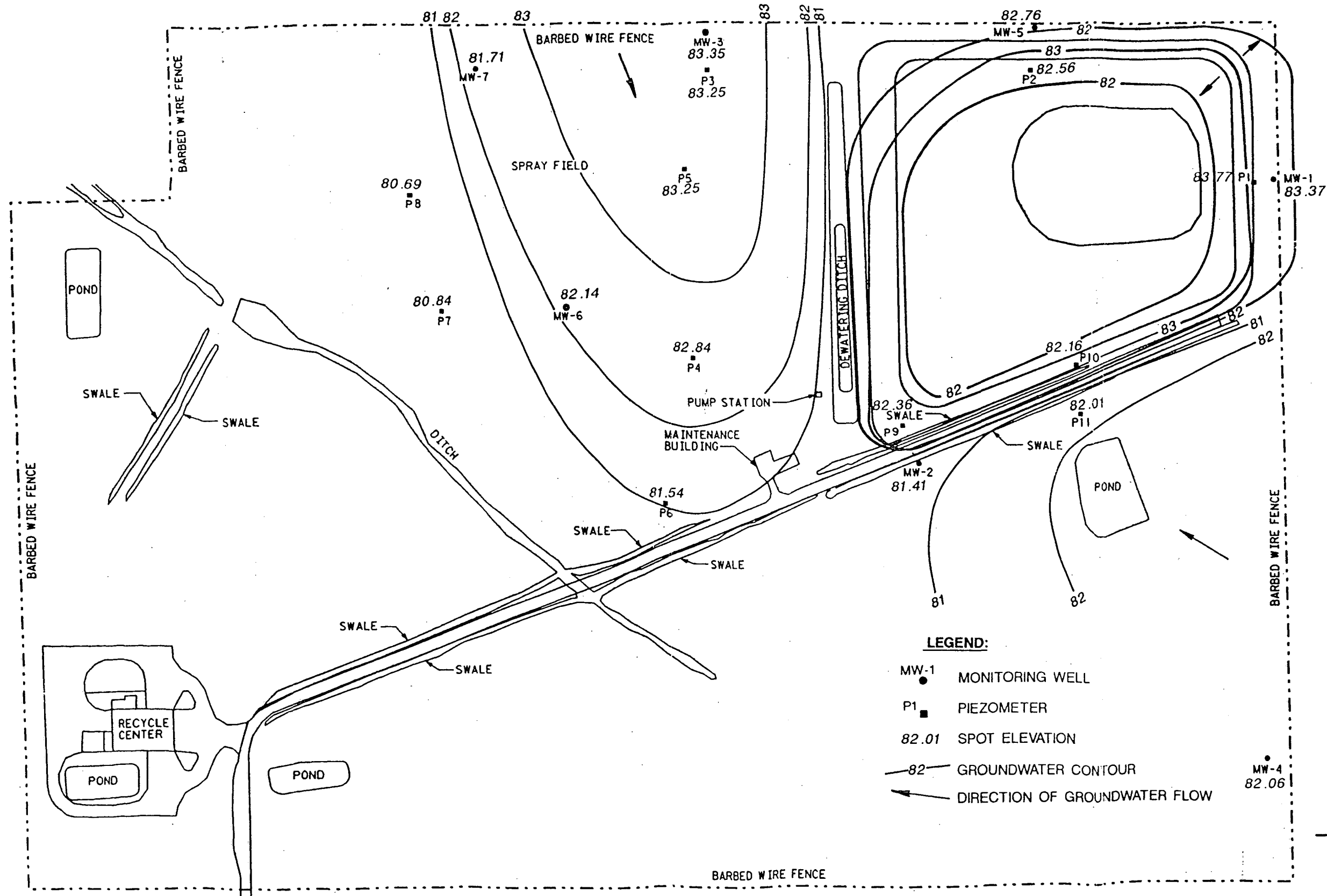


- LEGEND:**
- MW-1 ● MONITORING WELL
 - P1 ■ PIEZOMETER
 - 78.29 SPOT ELEVATION
 - 79— GROUNDWATER CONTOUR
 - ← DIRECTION OF GROUNDWATER FLOW

D.E.P.
JAN - 2 1998
SOUTHWEST DISTRICT
TAMPA

SCALE: 1"=200'

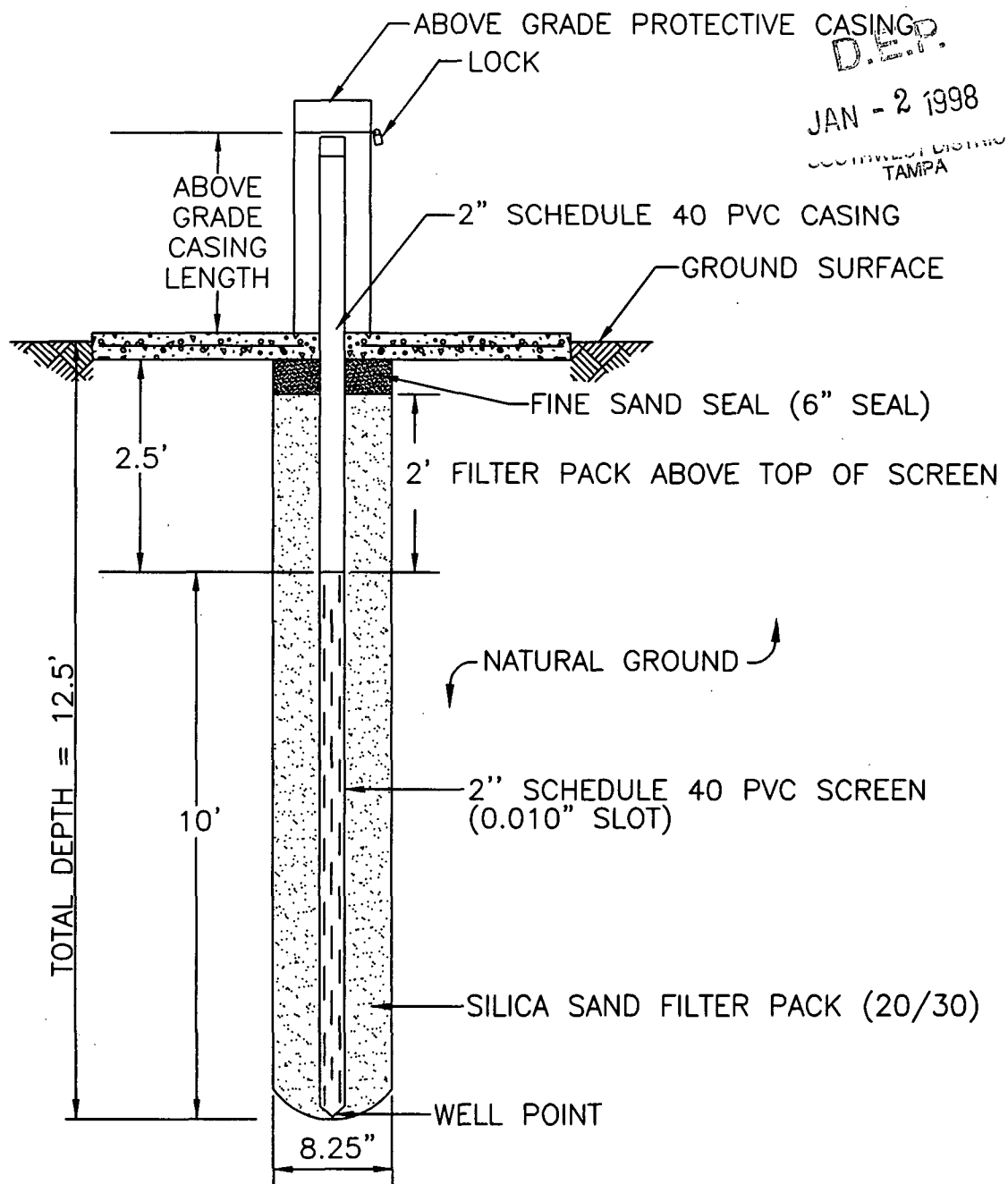
HARDEE COUNTY WASTE RECYCLING CENTER
GROUNDWATER CONTOURS
THIRD QUARTER 1994: 5/6/94



D.E.P.
JAN - 2 1998
SOUTHWEST DISTRICT
TAMPA

- LEGEND:**
- MW-1 MONITORING WELL
 - P1 PIEZOMETER
 - 82.01 SPOT ELEVATION
 - 82 GROUNDWATER CONTOUR
 - DIRECTION OF GROUNDWATER FLOW

HARDEE COUNTY WASTE RECYCLING CENTER
GROUNDWATER CONTOURS
FOURTH QUARTER 1994: 8/22/94



D.E.P.
JAN - 2 1998
SOUTHWEST DISTRICT
TAMPA

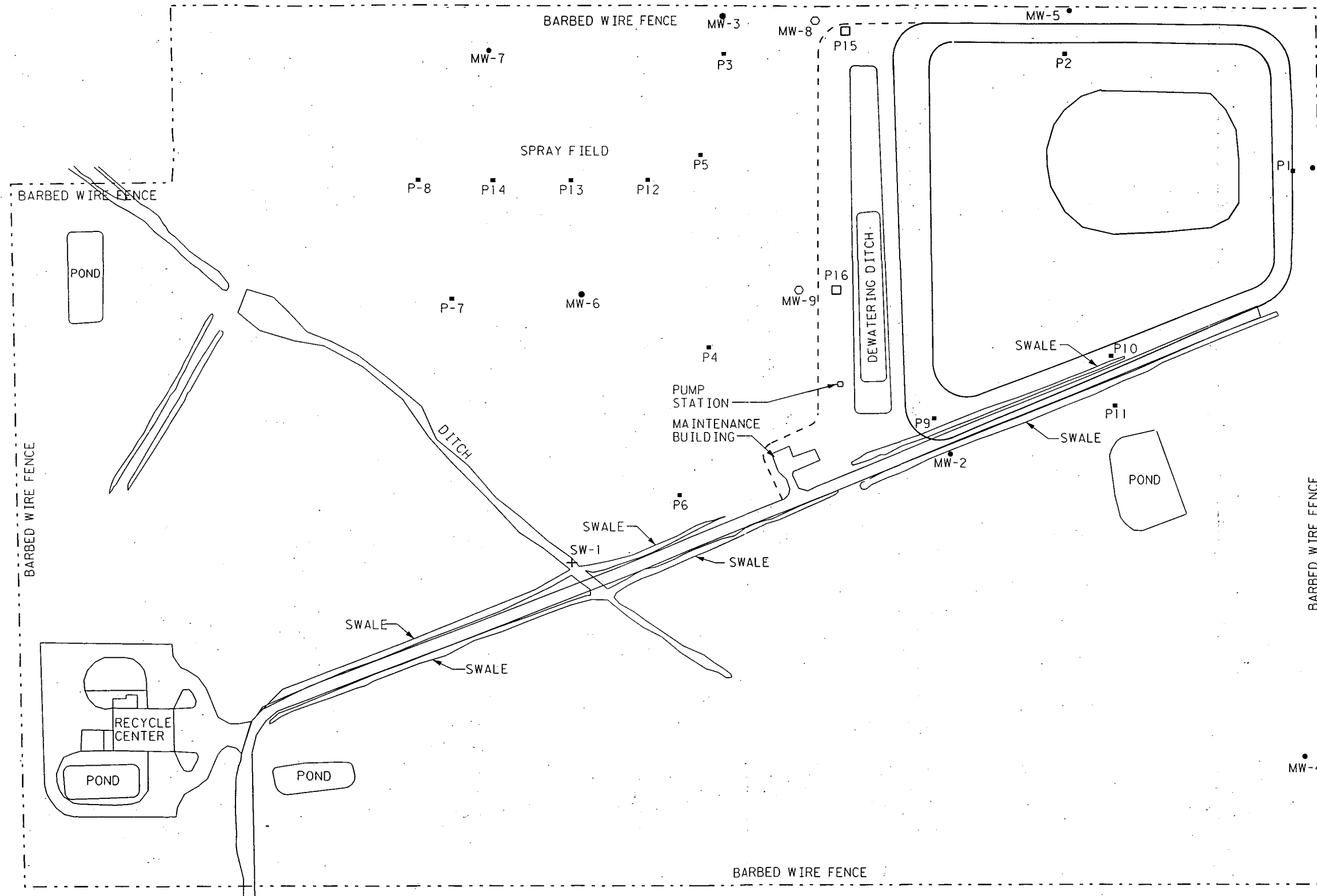
NOTE: ALL SPECIFICATIONS ARE PRELIMINARY ESTIMATES AND MAY CHANGE ACCORDING TO SITE SPECIFIC CONDITIONS.

I:\ENV\ADD\WASTEMAN\HARDEE\PERMIT\GWMWELL8.DWG



POST,
BUCKLEY,
SCHUH &
JERNIGAN, INC.

MONITORING WELL (MW-8 AND MW-9)
AND PIEZOMETER (P15 AND P16)
CONSTRUCTION DETAIL



SCALE: 1" = 200'

D.E.P.
APR 27 1998
SOUTHWEST DISTRICT
TAMPA

LEGEND

- MW-2 MONITORING WELL
- P11 PIEZOMETER
- PROPOSED LINER
- MW-8 PROPOSED MONITORING WELL
- P15 PROPOSED PIEZOMETER
- FENCE
- + SW-1 SURFACE WATER MONITORING POINT

**HARDEE COUNTY SOLID WASTE MANAGEMENT FACILITY
SITE PLAN**

PBSJ POST, BUCKLEY, SCHUH & JERNIGAN, INC.

M:\ENV\CAD\DWG\WATER\MSTN\HARDEE\CO\FIGURES\HCSITE.DGN

D.E.P.

APR 27 1998

SOUTHWEST DISTRICT
TAMPA

MONITORING POINT CLASSIFICATION CHART

| MONITORING POINT | ZONE MONITORED | CLASSIFICATION |
|------------------|----------------|----------------|
| MW-1 | SURFICIAL | UPGRADIENT |
| MW-2 | SURFICIAL | UPGRADIENT |
| MW-4 | SURFICIAL | BACKGROUND |
| MW-5 | SURFICIAL | DOWNGRADIENT |
| MW-6* | SURFICIAL | DOWNGRADIENT |
| MW-7* | SURFICIAL | DOWNGRADIENT |
| MW-8 | SURFICIAL | DOWNGRADIENT |
| MW-9 | SURFICIAL | DOWNGRADIENT |
| P-1 | SURFICIAL | N/A |
| P-2 | SURFICIAL | N/A |
| P-3 | SURFICIAL | N/A |
| P-4 | SURFICIAL | N/A |
| P-5 | SURFICIAL | N/A |
| P-6 | SURFICIAL | N/A |
| P-9 | SURFICIAL | N/A |
| P-10 | SURFICIAL | N/A |
| P-11 | SURFICIAL | N/A |
| P-15 | SURFICIAL | N/A |
| P-16 | SURFICIAL | N/A |
| SW-1 | SURFACE WATER | N/A |

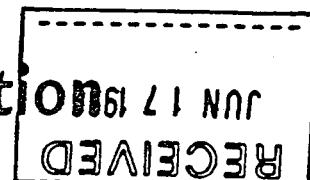
* Monitoring includes the collection of water elevations and groundwater conductivity values.

APPENDIX A

PERMITS



Department of Environmental Protection



Lawton Chiles
Governor

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

Virginia B. Wetherell
Secretary

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

JUN 13 1996

NOTICE OF PERMIT

Hardee County Board of County Commissioners
Mr. J.R. Prestridge, Assistant County Manager
412 West Orange St.
Wauchula, Florida 33873-2867

RE: Modification Number 286397 to existing operation
Permit No. 8025-214306, Hardee County
Hardee County Solid Waste Disposal Facility

Dear Mr. Prestridge:

Attached is modified permit number 8025-214306, issued pursuant to Section(s) 403.087(1), Florida Statutes. The following Conditions have been revised in modification number 286397:

| <u>SPECIFIC CONDITIONS</u> | <u>FROM</u> | <u>TO</u> | <u>TYPE OF MODIFICATION</u> |
|----------------------------|-------------|-----------|--|
| #53. | ---- | New | Leachate/Stormwater Management Plan, Revised Sequence of Filling |

This letter and its attachments constitute a complete permit and replace all previous permits and permit modifications for the above referenced facility.

A person whose substantial interests are affected by this modification of permit may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Department's Office of General Counsel, 2600 Blair Stone Road, Tallahassee, 32399-2400, within fourteen (14) days of receipt of this notice. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within fourteen (14) days shall constitute a waiver of any right such person has to an administrative determination (hearing) pursuant to Section 120.57, Florida Statutes.

"Protect, Conserve and Manage Florida's Environment and Natural Resources"

Printed on recycled paper.

The petition shall contain the following information;

- (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;
- (b) A statement of how and when each petitioner received notice of Department's action, or proposed action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
- (d) A statement of the material facts disputed by Petitioner, if any;
- (e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;
- (f) A statement of which rules or statutes petitioner contends warrant reversal or modification of the Department's action or proposed action; and
- (g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

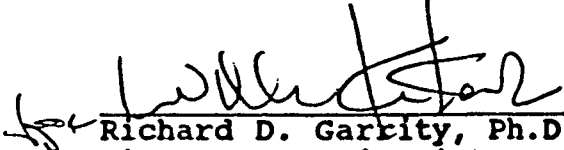
If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

This modified permit is final and effective on the date filed with the Clerk of the Department unless a petition is filed in accordance with the above paragraphs or unless a request for extension of time in which to file a petition is filed within the time specified for filing a petition and conforms to Rule 62-103.070, F.A.C. Upon timely filing of a petition or a request for an extension of time this transfer of permit will not be effective until further Order of the Department.

When the Order is final, any party to the Order has the right to seek judicial review of the Order pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, 32399-2400; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date the Final Order is filed with the Clerk of the Department.

Executed in Tampa, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION


Richard D. Garrity, Ph.D.
Director of District Management
Southwest District

RDG/sjp


Attachment

cc: Janice Williamson, Hardee County, PO Box 246, Wauchula, Fl. 33873
~~McC. Edward Hilton~~, P.E., PBSJ, 1560 Orange Ave., Ste. 700, Winter Park,
Fl. 32789
Kathy Anderson, FDEP Tallahassee
Fred Wick, FDEP Tallahassee
Doug Beason, OGC Tallahassee
Robert Butera, P.E., FDEP Tampa
Steve Morgan, Permit Notebook, FDEP Tampa

CERTIFICATE OF SERVICE

This undersigned duly designated deputy clerk hereby certifies that this NOTICE OF PERMIT and all copies were mailed before the close of business on JUN 13 1996 to the listed persons.
(date stamp)

FILING AND ACKNOWLEDGMENT
FILED, on this date, pursuant to Section 120.52(10), Florida Statutes, with the designated Department, Clerk, receipt of which is hereby acknowledged.


Clerk

JUN 13 1996
Date



Department of Environmental Protection

Lawton Chiles
Governor

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

Virginia B. Wetherell
Secretary

PERMITTEE

Hardee County Board of
County Commissioners
Mr. James Harrison
Chairman
412 West Orange Street
Wauchula, FL 33873-2867

PERMIT/CERTIFICATION

GMS ID No: 4025C30001
Permit No: SO25-214306
Date of Issue: 11/29/93
Expiration Date 6/10/97
County: Hardee
Lat/Long: 27°34'10"
81°47'01"
Sec/Town/Rge: 35/33S/25E
Project: Hardee County
Solid Waste
Disposal Facility

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rule(s) 62-3, 62-4, 62-25, 62-160, 62-522, 62-550, 62-701, and 62-711. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents, attached hereto or on file with the department and made a part hereof and specifically described as follows:

To operate a solid waste Class I sanitary landfill and related facilities (approximately 95 acres), referred to as Hardee County Solid Waste Disposal Facility, subject to the specific conditions attached, disposing of solid waste, near Airport Road and S.R. 64A, northeast of Wauchula, Hardee County, Florida. The specific conditions attached are for the construction of:

1. Class I Landfill Disposal Facility
2. Construction and Demolition Debris Disposal Facility
3. Waste Tire Storage & Processing Facility

This permit contains compliance items summarized in Attachment 1 that shall be complied with and submitted to the Department by the dates noted. If the compliance dates are not met and submittals are not received by the Department on the dates noted, enforcement action will be initiated.

This permit includes all previous modifications, dated 8-24-95.

Replaces Permit No.: SO25-096551

GENERAL CONDITIONS

1. The terms, conditions, requirements, limitations and restrictions set forth in this permit, are "permit conditions" and are binding and enforceable pursuant to Sections 403.141, 403.161, 403.727, or 403-859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.
2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.
3. As provided in subsections 403.087(6) and 403.722(5), F.S., the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, State, or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in this permit.
4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.
5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.
6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed and used by the permittee to achieve compliance with the conditions of this permit, are required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

GENERAL CONDITIONS:

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at reasonable times, access to the premises where the permitted activity is located or conducted to:

- (a) Have access to and copy any records that must be kept under conditions of the permit;
- (b) Inspect the facility, equipment, practices, or operations regulated or required under this permit; and
- (c) Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

- (a) A description of and cause of noncompliance; and
- (b) The period of noncompliance, including dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance.

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.111 and 403.73, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance; provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

GENERAL CONDITIONS:

11. This permit is transferable only upon Department approval in accordance with Rule 62-4.120 and 62-730.300, Florida Administrative Code, as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.
12. This permit or a copy thereof shall be kept at the work site of the permitted activity.
13. This permit also constitutes:
 - (a) Determination of Best Available Control Technology (BACT)
 - (b) Determination of Prevention of Significant Deterioration (PSD)
 - (c) Certification of compliance with State Water Quality Standards (Section 401, PL 92-500)
 - (d) Compliance with New Source Performance Standards
14. The permittee shall comply with the following:
 - (a) Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.
 - (b) The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.
 - (c) Records of monitoring information shall include:
 1. the date, exact place, and time of sampling or measurements;
 2. the person responsible for performing the sampling or measurements;
 3. the dates analyses were performed
 4. the person responsible for performing the analyses;
 5. the analytical techniques or methods used;
 6. the results of such analyses.

GENERAL CONDITIONS:

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware the relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

SPECIFIC CONDITIONS:

1. This site includes operation of a Class I landfill, construction and demolition debris disposal facility, and waste tire storage and processing, and shall be operated in accordance with all applicable requirements of Chapters 62-4, 62-25, 62-522, 62-550 62-701, and 62-711, Florida Administrative Code. This permit is valid for operation of the Class I landfill and related facilities in accordance with the reports and other information, and the October 1993 plans submitted by Wade-Trim to the FDEP, and in accordance with all applicable requirements of Department rules. Site improvements approved as part of this permit shall be completed within one hundred and eighty (180) days after issuance of this permit. Any construction not previously approved as part of this permit shall require a separate Department permit unless the Department determines a permit modification to be more appropriate.
2. Permits shall be modified in accordance with the requirements of Rule 62-4.080, F.A.C. A modification which is reasonably expected to lead to substantially different environmental impacts which require a detailed review by the Department is considered a substantial modification.
3. Within sixty (60) days after all specified construction has been completed and before use, the owner or operator shall submit to the Department a certification of construction completion, Form 62-701.900(2), signed and sealed by a professional engineer, and record drawings showing all modifications to verify conformance with the plans and specifications, and shall arrange for Department representatives to inspect the facility in the company of the permittee, the engineer, and the proposed facility operator. The new systems shall not be operated until the certification has been submitted and approved, all documentation required as a condition of the permit has been submitted, and a facility inspection by Department personnel has been conducted.
4. The prohibitions of the FAC Rule 62-701.300 shall not be violated.
5. Permits shall be renewed at least every five years. Applicants for permit renewal shall demonstrate how they will comply with any applicable new or revised laws or rules relating to construction, operation, or closure of landfills. Closure plans shall be updated at the time of permit renewal to reflect changes in closure design, long-term care requirements, and financial responsibility documentation. Facility information that was submitted to the Department to support the expiring permit, and which is still valid, does not need to be re-submitted for permit renewal. The permit renewal application shall list and reaffirm that the information is still valid.
6. A copy of the Department approved permit, revised construction drawings, operational plan, construction reports and record drawings, and supporting information shall be kept at the facility at all times for reference and inspections.

SPECIFIC CONDITIONS:

7. Landfills shall be designed, constructed, operated, maintained, closed, and monitored throughout its design period to control the movement of waste and waste constituents into the environment so that ground water and surface water quality standards and criteria of Chapters 62-3 and 62-302, F.A.C., will not be violated.
8. Landfills or solid waste disposal units shall not be located in the 100-year floodplain where it will restrict the flow of the 100-year flood, reduce the temporary water storage capacity of the floodplain unless compensating storage is provided, or result in a washout of solid waste.
9. All landfills shall be designed so that solid waste disposal units will be constructed and subsequently closed at planned intervals throughout the design period of the landfill.
10. All solid waste disposed of in the Class I disposal area must be covered with at least 6 inches of compacted earth or other suitable material, as approved by the Department, at the end of each working day. An intermediate cover of one (1) foot of compacted earth in addition to the six (6) inch initial cover shall be applied within seven (7) days of cell completion at all landfills if final cover or an additional lift is not to be applied within 180 days of cell completion. Top gradients of intermediate cover shall be designed to prevent ponding or low spots and minimize erosion. Portions of the landfill which have been filled with waste to the extent of designed dimensions shall be closed in accordance with all appropriate requirements of Department rules.
11. The Construction and Demolition Debris (C & D Debris) disposal area shall be limited to those items identified in F.A.C. Rule 62-701.200(17). The permittee shall not allow the disposal of "Garbage" in the C&D debris disposal area. The C & D Debris disposal area shall be operated in accordance with FAC Rules 62-701.730 and 62-701.803. Solid waste other than construction and demolition debris accepted at the Construction and Demolition Debris disposal area, shall be segregated, and recycled or disposed of in accordance with Department rules.
12. Waste tires and processed tires at the waste tire area shall be stored in accordance with the waste tire site requirements in Rule 62-711.510, F.A.C.
13. Storage at the waste tire area is limited to 1000 waste tires. At least 75 percent of both the waste tires and processed tires that are delivered to or are contained on the site of the waste tire area at the beginning of each calendar year must be removed for processing and disposal or recycling from the area during the year. An annual report summarizing these operations shall be submitted to the Department by March 1 of each year, pursuant to F.A.C. Rule 62-711.530(4).

SPECIFIC CONDITIONS:

14. This facility shall have at least one trained operator at the landfill during all times when the landfill receives waste. Trained operators are those who have satisfied the requirements of Chapter 62-703, F.A.C. All landfills shall have at least one spotter at each working face at all times when the landfill receives waste to detect unauthorized wastes. The owner or operator shall implement a load checking program to detect and discourage attempts to dispose of unauthorized wastes at the landfill. The load checking program shall consist of the minimum requirements specified in FDER Rule 62-701.500(6) which includes examining at least three random loads of solid waste received each week by the landfill operator.
15. The landfill owner or operator shall have an operational plan that provides written, detailed instructions for the daily operation of the landfill. The operation plan shall be kept at or near the landfill facility and shall be accessible to landfill operators. The operation plan shall be revised if operational procedures change. The plan shall include procedures for all the items listed in FDER Rule 62-701.500(2). A schedule for routine maintenance of the leachate collection and removal system shall be established to ensure operation of the system. The maintenance schedule shall be a part of the facility operation plan. Operating records shall be maintained as required by FDER Rule 62-701.500(3).
16. The owner or operator of the facility shall weigh all solid waste as it is received. Landfill operators shall record, in tons per day, the amount of solid waste received and shall estimate the amount of wastes listed in FDER Rule 62-701.500(4)(b). Waste reports shall be compiled monthly, and copies shall be submitted to the Department quarterly.
17. The landfill operator is responsible for leachate level monitoring, sampling, analysis of the landfill leachate, and for providing copies of the leachate analysis to the Department. The landfill operator shall have a prepared contingency plan to handle leachate collection, removal, and treatment problems such as those caused by interruptions of discharges to a treatment plant. Quantities of leachate collected by the leachate collection and removal system shall be recorded in gallons per day before on-site treatment or transport off-site. A rain gauge shall be installed, operated, and maintained to record daily precipitation at the landfill. All rain amounts greater than one tenth of an inch shall be recorded. Daily volumes of leachate pumped from the dewatering ditch will be recorded. Daily rainfall and leachate pump volume data will be submitted to the Department monthly. Complete yearly leachate/water balance data to demonstrate continuous compliance with Department rules shall be submitted to the Department annually.

SPECIFIC CONDITIONS:

18. The operating authority shall be responsible for the control of odors and fugitive particulates arising from this operation. Such control shall minimize the creation of these nuisance conditions on nearby property. Complaints received from the general public and confirmed by Department personnel upon site inspection shall constitute a nuisance condition and the permittee must take immediate corrective action to abate the nuisance.

19. Landfills that receive biodegradable wastes shall have a gas monitoring and control system designed to prevent explosions and fires, and to minimize off-site odors and damage to vegetation. The owners or operators shall implement a routine gas monitoring program to ensure that the standards of FDER Rule 62-701.400(10) are met. All monitoring points shall be sampled and the results reported to the Department quarterly. If methane gas levels exceed the lower explosive limits specified in FDER Rule 62-701.400(10)(a), the owner or operator shall:

- a. Immediately take all necessary steps to ensure protection of human health and notify the Department;
- b. Within 7 days of detection, submit to the Department for approval a remediation plan for the methane gas releases. The plan shall describe the nature and extent of the problem and the proposed remedy. The remedy shall be completed within 60 days of detection unless otherwise approved by the Department.

20. The permittee shall not accept hazardous waste or any hazardous substance at this site. Hazardous waste is a solid waste identified by the Department as a hazardous waste in Chapter 62-730, Florida Administrative Code. Hazardous substances are those defined in Section 403.703, Florida Statute or in any other applicable state or federal law or administrative rule.

21. The disposal or control of any "special wastes" at the site shall be in accordance with FAC Rules 62-701.300 and 62-701.520, and any other applicable Department rules, to protect the public safety, health and welfare. "Special Wastes" means solid wastes that can require special handling and management, including but not limited to white goods, waste tires, used oil, mattresses, furniture, lead-acid batteries, asbestos, and biological wastes.

22. The permittee shall maintain a program which prohibits the disposal of bulk industrial wastes which operation personnel reasonably believe to either be or contain hazardous waste, without first obtaining a chemical analysis of the material showing the waste to be non-hazardous. The chemical analysis of any such material so placed in the landfill, along with the customers name and date of disposal, shall be kept on file by the permittee on-site.

SPECIFIC CONDITIONS:

23. Open burning of solid waste is prohibited except in accordance with Rule 62-701.520(2), F.A.C. Controlled burning of solid waste is prohibited at this site except for clean vegetative and wood wastes which may be burned in a permitted air curtain incinerator in accordance with Rule 62-2.500(1)(e), F.A.C. Any accidental fires which require longer than one (1) hour to extinguish must be promptly reported to the Department of Environmental Protection.
24. All solid waste, recovered materials or residues handled at the facility shall be stored in a manner so as not to constitute a fire or safety hazard or a sanitary nuisance, and shall comply with all applicable local and state regulations. Recovered resources resulting from the facility and which may be offered for sale shall comply with applicable regulations of all appropriate state agencies.
25. Yard trash that is delivered to the site of the yard trash mulching area shall be processed within one hundred and eight (180) days and removed for disposal or recycling from the area within twelve (12) months of date delivered. A report summarizing these operations shall be submitted annually by March 1 of each year to the Solid Waste Section, Southwest District Office. Quarterly reports of yard waste are also acceptable to the Department.
26. The owner or operator shall control mosquitoes and rodents or request such control measures from the local mosquito control office, so as to protect the public health and welfare.
27. The permittee shall properly maintain the site. This includes erosion control, maintenance of grass cover, and prevention of ponding, leachate control system maintenance, and gas venting system repairs.
28. In the event of damage to any portion of the landfill site facilities regulated by this permit or failure of any portion of the landfill systems, the permittee shall immediately (within 24 hours) notify the Department of Environmental Protection explaining such occurrence and remedial measures to be taken and time needed for repairs. Written detailed notification shall be submitted to the Department within seven (7) days following the occurrence.
29. A trained supervisor or foreman shall be responsible for maintaining the facility in an orderly, safe, and sanitary manner. Sufficient personnel shall be employed to adequately operate the facility in compliance with this permit.
30. The site shall continue to have a surface water management system designed, constructed, operated, and maintained to prevent surface water from running on to waste filled areas, and a stormwater runoff control system designed, constructed, operated, and maintained to collect and control stormwater to meet the requirements of Chapter 62-25, F.A.C., and the requirements for management and storage of surface water in accordance with Chapter 373, F.S.

SPECIFIC CONDITIONS:

31. Stormwater management systems shall be designed to avoid mixing of stormwater with leachate. Stormwater or other surface water which comes into contact with the landfilled solid waste or mixes with leachate shall be considered leachate.

32. To prevent unauthorized waste disposal, access to and use of the facility shall be controlled by fencing, gates, or other barriers, as well as signs and facility personnel.

33. In addition to records and reporting required, the landfill owner or operator shall keep records of all information used to develop or support the permit applications and any supplemental information pertaining to construction of the landfill throughout the design period. Records pertaining to the operation of the landfill shall be kept for the design period of the landfill. Records of all monitoring information, including calibration and maintenance records, all original chart recordings for continuous monitoring instrumentation, and copies of all reports required by permit, shall be kept for at least ten years. Background water quality records shall be kept for the design period of the landfill.

34. Within ninety (90) days after issuance of this permit, the water quality monitoring system shall be installed in accordance with the Wade-Trim/Meyers & Associates Water Quality & Leachate Monitoring Plan dated July 21, 1993. All sampling and analysis activities shall be performed by organizations that have Comprehensive Quality Assurance Plans approved in accordance with Rule 62-160.300(8), F.A.C.

35. The groundwater monitoring wells are located as per 3/25/87 submittal, as follows:

| <u>Well Number</u> | <u>Aquifer</u> | <u>Location</u> |
|------------------------|------------------------|------------------------|
| MW-1 | Surficial | As per Permit Figure 1 |
| MW-2 | Surficial | As per Permit Figure 1 |
| MW-3 | Surficial | As per Permit Figure 1 |
| MW-4 | Surficial (background) | As per Permit Figure 1 |
| MW-5 | Surficial | As per Permit Figure 1 |
| MW-6 | Surficial | As per Permit Figure 1 |
| MW-7 | Surficial | As per Permit Figure 1 |

All wells are to be clearly labeled and easily visible at all times. All wells are considered to be detection wells, with the exception of the background well, MW-4.

Water levels shall be measured quarterly in all site piezometers, P1 through P14, for evaluation of the leachate/groundwater elevations in the landfill and leachate sprayfield. The locations of these piezometers are on Wade-Trim's August 2, 1993 Improvement Site Plan, Sheet 4 of 6. A reduced portion of this plan is presented as Figure 2 of this permit.

SPECIFIC CONDITIONS:

36. Pursuant to F.A.C. Rule 62-522.410, the zone of discharge shall extend horizontally to the property line or one hundred (100) feet beyond the waste management area, whichever is less, and vertically to the base of the surficial aquifer. The permittee shall ensure that the water quality standards for Class G-II groundwaters will not be exceeded at the boundary of the zone of discharge according to Rules 62-520.400 and 62-520.420, F.A.C.

37. Leachate shall be sampled from the leachate collection system prior to entering the dewatering ditch and analyzed every 6 months for the indicator parameters listed as follows:

Leachate indicator parameters:

| <u>Field parameters</u> | <u>Laboratory parameters</u> |
|-------------------------|------------------------------|
| Specific conductivity | Total Ammonia - N |
| pH | Bicarbonate |
| Dissolved oxygen | Chlorides |
| Colors, sheens | Iron |
| | Mercury |
| | Nitrate |
| | Sodium |
| | Total dissolved solids (TDS) |
| | Those parameters listed in |
| | 40 CFR Part 258, Appendix I |

In addition, leachate shall be sampled and analyzed annually for the parameters listed in 40 CFR Part 258, Appendix II. For landfills which are receiving waste, if this annual analysis indicates that a contaminant listed in 40 CFR 261.24 exceeds the regulatory level listed therein, the permittee shall initiate a monthly sampling and analysis program. If in any three consecutive months the same listed contaminant exceeds the regulatory level, the permittee shall, within 90 days, initiate a program designed to identify the source and reduce the presence of the contaminant in the leachate so that it no longer exceeds the regulatory level. This program may include additional monitoring of waste received and additional up-front separation of waste materials. Any leachate which is not recirculated or taken to a permitted domestic wastewater treatment facility shall be treated or managed so that no contaminant exceeds the regulatory level. If in any three consecutive months no listed contaminant is found to exceed the regulatory level, the permittee may discontinue the monthly sampling and analysis and return to a routine sampling schedule.
Amended 08-24-95.

SPECIFIC CONDITIONS:

38. All piezometers listed in Specific Condition #36 shall be constructed in accordance with the construction procedures of the July 21, 1993 Water Quality & Leachate Monitoring Plan submitted July 21, 1993 to the Department, and in accordance with best geological practices. In addition, all piezometers shall have an impermeable barrier at or near ground surface to prevent surface water infiltration to the piezometer. Within ninety (90) days after piezometer installation, the following information shall be submitted to the Solid Waste Section of the Southwest District Office of the Department:

| | |
|------------------------------------|---------------------------|
| Piezometer identification | Lithologic Log |
| Latitude/Longitude | Total depth of piezometer |
| Screen Type and slot size | Casing diameter |
| Screen length | Casing type and length |
| Piezometer seal type and thickness | |
| Elevation at top of piezometer | |
| Elevation at land surface | |

39. Within ninety (90) days after piezometer installation, a surveyed drawing shall be submitted showing the location of all monitor wells (active and abandoned) and piezometers in degrees, minutes and seconds of latitude and longitude, and the elevation of the top of the well casing to the nearest .01 foot, National Geodetic Vertical Datum. All surface water monitoring stations shall be surveyed in degrees, minutes and seconds of latitude and longitude. The surveyed drawing shall include the monitor well and piezometer identification number, location and elevation of all permanent benchmark(s) and/or corner monument marker(s) at the site. The survey shall be conducted by a registered Florida land surveyor.

40. All field and laboratory work done in connection with groundwater monitoring shall be conducted by a firm possessing a Generic Quality Assurance Plan or a Comprehensive Quality Assurance Plan approved by the Department in accordance with Chapter 62-160, F.A.C. The Quality Assurance Plan must specifically address the sampling and analytical work that is required by the permit. Documentation of an approved Quality Assurance Plan shall be submitted to the Department annually with the 1st quarterly groundwater sampling report for each year. Documentation shall include the completed signature page and the table of contents of the approved plan. The approved Quality Assurance Plan shall be followed by all persons collecting or analyzing samples related to this permit.

SPECIFIC CONDITIONS:

41. All detection wells and background wells shall be sampled and analyzed every 6 months for the ground water indicator parameters listed in 62-701.510(8)(a) as follows:

Ground water indicator parameters:

| | |
|---|---|
| Field parameters | Laboratory parameters |
| Static water level in wells before purging | Total Ammonia - N |
| Specific conductivity | Chlorides |
| pH | Iron |
| Dissolved oxygen | Mercury |
| Turbidity | Nitrate |
| Colors, sheens | Sodium |
| Temperature | Total dissolved solids (TDS) |
| | Those parameters listed in 40 CFR Part 258, Appendix I |

Compliance with groundwater standards and/or criteria shall be determined by analysis of unfiltered groundwater samples. Additional samples, wells, and parameters may be required based upon subsequent analysis.

Amended 08-24-95.

42. In accordance with 62-701.510(7), if at any time background groundwater standards are exceeded in the detection wells, the permittee has fifteen (15) days after the sampling data is received in which to resample the monitor well(s) to verify the original analysis. Should the permittee choose not to resample, the Department will consider the water quality analysis as representative of current groundwater conditions at the facility. If the exceedance of groundwater standards in the detection wells is confirmed, then assessment monitoring shall be initiated as detailed in 62-701.510(7).

43. If any monitoring well becomes damaged or inoperable, the permittee shall notify the Department of Environmental Protection immediately (within 24 hours). A detailed written report shall follow within seven (7) days. The written report shall detail what problem has occurred and remedial measures that have been taken to prevent the recurrence. All monitoring well design and replacement shall be approved by the Department prior to installation and may require a permit modification.

44. The field testing, sample collection and preservation and laboratory testing, including quality control procedures, shall be in accordance with methods approved by the Department in accordance with Chapters 62-4.246 and 62-3.401, F.A.C. Approved methods are published by the Department or as published in Standards Methods, A.S.T.M., or EPA methods shall be used. Approved methods for chemical analyses are summarized in the Federal Register, 40 CFR Part 136.

SPECIFIC CONDITIONS:

45. All water quality monitoring analyses shall be reported on the Department Quarterly Report on Groundwater Monitoring Form 62-522.900(2). The permittee shall submit to the Department the results of the water quality analysis, by July 15th and January 15th for the semi-annually periods January - June and July - December, respectively. The results shall be sent to the Solid Waste Section, Department of Environmental Protection, Southwest District office, 3804 Coconut Palm Drive, Tampa, Florida 33619-8313. In addition to the completed reporting form and analytical sheets, the report shall include a water table contour map for the date of the sampling event and a summary of all groundwater standard exceedances, as required by FAC 62-701.510(9)(a).

Amended 08-24-95.

46. Every two years and prior to ninety (90) days before the expiration of the Department Permit, the permittee shall submit an evaluation of the Groundwater Monitoring Plan as per F.A.C. Rule 62-701.510(9)(b). The evaluation shall include all applicable information as required by F.A.C. Rule 62-701.510(9), and shall include an assessment of the effectiveness of the existing landfill design and operation as related to the prevention of groundwater contamination. Any groundwater contamination that may exist, shall be addressed as part of a groundwater investigation for the landfill assessment. The Groundwater Monitoring Plan shall be adequate to monitor any modifications to the existing landfill site including but not limited to closure.

Amended 08-24-95.

47. The permittee shall provide financial assurance for this landfill site in accordance with F.A.C. Rule 62-701.630. All cost estimates for closure and long-term care shall be adjusted and submitted annually to: Solid Waste Manager, Solid Waste Section, Department of Environmental Protection, 3804 Coconut Palm Drive, Tampa, Florida 33619-8318. Proof that the financial assurance has been funded adequately shall be submitted annually to the FDEP District Office and to: Financial Coordinator, Solid Waste Section, Department of Environmental Protection, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.

48. Where required by Chapter 471 (P.E.) or Chapter 492 (P.G.), Florida Statutes, applicable portions of permit applications and supporting documents which are submitted to the Department for public record shall be signed and sealed by the professional(s) who prepared or approved them.

49. A closure permit application shall be required ninety (90) days prior to final acceptance of waste for each landfill portion of the site. The final cover shall be placed over the entire surface of each completed portion of the filled areas within one hundred and eighty (180) days after final waste deposit date for each area.

SPECIFIC CONDITIONS:

50. Prior to 90 days before the expiration of the Department Permit, the permittee shall apply for a renewal of a permit on forms and in a manner prescribed by the Department, in order to assure conformance with all applicable Department rules.

51. The permittee shall be aware of and operate under the attached "General Conditions". General Conditions are binding upon the permittee and enforceable pursuant to Chapter 403, Florida Statutes.

52. By acceptance of this Permit, the permittee certifies that he/she has read and understands the obligations imposed by the Specific and General Conditions contained herein and also including date of permit expiration and renewal deadlines. It is a violation of this permit for failure to comply with all conditions and deadlines.

53. This permit is valid for the revised method and sequence of filling and leachate/stormwater management plan in accordance with the following information submitted by Post, Buckley Schuh & Jernigan, Inc. (PBSJ):

Information dated February 22, 1996 (received February 28, 1996);

Information dated April 3, 1996 (received April 5, 1996);

"Proposed Stormwater Design Final Buildout and Details," Sheet 1 received April 5, 1996;

"Proposed Stormwater Design Operational Sequencing Plan," Sheet 2 received April 5, 1996; and

"Depth of Cover Field Investigation," Sheet 3, received February 28, 1996.

a. This plan shall be implemented within 30 days of receipt of this permit modification.

b. The silt screens shall be checked each work day and cleaned or replaced as necessary to promote adequate stormwater drainage.

New JUN 13 1996.

Attachment 1

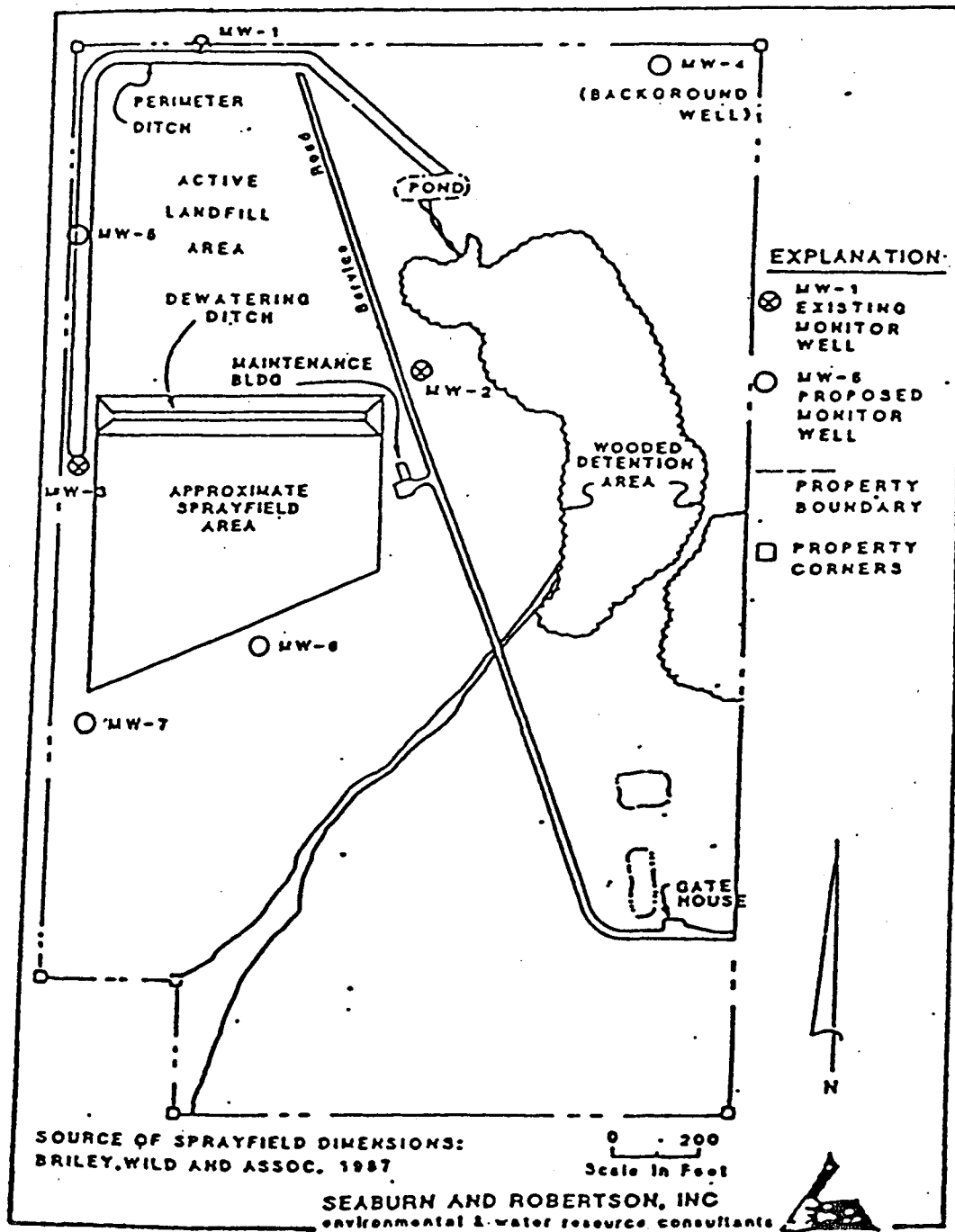
PERMITTEE: HARDEE COUNTY BOARD OF COUNTY COMMISSIONERS
HARDEE COUNTY SOLID WASTE DISPOSAL FACILITY
PERMIT NO.: SO25-214306

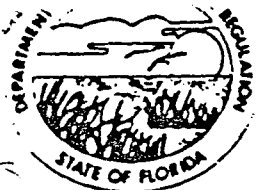
| SPECIFIC CONDITION | SUBMITTAL DUE DATE | REQUIRED ITEM |
|-----------------------|---|--|
| 1. | 180 days after issuance of permit | Site improvements completed |
| 3. | 60 days following construction | Certification and record drawings |
| 13. | March 1/Annually | Waste tire report |
| 16. | Quarterly | Waste quantity report |
| 17. | Monthly | Rainfall and leachate volume data |
| 17. | Annually | Leachate/water balance data |
| 19. | Quarterly | Gas monitoring results |
| 25. | Annually | Yard trash report |
| 34. | 90 days after issuance of permit | Water quality monitoring system installed |
| 37. | Quarterly | Leachate sampled/analyzed |
| 38. | 90 days after installation | Piezometer construction data |
| 39. | 90 days after installation | Survey of wells and piezometers |
| 40. | Annually with January 15th analysis results | Documentation of QA plan approval |
| 41. | Every 6 months | Wells sampled/analyzed |
| 45. | Each January 15th and July 15th | Analysis results |
| 46. | March 1997 | Evaluation of GWM Plan |

ATTACHMENT 1 cont'd

| SPECIFIC CONDITION | SUBMITTAL DUE DATE | REQUIRED ITEM |
|-----------------------|--|---|
| 47. | Annually | Updated cost estimates for closure and long-term care |
| 47. | Annually | Proof of funding for financial assurance |
| 49. | 90 days prior to final acceptance of waste | Closure Permit Application |
| 50. | 90 days prior to permit expiration | Apply for permit renewal |
| 53.a. | 30 days after receipt of modification | Implement leachate/stormwater management plan |

Permit Figure 1.





Florida Department of Environmental Regulation

Southwest District • 4520 Oak Fair Boulevard • Tampa, Florida 33610-34 • 813-623-5561

Bob Martinez, Governor

Dale Twachtman, Secretary

John Shearer, Assistant Secretary

Dr. Richard Garnitt, Deputy Assistant Secretary

PERMITTEE

Hardee County Board of
County Commissioners
c/o Mr. Ben Albritton
Room A-204, Courthouse Annex
412 West Orange Street
Wauchula, Florida 33873-2867

PERMIT/CERTIFICATION

GMS ID No: 4025C30001
Permit No: SC25-179573
Date of Issue: JUL 1 1990
Expiration Date: 6/1/92
County: Hardee
Lat/Long: 27°34'00"
81°46'50"
Sec/Town/Rge: 35/33S/25E
Project: Hardee County
Materials Recovery
Facility

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rule(s) 17-25 and 17-701. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents, attached hereto or on file with department and made a part hereof and specifically described as follows:

To construct a resource recovery facility (approximately 5 acres), referred to as the Hardee County Materials Recovery Facility, subject to the specific conditions attached, for materials recovery, storing and recycling, located near Airport Road and S.R. 64A, northeast of Wauchula, Hardee County, Florida.

Replaces Permit No.: N/A, New

PERMITTEE: Mr. Ben Britton PERMIT NO. SC25-179573
Hardee County Materials Recovery Facility

SPECIFIC CONDITIONS:

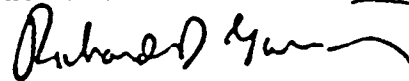
1. This site shall be classified as a resource recovery facility for materials recovery, sorting and recycling, and shall be constructed and operated in accordance with all applicable requirements of Chapters 17-25 and 17-701, Florida Administrative Code. This permit is valid for construction and operation in accordance with the reports and plans by Briley, Wild & Associates submitted on April 26, 1990, and additional information submitted by Briley, Wild & Associates on June 20, 1990, and in accordance with all applicable requirements of Department rules. Any construction not previously approved as part of this permit shall require a separate Department permit unless the Department determines a permit modification to be more appropriate.
2. After all significant initial construction of the site or facility components have been completed, the engineer or the authorized public officer shall complete an Application to Operate Only Resource Recovery and Management Facility-Certification of Construction Completion, Department Form 17-7.130(2) and contact the Department to arrange for Department representatives to inspect the facility in the company of the permittee, the engineer, and the proposed on-site facility operator. The inspection is to ensure that the site or facility components have been developed in accordance with the approved permit. "Record Drawings" shall be submitted to the Department.
3. The site shall have a surface water management system operated and maintained to prevent surface water flow onto waste filled areas, and a stormwater runoff control system operated and maintained to collect and control stormwater to meet requirements of Florida Administrative Code Rule 17-25 and requirements of the respective water management district.
4. In the event of damage to any portion of the site facilities or failure of any portion of the systems, the permittee shall immediately notify the Department of Environmental Regulation explaining such occurrence and remedial measures to be taken and time needed for repairs. Written detailed notification shall be made within one week following the occurrence.
5. Prior to 90 days before the expiration of the Department Permit, the permittee shall apply for a renewal of a permit on forms and in a manner prescribed by the Department, in order to assure conformance with all applicable Department rules.

SPECIFIC CONDITIONS:

6. The permittee shall submit to the Department a fire safety survey annually which includes a statement from the local fire protection authorities that the site meets the requirements of the local fire protection authorities. This survey report shall be submitted by January 1st of each year.
7. A trained supervisor or foreman shall be responsible for maintaining the facility in an orderly, safe, and sanitary manner. Sufficient personnel shall be employed as noted in the operation plan to adequately operate the facility.
8. The permittee shall remove from the site 75% of all recyclable goods each year, either for recycling or disposal.
9. The permittee shall dispose of all nonrecyclable goods in a landfill authorized by the Department.
10. The permittee shall be aware of and operate under the attached "General Conditions". General Conditions are binding upon the permittee and enforceable pursuant to Chapter 403, Florida Statutes.

Issued this 31 day of July, 1990

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION



Richard D. Garrity, Ph.D.
Deputy Assistant Secretary
Southwest District

ATTACHMENT - GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations and restrictions set forth in this permit, are "permit conditions" and are binding and enforceable pursuant to Sections 403.141, 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.
2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.
3. As provided in subsections 403.087(6) and 403.722(5), F.S., the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, State, or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in this permit.
4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.
5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties hereafter; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.
6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed and used by the permittee to achieve compliance with the conditions of this permit, are required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.
7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at reasonable times, access to the premises where the permitted activity is located or conducted to:
 - (a) Have access to and copy any records that must be kept under conditions of the permit;
 - (b) Inspect the facility, equipment, practices, or operations regulated or required under this permit; and

- (c) Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

- (a) A description of and cause of noncompliance; and
- (b) The period of noncompliance, including dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance.

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.111 and 403.73, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance; provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

11. This permit is transferable only upon Department approval in accordance with Rule 17-4.120 and 17-730.300, Florida Administrative Code, as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. This permit also constitutes:

- () Determination of Best Available Control Technology (BACT)
- () Determination of Prevention of Significant Deterioration (PSD)
- () Certification of compliance with State Water Quality Standards (Section 401, PL 92-500)
- () Compliance with New Source Performance Standards

14. The permittee shall comply with the following:

- (a) Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.
- (b) The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.
- (c) Records of monitoring information shall include:
 - 1. the date, exact place, and time of sampling or measurements;
 - 2. the person responsible for performing the sampling or measurements;
 - 3. the dates analyses were performed;
 - 4. the person responsible for performing the analyses;
 - 5. the analytical techniques or methods used;
 - 6. the results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware the relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

Environmental Protection

Lawton Chiles
Governor

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

Virginia B. Wetherell
Secretary

PERMITTEE

Hardee County Board of
County Commissioners
Mr. J.R. Prestridge,
Assistant County Manager
412 W. Orange Street
Wauchula, Fl 33873

PERMIT/CERTIFICATION

GMS ID No: 4025C30001
Permit No: SO25-271793
Date of Issue: SEP - 8 1995
Expiration Date: 09/01/2000
County: Hardee
Lat/Long: 27°34'00"N
81°46'50"W
Sec/Town/Rge: 35/33S/25E
Project: Hardee County
Materials Recovery
Facility

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rule(s) 62-3, 62-4, 62-25, 62-522, 62-550, 62-701, and 62-711. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans and other documents, attached hereto or on file with the Department and made a part hereof and specifically described as follows:

To construct and operate a materials recovery facility, referred to as the Hardee County Materials Recovery Facility, located on Airport Road, near the City of Wauchula, Hardee County, Florida, subject to the specific and general conditions attached. The specific conditions attached are for the operation of:

1. Materials Recovery Facility

Replaces Permit Number: SC25-179573

This permit contains compliance items summarized in Attachment 1 that shall be complied with and submitted to the Department by the dates noted. If the compliance dates are not met and submittals are not received by the Department on the dates noted, enforcement action may be initiated to assure compliance with the conditions of this permit.

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations and restrictions set forth in this permit, are "permit conditions" and are binding and enforceable pursuant to Sections 403.141, 403.161, 403.727, or 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.
2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.
3. As provided in subsections 403.087(6) and 403.722(5), F.S., the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of rights, nor any infringement of federal, State, or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in this permit.
4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgment of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.
5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.
6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed and used by the permittee to achieve compliance with the conditions of this permit, are required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

GENERAL CONDITIONS:

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at reasonable times, access to the premises where the permitted activity is located or conducted to:

- (a) Have access to and copy any records that must be kept under conditions of the permit;
- (b) Inspect the facility, equipment, practices, or operations regulated or required under this permit; and
- (c) Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

- (a) A description of and cause of noncompliance; and
- (b) The period of noncompliance, including dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance.

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is prescribed by Sections 403.111 and 403.73, F.S. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance; provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

GENERAL CONDITIONS:

11. This permit is transferable only upon Department approval in accordance with Rule 62-4.120 and 62-730.300, Florida Administrative Code, as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.
12. This permit or a copy thereof shall be kept at the work site of the permitted activity.
13. This permit also constitutes:
 - (a) Determination of Best Available Control Technology (BACT)
 - (b) Determination of Prevention of Significant Deterioration (PSD)
 - (c) Certification of compliance with State Water Quality Standards (Section 401, PL 92-500)
 - (d) Compliance with New Source Performance Standards
14. The permittee shall comply with the following:
 - (a) Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.
 - (b) The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.
 - (c) Records of monitoring information shall include:
 1. the date, exact place, and time of sampling or measurements;
 2. the person responsible for performing the sampling or measurements;
 3. the dates analyses were performed;
 4. the person responsible for performing the analyses;
 5. the analytical techniques or methods used;
 6. the results of such analyses.

GENERAL CONDITIONS:

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware the relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

SPECIFIC CONDITIONS:

1. **Facility Designation.** This site shall be classified as a resource recovery facility for materials recovery, sorting and recycling, and shall be constructed and operated in accordance with all applicable requirements of Chapters 62-3, 62-4, 62-25, 62-28, 62-520, 62-522, 62-550, and 62-701 Florida Administrative Code (F.A.C.) and all applicable requirements of Department Rules.
2. **Permit Application Documentation.** This permit is valid for operation of the material recovery facility and related facilities in accordance with the reports, plans and other information, submitted by Hardee County, Mr. Ronald D. Stowers, P.E., as follows:
 - Renewal Application - Solid Waste Recycle Center dated May 31, 1995;
 - Additional information dated June 29, 1995;
 - Record Drawings received May 31, 1995, entitled, Hardee County Solid Waste Recycling Center, originally dated December 1991 and prepared by Briley, Wild and Associates;
 - and in accordance with all applicable requirements of Department rules.
3. **Permit Modifications.** Any activities not previously approved as part of this permit shall require a separate Department permit unless the Department determines a permit modification to be more appropriate. Any significant changes to the operations at the facility shall require a permit modification. Permits shall be modified in accordance with the requirements of 62-4.080, F.A.C. A modification which is reasonably expected to lead to substantially different environmental impacts which require a detailed review by the Department is considered a substantial modification.
4. **Permit Renewal.** As required by F.A.C. 62-4.090(1), no later than sixty (60) days before the expiration of the Department Permit, the permittee shall apply for a renewal of a permit on forms and in a manner prescribed by the Department, in order to assure conformance with all applicable Department rules. Permits shall be renewed at least every five years as required by F.A.C. 62-701.330(3).
5. **Prohibitions.** The prohibitions of F.A.C. 62-701.300 shall not be violated.
6. **Facility Operation Requirements.** The permittee shall operate this facility in accordance with F.A.C. 62-701.700; and the Operations Plan in Renewal Application - Solid Waste Recycle Center dated May 31, 1995; the additional information dated June 29, 1995; and any other applicable requirements.

SPECIFIC CONDITIONS:

7. **Operation Plan and Operating Record.** A copy of the Department approved permit, operational plan, construction reports and record drawings, and supporting information shall be kept at the facility at all times for reference and inspections. The operations plan shall be reviewed and all changes, or a statement indicating that no changes have occurred, shall be submitted to the Department annually, by April 15th each year.
8. **Storage of Materials.**
 - a. All materials shall be stored as indicated on the Table, "Method of Storage for Recyclables" dated June 29, 1995.
 - b. All materials which are stored outside the building, shall be stored on impermeable surfaces and shall be covered, or shall be stored in covered containers to prevent precipitation infiltration of the materials.
 - c. All residuals (non-recoverable, non-recyclable materials) shall be stored in areas with leachate collection, and shall be disposed of within 24 hours of processing the material and generating the residual.
 - d. All recovered materials shall be removed from the site for recycling or disposal in accordance with the schedule outlined in the Table, "Method of Storage for Recyclables" dated June 29, 1995. In any event, recovered materials shall be removed from the facility within one year of processing/recovering the material.
9. **Waste Records.** The owner or operator of the materials recovery facility shall record, in tons per day, the amount of material received. The quantity, in tons, of each material (e.g. aluminum cans, steel/tin cans, glass (clear, amber), plastic (#1-7), newsprint, cardboard, residuals, etc.) which is removed from the site for recycling or disposal shall be compiled monthly and submitted to the Department quarterly, by January 15th, April 15th, July 15th and October 15th of each year. The operating authority shall remove from the site, 75% of all recovered materials each year, for recycling or disposal.
10. **Monitoring of Waste.** The permittee shall not accept hazardous waste or any hazardous substance at this site. Hazardous waste is a waste in Chapter 62-730, F.A.C. Hazardous substances are those defined in Section 403.703, Florida Statute or in any other applicable state or federal law or administrative rule.

SPECIFIC CONDITIONS:

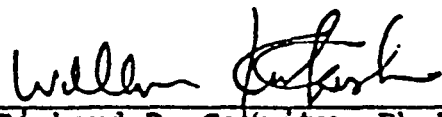
11. **Drainage Requirements.** All areas shall be cleaned at the end of each day's operation, at a minimum, or as needed, to prevent odor or vector problems. All liquids shall be contained within the building. Floors shall be free of standing liquids. All drains and conveyor pits shall be inspected for damage and clogging at least weekly, and shall be cleaned as required.
12. **Closure Requirements.** The facility owner or operator shall notify the Department of the facility's closure, no later than 180 days prior to the date when the facility is expected to close, as required by F.A.C. 62-701.700(3)(d). The facility shall be closed in accordance with F.A.C. 62-701.700(3)(d) and the Closure Plan submitted in the Renewal Application - Solid Waste Recycle Center dated May 31, 1995.
13. **Financial Assurance.** The permittee shall provide financial assurance for the material recovery facility site in accordance with F.A.C. 62-701.700(4).
 - a. All costs for closure shall be adjusted and submitted annually, by March 1st each year to: Solid Waste Manager, Solid Waste Section, Department of Environmental Protection, 3804 Coconut Palm Drive, Tampa, Florida 33619-8318.
 - b. Proof that the financial mechanism has been adequately funded shall be submitted annually, by September 1st each year, to: Financial Coordinator, Solid Waste Section, Department of Environmental Protection, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.
14. **Control of Nuisance Conditions.** The operating authority shall be responsible for the control of odors and fugitive particulates arising from this construction and operation. Such control shall minimize the creation of nuisance conditions on adjoining property. Complaints received from the general public, and confirmed by Department personnel upon site inspection, shall constitute a nuisance condition, and the permittee must take immediate corrective action to abate the nuisance. The owner or operator shall control disease vectors so as to protect the public health and welfare.
15. **Stormwater System.** The site shall continue to have a stormwater management system operated and maintained in accordance with F.A.C. 62-25, 62-330, and any other applicable Department rules.
16. **Fire Safety.** The permittee shall submit to the Department a fire safety survey annually which includes a statement from the local protection authorities that the site meets the requirements of the local fire protection authorities. This report shall be submitted by January 15th of each year.

SPECIFIC CONDITIONS:

17. **Facility Maintenance and Repair.** The site shall be properly maintained including building maintenance, and maintenance of processing equipment, drainage systems, and stormwater systems. In the event of damage to any portion of the site facilities or failure of any portion of the associated systems, the permittee shall immediately (within 24 hours) notify the Department of Environmental Protection explaining such occurrence and remedial measures to be taken and time needed for repairs. Written detailed notification shall be submitted to the Department within seven (7) days following the occurrence.
18. **Professional Certification.** Where required by Chapter 471 (P.E.) or Chapter 492 (P.G.), Florida Statutes, applicable portions of permit applications and supporting documents which are submitted to the Department for public record shall be signed and sealed by the professional(s) who prepared or approved them.
19. **General Conditions.** The permittee shall be aware of and operate under the "General Conditions". General Conditions are binding upon the permittee and enforceable pursuant to Chapter 403, Florida Statutes.
20. **Permit Acceptance.** By acceptance of this Permit, the Permittee certifies that he/she has read and understands the obligations imposed by the Specific and General Conditions contained herein and also including date of permit expiration and renewal deadlines. It is a violation of this permit for failure to comply with all conditions and deadlines.
21. **Regulations.** A copy of F.A.C. 62-701.700, effective May 19, 1994, attached, is a part of this permit and shall remain attached for future reference. In the event that these regulations governing this permitted operation are revised, the Department shall notify the permittee, and the permittee shall request modification of those specific conditions which are affected by the revision of regulations to incorporate those revisions.

Executed in Tampa, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION


for Richard D. Garrity, Ph.D.
Director of District Management
Southwest District

ATTACHMENT 1

| SPECIFIC CONDITION | SUBMITTAL DUE DATE | REQUIRED ITEM |
|-----------------------|---|--|
| 4. | 60 days prior to permit expiration (by July 1, 2000) | Permit Renewal Application |
| 7. | Annually, by April 15th each year | Revised Operations Plan |
| 9. | Quarterly, by January 15th, April 15th, July 15th, and October 15th | Waste quantity reports |
| 12. | 180 days prior to date of final material acceptance | Closure notification |
| 13.a. | Annually, by March 1st | Revised financial assurance cost estimates |
| 13.b. | Annually, by September 1st | Proof that financial mechanism is adequately funded |
| 16. | Annually, by January 15th | Fire safety survey/inspection report |
| 17. | Within 24 hours of occurrence | Notification of failure or damage to facility systems |
| 17. | Within 7 days of occurrence | Written notification |

STATEMENT OF COMPLETION
AND REQUEST FOR TRANSFER TO OPERATION ENTITY

Within 30 days after completion of construction of the Surface Water Management system the owner or authorized agent must SEND THE ORIGINAL PLUS ONE COPY OF THIS FORM AND COMPLETE SETS OF CERTIFIED AS-BUILT DRAWINGS for the Surface Water Management system structures and appurtenances to the Southwest Florida Water Management District, 23 Broad Street, Brooksville, Florida 34609-6899. Upon receipt, the District will review this statement of completion and may inspect the system for compliance with the approved permit and as-built drawings. Within 30 days after receipt of this statement, the District will notify the permittee whether the operation phase of the permit may commence. The operation phase of this permit is effective when the statement of completion form signed by an authorized District representative.

(1) SURFACE WATER MANAGEMENT SYSTEM INFORMATION:

Permit No. 407767.01 County Hardee

Project Name: Hardee County Solid Waste Recycling Center

Permittee: Hardee County Solid Waste Recycling Center

Address: Post Office Box 246

City: Hauchula State FL Zip 33873

Telephone: (813) 773-5089

(2) I hereby certify that all facilities have been built substantially in accordance with the approved permit design plan and that any substantial deviations (attached) will not prevent the system from fluctuating in compliance with the requirements of this chapter. This certification is verified by the attached "as-built" drawings (as-built drawings and certification must be signed and sealed by a Professional Engineer, if required by Chapter 471, F.S.).

By: 
 Signature of Engineer of Record

(Affix Seal)

Gloria C. Brady P.E. #35151
 Name (Please Type) Florida Registration No.

Aim Engineering & Surveying Inc.
 Company Name

Post Office Box 1057
 Company Address

Hauchula, FL 33873

Phone: (813) 773-5931 Date: 1-26-94

The District is hereby notified that construction of the Surface Water Management system is completed, and the Permittee requests that the Surface Water Management permit be transferred to the entity for operation and maintenance as named in Section (4).

J.R. Prestidge
Signature of Owner, Permittee or
Authorized Agent

Permit No. 407767.01

J.R. Prestidge, Supervisor
Name and Title (Please Type)

Hardee County Solid Waste Recycling Center
Company Name

Post Office Box 246
Address

Wauchula, FL 33873
City, State, Zip

Phone: (813) 773-5089 Date: 1/31/94

(4) The below-named entity or individual agrees to maintain and operate the Surface Water Management system in compliance with all permit conditions and the provisions of Chapter 40D-4, Florida Administrative Code (F.A.C.).

J.R. Prestidge
By: Signature of Individual or Authorized
Agent for Operation Entity

J.R. Prestidge, Supervisor
Name and Title (Please Type)

Permit No. 407767.01

Hardee County Solid Waste Recycling Center
Name of Individual or Operation Entity

Post Office Box 246
Address

Wauchula, FL 33873
City, State, Zip

Phone: (813) 773-5089 Date: 1/31/94

RESPONSIBILITY FOR MAINTENANCE AND OPERATION MAY BE TRANSFERRED TO ANOTHER ENTITY ONLY UPON WRITTEN NOTICE AND APPROVAL BY THE DISTRICT IN ACCORDANCE WITH RULE 40D-4.351, F.A.C.

SWFWMD USE ONLY

Based upon the certification by the Engineer of Record in Section (2) and the notice of completion in Section (3), the responsibility for operation and maintenance of the system is transferred to the entity named in section (4), and the operation phase of this permit is effective on the date indicated below.

Southwest Florida Water Management District

Authorized District Representative

Name and Title

Date: _____

Permit No. _____

APPENDIX B

CERTIFICATION OF FISCAL HARDSHIP

HARDEE COUNTY
BOARD OF COUNTY COMMISSIONERS
412 West Orange Street
Room A-203, Courthouse Annex
Wauchula, Florida 33873-2867
(941)773-9430 * (941)773-6952 * Fax (941)773-0958

March 03, 1997

Department of Environmental Protection
Solid Waste Section
Attention: Bob Butera
3804 Coconut Palm Drive
Tampa, Florida 33619-8318

Re: Permit Fee Reduction

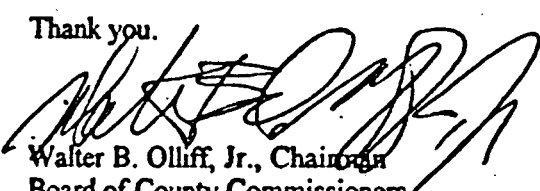
Dear Mr. Butera:

Pursuant to the Florida State Law 94-278, Hardee County is requesting a permit fee reduction.

Hardee County is currently at the ten mill ad valorem tax cap. Florida Law states that millage greater than eight mills would justify a permit fee reduction or waiver to be granted on the basis of fiscal hardship. Hardee County certifies that the cost of the permit processing fee is a fiscal hardship due to the fact that ad valorem operating millage is greater than eight mills.

Attached you will find the certification of the county millage by the Hardee County Property Appraisers Officer.

Thank you.



Walter B. Olliff, Jr., Chairman
Board of County Commissioners
Hardee County, Florida

WBO/jw

c: file
Hardee County Solid Waste Dept.
Ed Hilton, PBSJ

edp/permiff

Minor L. Bryant - Benny W. Albritton - Gordon R. Norris
E. Milton Lanier - Walter B. Olliff, Jr.
County Manager Gary Oden - Asst. Co. Manager J. R. Prestridge - County Attorney Gary A. Vorbeck

"An Equal Opportunity Employer"

RESOLUTION NO. 96-29

A RESOLUTION ADOPTING THE FINAL MILLAGE RATE
FOR HARDEE COUNTY BOARD OF COUNTY
COMMISSIONERS FOR FISCAL YEAR COMMENCING ON
OCTOBER 1, 1996 AND ENDING SEPTEMBER 30, 1997.

NOW, THEREFORE BE IT RESOLVED BY THE GOVERNING BOARD OF THE HARDEE
COUNTY COMMISSIONERS THAT:

SECTION 1. The Governing Board does hereby adopt its final millage rate of 10 mills to be levied
for the general fund upon all real and tangible personal property located within the boundaries of the
above named taxing authority.

SECTION 2. THE FINAL LEVY OF 10 MILLS WILL RESULT IN A 9.613 PERCENT
INCREASE OF THE ROLLED BACK RATE OF 9.123.

SECTION 3. This final millage rate of 10 mills for the general fund is for the calendar year 1997 to
fund the expenses for the fiscal year commencing October 1, 1996 and ending September 30, 1997.

PASSED AND ADOPTED THIS 17TH DAY OF SEPTEMBER 1996.

STATE OF FLORIDA

COUNTY OF HARDEE

YES -


BENNY ALBRITTON, CHAIRMAN

ABSENT

THIS IS TO CERTIFY THAT THE FOREGOING IS A TRUE

AND CORRECT COPY OF Resolution 96-29

AS ADOPTED BY THE BOARD OF COUNTY COMMISSIONERS NO -

OF HARDEE COUNTY THE 17th DAY OF September

19 96 YES -


TED C. HITE, SR.


WALTER OLLIE, JR.


MINOR L. BRYANT

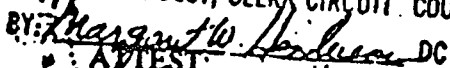
ABSENT

MILTON LANIER

WITNESS MY HAND AND OFFICIAL SEAL THIS 19th

DAY OF September, 1996

COLEMON W. BEST, CLERK CIRCUIT COURT

BY:  DC

TEST:


COLEMON W. BEST, CLERK

APPENDIX C

GEOTECHNICAL INVESTIGATION

**Report
Geotechnical Engineering Services
Hardee County Sanitary Landfill
PSI Project No. 757-75054**

March 10, 1997

Post, Buckley, Schuh & Jernigan, Inc.
1560 Orange Avenue, Suite 700
Winter Park, Florida 32789

Attention: Mr. Bob Mackey, P.E.
Project Manager

RE: Report
Geotechnical Engineering Services
Hardee County Sanitary Landfill
PSI Project No.: 757-75054

Dear Mr. Mackey:

In accordance with our proposal to you dated February 5, 1997, Professional Service Industries, Inc. (PSI) has provided geotechnical engineering services in connection with the referenced project. This report includes an overview of the field work and laboratory testing that we completed for the assignment. Also provided are preliminary recommendations for site preparation and foundation design of the leachate storage tanks.

PROJECT CONSIDERATIONS

The Hardee County Sanitary Landfill is located in northeast Hardee County, east of U.S. 17 and north of County Road 636. The property is located in Section 35, Township 33 South, Range 25 East. The landfill site is generally rectangular in shape occupying a plan area of approximately 100 acres.

At the present time, geotechnical engineering services have been directed at the northwest corner of the site, where a liner wall will be constructed as well as above ground leachate storage tanks. The liner wall will be located south of the existing dewatering ditch and will consist of installing a High Density Polyethylene (HDPE) liner in a trench. The HDPE liner will be keyed into low permeable clays at depth providing a hydraulic cut off barrier.

The leachate storage tanks are to be built near the maintenance building. They will comprise two 50,000 gallon above ground tanks. It is proposed that the tanks be supported on a shallow foundation system.

A generalized plan view of the facility and the area of interest at this time is included on Sheet 1.

Information To Build On

SUBSOIL AND GROUNDWATER CONDITIONS

General

To evaluate subsoil and groundwater conditions in the area of interest to this assignment, we drilled/sampled six Standard Penetration Test (SPT) borings. These borings were completed in general accordance with the procedures outlined in ASTM D-1586. The borings were advanced to depths in the range 25 to 40 feet below grade. The approximate locations at which the borings were drilled are indicated on Sheet 1.

In the upper 10 feet, SPT samples were recovered continuously then at 5 foot centers thereafter to boring termination. Samples recovered from the borings were visually stratified in the laboratory by a geotechnical engineer, following guidelines contained in the Unified Soil Classification System (USCS). Records of the materials encountered in the borings are presented as soil profiles on Sheet 2. Sheet 2 includes a legend describing the various materials in USCS format.

Stratigraphy

The borings disclosed reasonably consistent subsoil conditions in the area of evaluation. For the purpose of discussions, these conditions have been generalized as follows. From the ground surface to depths in the range 12 to 18 feet below grade is a varying sequence of fine sands. These sands grade from being relatively clean to slightly silty and silty/clayey in composition (i.e. SP, SP/SM, SM and SC materials). Based on the SPT blow counts, these materials are in a loose to medium dense condition.

Underlying the upper sands is clays. These clays grade from being sandy to silty in composition and from soft to extremely hard in consistency. There are clay zones that are primarily derived from weathered limestone, with SPT blow counts in excess of 50 blows for a few inches. All four of the proposed liner wall borings were terminated in clay.

Groundwater

Groundwater level measurements were made in the borings at the time of drilling. These measurements disclosed the water table at depths in the range 4.0 to 7.8 feet below grade. As a result of recharge during the rainy season, the water table will rise some 2 to 3 feet above current levels. The groundwater levels at the site will also be impacted by construction activities.

LABORATORY TESTING

As noted earlier, the laboratory testing work included the stratification of all soil samples in accordance with USCS procedures. Additionally, we carried out four laboratory permeability tests plus nominal classification tests to determine pertinent engineering characteristics/parameters. All permeability tests were performed in a triaxial cell at a



confining pressure of 5 psi. Results of the laboratory tests are presented in Table 1. This table also includes details on boring numbers and sample depths for the test specimens.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

General

The results of the borings and laboratory testing indicate low permeable soils at depth in the area of the proposed liner wall. Subsoils at the site of leachate storage tanks are considered generally suitable for grade support of these structures. In order to enhance foundation performance, the tanks should be supported on subgrade soils that have been densified by surface proof rolling. A design bearing value of 3000 pounds per square foot can be used to size foundations.

Site Preparation For Storage Tanks

At the outset of construction, the site should be stripped of the existing vegetation cover and topsoils. Next, the subgrade soils should be compacted in-situ by surface rolling with a large self propelled vibratory roller. The roller should be capable of imparting a dynamic drum force of at least 36,000 pounds. The tank subgrade soils should be uniformly compacted with the roller to attain a degree of densification that is at least 95 percent of the materials ASTM D-1557 maximum dry density for a depth of 2 feet.

Proof rolling operations should be observed by a representative of this office. Observations would be made as to the general stability of the subgrade in response to rolling. In the event that yielding/pumping soils are encountered during vibratory compaction, such materials should be removed and replaced with clean granular fill. The replacement fill should also be thoroughly compacted to provide a stable subgrade.

Fill required to raise site grades should comprise clean sand with less than 12 percent by dry weight passing the U.S. Standard Number 200 sieve. The fill should be placed in one foot lifts and be compacted to 95 percent or more of the materials ASTM D-1557 maximum dry density.

Foundation Support

Results of our evaluations indicate that the subsurface materials have adequate shear strength to support fully loaded tanks. We estimate that foundations designed for a bearing pressure of 3000 psf will have a factor of safety against a bearing capacity failure in excess of three. This value is based on the assumption that the structures will be founded on thoroughly compacted native soils and/or engineered fill. The outside foundations/edges of the tank should be adequately protected by soil as to prevent undermining.

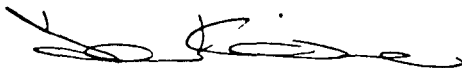


Based on our current understanding of the general loading conditions for the tanks, we anticipate settlement performance being within tolerable structural limits. We would be pleased to address settlement matters more fully when actual design loads are known.

PSI appreciates the opportunity to be of service to you on this assignment and we trust that the foregoing and accompanying attachments are of assistance to you at this time. In the event that you have any questions on the report or if you require additional information, please call.

Very truly yours,

PROFESSIONAL SERVICE INDUSTRIES, INC.



Ian Kinnear, P. E.
Senior Geotechnical Engineer
FL Registration No. 32614

IK:cd
IK\75775054.311

Attachments

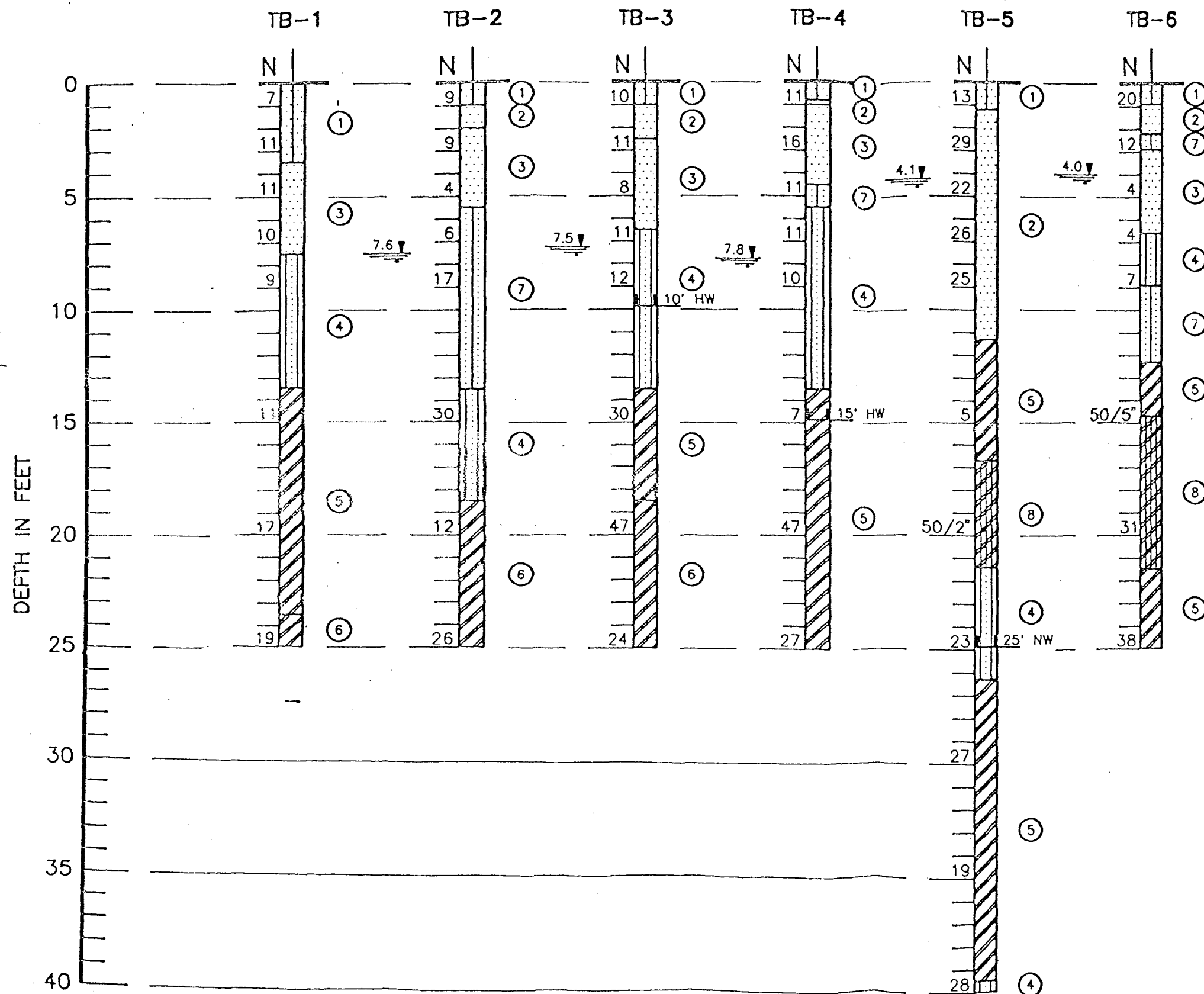
- Table 1
- Sheets 1 and 2



TABLE 1

SUMMARY OF LABORATORY TEST RESULTS
HARDEE COUNTY SANITARY LANDFILL

| Permeability Test Results | | | |
|---------------------------|---|-------------------------------|--|
| Boring TB-1 at 15 Feet | | | |
| Permeability | = | 3.3 x 10 ⁻⁷ cm/sec | |
| Wet Density | = | 104.4 pcf | |
| Moisture Content | = | 56.4 % | |
| Confining Pressure | = | 5 psi | |
| Boring TB-2 at 25 Feet | | | |
| Permeability | = | 7.7 x 10 ⁻⁸ cm/sec | |
| Wet Density | = | 89.0 pcf | |
| Moisture Content | = | 112.7 % | |
| Confining Pressure | = | 5 psi | |
| Boring TB-3 at 25 Feet | | | |
| Permeability | = | 4.3 x 10 ⁻⁷ cm/sec | |
| Wet Density | = | 93.5 pcf | |
| Moisture Content | = | 80.7 % | |
| Confining Pressure | = | 5 psi | |
| Boring TB-4 at 17 Feet | | | |
| Permeability | = | 6.1 x 10 ⁻⁸ cm/sec | |
| Wet Density | = | 118.9 pcf | |
| Moisture Content | = | 30.8 % | |
| Confining Pressure | = | 5 psi | |



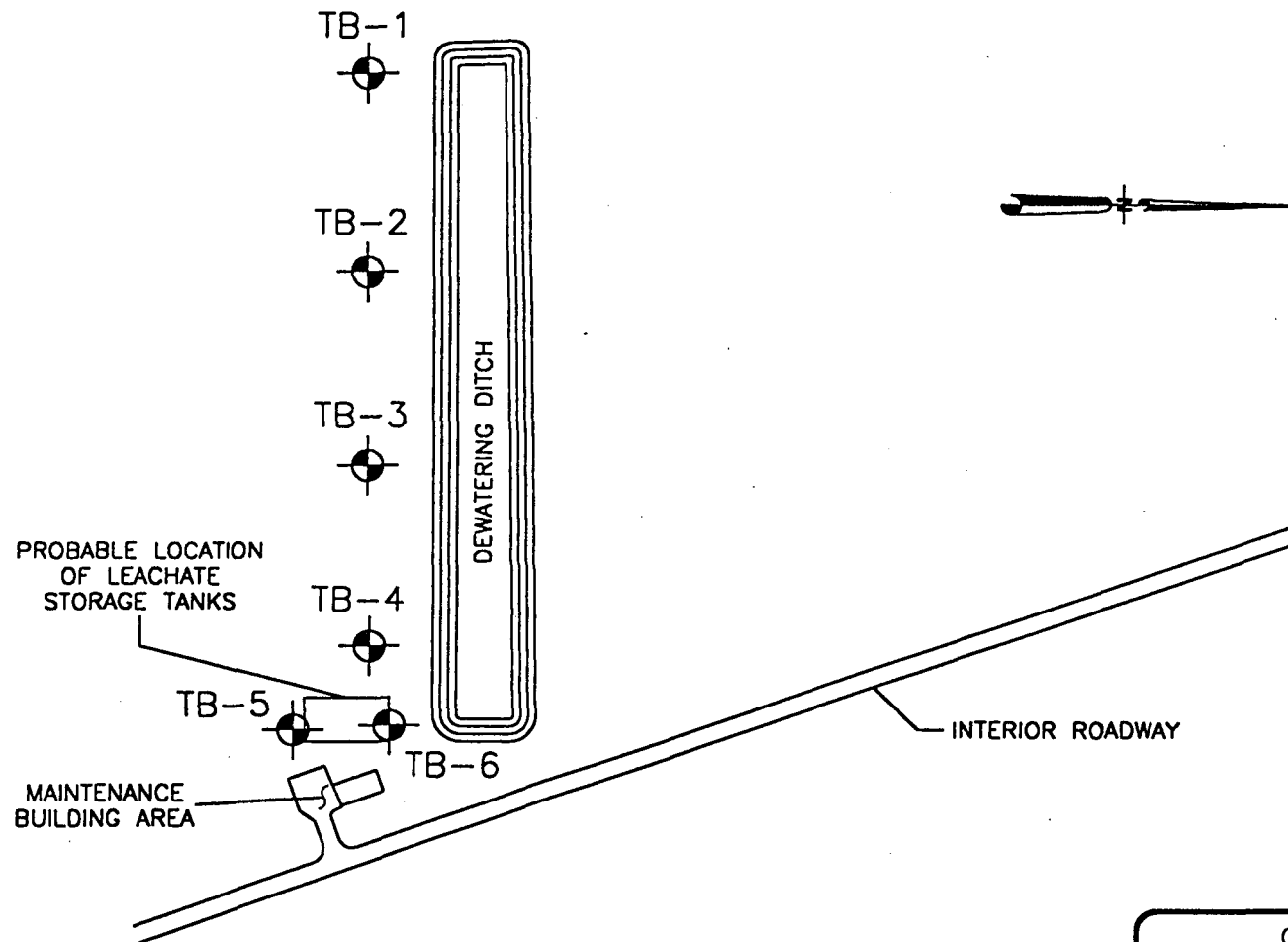
LEGEND

- ① GRAY TO BROWN FINE SAND TO SLIGHTLY SILTY FINE SAND TRACE ROOTS, (SP), (SP-SM)
 - ② LIGHT GRAY FINE SAND, (SP)
 - ③ LIGHT BROWN FINE SAND, (SP)
 - ④ GRAY TO BROWN SILTY FINE SAND TO CLAYEY FINE SAND, (SM), (SC)
 - ⑤ GREEN TO GRAY CLAY WITH SAND SEAMS OCCASIONAL PHOSPHATES, (CL)
 - ⑥ GREEN CLAY, (CH)
 - ⑦ LIGHT TO DARK RED-BROWN SLIGHTLY SILTY TO SILTY FINE SAND, OCCASIONAL WEAKLY CEMENTED FINE SAND, (SP-SM), (SM)
 - ⑧ LIGHT GRAY BROWN INDURATED CLAY/SILT TO WEATHERED LIMESTONE
- (SP) UNIFIED SOIL CLASSIFICATION GROUP SYMBOL
- 7.6 ▼ DEPTH TO GROUNDWATER LEVEL IN FEET: 2/13/97 TO 2/17/97
- N STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT
- 50/5' NUMBERS OF BLOWS REQUIRED (50) TO DRIVE SAMPLING SPOON 5 INCHES
- 10' NW/HW DEPTH TO WHICH NW/HW CASING WAS DRIVEN IN FEET, (NOTE: 3' CASING/4' CASING RESPECTIVELY)

GEOTECHNICAL ENGINEERING SERVICES
HARDEE COUNTY LANDFILL
WACHULA, FLORIDA

**Environmental
Geotechnical
Construction**
Consulting • Engineering • Testing

| | | |
|------------|---------------|---------------------|
| DRAWN: DCB | SCALE: NOTED | PROJ. NO: 757-75054 |
| CHECK: IK | DATE: 2-21-97 | SHEET: 2 |



SITE LOCATION

SCALE: 1"=200'



APPROXIMATE LOCATION OF STANDARD PENETRATION
TEST BORING

D.E.P.
JAN - 2 1998
TAMPA

GEOTECHNICAL ENGINEERING SERVICES

HARDEE COUNTY LANDFILL

WACHULA, FLORIDA

psi Environmental
Geotechnical
Construction
Consulting • Engineering • Testing

| | | |
|------------|---------------|---------------------|
| DRAWN: DCB | SCALE: NOTED | PROJ. NO: 757-75054 |
| CHKD: IK | DATE: 2-21-97 | SHEET: 1 |

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS
HARDEE COUNTY SANITARY LANDFILL

| Permeability Test Results | | | |
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| Boring TB-1 at 15 Feet | | | |
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| Wet Density | = | 104.4 pcf | |
| Moisture Content | = | 56.4 % | |
| Confining Pressure | = | 5 psi | |
| Boring TB-2 at 25 Feet | | | |
| Permeability | = | 7.7 x 10 ⁻⁸ cm/sec | |
| Wet Density | = | 89.0 pcf | |
| Moisture Content | = | 112.7 % | |
| Confining Pressure | = | 5 psi | |
| Boring TB-3 at 25 Feet | | | |
| Permeability | = | 4.3 x 10 ⁻⁷ cm/sec | |
| Wet Density | = | 93.5 pcf | |
| Moisture Content | = | 80.7 % | |
| Confining Pressure | = | 5 psi | |
| Boring TB-4 at 17 Feet | | | |
| Permeability | = | 6.1 x 10 ⁻⁸ cm/sec | |
| Wet Density | = | 118.9 pcf | |
| Moisture Content | = | 30.8 % | |
| Confining Pressure | = | 5 psi | |

D.E.P.
JAN - 2 1998
SOUTHWEST DISTRICT
TAMPA

TABLE 1 - Continued
SUMMARY OF LABORATORY TEST RESULTS
HARDEE COUNTY SANITARY LANDFILL

| Atterberg Limits | | |
|------------------------|---|-------|
| Boring TB-3 at 25 Feet | | |
| LL | = | 128 % |
| PL | = | 39 % |
| PI | = | 89 % |
| -200 | = | 75 % |
| Boring TB-5 at 24 Feet | | |
| LL | = | 110 % |
| PL | = | 35 % |
| PI | = | 75 % |
| -200 | = | 54 % |

D.E.P.
JAN - 2 1998
SOUTHWEST DISTRICT
TAMPA

| Moisture Content and No. 200 Wash Sieves | | |
|--|---|---------|
| Boring TB-1 at 15 Feet | | |
| Moisture Content | = | 56.4 % |
| -200 | = | 53 % |
| Boring TB-2 at 20 Feet | | |
| Moisture Content | = | 105.9 % |
| -200 | = | 86 % |
| Boring TB-2 at 25 Feet | | |
| Moisture Content | = | 112.7 % |
| -200 | = | 97 % |

APPENDIX D

WATER QUALITY PLAN MODIFICATION

**WATER QUALITY MONITORING PLAN MODIFICATION
HARDEE COUNTY SOLID WASTE MANAGEMENT FACILITY**

Permit No. SO25-214306

Prepared For:

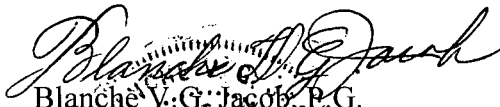
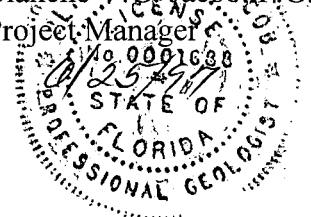
Hardee County
Board of County Commissioners

Prepared By:

Post, Buckley, Schuh & Jernigan, Inc.
1560 Orange Avenue, Suite 700
Winter Park, Florida 32789

May 1997

The following are responsible for the content presented herein:


Blanche V. G. Jacob, P.G.
Project Manager


Nick E. Gillette, E.I.
Engineer

Section 1.0

INTRODUCTION

The Hardee County Solid Waste Management Facility (HCSWMF) is located at Section 35, Township 33 South, Range 25 East and currently operates as a Class I solid waste disposal facility. The facility is also permitted as a construction and demolition debris disposal facility and a waste tire storage and processing facility.

The operating permit for the HCSWMF was issued on November 29, 1993 and was subsequently modified on August 24, 1995 and June 13, 1996. The first permit modification involved modifications to specific conditions numbers 37, 41, 45, and 46 of the original permit which involved improvements to the groundwater monitoring plan (GMP). These improvements involved modifications and additions to leachate sampling, groundwater monitoring parameters, and water quality reporting. An evaluation of the GMP was also added into the first operating permit modification as part of the biennial reporting requirements. The second permit modification amended specific condition number 53 which involved a new leachate/stormwater management plan. The operating permit expiration date is June 10, 1997.

The operating permit renewal application was submitted to the Florida Department of Environmental Protection (FDEP) on March 7, 1997. Comments from FDEP concerning the permit renewal application were submitted in correspondence dated April 2, 1997 and were addressed by PBS&J in correspondence dated April 29, 1997. Additional information was requested from FDEP per a telephone conversation on May 6, 1997 concerning groundwater contour maps for the facility. This information was submitted by PBS&J on May 8, 1997.

The permit modification for the HCSWMF will involve the installation of a vertical liner on the southern end of the landfill. Additionally, the leachate collection dewatering ditch currently present on the southern border of the landfill is proposed to be drained and incorporated into the active part of the landfill. The liner is proposed to be installed approximately 50 feet south of the current location of the dewatering ditch. Finally, the spray field present to the south of the landfill cell is proposed to be permanently taken off-line as part of this permit modification. All leachate will be collected and stored on site and subsequently removed for ultimate disposal.

This GMP modification incorporates all future operational changes proposed for the facility. The site setting, land use history, environmental setting, and hydrogeological investigation have been previously reported in the original groundwater monitoring plan and subsequent modification performed by Mevers & Associates, Inc. All findings and implementation activities performed in accordance with these investigations have been approved by the FDEP and are considered valid within this scope. The hydrogeological evaluation, GMP, and modified GMP performed by Mevers and Associates are included in Appendix A.

Section 2.0

SUPPLEMENTAL INVESTIGATIONS

Groundwater monitoring activities have been performed since the permit issue date of November 29, 1993. These activities included water quality and groundwater elevation monitoring. Groundwater elevation contour maps have been generated for the 1993, 1994, 1995 and 1996 calendar years and are included in Appendix B.

The natural groundwater flow direction currently remains along a south-southwest path. The landfill and associated spray field, however, have interrupted natural flow over time and mounding has occurred in some localized areas. This mounding should not occur once the retention ditch is removed and the spray field is no longer utilized.

Section 3.0

WATER QUALITY MONITORING PLAN MODIFICATION

3.1 Groundwater Monitoring

This modification document contains the proposed water quality monitoring plan specifications for the HCSWMF and was designed to comply with Rule 62-701.510 F.A.C.

The water quality monitoring plan submitted in accordance with the operating permit modification dated August 24, 1995 contained seven water quality monitoring wells (MW-1 through MW-7) and fourteen piezometers (P-1 through P-14) for testing. The downgradient monitoring wells (MW-3 and MW-6) included in this 1995 monitoring plan are not currently located within 50 feet of the landfill cell as specified in 62-701.510(3)(a) F.A.C. Additionally, these downgradient wells will not be located within 50 feet of the landfill cell after the proposed modifications are made to the southern end of the landfill as documented in the operating permit renewal application.

This modified water quality monitoring plan proposes the addition of two monitoring wells (MW-8 and MW-9) along the proposed southern border of the landfill cell. The current upgradient monitoring wells (MW-1 and MW-2), downgradient monitoring well MW-5, and background well MW-4 are sufficient to meet the requirements of 62-701.510 F.A.C. Monitoring wells MW-3, MW-6, and MW-7 will be removed from the water quality monitoring plan for sampling since these monitoring wells do not meet the specific requirements of 62-701.510(3)(a) F.A.C. and the spray field is proposed to be taken offline and monitoring in this area is not necessary.

Piezometers P1, P2, P3, P4, P5, P9, P10 and P11 will continue to be monitored as part of this water quality monitoring plan to measure groundwater elevations around the landfill cell. Piezometers P15 and P16 are proposed to be added inside the liner wall along the proposed southern addition. These piezometers will be installed opposite monitoring wells MW-8 and MW-9 to provide groundwater elevation data on both sides of the proposed liner. It is not necessary to monitor the remaining piezometers since the spray field is proposed to be taken offline.

The locations of the current and proposed monitoring wells and piezometers are graphically depicted in Figure 3-1. A summary of the monitoring wells and piezometers included in this water quality monitoring plan is included in Table 3-1. The proposed monitoring well construction logs for monitoring wells MW-8 and MW-9 and piezometers P15 and P16 are included in Appendix C.

Monitoring wells (MW-3, MW-6, and MW-7) and piezometers (P6, P7, P8, P12, P13, and P14), which are not included as part of this water quality monitoring plan, will be retained in the instance they are needed at a later time.

TABLE 3-1**MONITOR WELL CLASSIFICATION CHART**

| MONITOR WELL | ZONE MONITORED | CLASSIFICATION |
|---------------------|-----------------------|-----------------------|
| MW-1 | SURFICIAL | UPGRADIENT |
| MW-2 | SURFICIAL | UPGRADIENT |
| MW-4 | SURFICIAL | BACKGROUND |
| MW-5 | SURFICIAL | DOWNGRADIENT |
| MW-8 | SURFICIAL | DOWNGRADIENT |
| MW-9 | SURFICIAL | DOWNGRADIENT |
| P-1 | SURFICIAL | N/A |
| P-2 | SURFICIAL | N/A |
| P-3 | SURFICIAL | N/A |
| P-4 | SURFICIAL | N/A |
| P-5 | SURFICIAL | N/A |
| P-9 | SURFICIAL | N/A |
| P-10 | SURFICIAL | N/A |
| P-11 | SURFICIAL | N/A |
| P-15 | SURFICIAL | N/A |
| P-16 | SURFICIAL | N/A |

3.2 Water Quality Parameters

The groundwater and leachate monitoring parameters specified in the operating permit modification dated August 24, 1995 are adequate and meet the requirements of 62-701.510(8).

APPENDIX A

MEYERS & ASSOCIATES, INC.
ENGINEERING CONSULTANTS

D. E. R.

JUL 21 1993

SOUTHWEST DISTRICT
TAMPA

WATER QUALITY AND
LEACHATE MONITORING PLAN
HARDEE COUNTY LANDFILL
WACHULA, FLORIDA

PREPARED FOR:

HARDEE COUNTY
DEPARTMENT OF SOLID WASTE
WACHULA, FLORIDA

AND

WADE-TRIM, INC.
4919 MEMORIAL HIGHWAY
SUITE 200
TAMPA, FLORIDA

REVISED JULY 1993

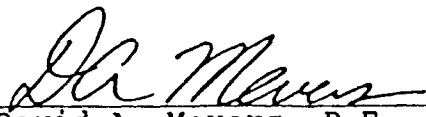

David A. Mevers, P.E.
State of Florida #45950

TABLE OF CONTENTS

| | | |
|-----|---|-----|
| 1.0 | Project Description..... | 1 |
| 2.0 | Water Quality and Leachate Monitoring Network..... | 1 |
| 3.0 | Water Quality and Leachate Monitoring Parameters..... | 2-3 |
| 4.0 | Sampling Methods..... | 3 |
| 5.0 | Monitoring Schedule..... | 3 |
| 6.0 | Water Quality Monitoring Reporting..... | 4-6 |
| 7.0 | Assessment Monitoring and Corrective Actions..... | 6-8 |

1.0 PROJECT DESCRIPTION

The Hardee County Landfill Facility is located east of Wachula, Florida in Section 35 of Township 33 South, Range 25 east. The landfill is currently being used for Class I materials as well as construction debris and waste tires.

The landfill is constructed with plastic PVC sidewall liners tied to a natural clay base on the west, north and east sides of the landfill. A dewatering ditch is located along the south side of the landfill area. This configuration serves to effectively isolate the landfill from any surrounding groundwater influences and therefore any leachate generated results from existing groundwater within the landfill and from infiltration of rainwater falling on the landfill surface. A general site plan for the Hardee County Landfill is shown in Figure 1.

2.0 WATER QUALITY AND LEACHATE MONITORING NETWORK

Water quality and leachate monitoring will be handled via a network of seven (7) monitoring wells and one (1) leachate collection point in the dewatering ditch. The seven (7) existing wells are located around the landfill facility as indicated on the attached site plan (Sheet 1). In addition, water level monitoring over the site will be completed in the series of piezometers (P-1 through P-13) installed on-site. The locations of the piezometers are also indicated in the attached site plan. Leachate sampling will be conducted at the south end of the dewatering ditch.

3.0 WATER QUALITY AND LEACHATE MONITORING PARAMETERS

As outlined in Chapter 17-701.510 (8)(a) the following parameters will be measured in the field in each groundwater monitoring well:

- Static water level prior to purging
- Specific conductivity
- pH
- Dissolved oxygen
- Turbidity
- Temperature
- Colors and sheens

As part of the initial conditions for renewal of the landfill permit, the following parameters will be analyzed for each well as outlined in Chapter 17-701.510(8)(a):

- | | |
|------------------------------|-------------------------------|
| -Ammonium (NH ₄) | -Mercury |
| -Arsenic | -Nitrate |
| -Bicarbonate | -Sodium |
| -Cadmium | -Total Dissolved Solids (TDS) |
| -Chlorides | -Total organic carbon (TOC) |
| -Chromium | -EPA 601 & 602 analyses |
| -Iron | -Lead |

As outlined in Chapter 17-701.510 (8)(c) the following parameters will be measured in the field at the leachate sampling location prior to sample collection:

- Specific conductivity
- pH
- Dissolved oxygen
- Colors, sheens

The initial and subsequent quarterly sampling and analysis of leachate will consist of the following parameters as outlined in Chapter 17-701.510(8)(c):

- | | |
|------------------------------|-------------------------------|
| -Ammonium (NH ₄) | -Mercury |
| -Arsenic | -Nitrate |
| -Bicarbonate | -Sodium |
| -Cadmium | -Total Dissolved Solids (TDS) |
| -Chlorides | -Total Organic Carbon (TOC) |
| -Chromium | -EPA 601 & 602 Analyses |
| -Iron | |
| -Lead | |

4.0 SAMPLING METHODS

All sampling shall be conducted following the protocols outlined in the Comprehensive Quality Assurance Plan (CompQAP) approved by the State for the company or laboratory conducting the sampling.

5.0 MONITORING FREQUENCY

After the initial round of sampling, all indicator parameters for monitoring wells and leachate monitoring locations shall be sampled and analyzed on a quarterly basis. In addition, leachate samples shall be analyzed for those parameters listed in 40 CFR Part 258, Appendix II, on an annual basis.

6.0 WATER QUALITY MONITORING REPORTING

The landfill owner or operator shall report all water quality monitoring results to the Department of Environmental Regulation (DER) on a quarterly basis. The operator of the landfill shall notify the DER at least 14 days before the sampling is scheduled to occur so that the DER may collect split samples, if desired.

Quarterly reporting periods shall be established in the facility permit. The report shall include at least the following as a minimum:

1. The facility name and identification number, sample collection dates, and analysis dates;
2. All analytical results, including all peaks even if below maximum contamination levels;
3. Identification number and designation of all surface water and ground water monitoring points;
4. Applicable water quality standards;
5. Quality assurance, quality control notations;
6. Method detection limits;
7. STORET code numbers for all parameters;
8. Water levels recorded prior to evacuating wells or sample collection. Elevation reference shall include the top of the well casing and land surface at each well site at a precision of plus or minus 0.01 foot (NGVD);

9. An updated ground water table contour map, with contours at no greater than one-foot intervals, which indicates ground water elevations and flow direction; and
10. A summary or trend analysis of any water quality standards or criteria that are exceeded, including elevations of parameters above background levels.

At the end of each year of data collection, with the year beginning with the date the landfill permit was issued, a technical report, prepared, signed and sealed by a professional geologist or professional engineer with experience in hydrogeologic investigations, shall be submitted to the DER. The report shall summarize and interpret the water quality data and water level measurements collected during the past two years. The report shall contain, at a minimum, the following:

1. Tabular and graphical displays of the data, including hydrographies for all monitor wells;
2. Trend analyses;
3. Comparisons among shallow, middle, and deep zone wells.
4. Comparisons between upgradient and downgradient wells;
5. Correlations between related parameters such as total dissolved solids and specific conductance;
6. Discussion of erratic and/or poorly correlated data; and
7. A summary ground water table contour map and an interpretation of the quarterly ground water contour maps.

All field and laboratory records specified in Rules 17-160.600-.630, F.A.C., shall be made available to the Department and be retained for the design period of the landfill.

7.0 ASSESSMENT MONITORING AND CORRECTION ACTION

(A) Assessment monitoring. If indicator parameters are detected in detection wells in concentrations which are significantly above background water quality, or which are at levels above the DER's water quality standards or criteria specified in Chapter 17-520, F.A.C., the permittee shall resample the wells within 15 days after the sampling data is received, to confirm the data. If the data is confirmed, the permittee shall notify the DER in writing within 14 days of this finding. Upon notification by the DER, the permittee shall initiate assessment monitoring as follows:

1. Routine monitoring of all monitoring wells, surface water monitoring locations and leachate sampling locations shall continue according to the requirements of section 3.0 of this plan.
2. Within 90 days of initiating assessment monitoring and annually thereafter, the permittee shall sample and analyze a representative sample of the background wells and all affected detection wells for the parameters listed in 40 CFR Part 258, Appendix II. Any new parameters detected and confirmed in the affected downgradient wells shall be added to the routine ground water monitoring parameter lists required in section 3.0 of this plan.

3. Within 90 days of initiating assessment monitoring, the permittee shall install and sample compliance monitoring wells at the compliance line of the zone of discharge and downgradient from the affected detection monitoring wells. These wells shall be installed according to the requirements of Chapter 17-701.510 (3)(d), and samples shall be analyzed for the parameters listed in section 3.0 of this plan and also 40 CFR Part 258, Appendix II.
4. Within 180 days of initiating assessment monitoring, the permittee shall submit a contamination assessment plan to the DER. This plan shall be designed to delineate the extent and cause of the contamination, to predict the likelihood that DER water quality standards will be violated outside the zone of discharge, and to evaluate methods to prevent any such violations. Upon approval by the DER, the permittee shall implement this plan and submit a contamination assessment report in accordance with the plan. All reasonable efforts shall be made by the permittee to prevent further degradation of water quality from the landfill activities.
5. If for two (2) consecutive sampling events the concentrations of all indicator parameters and the parameters listed in 40 CFR Part 258, Appendix II are at or below background values, the permittee, upon approval by the DER, may discontinue assessment monitoring and return to the routine monitoring requirements in Section 3.0 of this plan.

B. Corrective actions.

1. If the contamination assessment report indicates that water quality standards are likely to be violated outside the zone of discharge, the permittee shall, within 90 days, submit a remedial action plan to the DER. Upon approval, the permittee shall initiate corrective actions to prevent such violations.
2. If any contaminants are detected and confirmed in compliance wells in concentrations which exceed both background levels and DER water quality standards or criteria, are detected and confirmed in detection wells in concentrations which are above DER water quality minimum criteria, the permittee shall notify the Department within 14 days of this finding and shall initiate corrective actions. Assessment monitoring shall continue according to the requirements of this section.



Department of
Environmental Protection

BEST AVAILABLE COPY

Lawton Chiles
Governor

Southwest District
3804 Coconut Palm Drive
Tampa, Florida 33619

Virginia B. Wetzel
Secretary

AUG 24 1995

PERMITTEE
Mr. J.R. Prestridge, for
Hardee County Board of
County commissioners
412 West Orange Street
Wachula, Florida 33873-2867

RE: Modification to existing operation
Permit No. 8025-214306, Hardee County
Hardee County Solid Waste Disposal Facility

Dear Mr. Prestridge:

We are in receipt of your request for permit modifications for groundwater and leachate monitoring for solid waste operational permit No. 8025-214306 at the Hardee County Solid Waste Disposal Facility. The following conditions have been modified.

| <u>SPECIFIC CONDITIONS</u> | <u>FROM</u> | <u>TO</u> | <u>TYPE OF MODIFICATION</u> |
|----------------------------|-------------|-----------|--|
| #37 | Existing | Amended | Leachate Sampling |
| #41 | Existing | Amended | Groundwater Monitoring Parameters |
| #45 | Existing | Amended | Water Quality Reporting |
| #46 | Existing | Amended | Groundwater Monitoring Plan Evaluation |

In addition, the FDEP rule references have been renumbered from Chapter 17 to Chapter 62. These changes have been made in this permit modification. This letter and its attachments constitute a complete permit and replace all previous permits and permit modifications for the above referenced facility.

Sincerely,

Richard D. Garrity, Ph.D.
Director of District Management
Southwest District

RDG/aa
Attachments

"Protect, Conserve and Manage Florida's Environment and Natural Resources"

Printed on recycled paper.

SPECIFIC CONDITIONS:

36. Pursuant to F.A.C. Rule 62-522.410, the zone of discharge shall extend horizontally to the property line or one hundred (100) feet beyond the waste management area, whichever is less, and vertically to the base of the surficial aquifer. The permittee shall ensure that the water quality standards for Class C-II groundwaters will not be exceeded at the boundary of the zone of discharge according to Rules 62-520.400 and 62-520.420, F.A.C.

37. Leachate shall be sampled from the leachate collection system prior to entering the dewatering ditch and analyzed every 6 months for the indicator parameters listed as follows:

Leachate indicator parameters:

| <u>Field parameters</u> | <u>Laboratory parameters</u> |
|-------------------------|------------------------------|
| Specific conductivity | Total Ammonia - N |
| pH | Bicarbonate |
| Dissolved oxygen | Chlorides |
| Colors, sheens | Iron |
| | Mercury |
| | Nitrate |
| | Sodium |
| | Total dissolved solids (TDS) |
| | Those parameters listed in |
| | 40 CFR Part 258, Appendix I |

In addition, leachate shall be sampled and analyzed annually for the parameters listed in 40 CFR Part 258, Appendix II. For landfills which are receiving waste, if this annual analysis indicates that a contaminant listed in 40 CFR 261.24 exceeds the regulatory level listed therein, the permittee shall initiate a monthly sampling and analysis program. If in any three consecutive months the same listed contaminant exceeds the regulatory level, the permittee shall, within 90 days, initiate a program designed to identify the source and reduce the presence of the contaminant in the leachate so that it no longer exceeds the regulatory level. This program may include additional monitoring of waste received and additional up-front separation of waste materials. Any leachate which is not recirculated or taken to a permitted domestic wastewater treatment facility shall be treated or managed so that no contaminant exceeds the regulatory level. If in any three consecutive months no listed contaminant is found to exceed the regulatory level, the permittee may discontinue the monthly sampling and analysis and return to a routine sampling schedule.

Amended AUG 24 1995.

Hardaway County Solid Waste Disposal Facility

SPECIFIC CONDITIONS:

41. All detection wells and background wells shall be sampled and analyzed every 6 months for the ground water indicator parameters listed in 62-701.510(8)(a) as follows:

Ground water indicator parameters:

| Field parameters | Laboratory parameters |
|--|--|
| Static water level in wells before purging | Total Ammonia - N |
| Specific conductivity | Chlorides |
| pH | Iron |
| Dissolved oxygen | Mercury |
| Turbidity | Nitrate |
| Colors, sheens | Sodium |
| Temperature | Total dissolved solids (TDS) |
| | Those parameters listed in 40 CFR Part 258, Appendix I |

Compliance with groundwater standards and/or criteria shall be determined by analysis of unfiltered groundwater samples. Additional samples, wells, and parameters may be required based upon subsequent analysis.

Amended AUG 24 1995.

42. In accordance with 62-701.510(7), if at any time background groundwater standards are exceeded in the detection wells, the permittee has fifteen (15) days after the sampling data is received in which to resample the monitor well(s) to verify the original analysis. Should the permittee choose not to resample, the Department will consider the water quality analysis as representative of current groundwater conditions at the facility. If the exceedance of groundwater standards in the detection wells is confirmed, then assessment monitoring shall be initiated as detailed in 62-701.510(7).

43. If any monitoring well becomes damaged or inoperable, the permittee shall notify the Department of Environmental Protection immediately (within 24 hours). A detailed written report shall follow within seven (7) days. The written report shall detail what problem has occurred and remedial measures that have been taken to prevent the recurrence. All monitoring well design and replacement shall be approved by the Department prior to installation and may require a permit modification.

SPECIFIC CONDITIONS:

44. The field testing, sample collection and preservation and laboratory testing, including quality control procedures, shall be in accordance with methods approved by the Department in accordance with Chapters 62-4.246 and 62-3.401, F.A.C. Approved methods are published by the Department or as published in Standards Methods, A.S.T.M., or EPA methods shall be used. Approved methods for chemical analyses are summarized in the Federal Register, 40 CFR Part 136.

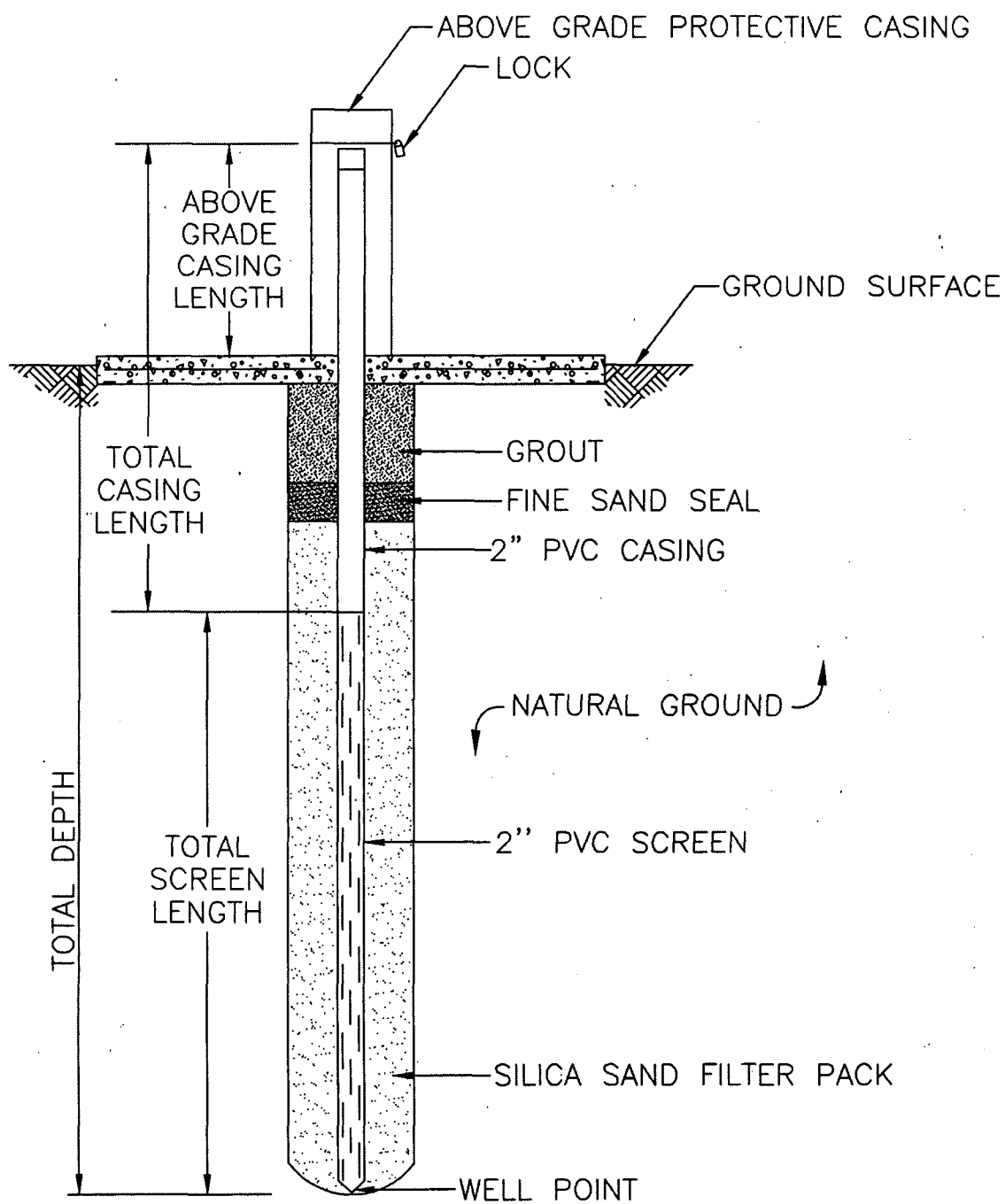
45. All water quality monitoring analyses shall be reported on the Department Quarterly Report on Groundwater Monitoring Form 62-522.900(2). The permittee shall submit to the Department the results of the water quality analysis, by July 15th and January 15th for the semi-annually periods January - June and July - December, respectively. The results shall be sent to the Solid Waste Section, Department of Environmental Protection, Southwest District office, 3804 Coconut Palm Drive, Tampa, Florida 33619-8313. In addition to the completed reporting form and analytical sheets, the report shall include a water table contour map for the date of the sampling event and a summary of all groundwater standard exceedances, as required by FAC 62-701.510(9)(a).
Amended AUG 24 1995.

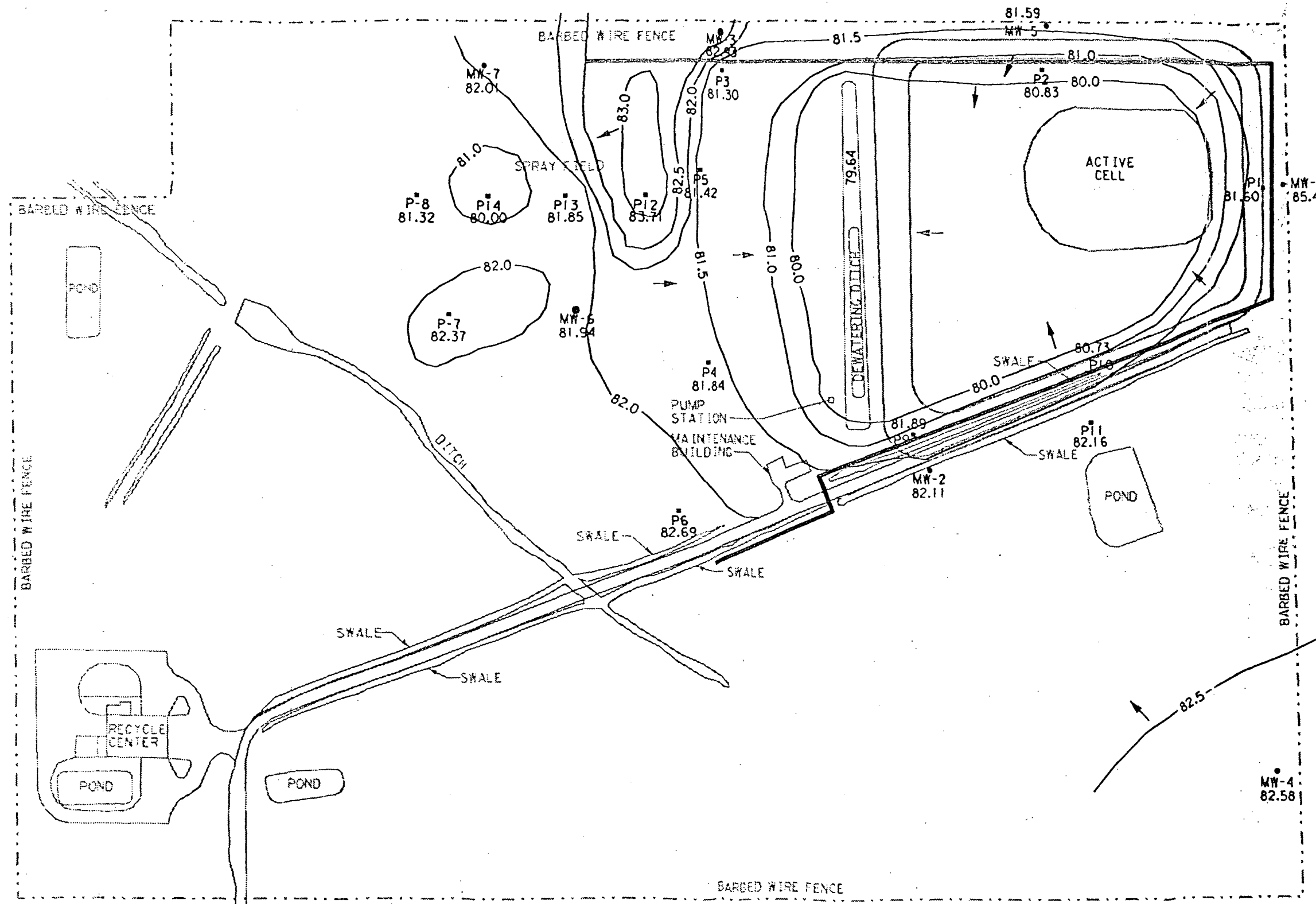
46. Every two years and prior to ninety (90) days before the expiration of the Department Permit, the permittee shall submit an evaluation of the Groundwater Monitoring Plan as per F.A.C. Rule 62-701.510(9)(b). The evaluation shall include all applicable information as required by F.A.C. Rule 62-701.510(9), and shall include an assessment of the effectiveness of the existing landfill design and operation as related to the prevention of groundwater contamination. Any groundwater contamination that may exist, shall be addressed as part of a groundwater investigation for the landfill assessment. The Groundwater Monitoring Plan shall be adequate to monitor any modifications to the existing landfill site including but not limited to closure.
Amended AUG 24 1995.

47. The permittee shall provide financial assurance for this landfill site in accordance with F.A.C. Rule 62-701.630. All cost estimates for closure and long-term care shall be adjusted and submitted annually to: Solid Waste Manager, Solid Waste Section, Department of Environmental Protection, 3804 Coconut Palm Drive, Tampa, Florida 33619-8318. Proof that the financial assurance has been funded adequately shall be submitted annually to the FDEP District Office and to: Financial Coordinator, Solid Waste Section, Department of Environmental Protection, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.

APPENDIX B

APPENDIX C





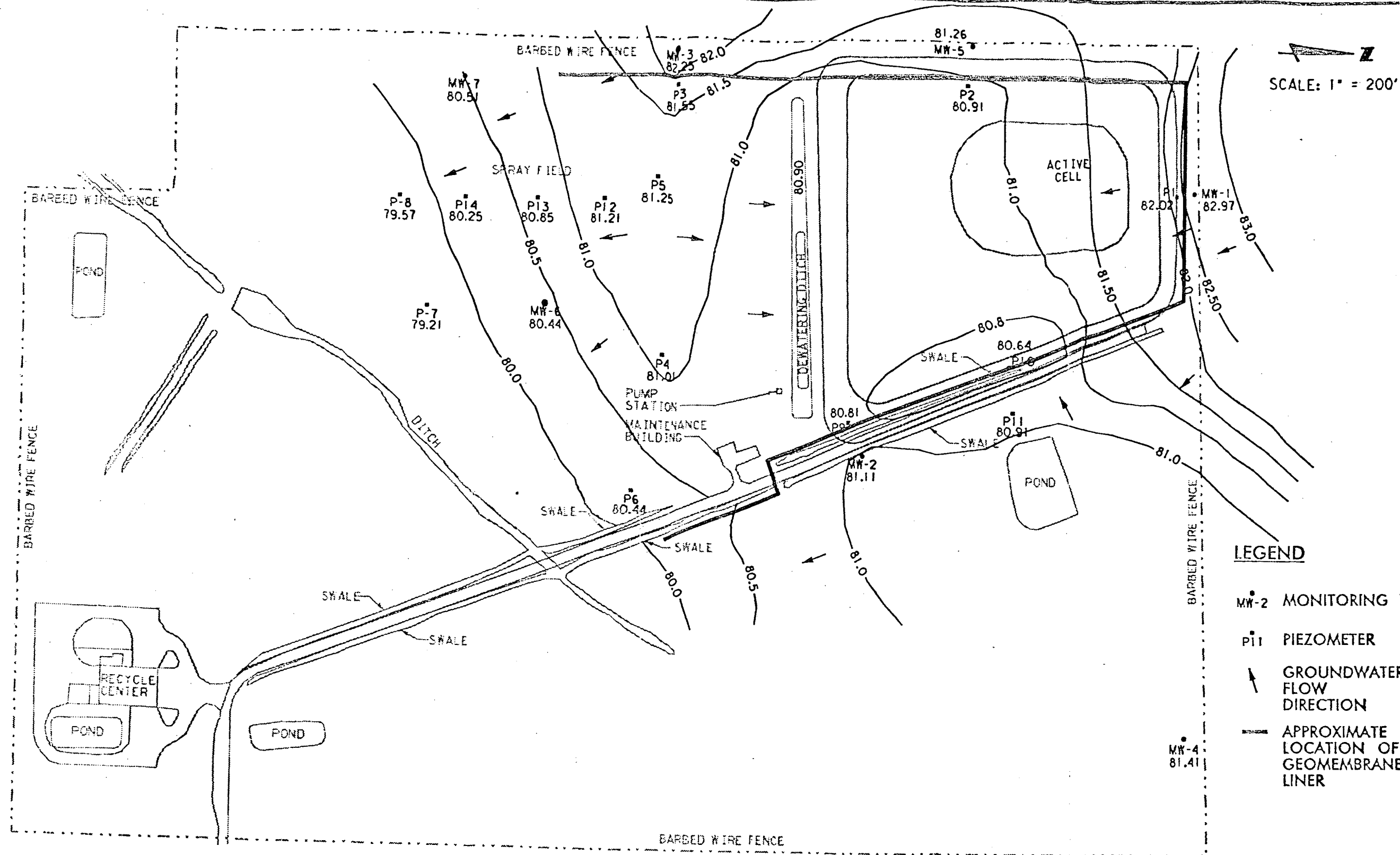
SCALE: 1" = 200'

LEGEND

- MW-2 MONITORING WELL
- PI-1 PIEZOMETER
- GROUNDWATER FLOW DIRECTION
- APPROXIMATE LOCATION OF GEOMEMBRANE LINER

HARDEE COUNTY SOLID WASTE MANAGEMENT FACILITY
GROUNDWATER ELEVATION CONTOUR MAP
(FEBRUARY 21, 1995)

FIGURE
1

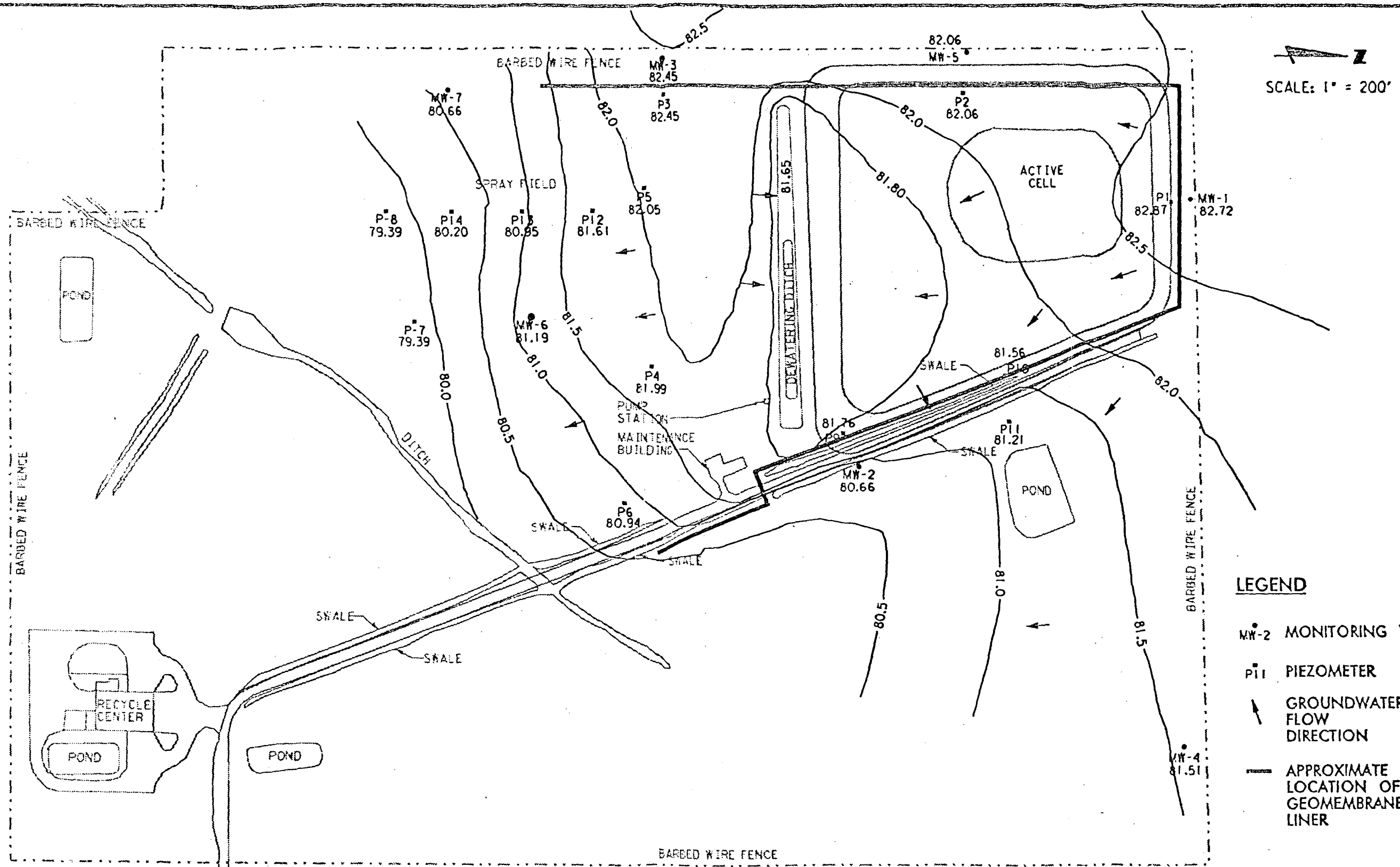


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PBSJ POST, BUCKLEY, SCHUH & JERNIGAN, INC.

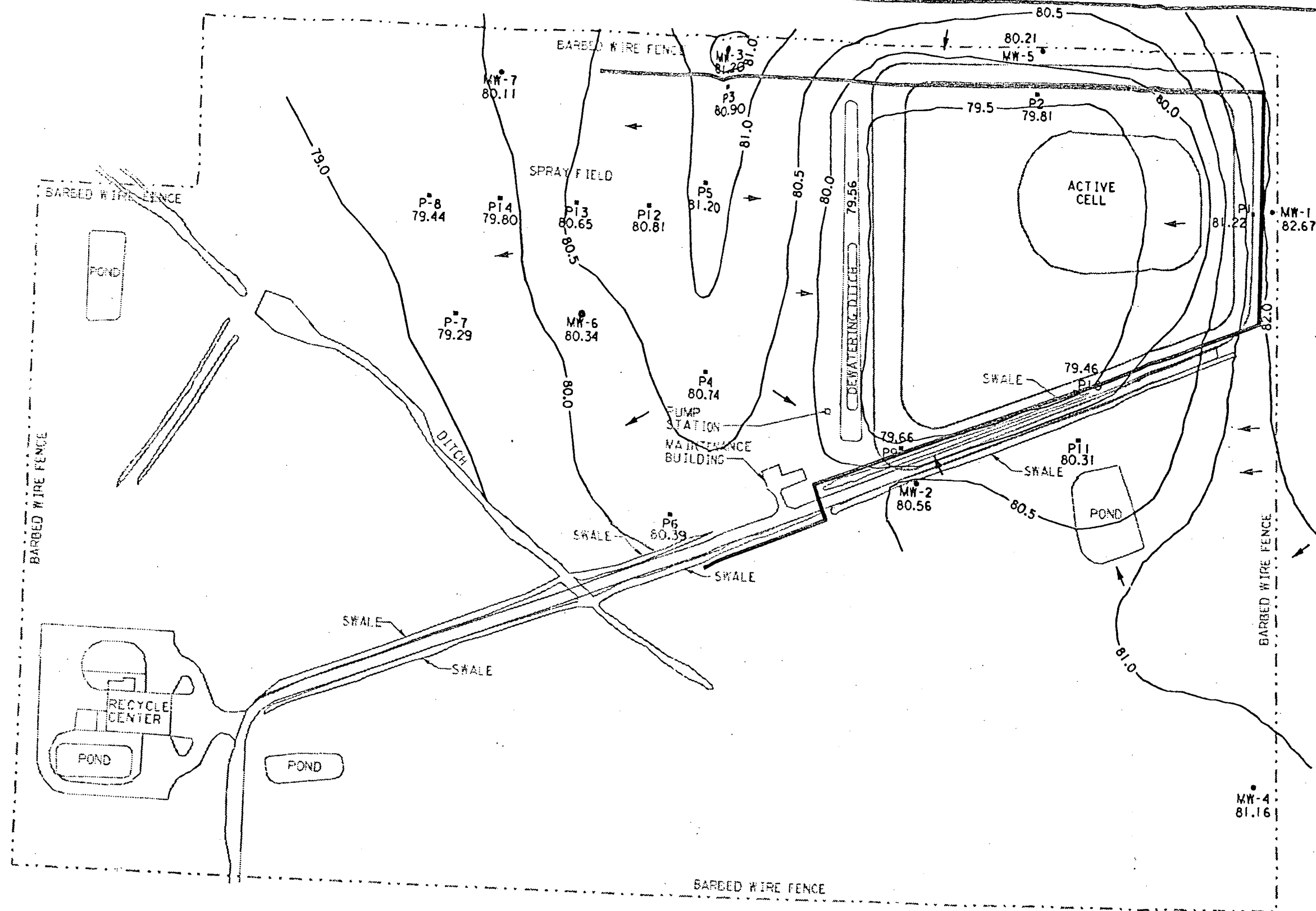
25-APR-1997 16:34 --- EMP. NO: 11361

**FIGURE
2**



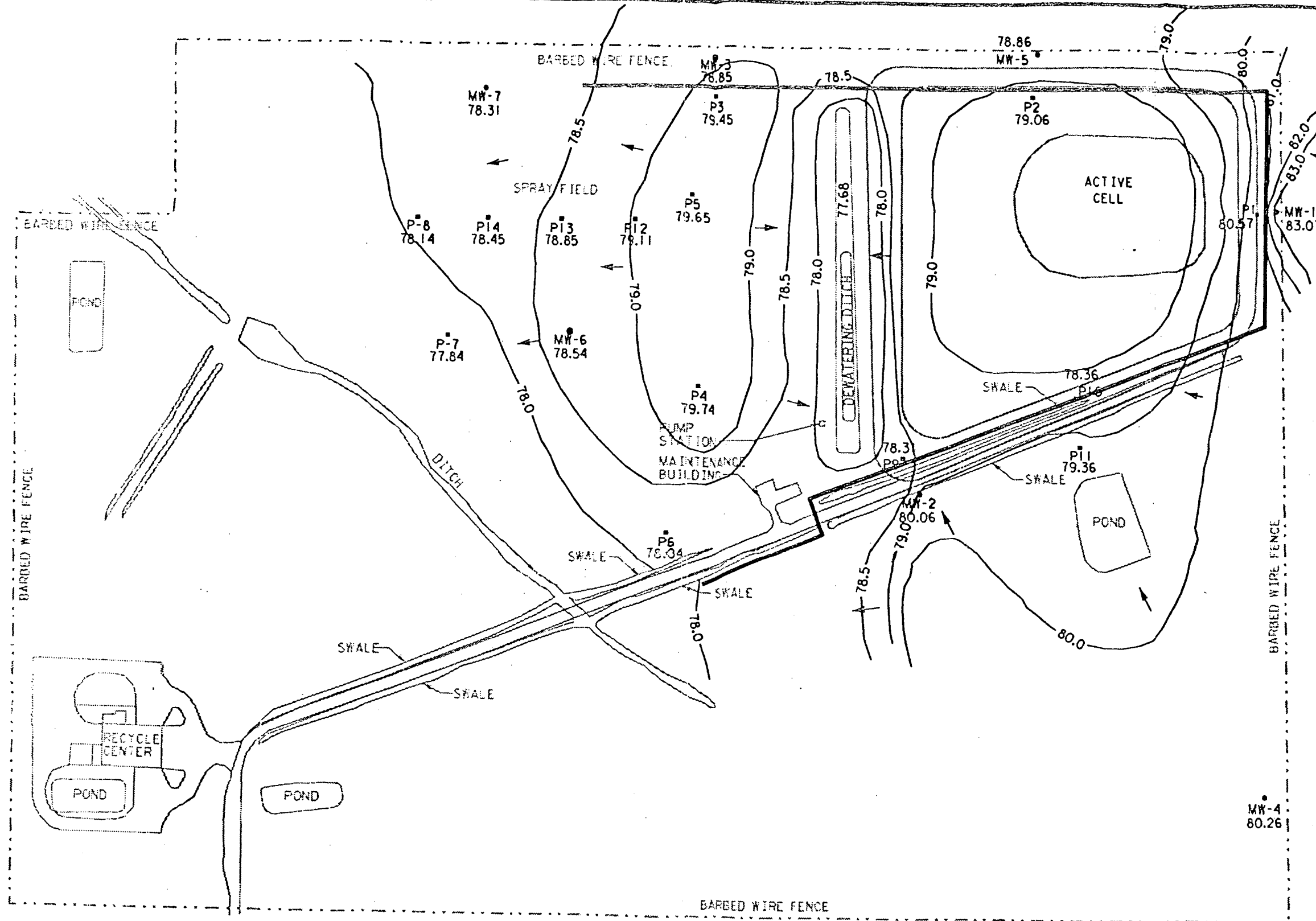
HARDEE COUNTY SOLID WASTE MANAGEMENT FACILITY
GROUNDWATER ELEVATION CONTOUR MAP
(DECEMBER 5, 1995)

FIGURE
3



HARDEE COUNTY SOLID WASTE MANAGEMENT FACILITY
GROUNDWATER ELEVATION CONTOUR MAP
(JUNE 4, 1996)

FIGURE
4



HARDEE COUNTY SOLID WASTE MANAGEMENT FACILITY
GROUNDWATER ELEVATION CONTOUR MAP
(DECEMBER 9, 1996)

FIGURE
5

APPENDIX E

PERMIT DRAWINGS **(Revised)**

D.E.P.
JAN - 2 1998
COUNTY OF
TAMPA

SUMMARY OF CHANGES

Drawing C-1

1. The temporary dewatering storage area was added south of the project site.

Drawing C-2

1. Revised south invert elevation of pipe between manholes #6 and #7 to 74.10.
2. Note 3 revised to add maximum groundwater elevation 85.95.
3. The plan view of the maintenance facility was revised. The note about the water well was revised to show that the well will not be abandoned.

Drawing C-3

1. The plan view of the maintenance facility was revised. The note about the water well was revised to show that the well will not be abandoned.

Drawing C-4

1. Detail 1 was revised to provide additional information.
2. Marker posts delineating the edges of liner have been added to Section A, and also the edge of waste has been added to this Section.
3. Section B has been added to Detail 3 to show the location of liner anchor trench with respect to the manhole. The current Detail 3 was relabeled to Section A.
4. A Note was added to Detail 4 to clarify depth of leachate collection trench with reference to Sheet C-2 for invert elevations of leachate collection pipe.
5. A call-out was added to Detail 4 indicating slot size and orientation.
6. Note 1 was added to Detail 3 explaining the future use of the blind flange.
7. Manufacturer and model of geotextile was added to the note indicating "8 oz. non-woven geotextile" of Detail 4.

D.F.P.

JAN - 2 1998

SCOTT
TAMPA

Drawing M-3

1. Added 4" overflow from primary tank to secondary containment tank.
2. Revised item No. 34 on equipment and fitting schedule to reference in Detail 10 from M-7.
3. Added note No. 4 regarding the alternate tank.

Drawing M-4

1. Added 4" overflow detail.

Drawing M-5

1. Revised item No. 34 on equipment and fitting schedule to reference in Detail 10 from M-7.
2. Added 4" drain in Section B from truck loading pump area.
3. Added clearance from the floor to the 8" suction bell in Section B.

Drawing M-7

1. Revised Detail 10 to show a bent hose valve.

D.E.P.

APR 27 1998

SOUTHWEST DISTRICT
TAMPA

SUMMARY OF CHANGES TO DRAWINGS

Drawing C-1

1. The temporary dewatering storage area was removed, and a temporary reinfiltration pond was added.
2. The material stockpile area was relocated.
3. A note on the existing sprinklers label in the was added, stating, "(to be removed)".
4. The existing road located within the proposed reinfiltration pond was labeled with a note stating, "(to be relocated)".

Drawing C-2

1. The temporary reinfiltration pond was added.
2. A note on the existing sprinklers label in the was added, stating, "(to be removed)".
3. The existing road located within the proposed reinfiltration pond was labeled with a note stating, "(to be relocated)".

Drawing C-3

1. The label for the existing water well was revised so that it does not show that the well will be abandoned.

Drawing C-4

1. Detail 5 (Corrugated HDPE Piping) and Detail 6 (Split Coupling for 8" Pipe) were added.
2. The details were reorganized to fit the two new details on this sheet.
3. On the leachate collection trench detail (Detail 4, Sheet C-4), the slot size has been revised from "1/8" x 2 1/2"" to "1/8" x 1 1/4"".
4. On Section A, the depth of protective cover soil has been revised from "12"" to "approximately 12"".
5. A detail was added showing a cross section through the berm of the proposed temporary reinfiltration pond, which was added on Sheet C-1.