

# GLOBEX Engineering & Development

22 May 2007

Mr. Bill Krumbholz Florida Department of Environmental Protection 2295 Victoria Avenue, Suite 364 West Fort Myers, Florida 33901-3881

Subject: Lining System Performance Evaluation Glades Landfill, Moore Haven, Florida

Dear Mr. Krumbholz:

On behalf of Glades Landfill, LLC, Globex Engineering & Development, Inc. (Globex) has prepared this document in accordance with our 18 May 2007 discussions regarding the currently permitted lining system (CPLS) at Glades Landfill located in Moore Haven, Florida.

# BACKGROUND

During a telephone conversation on 17 May 2007, you raised a question regarding the structural fill below the lining system geomembrane in the originally permitted lining system (OPLS) having a maximum hydraulic conductivity of  $1 \times 10^{-4}$  cm/s which was eliminated in the CPLS, and you inquired whether such a hydraulic conductivity should have been included in the CPLS. The matter was discussed during our 18 May 2007 and I stated that the structural fill specifications were revised in the CPLS and the maximum hydraulic conductivity of  $1 \times 10^{-4}$  cm/s was eliminated, and I also stated that the CPLS with the geocomposite overlying the geomembrane performs superior to the OPLS even with the structural fill at hydraulic conductivities anticipated in the local soil. You verbally requested a presentation of superiority of the CPLS. This request was later reiterated in writing in your Conversation Record dated 18 May 2007.

# **BASIS OF EVALUATION**

The basis of evaluation is the performance of the OPLS and CPLS in protecting the environment. The protection of environment can be measured in terms of leakage rate into the ground through a defect in the geomembrane component of the lining system. The evaluation presented below compares the leakage rate from the OPLS to the leakage rate from the CPLS under similar environmental conditions (such as rainfall

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and defect size) and varying design characteristics that are specific to each design (such as drainage length to collection pipe, slope of the base, hydraulic conductivity of the drainage layer, and hydraulic conductivity of the geomembrane underlying soil). The performance evaluation is discussed below in more detail.

# **PERFORMANCE EVALUATION**

# **Overview**

*Leakage Rate* - Leakage rates through liners are a function of many parameters, including hydraulic head, size of the actual geomembrane defect, thickness, hydraulic conductivity of the soil layer underlying the geomembrane, and quality of contact between the geomembrane and the underlying soil. As indicated by USEPA [1987a] and Giroud and Bonaparte [1989b], the latter parameter plays an essential role. Bonaparte et al. [1989] defined the quality of contact between the geomembrane and the underlying soil as follows:

- The *good contact condition* corresponds to a geomembrane installed, with as few wrinkles as possible, on top of a soil layer that has been adequately compacted and has a smooth surface.
- The *poor contact condition* corresponds to a geomembrane that has been installed with a certain number of wrinkles, and/or placed on a soil that has not been well compacted and does not appear smooth.

In the case of *good contact* between the geomembrane and the underlying soil, the leakage rate through the lining system due to holes in the geomembrane can be calculated as follows [Giroud et al., 1992, 1994]:

$$O_{\text{leak}} = 0.21 \, i_{\text{avg}} h_{\text{LCS}}^{0.9} a^{0.1} k_{\text{GCL}}^{0.74}$$
 (Equation 1)

where:  $Q_{leak}$  = rate of leakage through the lining system due to defects in the geomembrane;  $i_{avg}$  = average hydraulic gradient;  $h_{LCS}$  = hydraulic head on top of the geomembrane; a = area of the geomembrane defect; and  $k_{GCL}$  = hydraulic conductivity of

the underlying soil. This equation is only valid with the following SI units:  $Q_{\text{leak}}$  (m<sup>3</sup>/s),  $h_{\text{LCS}}$  (m), a (m<sup>2</sup>), and  $k_{\text{GCL}}$  (m/s);  $i_{\text{avg}}$  is a dimensionless factor in Figure 1.

In the case of *poor contact* between the geomembrane and the underlying soil, the formula giving the leakage rate becomes [Giroud et al., 1992, 1994]:

$$Q_{\text{leak}} = 1.15 i_{\text{avg}} h_{\text{LCS}}^{0.9} a^{0.1} k_{\text{GCL}}^{0.74}$$
 (Equation 2)

where:  $Q_{\text{leak}}$ ,  $i_{\text{avg}}$ ,  $h_{\text{LCS}}$ , a, and  $k_{\text{GCL}}$  are as defined previously.

Figure 1 shows that  $i_{avg}$  is equal to one if the hydraulic head is less than or equal to the thickness of the soil layer below the geomembrane.

The following assumptions are made in this section. Justifications for many of these assumptions are given by USEPA [1987a; 1987b] and Giroud and Bonaparte [1989a].

It is assumed that the landfill cell will be constructed with high quality materials, that good construction practices will be followed, and that a very good construction quality assurance (CQA) program will be implemented

The size and frequency of defects considered in the calculations were selected as follows:

- Defect Size. USEPA [1987a] and Giroud and Bonaparte [1989a], present casestudy data which provide information on the size of defects that may occur in geomembranes at properly designed and constructed facilities, with good CQA. Using these data, a defect size of 0.16 in<sup>2</sup> (100 mm<sup>2</sup>) has been selected to calculate a conservative leakage rate from the lining system. However, as mentioned by Giroud and Bonaparte [1989a] and Bonaparte and Gross [1993], a defect size of 0.005 in<sup>2</sup> (3.1 mm<sup>2</sup>) is more appropriate for geomembranes installed with proper construction workmanship and very good CQA.
- *Defect Frequency*. Based on forensic analyses of the frequency of defects in geomembranes [Giroud and Fluet, 1986], a frequency of 1 defect per acre (4,000 m<sup>2</sup>) has been selected for leakage calculations.

*Maximum Leachate Head above Liner* - The head of leachate above the geomembrane affects the rate of leakage through the defect in the geomembrane. In order to minimize leakage through the geomembrane, the leachate collection system (LCS) drainage layer (the  $1 \times 10^{-2}$  sand in the case of the OPLS and the geocomposite in the case of the CPLS) must minimize the leachate head.

The head of leachate in the LCS drainage layer is a function of a number of parameters including impingement rate, hydraulic conductivity of the LCS material, and dimensions and slopes of the LCS drainage layer. The maximum head of leachate on the lining system geomembrane may be determined using Giroud's equation [Giroud and Houlihan, 1995]:

 $h_{LCS \max} = L [((4q / k_{LCS}) + \tan^2 \beta)^{1/2} - \tan \beta] / (2 \cos \beta)$  (Equation 3)

where:  $h_{LCS max}$  = maximum head of leachate on the geomembrane; L = maximum plan length of the LCS drainage layer between the high edge of the LCS and the collection pipe;  $q_i$  = impingement rate;  $k_{LCS}$  = hydraulic conductivity of the LCS drainage layer; and tan  $\beta$  = slope of the LCS drainage layer. Basic SI units are:  $h_{LCS max}$  (m), L (m), q (m/s),  $k_{LCS}$  (m/s), and  $\beta$  (°).

*Impingement Rate* – Leachate production rate is normally calculated using the Hydrologic Evaluation of Landfill Performance (HELP) model, Version 3, developed by the U.S. Environmental Protection Agency (USEPA). With proper setup of parameters in the HELP Model, the impingement rate of leachate reaching the LCS drainage layer can be calculated. The impingement rate is used to calculate the maximum leachate head above the geomembrane, as discussed above.

# **Impingement Rate**

The HELP model was used to calculate the leachate production rate for a conservative operational case. In this case, it is assumed that the Phase I area is covered with 10 ft of construction demolition debris (C&D) material. Rain water falling over the Phase I area percolates through the 10 ft thickness of the C&D material and reaches the lining system components. The flow rate of leachate out of the 10-ft thick C&D material is used as the

impingement rate for the analysis. The Help model run is presented in Attachment A. The highest average monthly value of 4.38 inches per month (month of June) was used as the impingement rate. Following conversion of the units, the impingement rate for the analysis was calculated to be  $4.3 \times 10^{-8}$  m/s.

# Drainage Length

The maximum drainage length for the OPLS and CPLS were calculated to be 70 ft (21.35 m) and 150 ft (45.75 m), respectively.

# LCS Drainage Layer Slope and Angle

The LCS drainage layer slopes for the OPLS and CPLS are 3.2 percent and 1.0 percent, respectively. The actual angles for these slopes are 1.83 degrees for the OPLS and 0.57 degrees for the CPLS.

# Hydraulic Conductivity of LCS Drainage Layer

The hydraulic conductivity of the LCS drainage layer in the OPLS is  $1 \times 10^{-2}$  cm/s (1 x  $10^{-4}$  m/s). The hydraulic conductivity of the LCS drainage layer in the CPLS was calculated using typical transmissivity tests performed on similar geocomposites. The results of a transmissivity test performed on a geocomposite similar to the one used in the CPLS, under 15,000 psf pressure, is presented in Attachment B. The 15,000 psf pressure is much greater than pressures anticipated in the Phase I of the Glades Landfill; however, this test result was used to be conservative. The reported transmissivity value is approximately  $3 \times 10^{-4}$  m<sup>2</sup>/s.

The thickness of the geonet component of the geocomposite drainage layer in the CPLS is 250 mils (0.00625 m). Considering 80 percent of the geonet thickness for leachate flow to account for geotextile intrusion into the geonet void, the thickness used for calculating the hydraulic conductivity was calculated to be 200 mils (0.005 m). The hydraulic conductivity of the geocomposite was calculated by dividing the transmissivity value by the thickness value, which was calculated to be 0.06 m/s.

# Maximum Leachate Head Above Geomembrane

By substituting the above values in Equation 3, the maximum leachate above the geomembrane for the OPLS and CPLS were calculated to be 0.175 m and 0.0025 m, respectively. Therefore, the maximum leachate head above the geomembrane in the OPLS is nearly two orders of magnitude larger than the maximum leachate head above the geomembrane in the CPLS. This is contributed to the high hydraulic conductivity value of the geocomposite in the CPLS.

# Hydraulic Gradient

To calculate the hydraulic gradient, it was assumed that the thickness of structural fill below the liner geomembrane is 1 ft. The hydraulic gradient for the OPLS was calculated by adding the leachate head above the geomembrane to the thickness of the underlying soil and dividing the result by the thickness of the underlying soil. The hydraulic gradient for the OPLS was calculated to be 1.73.

Since the leachate head above the CPLS is very small, the hydraulic gradient for the case of the CPLS is approximately 1.0.

# Hypothetical Leakage Rate into Ground

To calculate hypothetical leakage rates for the OPLS and CPLS, the calculated values for the following parameters were submitted in Equations 1 and 2:

- Hydraulic gradient (1.73 and 1.0 for the OPLS and CPLS, respectively);
- Maximum leachate head above the geomembrane (0.218 m and 0.0035 m for the OPLS and CPLS, respectively);
- Area of defect in the geomembrane  $(1 \times 10^{-4} \text{ m}^2 \text{ for both cases})$ ; and
- Hydraulic conductivity of the underlying soil (1 x 10<sup>-6</sup> m/s and 1 x 10<sup>-5</sup> m/s for the OPLS and CPLS, respectively).

Using the frequency of one defect per acre of geomembrane, the leakage rates per acre per day were calculated. These values are:

• For OPLS:

- good contact = 28.2 gpad
- poor contact = 154.4 gpad
- For CPLS:
  - good contact = 1.8 gpad
  - poor contact = 9.8 gpad

# CONCLUSION

The hypothetical leakage rates calculated above indicate that the performance of the CPLS is superior to the performance of the OPLS by approximately 1.5 orders of magnitude. The superiority of the CPLS over the OPLS stems from the fact that the geocomposite drainage layer in the CPLS can maintain a significantly lower leachate head above the liner geomembrane due to its high hydraulic conductivity (0.06 m/s) compared to the lower hydraulic conductivity of the drainage sand in the OPLS (1 x 10<sup>-2</sup> cm/s). Therefore, leakage through the geomembrane for the case of the CPLS is significantly lower than the leakage rate for the OPLS. Clearly, the lower hydraulic conductivity of the underlying soil in the case of the OPLS (1 x 10<sup>-4</sup> cm/s) does not play a major role in overcoming the adverse impact of the high leachate head above the geomembrane. Therefore, the CPLS is certainly a superior design and the structural fill underlying the geomembrane does not need to have a maximum hydraulic conductivity of 1 x 10<sup>-4</sup> cm/s, as required in the OPLS.

We appreciate the opportunity to submit this document to Florida Department of Environmental Protection. Please contact me at (954) 571-9200 if you have any questions.

Sincerely,

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Ali Khatami, Ph.D., P.E. Principal

Attachments

# REFERENCES

Bonaparte, R., Giroud, J.P., and Gross, B.A., "Rates of Leakage through Landfill Liners", *Conference Proceedings, Geosynthetics* '89, Vol. 1, San Diego, CA, Feb 1989, pp. 18-29.

Bonaparte, R. and Gross, B.A., "LDCRS Flows from Double-Lined Landfills and Surface Impoundments", Report to, under Contract No. 68-CO-0068, USEPA Risk Reduction Engineering Research Laboratory, Cincinnati, OH, 1993, 65 p.

Giroud, J.P., and Fluet, J.E., Jr., "Quality Assurance of Geosynthetic Lining Systems", Geotextiles and Geomembranes, Vol. 3, No. 4, 1986, pp. 249-287.

Giroud, J.P., and Bonaparte, R., "Leakage Through Liners Constructed with Geomembranes, Part I: Geomembrane Liners", *Geotextiles and Geomembranes*, Vol. 8, No. 1, 1989a, pp. 27-67.

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Giroud, J.P., Badu-Tweneboah, K., and Bonaparte, R., "Rate of Leakage through a Composite Liner due to Geomembrane Defects", *Geotextiles and Geomembranes*, Vol. 11, No. 1, 1992, pp. 1-28.

Giroud, J.P., Badu-Tweneboah, K., and Soderman, K.L., "Evaluation of Landfill Liners", *Proceedings, 5th International Conference on Geotextiles, Geomembranes, and Related Products*, Singapore, 1994, pp. 981-986.

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FIGURE NO. PROJECT NO.

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# HYDRAULIC HEAD/SOIL COMPONENT THICKNESS, H/D



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# ATTACHMENT A

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# HELP MODEL RESULTS

HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE HELP MODEL VERSION 3.07 (1 NOVEMBER 1997) DEVELOPED BY ENVIRONMENTAL LABORATORY USAE WATERWAYS EXPERIMENT STATION FOR USEPA RISK REDUCTION ENGINEERING LABORATORY

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PRECIPITATION DATA FILE:C:\HELP\DATA\DATA4.D4TEMPERATURE DATA FILE:C:\HELP\DATA\DATA7.D7SOLAR RADIATION DATA FILE:C:\HELP\DATA\DATA13.D13EVAPOTRANSPIRATION DATA:C:\HELP\DATA\DATA11.D11SOIL AND DESIGN DATA FILE:C:\HELP\DATA\GLLLC.D10OUTPUT DATA FILE:C:\HELP\DATA\OUT.OUT

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NOTE: INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.

# LAYER 1

# TYPE 1 - VERTICAL PERCOLATION LAYER MATERIAL TEXTURE NUMBER 19

THICKNESS	=	120.00 INCHES	
POROSITY	=	0.1680 VOL/VOL	
FIELD CAPACITY	=	0.0730 VOL/VOL	
WILTING POINT	=	0.0190 VOL/VOL	
INITIAL SOIL WATER CONTENT	=	0.0681 VOL/VOL	
EFFECTIVE SAT. HYD. COND.	=	0.10000005000E-02	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT SOIL DATA BASE USING SOIL TEXTURE #19 WITH BARE GROUND CONDITIONS, A SURFACE SLOPE OF 0.% AND A SLOPE LENGTH OF 200. FEET.

SCS RUNOFF CURVE NUMBER	=	0.00	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	10.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	0.190	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	1.680	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	0.190	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	8.169	INCHES
TOTAL INITIAL WATER	=	8.169	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

# EVAPOTRANSPIRATION AND WEATHER DATA

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# NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM TAMPA FLORIDA

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STATION LATITUDE	=	27.58	DEGREES
MAXIMUM LEAF AREA INDEX	-	0.00	
START OF GROWING SEASON (JULIAN DATE)	=	0	
END OF GROWING SEASON (JULIAN DATE)	-	367	
EVAPORATIVE ZONE DEPTH	. =	10.0	INCHES
AVERAGE ANNUAL WIND SPEED		8.60	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY		74.00	e e
AVERAGE 2ND QUARTER RELATIVE HUMIDITY		72.00	Ş
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	78.00	00
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	76.00	90

# NOTE: PRECIPITATION DATA FOR TAMPA FLORIDA WAS ENTERED FROM THE DEFAULT DATA FILE.

# NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR TAMPA FLORIDA

# NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
		·			
59.80 82.20	60.80 82.20	66.20 80.90	71.60 74.50	77.10 66.70	80.90 61.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR TAMPA FLORIDA AND STATION LATITUDE = 27.58 DEGREES Contraction of the second

ANNUAL TOTALS FOR YEAR 1974

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	INCHES	CU. FEET	PERCENT
PRECIPITATION	33.90	123056.992	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	13.581	49298.602	40.06
PERC./LEAKAGE THROUGH LAYER	1 20.319120	73758.406	59.94
CHANGE IN WATER STORAGE	0.000	0.003	0.00
SOIL WATER AT START OF YEAR	8.169	29654.137	
SOIL WATER AT END OF YEAR	8.169	29654.141	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.021	0.00
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	INCHES	CU. FEET	PERCENT
PRECIPITATION	3.44	157687.156	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	19.684	71454.367	45.31
PERC./LEAKAGE THROUGH LAYER 1	23.278046	84499.305	53.59
CHANGE IN WATER STORAGE	0.478	1733.560	1.10
SOIL WATER AT START OF YEAR	8.169	29654.141	
SOIL WATER AT END OF YEAR	8.647	31387.701	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.083	0.00
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\* ANNUAL TOTALS FOR YEAR 1976

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	INCHES	CU. FEET	PERCENT
PRECIPITATION	41.73	151479.906	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	19.021	69046.625	45.58
PERC./LEAKAGE THROUGH LAYER	1 23.163898	84084.953	55.51
CHANGE IN WATER STORAGE	-0.455	-1651.667	-1.09
SOIL WATER AT START OF YEAR	8.647	31387.701	
SOIL WATER AT END OF YEAR	8.192	29736.033	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.000	0.00
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ANNUAL TOTALS FOR YEAR 1977

ANNUAI	ANNUAL TOTALS FOR TEAR 1977			
	INCHES	CU. FEET	PERCENT	
PRECIPITATION	32.03	116268.922	100.00	
RUNOFF	0.000	0.000	0.00	
EVAPOTRANSPIRATION	18.108	65730.859	56.53	
PERC./LEAKAGE THROUGH LAYER	1 13.644430	49529.281	42.60	
CHANGE IN WATER STORAGE	0.278	1008.759	0.87	
SOIL WATER AT START OF YEAR	8.192	29736.033		
SOIL WATER AT END OF YEAR	8.470	30744.793		
SNOW WATER AT START OF YEAR	0.000	0.000	0.00	
SNOW WATER AT END OF YEAR	0.000	0.000	0.00	
ANNUAL WATER BUDGET BALANCE	0.0000	0.021	0.00	

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ANNUAL TOTALS FOR YEAR 1978

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	INCHES	CU. FEET	PERCENT
PRECIPITATION	39.85	144655.484	100.00
RUNOFF	0.000	0.000	0.00
EVAPOTRANSPIRATION	20.425	74143.852	51.26
PERC./LEAKAGE THROUGH LAYER 1	18.773417	68147.500	47.11
CHANGE IN WATER STORAGE	0.651	2364.134	1.63
SOIL WATER AT START OF YEAR	8.470	30744.793	
SOIL WATER AT END OF YEAR	9.121	33108.926	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.007	0.00
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J	AN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DE
- PRECIPITATION						
TOTALS	1.46 5.24	2.16 5.54	1.65 5.78	0.98 2.07	3.41 0.76	6.8 2.3
STD. DEVIATIONS	1.35 1.27	1.88 1.10	0.75 3.22	0.53 2.05	3.13 0.89	4.8 1.1
RUNOFF						
TOTALS	0.000	0.000	0.000	0.000 0.000	0.000 0.000	0.00
STD. DEVIATIONS	0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.000 0.000	0.0
EVAPOTRANSPIRATIO	N					
TOTALS	0.907	0.860 3.069	1.108 2.690	0.524 1.010	1.365 0.464	2.3 1.0
STD. DEVIATIONS	0.767 0.761	0.560 0.328	0.141 1.184	0.198 0.574	1.049 0.357	1.1 0.7
PERCOLATION/LEAK	AGE THRO	DUGH LAYER	. 1			
TOTALS	0.6209 2.2860	1.1553 2.4487	0.7285 3.0448	0.4322 1.1861	1.9212 0.6411	4.38 0.98
STD. DEVIATIONS	0.6750 0.4733	1.3382 1.3800	0.6081 1.9738	0.3527	2.1885 0.4395	3.95 0.78

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1974 THROUGH 1978

	INCHES		CU. FEET	PERCENT
PRECIPITATION	38.19	(4.980)	138629.7	100.00
RUNOFF	0.000	(0.0000)	0.00	0.000
EVAPOTRANSPIRATION	18.164	(2.7004)	65934.86	47.562
PERCOLATION/LEAKAGE THROUGH LAYER 1	19.83578	(3.95666)	72003.883	51.93973
CHANGE IN WATER STORA	GE 0.190	(0.4345)	690.96	0.498

	(INCHES)	(CU. FT.)
PRECIPITATION	5.47	19856.100
RUNOFF	0.000	0.0000
PERCOLATION/LEAKAGE THROUGH LAYER 1	3.743185	13587.75980
SNOW WATER	0.00	0.0000
MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.1	247
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.0190	
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FINAL WATER STORAGE AT END OF YEAR 1978

FINAL WAISH C			
 LAYER	(INCHES)	(VOL/VOL)	
1	9.1209	0.0760	
SNOW WATER	0.000		

# ATTACHMENT B

# TRANSMISSIVITY TEST RESULTS

# GEOCOMPOSITE TEST RESULTS Hydraulic Transmissivity (ASTM D 4716) Client: Globex Engineering & Development, Inc. Project: Landfill

TRI Log No.:E2144-32-04Material: Double sided geocompositeTest Date:08/14/00Fluid Media: WaterReport Date:08/26/00Confining Pressure (psf): 15,000Direction Tested: Machine Dir.

Roll #: 9023

	Normal Load		Flow		
Trial	Time	Hydraulic	Rate	Flow Rate/Unit Wid	Transmissivity
Number	(hrs)	Gradient	(ml/sec)	(gal/min/ft)	(m2/s)
-					
1	100	0.10	10.5	0.17	3.5E-04
2	100	0.10	9.8	0.16	3.2E-04
3	100	0.10	9.7	0.15	3.2E-04
Ava.			10.0	0.16	3.28E-04
Std. Dev.			0.47	0.01	0.00

Transmissivity Box Configuration: (top to bottom) Steel Plate Synthetic Soil (butyl rubber pad) Test Sample 60 mil THDPE Geomembrane Steel Plate

SRA 08.26.00

Quality Review / Date

#### N/A Not Available

The testing herein is based upon accepted industry practice as well as the test method listed. Test results reported herein do not apply to samples other than those tested. TRI neither accepts responsibility for nor makes claim as to the final use and purpose of the material. TRI observes and maintains client confidentiality. TRI limits reproduction of this report, except in full, without approval of TRI.



# Florida Department of Environmental Protection

South District P.O. Box 2549 Fort Myers, Florida 33902-2549 Charlie Crist Governor

Jeff Kottkamp Lt. Governor

Michael W. Sole Secretary

May 3, 2007

CERTIFIED MAIL NO. 7006 0810 0003 5373 8843 RETURN RECEIPT REQUESTED

GLADES LANDFILL, LLC c/o Linda Tarasco, Managing Member 1111 Route 110, Suite 220 East Farmingdale, New York 11735

Re: <u>Glades County - SW</u> GLADES LANDFILL, LLC Permit No. 0210803-001-SO/22 Base Grade Modification and Leachate Storage Ponds Permit Intermediate Modification Application No. 0210803-003-SO/IM

Dear Ms. Tarasco:

The Department hereby approves the requested modification to the Construction/Operation Permit dated September 6, 2006, prepared and submitted by Globex Engineering and Development and received by the Department September 7, 2006. Subsequent additional information was incorporated in the original application package. The modification allows the Permittee to construct the waste disposal unit, referred to as Phase 1 with the revised base grade and to construct two double lined leachate storage ponds instead of installing the previously approved leachate storage tanks. The modifications shall be done in accordance with the approved application package. An approved copy of the submittal is enclosed for your records.

The modification has been considered a Permit Intermediate Modification and approved under No. 0210803-003-SO/IM.

GLADES LANDFILL, LLC Application No. 0210803-003-SO/IM May 3, 2007 Page 2 of 4

Specific conditions associated with this approval are as follows:

- 1) The Permittee shall notify the Department at least 48 hours in advance of the following stages of the construction for the leachate storage ponds:
  - a) Completion of subgrade before placing the geosynthetic clay liner.
  - b) During placement of the lower 60 mil thick geomembrane.
  - c) During placement of geonet detection layer over the lower geomembrane.
  - d) During the placement of the upper 60 mil thick geomembrane.
- 2) Permittee shall submit a Certification of Construction Completion (CCC), FDEP Form 62-701.900(2); signed, dated and sealed by a professional engineer within thirty (30) days of construction completion for Disposal Area 1 and Leachate Storage Ponds. Permittee shall provide at least fourteen (14) days advance notice to the Department prior to accepting solid waste, so that the Department has the opportunity to inspect the site.
- 3) A minimum of two feet of freeboard above the depth which would occur in the event of a 25-year, 24-hour storm shall be maintained in leachate surface impoundments (Leachate Storage Ponds) [Florida Administrative Code, F.A.C., Rule 62-701.400(6)(b)5.].
- 4) The Permittee shall submit a supplement to the approved Long-Term Care Cost Estimate with respect to leachate storage ponds OR recalculated Closure and Long-Term Care Cost Estimates and financial assurance for the disposal unit, Phase 1 and Leachate Storage Ponds at least 30 days before receiving waste.

Please attach this letter to Operation Permit No. 0210803-001-SO/22, as it becomes a part of that Permit.

Should you need further information, please call Ghous Minhaj, Solid Waste Permitting Engineer, at (239) 332-6975, extension 185.

GLADES LANDFILL, LLC Application No. 0210803-003-SO/IM May 3, 2007 Page 3 of 4

# NOTICE OF RIGHTS

The Department's Notice of Modification will be considered final, unless a timely petition for an administrative hearing is filed under Sections 120.569 and 120.57, Florida Statutes (F.S.). The petition must contain the information required by Florida Administrative Code (F.A.C.), Rule 28-106.201 or Rule 28-106.301, and must be filed (received) within fourteen (14) days of receipt of this written notice in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000. A copy of F.A.C., Chapter 28-106 can be found at <a href="http://fac.dos.state.fl.us/">http://fac.dos.state.fl.us/</a>.

Mediation is not available in this proceeding.

Any party to this order has the right to seek judicial review of it under Section 120.68, F.S., by filing a notice of appeal under Rule 9.110, Florida Rules of Appellate Procedure, with the clerk of the Department in the Office of General Counsel, Mail Station 35, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000, 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 thirty (30) days after this order is filed with the clerk of the Department.

Executed in Fort Myers, Florida.

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Jon M. İglehárt Director of District Management

# CERTIFICATE OF SERVICE

The undersigned duly designated deputy agency clerk hereby certifies that this PERMIT MINOR MODIFICATION and all copies were mailed before the close of business on \_\_\_\_\_\_\_\_\_ 2007, to the listed persons.



GLADES LANDFILL, LLC Application No. 0210803-003-SO/IM May 3, 2007 Page 4 of 4

# FILING AND ACKNOWLEDGMENT

FILED, on this date, under Section 120.52(7), Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

(Clerk)

(Date)

# Enclosure JMI/GAM/MHR/rcd

# CC:

Ali Khatami, PhD, P.E. Globex Engineering and Development (Enclosure) Richard Tedder, DEP (via e-mail) <u>Richard.Tedder@dep.state.fl.us</u> Chris McGuire, OGC DEP (via e-mail) <u>Chris.McGuire@dep.state.fl.us</u> Jack Chisolm, OGC DEP (via e-mail) <u>Jack.Chisolm@dep.state.fl.us</u> Tor Bejnar, DEP Bill Krumbholz, DEP Jack D. Myers, DEP Prepared for:

# **Glades Landfill, LLC**

111 Route 110, Suite 220 East Farmingdale, New York 11735



# PERMIT MODIFICATION APPLICATION

# FOR THE GLADES LANDFILL, LLC GLADES COUNTY, FLORIDA

Prepared By:



# GLOBEX Engineering & Development 6115 Lyons Road

Coconut Creek, Florida 33073 (954) 571-9200

Project No. 1895 September 2006

# MEMORANDUM

TO:	Ghous Minhaj, Florida Department of Environmental Protection (FDEP)			
FROM:	Brenda Ann Smith Clark, Globex Engineering & Development (Globex)			
DATE:	30 January 2007	Prenda an Inith dall		
SUBJECT:	Transmittal of Additional Information <u>Glades County - SW</u> GLADES LANDFILL, LLC Permit No. 0210803-001-SO/22 Base Grade Modification, Cell Phase I Permit Intermediate Modification	200 anaay 2007		

On behalf of GLADES LANDFILL, LLC (Glades Landfill), Globex is pleased to provide additional information requested by the Florida Department of Environmental Protection (FDEP) during a telephone conversation between myself and Ghous Minhaj and Mel Reinhart, both of FDEP, on 18 January 2007, for the above referenced project. In accordance with the 18 January 2007 conversation, the following information is attached:

- The Agreement between Cliff Berry, Inc. (CBI) and Glades Landfill is presented in Attachment A. The Agreement has been signed by Mr. Victor Delle Fave, a responsible official for Glades Landfill. Mr. Delle Fave is a managing member of DTG Holdings, LLC, which as previously indicated, is the sole Owner/Member of Glades Landfill.
- Section 3.2 of the Operation Plan Addendum has been revised to indicate that the dates of inspection and maintenance of the leachate collection system components will be recorded. A copy of revised Section 3.2 of the Operation Plan Addendum is presented in Attachment B.
- Section 3.2.2 of the Operation Plan Addendum has been revised to include a description of the pump operations. A copy of revised Section 3.2.2 of the Operation Plan Addendum is presented in Attachment C.
- Section 3.2.3 of the Operation Plan Addendum has been revised to reference Rule 62-701.400(6)(b) of the Florida Administrative Code (FAC). A copy of

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RECEIVED - D.E.P.

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SOUTH DISTRICT

Mr. Ghous Minhaj 30 January 2007 Page 2

revised Section 3.2.3 of the Operation Plan Addendum is presented in Attachment C

• Section 3.5.2 of the Operation Plan Addendum has been revised to indicate that, in the event of an interruption of discharge to the waste water treatment plant, the owner will assess the situation, and discuss with FDEP any additional measures required for the storage and/or handling of the leachate during the interruption of discharge. Revised Section 3.5.2 of the Operation Plan Addendum is presented in Attachment D.

RECEIVED - D.E.P.

FEB 08 2007



and for maintaining the system as designed for the design period. Prior to operation, the sump, cleanout pipes, leachate collection pumps and control panel will be inspected for proper operation. The leachate collection system, including the pumps and controls will be inspected on a weekly basis during operation to assure proper operation of the system. The landfill operator will monitor information from the control panel on the leachate head on top of the liner and volume of leachate removed from the active disposal area on a daily basis to confirm proper operation of the system. Pumps located in active areas, or areas without final cover, will be inspected on a monthly basis to confirm normal operation. Additional inspection, preventative maintenance, and checking of the electrical components are performed in a manner and frequency in accordance with manufacturer's recommendations. The date and data of all inspection and maintenance will be recorded. Records will be available at the site upon request.

The leachate shall be collected as necessary so that water quality standards and criteria are not violated. If the leachate is classified as a hazardous waste, it shall be managed in accordance with Chapter 62-730 of the FAC.

## 3.2.1 Leachate Collection System

Each C&D debris waste disposal cell area includes a lining system. The lining system includes a leachate collection system (LCS), which provides for the effective collection of leachate accumulating on the geomembrane liner. The purpose of the LCS, in combination with the geomembrane liner, is to collect and convey leachate to the sumps.

The LCS for the waste disposal area consists of:

- LCS geocomposite drainage layer covering the entire cell area; and
- LCS pipe including an 8-in. nominal diameter perforated high density polyethylene (HDPE) pipe embedded in pipe bedding material (gravel, FDOT No. 57 aggregate).

The LCS is overlain by a 2-ft thick protective cover layer consisting of granular material. In accordance with Rule 62-701.400(3)(d)3, FAC, the upper foot of the protective cover layer may consist of tire chips.

The C&D waste disposal area is graded such that leachate is conveyed to a swale area. From the swale area, the leachate is conveyed to a sump. The leachate will be removed from the sump, via the leachate collection riser pipe, to the leachate force main. The leachate pumps will be located outside the leachate riser pipes on the landfill berm to allow for ease of pump maintenance and repair (see Attachment A for typical information on pump).

#### 3.2.2 Leachate Removal and Transfer

The leachate pump is controlled by a submersible level sensors located inside the riser pipe (see Attachment B for typical information on submersible level sensor). The pumps discharge the leachate from the sumps to the leachate storage ponds via a force main. The force main is located in the landfill perimeter berms and extends from the C&D waste disposal area to the leachate storage ponds.

1895/F060356 Revised 21 December 2006 Revised 25 January 2007 Globex Engineering & Development **FECEVED** FEB ( 8 2007 D E P.- South District

2

and for maintaining the system as designed for the design period. Prior to operation, the sump, cleanout pipes, leachate collection pumps and control panel will be inspected for proper operation. The leachate collection system, including the pumps and controls will be inspected on a weekly basis during operation to assure proper operation of the system. The landfill operator will monitor information from the control panel on the leachate head on top of the liner and volume of leachate removed from the active disposal area on a daily basis to confirm proper operation of the system. Pumps located in active areas, or areas without final cover, will be inspected on a monthly basis to confirm normal operation. Additional inspection, preventative maintenance, and checking of the electrical components are performed in a manner and frequency in accordance with manufacturer's recommendations. The date and data of all inspection and maintenance will be recorded. Records will be available at the site upon request.

The leachate shall be collected as necessary so that water quality standards and criteria are not violated. If the leachate is classified as a hazardous waste, it shall be managed in accordance with Chapter 62-730 of the FAC.

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The LCS is overlain by a 2-ft thick protective cover layer consisting of granular material. In accordance with Rule 62-701.400(3)(d)3, FAC, the upper foot of the protective cover layer may consist of tire chips.

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## 3.2.2 Leachate Removal and Transfer

The leachate pump is controlled by a submersible level sensors located inside the riser pipe (see Attachment B for typical information on submersible level sensor). The pumps discharge the leachate from the sumps to the leachate storage ponds via a force main. The force main is located in the landfill perimeter berms and extends from the C&D waste disposal area to the leachate storage ponds.

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GLOBEX Engineering & Development

21 December 2006

Mr. Philip Barbaccia Florida Department of Environmental Protection – South District 2295 Victoria Avenue, Suite 364 West Fort Myers, Florida 33902

Subject: <u>Glades County – SW</u> GLADES LANDFILL, LLC Permit No. 0210803-001-SO/22 Base Grade Modification, Cell Phase I Permit Intermediate Modification Request for Additional Information (RAI) No. 2

Dear Mr. Barbaccia:

On behalf of GLADES LANDFILL, LLC (Glades Landfill), Globex Engineering & Development (Globex) is pleased to provide the Florida Department of Environmental Protection (FDEP) with this additional information regarding the application for modifications to the design of the Glades Landfill (Permit Modification Application). Glades Landfill was issued permit No. 0210803-001-SO/22 to construct and operate a construction and demolition (C&D) debris disposal facility (Permit). The Glades Landfill is located east of State Road (SR) 78, approximately 2.5 miles north of the intersection of SR 78 and US Highway 27, in Glades County, Florida. This document has been prepared in response to the request for additional information (RAI) No. 2 dated 3 October 2006 from the Florida Department of Environmental Protection (FDEP). The Permit Modification Application for the Glades Landfill was received by FDEP on 7 September 2006. This document follows the format presented in RAI No. 2 and presents each FDEP comment in italics, followed by the response.

# **REQUEST FOR ADDITIONAL INFORMATION**

# **FDEP** Comment

<u>REQUEST FOR PERMIT MOFIDICATION</u>: Please provide a copy of the Florida Corporation Records that verify the position of the person signing as Applicant or Agent for this letter, the letter of authorization, Part C.1 of the permit application and the Financial Assurance Correction Econt. P.All

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SOUTH DISTRICT

request letters, Forms and applications shall have legible original signature by the authorized person. Moreover, this is required with respect to the person/entity responsible for financial assurance for closure and long-term care of this facility [Florida Administrative Code, F.A.C., Rules 62-701.730(2), 62-701.320(7) and 62-701.630(1)(a)].

# **Response to FDEP Comment**

The Florida Corporation Records that verify that Ms. Linda Tarasco is the managing member of Glades Landfill, LLC, are presented in Appendix A. As a managing member of the LLC, she is authorized to sign on behalf of the LLC.

# **FDEP** Comment

ENGINEER'S LETTER, dated September 6, 2006, Revised November 6 2006: Pages 2 and 3, Engineering Drawings, Paragraph 4: Please provide the Rule Reference pertaining to the leachate storage ponds design, F.A.C. Rule 62-701.400(6)(b), in place of F.A.C. Rule 62-701.400(4), which pertains to the leachate collection system.

## **Response to FDEP Comment**

The Engineer's letter has been revised to include the requested information. The revised letter is presented in Appendix B.

#### **FDEP Comment**

ENGINEER'S LETTER, dated September 6, 2006, Revised November 6 2006: Page 3, Closure and Long Term Care Cost Estimates: Please reference the request noted in the comment "REQUEST FOR PERMIT MODIFICATION". Please verify the position of the person signing this Form.

## **Response to FDEP Comment**

The Florida Corporation Records that verify that Ms. Linda Tarasco is one of the managing members of Glades Landfill, LLC, with authority to represent the company, are presented in Appendix A.



# **FDEP** Comment

ENGINEER'S LETTER, dated September 6, 2006, Revised November 6 2006: Page 5, ATTACHMENT C, SPECIFICATIONS: a) It is noted "Material specifications for the leachate storage tank construction are presented in ATTACHMENT C of APPENDIX B". Please clarify where in ATTACHMENT C the material specifications for the leachate storage tank construction are presented [F.A.C. Rule 62-701.320(7)].

# **Response to FDEP Comment**

The Engineer's letter has been revised to indicate that the specifications for the leachate storage pond construction are presented in Attachment C of Appendix B. The revised letter is presented in Appendix B.

# **FDEP** Comment

ENGINEER'S LETTER, dated September 6, 2006, Revised November 6 2006: Page 5, ATTACHMENT C, SPECIFICATIONS: b) Please note specifications for geonet are missing from the TABLE OF CONTENTS for ATTACHMENT C.

# **Response to FDEP Comment**

The Table of Contents for the Technical Specifications has been revised and is presented in Appendix C.

# **FDEP** Comment

ENGINEER'S LETTER, dated September 6, 2006, Revised November 6 2006: Page 5, ATTACHMENT C, SPECIFICATIONS: c) Please clarify what Sections of the Specifications (ATTACHMENT C, APPENDIX B submitted September 6, 2006) are applicable to the Leachate Collection Ponds.

# **Response to FDEP Comment**

The leachate storage ponds include the following components, from bottom to top: (i) construction of the structural fill to achieve the proposed leachate storage pond grades;

(ii) a geosynthetic clay liner (GCL); (iii) a 60-mil thick high density polyethylene (HDPE) geomembrane; (iv) a geonet drainage layer; (v) a 1-ft thick sand drainage layer; (vi) a gravel wrapped in a geotextile filter; and (vii) a 60-mil thick HDPE geomembrane. The material and construction specifications for each of these components of the leachate storage ponds are included in the Technical Specifications. For example, Section 02200: Earthwork addresses the soil materials and construction requirements for the structural fill and the drainage gravel. Section 02711: Protective Cover addresses the soil material and construction requirements for the drainage sand. The additional components are also each addressed in the Technical Specifications.

# **FDEP** Comment

<u>APPLICATION FORM</u>, PART B. ADDITIONAL INFORMATION: B.1: The response to B.1.d. does not address "an estimate of the planned active life of the facility". Please address [F.A.C. Rule 62-701.900(6)].

#### **Response to FDEP Comment**

Page 3 of 4 of the Application Form has been revised to provide the requested information. The Revised Page 3 of 4 is presented in Appendix D.

# **FDEP** Comment

<u>APPLICATION FORM</u>, PART B. ADDITIONAL INFORMATION: B.3: The Response to FDEP Comment notes "The operation plan does not address the leachate collection, treatment and storage except in the drawings and in the Appendix 2 to the Engineering Report (application for leachate disposal)". Please provide the exact references for the drawings and the Appendix 2 to the Engineering Report being referenced in that statement.

Please clarify that Cliff Berry, Incorporated, has a license/permit to transport leachate generated at the facility to a permitted wastewater treatment plant (WWTP) for disposal/treatment. Please provide the name of the WWTP and documentation that the WWTP accepts the disposal of the facility's leachate at their treatment plant.

> Part B.2 of the Application Form indicates "No change from the Application for Permit" for this item. The response to RAI I indicates a change in the operation plan was made with an Addendum to Operation Plan titled Leachate Management found in ATTACHMENT F. Please revise the initial comment to reflect this on Part B.3 of the application form. Also, include this comment for item B.9 of the application form.

# **Response to FDEP Comment**

This comment, presented in the Response to Comments dated November 2006 was referencing the original *Construction/Operation Permit Application Construction and Demolition Debris Disposal Facility*, prepared by SCS Engineers and dated January 2005 (Application for Permit). The Application for Permit included an operation plan, however, that operation plan did not address the leachate collection, treatment and storage systems for the Glades Landfill. Treatment of the leachate on-site was not originally and is not currently proposed. The collection and storage of the leachate was described in the engineering drawings included in the Application for Permit. The only other document in the Application for Permit that addressed leachate was Appendix 2 of the Engineering Report, which included an application for discharge of leachate to the waste water treatment plant in the City of Moore Haven, Florida.

Cliff Berry, Inc. (CBI) has a waste water pretreatment plant located in Miami, Florida (Miami Terminal). The leachate generated at the Glades Landfill will be removed from the site by CBI and disposed of at the Miami Terminal. Information regarding the Miami Terminal, including information on their transportation and disposal licenses are presented in Appendix E. In addition, a wastewater disposal agreement with CBI is also presented in Appendix E.

Page 3 of 4 of the Application Form has been revised to provide the requested information. The Revised Page 3 of 4 is presented in Appendix D. A cover sheet for the Addendum to the Operation Plan has been included in Appendix F, for inclusion in the original Permit Modification Application.

#### **FDEP** Comment

ATTACHMENT F, ADDENDUM TO OPERATION PLAN was reviewed and the following items need to be addressed: a) Page 1, Section 1., INTRODUCTION,



4<sup>th</sup> sentence: Please revise rule reference from F.A.C. Rule 62-730 to 62-701.730

# **Response to FDEP Comment**

The Addendum to the Operation Plan has been revised to include the requested revision. The revised Addendum to Operation Plan is presented in Appendix G.

# **FDEP** Comment

ATTACHMENT F, ADDENDUM TO OPERATION PLAN was reviewed and the following items need to be addressed: b) Please reword this paragraph for Section 1 to reflect other requirements, F.A.C. Rule 62-701.730(4)(a) that provides the Department with the discretion to require the installation of a liner or not. For this permitted facility it was determined that a liner was required.

# **Response to FDEP Comment**

The Addendum to the Operation Plan has been revised to include the requested revision. The revised Addendum to Operation Plan is presented in Appendix G.

# **FDEP Comment**

ATTACHMENT F, ADDENDUM TO OPERATION PLAN was reviewed and the following items need to be addressed: c) For Section 3.1, Leachate Monitoring: Include sampling, analysis of the landfill leachate, and for providing copies of the leachate analysis to the Department [F.A.C. 62-701.500(8)(a)].

# **Response to FDEP Comment**

The Addendum to the Operation Plan has been revised to include the requested revision. The revised Addendum to Operation Plan is presented in Appendix G.



# **FDEP** Comment

ATTACHMENT F, ADDENDUM TO OPERATION PLAN was reviewed and the following items need to be addressed: d) For Section 3.2, Operations and Maintenance: Please provide how the operator will maintain the leacahte collection and removal system as designed for the design period. Please indicate what operational parameters of the leachate collection system would provide the operator with an early warning that the collection system is not operating as designed.

# **Response to FDEP Comment**

The Addendum to the Operation Plan has been revised to include the requested revision. The revised Addendum to Operation Plan is presented in Appendix G.

# **FDEP** Comment

ATTACHMENT F, ADDENDUM TO OPERATION PLAN was reviewed and the following items need to be addressed: e) For Section 3.2.1, Leachate Collection System, paragraph 4: Please provide a detailed drawing with cross-sections and dimensions of the leachate collection sump proposed for the landfill.

# **Response to FDEP Comment**

Drawing 6 of the Engineering Drawings has been revised to include cross-sections and dimensions of the leachate collection sump. The revised drawings are presented in Appendix H.

## FDEP Comment

ATTACHMENT F, ADDENDUM TO OPERATION PLAN was reviewed and the following items need to be addressed: f) For Section 3.2.2, Leachate Removal and Transfer: Please provide the leachate removal pump specifications for leachate being removed from the landfill. Please describe the control system for the leachate pump and provide its specifications.


Mr. Philip Barbaccia 21 December 2006 Page 8

## **Response to FDEP Comment**

The Addendum to the Operation Plan has been revised to include the requested revision. The revised Addendum to Operation Plan is presented in Appendix G.

## **FDEP Comment**

ATTACHMENT F, ADDENDUM TO OPERATION PLAN was reviewed and the following items need to be addressed: g) For Section 3.2.2, Leachate Disposal, paragraph 1: Please provide the Rule Reference pertaining to leachate storage ponds design, F.A.C. Rule 62-701.400(6)(b), in place of F.A.C. rule 62-701.400(4), which pertains to the leachate collection system.

#### **Response to FDEP Comment**

The Addendum to the Operation Plan has been revised to include the requested revision. The revised Addendum to Operation Plan is presented in Appendix G.

## **FDEP** Comment

ATTACHMENT F, ADDENDUM TO OPERATION PLAN was reviewed and the following items need to be addressed: h) For Section 3.2.3, Leachate Disposal, paragraph 4: F.A.C. rule 62-701.500(8)(c) states that "The landfill operator is responsible for having a written contract or agreement with the off-site treatment plant to discharge leachate to the plant". Please provide a written contract or agreement.

#### **Response to FDEP Comment**

The agreement with CBI is presented in Appendix E.



Mr. Philip Barbaccia 21 December 2006 Page 9

## **FDEP** Comment

ATTACHMENT F, ADDENDUM TO OPERATION PLAN was reviewed and the following items need to be addressed: i) For Section 3.3, Leachate Discharge – Off-Site: Please reference the request for item h) above.

## **Response to FDEP Comment**

The agreement with CBI is presented in Appendix E.

## **FDEP** Comment

B.2 thru 12: Items B.3 and B.9 of the application form need to be noted as describe in second paragraph for comment to item B.3. [F.A.C. rule 62-701.900(6)].

#### **Response to FDEP Comment**

Page 3 of 4 of the Application Form has been revised to provide the requested information. The Revised Page 3 of 4 is presented in Appendix D.

## **FDEP Comment**

PART C. CERTIFICATION: C.1: Please reference the request noted in the comment "REQUEST FOR PERMIT MODIFICATION". Please verify the position of the person signing this Form.

#### **Response to FDEP Comment**

The Florida Corporation Records that verify that Ms. Linda Tarasco is one of the managing members of Glades Landfill, LLC, with authority to represent the company, are presented in Appendix A.



Mr. Philip Barbaccia 21 December 2006 Page 10

## **CLOSURE**

On behalf of GLADES LANDFILL, LLC, Globex is pleased to provide FDEP with this response to the request for additional information regarding the application for modifications to the design of the Glades Landfill. Should you have any questions regarding the information in this response letter, please contact Ms. Clark at (954) 571-9200.

Sincerely,

Bunda and mith Clath

ZI DUCUMBLY 201 Brenda Ann Smith Clark, P.E. Project Director Project Director

ali Khate

Ali Khatami, Ph.D., P.E. Principal

Attachments





GLOBEX **Engineering & Development** 

8 November 2006

Mr. Philip Barbaccia Florida Department of Environmental Protection - South District 2295 Victoria Avenue, Suite 364 West Fort Myers, Florida 33902

Subject: Glades County – SW **GLADES LANDFILL, LLC** Permit No. 0210803-001-SO/22 Base Grade Modification, Cell Phase I Permit Intermediate Modification Request for Additional Information (RAI) No. 1

Dear Mr. Barbaccia:

On behalf of GLADES LANDFILL, LLC (Glades Landfill), Globex Engineering & Development (Globex) is pleased to provide the Florida Department of Environmental Protection (FDEP) with this additional information regarding the application for modifications to the design of the Glades Landfill (Permit Modification Application). Glades Landfill was issued permit No. 0210803-001-SO/22 to construct and operate a construction and demolition (C&D) debris disposal facility (Permit). The Glades Landfill is located east of State Road (SR) 78, approximately 2.5 miles north of the intersection of SR 78 and US Highway 27, in Glades County, Florida. This document has been prepared in response to the request for additional information (RAI) No. 1 dated 3 October 2006 from the Florida Department of Environmental Protection (FDEP). The Permit Modification Application for the Glades Landfill was received by FDEP on 7 September 2006. This document follows the format presented in RAI No. 1 and presents each FDEP comment in italics, followed by the response.

## **REQUEST FOR ADDITIONAL INFORMATION**

## **FDEP** Comment

REQUEST FOR PERMIT MODIFICATION - The Permittee, GLADES LANDFILL, LLC, is required to submit a request letter describing the desired modification, "Base Grade Modification of the first cell Phase 1 of the disposal facility." The letter shall be signed by the president of the corporation or by a PECOLUMETO = Do Eale MECOLUMETO = Do Eale MECOLUMETO = DO Eale MECOLUMETO = DO EALE

duly authorized agent [Florida Administrative Code (F.A.C.) Rule 62-701.320(7)].

## **Response to FDEP Comment**

The requested correspondence is presented in Attachment A.

## **FDEP Comment**

ENGINEER'S LETTER, dated September 6, 2006 – Pages 2 and 3, Engineering Drawings: Please provide reference to exact drawing(s) and sections for leachate conveyance to the sump and pump, and describe in the narrative. Also please provide adequate description of the pump's operation and conveyance of leachate to the ponds.

## **Response to FDEP Comment**

The Engineer's letter dated 6 September 2006 has been revised to include the requested information. The revised letter is presented in Attachment B.

#### **FDEP** Comment

ENGINEER'S LETTER, dated September 6, 2006 – Page 3, Closure and Long Term Care Cost Estimates: Please note that the current Permit 0210803-001-SO/22 was issued January 5, 2006. In accordance with Specific Condition No. 24.b of the Permit, revised Closure and Post Closure Long-term Care Cost Estimates and corresponding financial assurance shall be submitted to the Fort Myers District office of the Department, at least sixty (60) days before the anticipated date of starting construction. Please provide the anticipated date of starting construction. As the engineer of record has changed all the eleven pages of the form, [DEP Form 62-701.900(28)] shall be submitted with signature of the current owner/operator, and signature, date and seal of the current engineer of record on Page 2 of 11. Please include cost of erosion control and maintenance, e.g. additional soil to fill ruts or slopes, mowing of grass and the labor required [F.A.C. Rule 62-701.630].

### **Response to FDEP Comment**

It was originally proposed to only modify those sheets that included a mathematical error in order to prevent redoing the entire financial assurance cost estimate for the facility. However, during our meeting on 17 October 2006, FDEP indicated that in order to correct the mathematical error, the entire financial assurance would need to be resubmitted. However, Glades Landfill will be submitting the design of the remainder of the disposal area in the early part of 2007. At that time, a new financial assurance cost estimate will be required. Therefore, Glades Landfill has chosen not to modify the financial assurance cost estimate that is currently permitted. The Engineer's letter dated 6 September 2006 has been revised to include this information. The revised letter is presented in Attachment B.

In accordance with Condition 24.b of the Permit, the updated financial assurance, adjusted for inflation, is presented in Attachment C.

## **FDEP** Comment

ENGINEER'S LETTER, dated September 6, 2006 – Page 4, Specifications: Please clarify the location where the referenced material can be located in this submittal [F.A.C. Rule 62-701.320(7)].

## **Response to FDEP Comment**

The Engineer's letter dated 6 September 2006 has been revised to include the requested information. The revised letter is presented in Attachment B.

## **FDEP** Comment

COVER PAGE FOR APPENDIX A: Please clarify under the TABLE OF CONTENTS that this TABLE reflects the material submitted with the application for the current permit (Permit No. 0210803-001-SO/22].

#### **Response to FDEP Comment**

The cover page for Appendix A has been revised to include the requested information. The revised cover page is presented in Attachment D.

## **FDEP** Comment

APPLICATION FORM: PART A. GENERAL INFORMATION, A.3: Please mark the Classification of this application as an Intermediate Modification.

## **Response to FDEP Comment**

The Application Form has been revised to indicate that the application is an Intermediate Modification. The Revised Application Form is presented in Attachment E.

## **FDEP** Comment

APPLICATION FORM: PART A. GENERAL INFORMATION, A.4 and A.8: Please capitalize GLADES LANDFILL, LLC, to be consistent with the entity name in the database of the Florida Department of State, Division of Corporations [F.A.C. Rule 62-701.900(6)].

## **Response to FDEP Comment**

The Application Form has been revised as requested. The Revised Application Form is presented in Attachment E.

### **FDEP** Comment

APPLICATION FORM: PART B. ADDITIONAL INFORMATION, B.1: Please provide complete reference for this item [F.A.C. Rule 62-701.900(6)].

## **Response to FDEP Comment**

The Application Form has been revised as requested. The Revised Application Form is presented in Attachment E.

## **FDEP** Comment

APPLICATION FORM: PART B. ADDITIONAL INFORMATION, B.3: The leachate collection, treatment, and storage have changed from the original permit. Please address leachate treatment, after it is collected in the ponds and its disposal. Please revise the operations plan accordingly [F.A.C. Rule 62-701.730(2)(c) and (7)].

## **Response to FDEP Comment**

The operation plan does not address the leachate collection, treatment and storage except in the drawings and in Appendix 2 to the Engineering Report (application for leachate disposal). An addendum to the Operation Plan is presented in Attachment F to address the leachate collection, treatment, and storage.

## **FDEP** Comment

APPLICATION FORM: PART B. ADDITIONAL INFORMATION, B.4, B.5 and B.11: Please note the comment on Page 3 under ENGINEER'S LETTER [F.A.C. Rule 62-701.730(9) and (10)].

### **Response to FDEP Comment**

The Application Form has been revised as requested. The Revised Application Form is presented in Attachment E.

## FDEP Comment

APPLICATION FORM: PART B. ADDITIONAL INFORMATION, B.2, through 12: For those items marked as "No Substantial Change," please note any minor changes that may have occurred to those items. If there is none, please mark those items as "No Change" from the Application fro Permit and/or Minor Modification, as applicable [F.A.C. Rules 62-701.900(6) and 62-701.320(10)]

## **Response to FDEP Comment**

The Application Form has been revised as requested. The Revised Application Form is presented in Attachment E.

## **FDEP Comment**

PART C. CERTIFICATION: C.1: Please provide a letter of authorization by President, GLADES LANDFILL, LLC, by noting that the agent signing the application is authorized to do so for the corporation [F.A.C. Rule 62-701.900(6)].

## **Response to FDEP Comment**

Ms. Linda Tarasco is the President of GLADES LANDFILL, LLC. A letter authorizing Ms. Tarasco to sign on behalf of GLADES LANDFILL, LLC is presented in Attachment G.

## **FDEP Comment**

DRAWINGS: Drawing No. 3, PROPOSED GRADING PLAN: Please provide cross-sections with elevations for the leachate storage ponds. References 9/7 and 10/7 on Drawing 7 are plans and do not provide cross-sections of the leachate storage ponds. Please mark all locations of cross-sections with the direction of view (indicate with two arrows for each). Please show sequence of filling with access road to Phase 1, disposal area, on the Drawing [F.A.C. Rule 62-701.320(7)(f)].

## **Response to FDEP Comment**

Cross sections, with elevations for the leachate storage ponds are provided in Drawing 7. A drawing with the sequence of filling, with the access road, is provided in Drawing 10 (Sheet 11 of 12). Drawings 7 and 10 are presented in Attachment H. The revised cover sheet is also presented in Attachment H.

## **FDEP** Comment

DRAWINGS: Drawing No. 4, LEACHATE COLLECTION SYSTEM PLAN AND PROTECTIVE COVER SYSTEM PLAN: Please show sequence of filling with access road to Phase 1, disposal area, and during the progress of filling on the Drawing. Please mark all locations of cross-sections (e.g., 3/5, 4/5, etc) with the direction of view (indicate with two arrows for each). Please provide a cross-section of the perimeter surface water retention area, berm and roads west of Cell Phase 1 [F.A.C. Rule 62-701.320(7)(f)].

## **Response to FDEP Comment**

A drawing with the sequence of filling, with the access road, is provided in Drawing 10 (Sheet 11 of 12). Drawing 4 prepared by SCS Engineers is considered to be Sheet 10 of 12. A cross-section of the perimeter surface water retention area, berm and roads west of Phase 1 is provided in Drawing 11 (Sheet 12 of 12). Drawings 10 and 11 are presented in Attachment H.

## **FDEP** Comment

ATTACHMENT C. SPECIFICATIONS: In Section/Page numbers 02711-5 and .02716-11, the protective cover layer is represented being 3 feet in thickness. The narrative and drawings indicate the protective cover layer to be 2 feet in thickness, as required by F.A.C. Rule 62-701.340(3)(d)3. Please clarify.

#### **Response to FDEP Comment**

The reference in question is a table that is presented in the Specifications. The purpose of the table is to identify the thickness of the soil layer that needs to be between the equipment and the geosynthetic materials, based on the size of the equipment. For example, if the contractor uses a piece of equipment with a ground pressure greater than 20 psi to transport or deliver the protective cover material, he must keep a layer of soil that is at least 3 feet thick between the wheels of the equipment and the geosynthetic material (i.e., geotextile or geocomposite) to prevent damage to the geosynthetic material. Upon completion, the protective cover soil will only be 2 feet thick. The table is provided in both the geotextile section and the geocomposite section of the

specifications because these are the materials that are in direct contact with the protective cover material.

## **CLOSURE**

Globex is pleased to provide GLADES LANDFILL, LLC with this response to the FDEP request for additional information regarding the application for modifications to the design of the Glades Landfill. Should you have any questions regarding the information in this response letter, please contact either of the undersigned at (954) 571-9200.

Sincerely,

Prenda ann Inith Clack

Brenda Ann Smith Clark, P.E. B WWember2004 Project Director

ale Khate

Ali Khatami, Ph.D., P.E. Principal

Attachments





GLOBEX Engineering & Development

> 6 September 2006 Revised 8 November 2006 Revised 21 December 2006

Mr. Philip Barbaccia Florida Department of Environmental Protection – South District 2295 Victoria Avenue, Suite 364 West Fort Myers, Florida 33902

## Subject: Transmittal Letter Application for Modification of Solid Waste Permit Glades Landfill, Glades County, Florida

Dear Mr. Barbaccia:

On behalf of Glades Landfill, LLC (Glades Landfill), Globex Engineering & Development (Globex) is pleased to provide the Florida Department of Environmental Protection (FDEP) with this application for modifications to the design of the Glades Landfill (Permit Modification Application). Glades Landfill was issued permit No. 0210803-001-SO/22 to construct and operate a construction and demolition (C&D) debris disposal facility (Permit). The Glades Landfill is located east of State Road (SR) 78, approximately 2.5 miles north of the intersection of SR 78 and US Highway 27, in Glades County, Florida. The Permit Modification Application proposes modifications to the design of the disposal area (cell), leachate storage tanks, and material specifications. In addition, this Permit Modification Application Application addresses modifications to the Financial Assurance Cost Estimate.

## **Project Background**

Glades Landfill was recently issued both a Permit for the construction and operation of a construction and demolition (C&D) debris disposal facility and an Environmental Resources Permit (ERP) for a surface water management system. Both permits were issued by FDEP. The Permit addressed the construction and operation of an 8.07 acre cell and other ancillary facilities (i.e., perimeter roads, attendant building, office area, and leachate collection and storage facilities). This development is referred to in the Permit as Phase I. Although the Permit addressed the construction and operation of an 8.07 acre cell, the final C&D debris disposal area will consist of 17 cells for a total of approximately 190 acres. The surface water management system presented in the ERP

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is designed to contain the surface water runoff from the final development of the 190 acre disposal facility, as well as the addition ancillary features, for a total acreage of 223.6 acres.

### Information Included in SCS Permit Application

The permit application for the Permit was prepared by SCS Engineers of Tampa, Florida. The permit application is herein referred to as the Permit Application. The Permit Application included the information required to describe the construction and operation of the Glades Landfill. The Table of Contents for the Permit Application is presented in Appendix A. The permitted design of the cell and leachate storage tanks are addressed in Appendix 1 of Attachment E of the Permit Application. The financial assurance and the material specifications are presented in Appendix 7 and 8, respectively, of Attachment E of the Permit Application. As previously indicated, this Permit Modification Application addresses the design of the cell, leachate storage tanks, financial assurance, and material specifications. There are no modifications proposed to any further information presented in other sections of the Permit Application.

#### **Proposed Modifications**

The proposed modifications to the existing permitted facility addressed in this Permit Modification Application include revisions to the base grades of the waste disposal area, referred to as Phase I, and leachate storage tanks, modifications to the Financial Assurance Cost Estimate Form, and specifications. The proposed modifications are described in the following subsections. The Permit Modification Application, including the permit application form addressing these proposed modifications is presented in Appendix B.

#### Engineering Drawings

The permitted drawings indicate that base grades for the cell area range from approximately elevation 12.0 ft to 20.6 ft, National Geodetic Vertical Datum (NGVD). Modifications to these grades are proposed. The proposed modified base grades are within the range of the currently permitted base grades and are presented in the Engineering Drawings included in the Permit Modification Application presented in



Appendix B. As shown in Sheets 3 and 4 of the Engineering Drawings, the cell is graded such that leachate is conveyed to a swale area. From the swale area, the leachate is conveyed to a sump. The leachate will be removed from the sump, via the leachate collection riser pipe, to the leachate force main. The leachate pumps will be located outside the leachate riser pipes on the landfill berm to allow for ease of pump maintenance and repair.

The leachate pump is controlled by a bubbler system located inside the riser pipe. The pumps discharge the leachate from the sumps to the leachate storage ponds via a force main. The force main is located in the landfill perimeter berms and extends to the leachate storage ponds, as shown in the Engineering Drawings included in the Permit Modification Application presented in Appendix B.

The force main consists of a 10-in. nominal diameter HDPE pipe with an SDR of 17. The leachate force main has been sized to handle the flow from the pumps and future cells.

Leachate from the landfill will be transferred to one of two leachate storage ponds located north of Phase I. The design of the leachate storage ponds is presented in Sheet 7 of the Engineering Drawings included in the Permit Modification Application presented in Appendix B. The leachate storage ponds, which will store more than 80,000 gallons of leachate, have been designed in accordance with the requirements of Rule 62-701.400(6)(b) of the Florida Administrative Code (FAC).

The leachate storage ponds are equipped with pumps for the removal of the leachate through the truck loading pad, as shown in Sheet 8 of the Engineering Drawings. The leachate will be removed from the site via a tanker truck. A leachate pump is located just beyond the leachate storage ponds for the removal of leachate to the tanker truck. Approximately one tanker truck (approximately 6,000 gallons) of leachate shall be removed from the site on a daily basis during the operation of Phase I. This rate will vary depending on rainfall and evaporation.

The pump for the removal of leachate from the storage pond will have an approximate capacity of 400 gallons per minute (gpm). This pump capacity will provide adequate

capacity to pump the leachate from the storage pond.

The leachate will be removed from the site by Cliff Berry Incorporated for disposal at a permitted waste water treatment facility.

The permitted lining system for Phase I has been modified. The currently permitted lining system, from top to bottom, includes:

- 24 inches of  $1 \times 10^{-2}$  cm/sec sand drainage layer; and
- 60-mil thick high density polyethylene (HDPE) smooth geomembrane.

The proposed lining system includes, from top to bottom:

- 24 inches of  $1 \times 10^{-3}$  cm/sec sand drainage layer;
- Geocomposite drainage layer; and
- 60-mil thick high density polyethylene (HDPE) textured geomembrane.

The currently permitted design includes leachate storage tanks. As part of this Permit Modification Application, the leachate storage tanks would be replaced with leachate storage ponds. The leachate storage ponds, including the lining system, have been designed in accordance with the requirements of Rule 62-701.400(6)(b) of the Florida Administrative Code (FAC).

The surface water management system shown in the Engineering Drawings is only a portion of the system that was permitted under the ERP. On behalf of Glades Landfill, Globex has submitted a letter to FDEP addressing the construction of the surface water management system. The letter, addressed to Mr. Jack Myers of FDEP, is dated 31 August 2006, and is currently on file with FDEP.

## Closure and Long-Term Care Cost Estimates

The Financial Assurance Cost Estimate Form was included in the Permit Application addressing both the closure and long-term care of the Glades Landfill. In accordance with Specific Condition 24.b of the Permit, an updated Closure and Post Closure Long-Term Care Cost Estimate is to be submitted. Globex has used the inflation factor for

2006 to update the Closure and Post Closure Long-Term Care Cost Estimate. The updated Closure and Post Closure Long-Term Care Cost Estimate is presented in Appendix B.

## **Specifications**

The materials used in the cell liner have been revised from that originally permitted. Specifications to address the additional and/or revised materials involved in the lining system construction are presented in Attachment C of the Permit Modification Application presented in Appendix B. Material specifications for the leachate storage pond construction are also presented in Attachment C of Appendix B.

## Closure

Globex is pleased to provide FDEP with this Permit Modification Application for the Glades Landfill. Those sections of the Permit Application not addressed in this Permit Modification Application remain unchanged and are therefore not submitted. Should you have any questions regarding the information in this Permit Modification Application, please contact the undersigned at (954) 571-9200.

Sincerely,

PorindhanuSmith Clack 21 Dicember 2001 Brenda Ann Smith Clark, P.E.

Project Director

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Ali Khatami, Ph.D., P.E. Principal

Appendices



GLOBEX Engineering & Development

> 6 September 2006 Revised 8 November 2006

Mr. Philip Barbaccia Florida Department of Environmental Protection – South District 2295 Victoria Avenue, Suite 364 West Fort Myers, Florida 33902

## Subject: Transmittal Letter Application for Modification of Solid Waste Permit Glades Landfill, Glades County, Florida

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## **Project Background**

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acre disposal facility, as well as the addition ancillary features, for a total acreage of 223.6 acres.

## Information Included in SCS Permit Application

The permit application for the Permit was prepared by SCS Engineers of Tampa, Florida. The permit application is herein referred to as the Permit Application. The Permit Application included the information required to describe the construction and operation of the Glades Landfill. The Table of Contents for the Permit Application is presented in Appendix A. The permitted design of the cell and leachate storage tanks are addressed in Appendix 1 of Attachment E of the Permit Application. The financial assurance and the material specifications are presented in Appendix 7 and 8, respectively, of Attachment E of the Permit Application. As previously indicated, this Permit Modification Application addresses the design of the cell, leachate storage tanks, financial assurance, and material specifications. There are no modifications proposed to any further information presented in other sections of the Permit Application.

### **Proposed Modifications**

The proposed modifications to the existing permitted facility addressed in this Permit Modification Application include revisions to the base grades of the waste disposal area, referred to as Phase I, and leachate storage tanks, modifications to the Financial Assurance Cost Estimate Form, and specifications. The proposed modifications are described in the following subsections. The Permit Modification Application, including the permit application form addressing these proposed modifications is presented in Appendix B.

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is conveyed to a sump. The leachate will be removed from the sump, via the leachate collection riser pipe, to the leachate force main. The leachate pumps will be located outside the leachate riser pipes on the landfill berm to allow for ease of pump maintenance and repair.

The leachate pump is controlled by a bubbler system located inside the riser pipe. The pumps discharge the leachate from the sumps to the leachate storage ponds via a force main. The force main is located in the landfill perimeter berms and extends to the leachate storage ponds, as shown in the Engineering Drawings included in the Permit Modification Application presented in Appendix B.

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The leachate storage ponds are equipped with pumps for the removal of the leachate through the truck loading pad, as shown in Sheet 8 of the Engineering Drawings. The leachate will be removed from the site via a tanker truck. A leachate pump is located just beyond the leachate storage ponds for the removal of leachate to the tanker truck. Approximately one tanker truck (approximately 6,000 gallons) of leachate shall be removed from the site on a daily basis during the operation of Phase I. This rate will vary depending on rainfall and evaporation.

The pump for the removal of leachate from the storage pond will have an approximate capacity of 400 gallons per minute (gpm). This pump capacity will provide adequate capacity to pump the leachate from the storage pond.

The leachate will be removed from the site by Cliff Berry Incorporated for disposal at a

permitted waste water treatment facility.

The permitted lining system for Phase I has been modified. The currently permitted lining system, from top to bottom, includes:

- 24 inches of  $1 \times 10^{-2}$  cm/sec sand drainage layer; and
- 60-mil thick high density polyethylene (HDPE) smooth geomembrane.

The proposed lining system includes, from top to bottom:

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The currently permitted design includes leachate storage tanks. As part of this Permit Modification Application, the leachate storage tanks would be replaced with leachate storage ponds. The leachate storage ponds, including the lining system, have been designed in accordance with the requirements of Rule 62-701.400(6)(b) of the Florida Administrative Code (FAC).

The surface water management system shown in the Engineering Drawings is only a portion of the system that was permitted under the ERP. On behalf of Glades Landfill, Globex has submitted a letter to FDEP addressing the construction of the surface water management system. The letter, addressed to Mr. Jack Myers of FDEP, is dated 31 August 2006, and is currently on file with FDEP.

### Closure and Long-Term Care Cost Estimates

The Financial Assurance Cost Estimate Form was included in the Permit Application addressing both the closure and long-term care of the Glades Landfill. In accordance with Specific Condition 24.b of the Permit, an updated Closure and Post Closure Long-Term Care Cost Estimate is to be submitted. Globex has used the inflation factor for 2006 to update the Closure and Post Closure Long-Term Care Cost Estimate. The updated Closure and Post Closure Long-Term Care Cost Estimate. The updated Closure and Post Closure Long-Term Care Cost Estimate is presented in Appendix B.

#### **Specifications**

The materials used in the cell liner have been revised from that originally permitted. Specifications to address the additional and/or revised materials involved in the lining system construction are presented in Attachment C of the Permit Modification Application presented in Appendix B. Material specifications for the leachate storage tank construction are also presented in Attachment C of Appendix B.

## Closure

Globex is pleased to provide FDEP with this Permit Modification Application for the Glades Landfill. Those sections of the Permit Application not addressed in this Permit Modification Application remain unchanged and are therefore not submitted. Should you have any questions regarding the information in this Permit Modification Application, please contact the undersigned at (954) 571-9200.

Sincerely,

Prenda and mith Clathe

Brenda Ann Smith Clark, P.E. & Dovenhar 2006 Project Director

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Ali Khatami, Ph.D., P.E. Principal

Appendices



## GLOBEX Engineering & Development

6 September 2006

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Mr. Philip Barbaccia Florida Department of Environmental Protection – South District 2295 Victoria Avenue, Suite 364 West Fort Myers, Florida 33902

Subject: Transmittal Letter Application for Modification of Solid Waste Permit Glades Landfill, Glades County, Florida

Dear Mr. Barbaccia:

On behalf of Glades Landfill, LLC (Glades Landfill), Globex Engineering & Development (Globex) is pleased to provide the Florida Department of Environmental Protection (FDEP) with this application for modifications to the design of the Glades Landfill (Permit Modification Application). Glades Landfill was issued permit No. 0210803-001-SO/22 to construct and operate a construction and demolition (C&D) debris disposal facility (Permit). The Glades Landfill is located east of State Road (SR) 78, approximately 2.5 miles north of the intersection of SR 78 and US Highway 27, in Glades County, Florida. The Permit Modification Application proposes modifications to the design of the disposal area (cell), leachate storage tanks, and material specifications. In addition, this Permit Modification Application addresses modifications to the Financial Assurance Cost Estimate.

## **Project Background**

Glades Landfill was recently issued both a Permit for the construction and operation of a construction and demolition (C&D) debris disposal facility and an Environmental Resources Permit (ERP) for a surface water management system. Both permits were issued by FDEP. The Permit addressed the construction and operation of an 8.07 acre cell and other ancillary facilities (i.e., perimeter roads, attendant building, office area, and leachate collection and storage facilities). This development is referred to in the Permit as Phase I. Although the Permit addressed the construction and operation of an 8.07 acre cell, the final C&D debris disposal area will consist of 17 cells for a total of approximately 190 acres. The surface water management system presented in the ERP is designed to contain the surface water runoff from the final development of the 190



Mr. Philip Barbaccia 6 September 2006 Page 2

acre disposal facility, as well as the addition ancillary features, for a total acreage of 223.6 acres.

## Information Included in SCS Permit Application

The permit application for the Permit was prepared by SCS Engineers of Tampa, Florida. The permit application is herein referred to as the Permit Application. The Permit Application included the information required to describe the construction and operation of the Glades Landfill. The Table of Contents for the Permit Application is presented in Appendix A. The permitted design of the cell and leachate storage tanks are addressed in Appendix 1 of Attachment E of the Permit Application. The financial assurance and the material specifications are presented in Appendix 7 and 8, respectively, of Attachment E of the Permit Application. As previously indicated, this Permit Modification Application addresses the design of the cell, leachate storage tanks, financial assurance, and material specifications. There are no modifications proposed to any further information presented in other sections of the Permit Application.

### **Proposed Modifications**

The proposed modifications to the existing permitted facility addressed in this Permit Modification Application include revisions to the base grades of the waste disposal area, referred to as Phase I, and leachate storage tanks, modifications to the Financial Assurance Cost Estimate Form, and specifications. The proposed modifications are described in the following subsections. The Permit Modification Application, including the permit application form addressing these proposed modifications is presented in Appendix B.

#### Engineering Drawings

The permitted drawings indicate that base grades for the cell area range from approximately elevation 12.0 ft to 20.6 ft, National Geodetic Vertical Datum (NGVD). Modifications to these grades are proposed. The proposed modified base grades are within the range of the currently permitted base grades and are presented in the Engineering Drawings included in the Permit Modification Application presented in Appendix B. As shown in the Engineering Drawings, the cell is graded such that leachate is conveyed to a swale area. From the swale area, the leachate is conveyed to a



## Mr. Philip Barbaccia 6 September 2006 Page 3

sump. The sump is equipped with a pump to remove the leachate from the cell and transfer it to the leachate storage area.

The permitted lining system for Phase I has been modified. The currently permitted lining system, from top to bottom, includes:

- 24 inches of  $1 \times 10^{-2}$  cm/sec sand drainage layer; and
- 60-mil thick high density polyethylene (HDPE) smooth geomembrane.

The proposed lining system includes, from top to bottom:

- 24 inches of  $1 \times 10^{-3}$  cm/sec sand drainage layer;
- Geocomposite drainage layer; and
- 60-mil thick high density polyethylene (HDPE) textured geomembrane.

The currently permitted design includes leachate storage tanks. As part of this Permit Modification Application, the leachate storage tanks would be replaced with leachate storage ponds. The leachate storage ponds, including the lining system, have been designed in accordance with the requirements of Rule 62-701.400(6)(b) of the Florida Administrative Code (FAC).

The surface water management system shown in the Engineering Drawings is only a portion of the system that was permitted under the ERP. On behalf of Glades Landfill, Globex has submitted a letter to FDEP addressing the construction of the surface water management system. The letter, addressed to Mr. Jack Myers of FDEP, is dated 31 August 2006, and is currently on file with FDEP.

## Closure and Long-Term Care Cost Estimates

The Financial Assurance Cost Estimate Form was included in the Permit Application addressing both the closure and long-term care of the Glades Landfill. There appears to be a mathematical error in the Annual Cost for Long-Term Care. Globex has revised the Financial Assurance Cost Estimate Form using the unit rates included in the Permit Application. The revised sheets of the Financial Assurance Cost Estimate Form are presented in Appendix B.

## Mr. Philip Barbaccia 6 September 2006 Page 4

#### **Specifications**

The materials used in the cell liner have been revised from that originally permitted. Specifications to address the additional and/or revised materials involved in the lining system construction are presented in the Permit Modification Application presented in Appendix B. Material specifications for the leachate storage tank construction are also presented in Appendix B.

## Closure

Globex is pleased to provide FDEP with this Permit Modification Application for the Glades Landfill. Those sections of the Permit Application not addressed in this Permit Modification Application remain unchanged and are therefore not submitted. Should you have any questions regarding the information in this Permit Modification Application, please contact the undersigned at (954) 571-9200.

Sincerely,

Posenda and mith Clark

Brenda Ann Smith Clark, P.E. 4 Leptember 2006 Project Director

For Ali Khatami, Ph.D., P.E. Principal

Appendices

# APPENDIX A

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## APPENDIX A

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TABLE reflects the material submitted with the application for the current permit (Permit No. 0210803-001-SO/22)

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Application for Permit to Construct, Operate or Modify a Construction and Demolition Debris Disposal or Disposal with Recycling Facility

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Appendix 7	Closure and Long Term Care Cost Estimates
Appendix 8	Specifications



MAR 2 3 2005

# D.E.P. - South District

# APPENDIX B

# PERMIT MODIFICATION APPLICATION

Prepared for:

## **Glades Landfill, LLC**

111 Route 110, Suite 220 East Farmingdale, New York 11735

SEP 97 2006

## PERMIT MODIFICATION APPLICATION

# FOR THE GLADES LANDFILL, LLC

## **GLADES COUNTY, FLORIDA**



Prepared By:



## GLOBEX Engineering & Development 6115 Lyons Road

Coconut Creek, Florida 33073 (954) 571-9200

Project No. 1895 September 2006

Posenda ann Imith Clark 6 september 2006

Glades Landfill Permit Modification Application

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## DEP Form #62-701.900(6)

Attachment A: Engineering DrawingsAttachment B: Financial Assurance DocumentationAttachment C: Specifications

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## 1895/F060620.TOC

Globex Engineering & Development



Florida Department of Environmental Protection

DEP Form # 62-701.900(6)
Form Title Application to Construct. Operate or
Modify a Construction and Demolition Debris Disposal
or Disposal with Recycling Facility
Effective Date 05-27-01
DEP Application No. <u>0210803-003</u> SOXTA (Filled by DEP)

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, FL 32399-2400

#### STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

#### APPLICATION FOR PERMIT TO CONSTRUCT, OPERATE OR MODIFY A CONSTRUCTION AND DEMOLITION DEBRIS DISPOSAL OR DISPOSAL WITH RECYCLING FACILITY

**GENERAL REQUIREMENT**: Solid Waste Management Facilities shall be permitted pursuant to Section 403.707, Florida Statutes, (F.S.) and in accordance with Florida Administrative Code (F.A.C.) Chapter 62-701. A minimum of four copies of the application shall be submitted to the Department District Office having jurisdiction over the facility. The appropriate fee in accordance with Rule 62-701.315(5), F.A.C., shall be submitted with the application by check made payable to the Department of Environmental Protection (DEP). Complete appropriate sections for the type of facility for which application is made and include all additional information, drawings, and reports necessary to evaluate the facility.

Please Type or Print in Ink A. GENERAL INFORMATION

1. Type of facility:

[√] C&D Disposal
[ ] C&D Disposal with Recycling

NOTE: C&D Recyclers, with no disposal, shall apply on DEP FORM 62-701.900(4), F.A.C.

- 2. Type of application:
  - [√] Construction/Operation
    [ ] Operation Without Additional Construction
    [ ] Long-term Care

3. Classification of application:

[ ] New [ ] Renewal [ ] Substantial Modification
[ ] Intermediate Modification
[ ] Minor Modification



4.	Facility name:	GLADES LANDFILL, LLC			
5.	DEP ID number:	WACS 00093641	County:	Glades	
б.	Facility locati	on (main entrance):	East of Stat	te Road 78, approximate	ly 2.5 miles
	north of inters	ection of SR 78 and US	Highway 27, al	bout 1.5 miles west of i	Moore Haven
7.	Location coordi	nates:			
	Section: 27,34	Township: 41S Ra	nge: <u>32E</u>		
	UTMs: Zone	km E	km N		
	Latitude: 26	° <u>52</u> ' <u>24</u> " Lo	ongitude: 81	° 7 ' 7 ''	
Northwe Governr sacola, F	est District Northe mental Center 7825 Baymead FL 32501-5794 Jacksonville 95-8360 904-	east District Central C ows Way, Ste. B200 3319 Maguire Bl 5, FL 32256-7590 Orlando, FL 3 448-4300 407-894	istrict Southwe vd., Ste. 232 3804 Coco 2803-3767 Tampa, 7555 813-7	est District South District nut Palm Dr. 2295 Victoria Ave., Ste. 3 FL 33619 Fort Myers, FL 33901-38 44-6100 941-332-6975	Southeast Dis 364 400 North Congre 81 West Palm Beach, I 561-681-660

	Applicant name (ope	erating authority)	GLADES LANDFILL, LLC
	Mailing address	c/o 1111 Route 3	
	Malling address: _	Street or P.	O. Box City State Zip
	Contact person:	Linda Tarasc	• Telephone: ( <sup>631</sup> ) <u>420-0440</u>
	Manag	ging Member	dtcpallp@aol.com
	Title:		E-Mail address (if available)
	Authorized agent/Co	onsultant:	Globex Engineering & Development
	Authorized agene, e.	6115 Lyons	Road, Coconut Creek, Florida 33073
	Mailing address: _	Street or P.	O. Box City State Zip
	Contact person	Brenda S. Cla	Telephone: (954) 571-9200
	Proje	ct Director	clark@qlobexeng.com
	Title:		E-Mail address (if available)
		ront than applican	+).
•	Landowner (II diffe	Tent than apprican	().
	Mailing address:	Street or P	.O. Box City State Zip
	4 		
	Contact person:		
			E-Mail address (if available)
			Glades County and other counties
ι.	Cities, towns and	areas to be served	
			upon notification
2.	Date site will be	ready to be inspec	
3.	Estimated costs:		
	Total Constructior	1,234,000	Closing Costs: \$554,210
4.	Anticipated constr	uction starting ar	nd completion dates:
	Ser Ser	otember 2006	To: March 2007
5.	Expected volume of	waste to be recei	ived:yds'/daytons/day
6.	Provide a brief de	escription of the o	operations planned for this facility:
	This facility ac	cepts C&D debris e	exclusively to be landfilled in an 8-acre
	phase (Phase I).		
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	and the second sec		
	A REAL PRIMA		
DEP	FORM 62-701.900(6)		Page 2 of 4
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#### B. ADDITIONAL INFORMATION

Please attach the following reports or documentation as required.

- 1. Provide an engineering report, signed and sealed by a professional engineer, that includes (Rule 62-701.730(2)(a), F.A.C.):
  - a. A site plan, of a scale not greater than 200 feet to the inch, which shows the project location and identifies the proposed disposal units, total acreage of the site and of the proposed disposal units, and any other relevant features such as water bodies or wetlands on or within 200 feet of the site, potable water wells on or within 500 feet of the site, and community water systems on or within 1000 feet of the site; No change from the Application for Permit
  - b. A geotechnical investigation which meets the criteria of Rule 62-701.410, F.A.C.;
  - c. A hydrogeological investigation which meets the criteria of Rules 62-701.410(1)(a) and (c), F.A.C.; and No change from the Application for Permit
  - d. An estimate of the planned active life of the facility, the design of the disposal areas, and the design height of the facility There is no change from the Permit Minor Modification
- which states the planned active life of the facility is 12 months. Proposed modifications to the design of the disposal area are provided in Attachment A. 2. Provide a boundary survey, legal description, and topographic survey of the property (Rule 62-701.730(2)(b), F.A.C.). No change from the Application for Permit.
- 3. Provide an operation plan which describes how the applicant will comply with Rule 62-701.730(7), F.A.C. (Rule 62-701.730(2)(c), F.A.C.). An addendum to the Operation Plan
- included in the Application for Permit has been provided in Attachment D to address leachate management. 4. Provide a closure plan which describes generally how the applicant will comply with Rules 62-701.730(9) and (10), F.A.C. (Rule 62-701.730(2)(d), F.A.C.).
- No change from the Application for Permit. 5. Provide the financial assurance documentation required by Rule 62-701.730(11), F.A.C. (Rule 620701.730(2)(e), F.A.C.).
- Updated Financial Assurance Documentation Provided in Attachment B. 6. Provide a ground water monitoring plan which complies with the requirements of Rule 62-701.730(4)(b), F.A.C.
  - No change from the Application for Permit.
- 7. Provide documentation to show that stormwater will be controlled according to the requirements of Rule 62-701.730(5), F.A.C. No change from the Application for Permit.
- 8. Provide documentation to show how the applicant will comply with the temporary storage requirements of Rule 62-701.730(6), F.A.C.
- No change from the Application for Permit.
- 9. Provide documentation to show how the applicant will comply with the operation requirements of Rules 62-701.730(7) and (18), F.A.C. An addendum to the Operation Plan included in the Application for permit has been provided in Attachment D to address leachate management.
- 10. Provide documentation to show how the applicant will comply with the training requirements of Rule 62-701.730(8), F.A.C.
  - No change from the Application for Permit.
- 11. Provide documentation to show how the applicant will comply with the closure and long-term care requirements of Rules 62-701.730(9) and (10), F.A.C.
  - Financial Assurance to be provided under separate cover.
- 12. Provide documentation to show how the applicant will comply with the annual report requirements of Rule 62-701.730(12), F.A.C.

No change from the Application for Permit.

DEP FORM 62-701.900(6) Effective 05-27-01

Page 3 of 4

DEC 22 2006

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**SOUTH DISTRICT** 

## CERTIFICATION BY APPLICANT AND ENGINEER OR PUBLIC OFFICER

Applicant:

1.

2.

The undersigned applicant or authorized representative of Glades Landfill, LLC

Glades Landfill, LLC is aware that statements made in this form and attached Modification to Construction/

information are an application for a <u>operation</u> Permit from the Florida Department of Environmental Protection and certifies that the information in this application is true, correct and complete to the best of his/her 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.

1111 Route 110, Suite 220		
Mailing Address		
E. Farmingdale, NY, 11735		
City, State, Zip Code		
(631) 420-0440		
Telephone Number		
Date:7 November 2006		

Attach letter of authorization if agent is not a governmental official, owner, or corporate officer.

Professional Engineer registered in Florida (or Public Officer if authorized under Sections 403.707 and 403.7075, Florida Statutes):

This is to certify that the engineering features of this construction and demolition debris facility have been designed/examined by me and found to conform to engineering principles applicable to such facilities. In my professional judgment, 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.

Brendagnasmithalanh

Signature Brenda Ann Smith Clark, PE

Name and Title (please type)

42754

Florida Registration Number (please affix seal)

6115 Lyons Road
Mailing Address
Coconut Creek, FL, 33073
City, State, Zip Code
clark@globexeng.com
E-Mail address (if available) (954) 571-9200
Telephone Number
7 November 2006

DEP FORM 62-701.900(6) Effective 05-27-01

Page 4 of 4

## GLADES LANDFILL, LLC 1985 E. STATE ROAD 78 NW MOORE HAVEN, FL 33471 631-420-0440

October 23, 2006

Brenda Clark Globex Engineering & Development 6115 Lyons Rd Coconut Creek, FL 33073

Dear Brenda,

Please be advised that I, Linda Tarasco, am the president as well as the Managing Member of Glades Landfill, LLC. As such I have the authority to sign on behalf of Glades Landfill, LLC on all permit applications and any other documents submitted to the Florida Department of Environmental Protection.

If you require any additional information please let me know.

Sincerely,

a salar alar

Linda Tarasco President.

: NOV 7 6 4066 :
# GLADES LANDFILL, LLC 1985 E. STATE ROAD 78 NW MOORE HAVEN, FL 33471 631-420-0440

October 25, 2006

Mr. Philip Barbaccia Florida Department of Environmental Protection – South District 2295 Victoria Avenue, Suite 364 West Fort Myers, Florida 33902

Dear Mr. Barbaccia,

Please be advised that GLADES LANDFILL, LLC is requesting a modification of the current permit. This modification if for a "Base Grade Modification of the First cell Phase 1 of the disposal facility.

Please be advised that Globex Engineering is acting on behalf of GLADES LANDFILL, LLC in dealing with the FDEP on this issue.

If you require any additional information please do not hesitate to contact me.

Sincerely,

The same

Linda Tarasco President

# ATTACHMENT A

# ENGINEERING DRAWINGS



distant.	DEP Form # 62-701.900(28)
	Effective Date 05-27-01
	DEP Application No. 0210803-001-50
	(Filled by DEP) /2.

Florida Department of Environmental Protection Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, FL 32399-2400

# FINANCIAL ASSURANCE COST ESTIMATE FORM

		1-			*		
I. GENERAL INI	CINIMATION	<b>.</b>					
Facility Name:	GLADES L	ANDFILI	, LLC		·	WACS or GMSI	D# 00093641
Permit / Applicati	ion No.	0210803	-001-SO/2	2		Expiration Da	ite:
Facility Address:	1985 B.	State R	oad 78 NW,	, Moore Hay	ven, FL 3	3471	
Permittee:	GLADES L	ANDFILL	, LLC	· · · · · · · · · · · · · · · · · · ·			
Mailing Address:	1111 Rou	te 110,	Suite 22	0, E. Farm	ingdale,	NY 11735	
Latitude:	26°52'24	n	Longitude:	81°7'7"	_	or U	JTM:
Solid Waste Dis	posal Units	Include	d in Estimat	e:			CHI OF ENVIRONME
	-			Date Unit			
				Accepting		From Date of In	
Phase / Cell		Acres		Waste	_	Receipt of Was	ste 02/19/0
Phase I	-	8				9 months	or the
		· · · · · · · · · · · · · · · · · · ·	•••••••••••••••••••••••••••••••••••••••				ATE OF FLOP
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······································	•	·	·		-	<u>, , , , , , , , , , , , , , , , , , , </u>	
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n	_1		·		-	<u> </u>	
			•		-		
				<u> </u>	- 		
Total Landfill Acr	eage include	ed in this	estimate.	8	_Closure	8	Long-Term Care
Type of landfill:	-		_Class I		Class III	✓	C&D Debris
II. TYPE OF FIN	IANCIAL AS	SURAN		ENT (Check Type)			
	1	1*14			tu	Cautificate	+RI*L'
<b>v</b>		eait			_insurance	RE	
:	Performance	e Bond*			_Escrow Ad	count	require use of a
							FEB Standby Frust Fund
	Guaranty B	ond*		<u></u>	_Trust Fund	d Agreement <b>SO</b>	UTH DISTRICT
						Devile Dist	

#### III. ESTIMATE ADJUSTMENT

40 CFR Part 264 Subpart H as adopted by reference in Rule 62-/01.630, Florida Administrative Code sets forth the method of annual cost estimate adjustment. Cost estimates may be adjusted by using an inflation factor or by recalculating the maximum costs of closure in current dollars. Select one of the methods of cost estimate adjustment below.

#### (a) Inflation Factor Adjustment

Inflation adjustment using an inflation factor may only be made when a Department approved closure cost estimate exists and no changes have occurred in the facility operation which would necessitate modification to the closure plan. The inflation factor is derived from the most recent Implicit Price Deflator for Gross National Product published by the U.S. Department of Commerce in its survey of Current Business. The inflation factor is the result of dividing the latest published annual Deflator by the Deflator for the previous year. The inflation factor may also be obtained from the Solid Waste Financial Coordinator at (850)-488-0300.

Latest Department Approved Closure Cost Estimate:		Current Year Inflation Factor		Inflation Adjusted Closure Cost Estimate:
This adjustment is based on the I	Department ap	proved long-term care cost	estimate dated:	November 8,2006
Latest Department Approved				Inflation Adjusted
Latest Department Approved Annual Long-Term Care Cost Estimate:		Current Year Inflation Factor		Inflation Adjusted Annual Long-Term Care Cost Estimate:
atest Department Approved Annual Long-Term Care Cost Estimate: \$77,075.93	X	Current Year Inflation Factor 1.03	=	Inflation Adjusted Annual Long-Term Care Cost Estimate: \$79,388.21
Latest Department Approved Annual Long-Term Care Cost Estimate: \$77,075.93 Number of Years o	<b>X</b> f Long Term (	Current Year Inflation Factor 1.03 Care Remaining:	=	Inflation Adjusted Annual Long-Term Care Cost Estimate: \$79,388.21 5

(b) Recalculate Estimates (see section V)

#### **IV. CERTIFICATION BY ENGINEER**

This is to certify that the Financial Assurance Cost Estimates pertaining to the engineering features of the this solid waste management facility have been examined by me and found to conform to engineering principals applicable to such facilities. In my professional judgement, the Cost Estimates are a true, correct and complete representation of the financial liabilities for closing and long-term care of the facility and comply with the requirements of Florida Administrative Code (F.A.C.), Rule 62-701.630 and all other Department of Environmental Protection rules, and statutes of the State of Florida. It is understood that the Financial Assurance Cost Estimates shall be submitted to the Department annually, revised or adjusted as required by Rule 62-701.630(4), F.A.C.

Bunda ann Smith Clam Signature of Engineer 9 February 200)

Signature of Engineer

Brenda Ann Smith Clark, P.E.

Name & Title (please type)

42754

Florida Registration Number (affix seal)

6115 Lyons Road, Coconut Creek, FL 33073 Mailing Address

(954) 571-9200

**Telephone Number** 

DEP FORM 62-701.900(28) Effective 5-27-01

l son  $< \alpha$ Signature of Owner/Operator

Linda Tarasco, Managing Member Name & Title (please type)

(631) 420-0440 **Telephone Number** 

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C C		P Form # 62.701.900 Form Title <u>Financial Ass</u> Effective Date05.27 DEP Application No.	128) Jurance Cost Estimate Form 01 2 <i>10 803 - 003 -</i> (Filled by DEP)
Florida Department of Entropy Twin Towers Office Bldg. • 2600 Blair Stone	vironmental Protection Road • Tallahassee. FL 32399-2400	1	00/IM
FINANCIAL ASSU	JRANCE COST ESTIM	ATE FORM	
Date: 7 November 2006	Date of DEP Approval:	December	14,2006
I. GENERAL INFORMATION:			
Facility Name: GLADES LANDFILL, LLC		WACS or GMSID #:	00093641
003 Permit + Application No. 0210803-001-50/	/22	Expiration Date:	
Facility Address: 1985 E. State Road 78 N	W, Moore Haven, FL 33	3471	· · · · · · · · · · · · · · · · · · ·
Permittee: GLADES LANDFILL, LLC			·
Mailing Address: 1111 Route 110, Suite 2	20, E. Farmingdale, 1	NY 11735	
Latitude: <u>26°52'24</u> " Longitude	e: 81°7'7"	or UTM:	UN OF ENVIRONMENTAL B
Phase / Cell Acres	Date Unit Began Accepting Waste	Design Life of Unit From Date of Initial <u>Receipt of Waste</u> 9 months	APPROVED 12/14/06 STATE OF FLOTION
Total Landfill Acreage included in this estimate	8 Closure	8	RECEIVED NOV 1 3 2006
Total Editatility toreage included in this countate.			
Type of landfill:Class I	Class III		_C&D Debris
II. TYPE OF FINANCIAL ASSURANCE DOCU	MENT (Check Type)		
Letter of Credit*	Insurance	Certificate	*Indicates
Performance Bond*	Escrow Ac	count	require use of a Standby Trust Fund
Guaranty Bond*	Trust Func	Agreement	Agreement
Northwest DistrictNortheast DistrictCer160 Governmental Center7825 Baymeadows Way, Ste. B2003319 MagPensacola, FL 32501-5794Jacksonville, FL 32256-7590Orlando850-595-8360904-448-430040	ntral District Southwest Distri uire Blvd., Ste. 232 3804 Coconut Paln p, FL 32803-3767 Tampa, FL 3361 7-894-7555 813-744-6100	ct South District h Dr. 2295 Victoria Ave., Ste. 9 Fort Myers, FL 33901-3i 941-332-6975	Southeast District 364 400 North Congress Ave. 381 West Palm Beach, FL 33401 561-681-6600

#### **III. ESTIMATE ADJUSTMENT**

40 CFR Part 264 Subpart H as adopted by reference in Rule 62-701.630, Florida Administrative Code sets forth the method of annual cost estimate adjustment. Cost estimates may be adjusted by using an inflation factor or by recalculating the maximum costs of closure in current dollars. Select one of the methods of cost estimate adjustment below.

### (a) Inflation Factor Adjustment

Inflation adjustment using an inflation factor may only be made when a Department approved closure cost estimate exists and no changes have occurred in the facility operation which would necessitate modification to the closure plan. The inflation factor is derived from the most recent Implicit Price Deflator for Gross National Product published by the U.S. Department of Commerce in its survey of Current Business. The inflation factor is the result of dividing the latest published annual Deflator by the Deflator for the previous year. The inflation factor may also be obtained from the Solid Waste Financial Coordinator at (850)-488-0300.

Latest Department Approved Closure Cost Estimate: \$554,210,00	v	Current Year Inflation Factor 1.03	=	Inflation Adjusted Closure Cost Estimate \$570,836.30
This adjustment is based on the L	epannent ap	proved long-term care cost	commate dated.	·
Latest Department Approved		Current Year		Inflation Adjusted
Latest Department Approved Annual Long-Term Care Cost Estimate:	epartment ap	Current Year Inflation Factor		Inflation Adjusted Annual Long-Term Car Cost Estimate:
_atest Department Approved Annual Long-Term Care Cost Estimate: \$74,831.00	X	Current Year Inflation Factor 1.03	=	Inflation Adjusted Annual Long-Term Car Cost Estimate: \$77,075.93
Latest Department Approved Annual Long-Term Care Cost Estimate: \$74,831.00	X	Current Year Inflation Factor 1.03	= X	Inflation Adjusted Annual Long-Term Car Cost Estimate: \$77,075.93 5

(b) Recalculate Estimates (see section V)

### IV. CERTIFICATION BY ENGINEER

This is to certify that the Financial Assurance Cost Estimates pertaining to the engineering features of the this solid waste management facility have been examined by me and found to conform to engineering principals applicable to such facilities. In my professional judgement, the Cost Estimates are a true, correct and complete representation of the financial liabilities for closing and long-term care of the facility and comply with the requirements of Florida Administrative Code (F.A.C.), Rule 62-701.630 and all other Department of Environmental Protection rules, and statutes of the State of Florida. It is understood that the Financial Assurance Cost Estimates shall be submitted to the Department annually, revised or adjusted as required by Rule 62-701.630(4), F.A.C.

Brends and mids Clark SNOVEMBEN 2006

Signature of Engineer

Brenda Ann Smith Clark, P.E.

Name & Title (please type)

42754

Florida Registration Number (affix seal)

6115 Lyons Road, Coconut Creek, FL 33073 Mailing Address

(954) 571-9200

Telephone Number

Signature of Owner/Operator

Linda Tarasco, Managing Member Name & Title (please type)

(631) 420-0440 **Telephone Number** 



DEP FORM 62-701.900(28) Effective 5-27-01

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# FLORIDA CORPORATION RECORDS

APPENDIXA

Daniel S. Torchio, Esq. 880 Third Avenue – 13<sup>th</sup> Floor New York, New York 10022 (212) 752-6977 (212) 750-9773 FAX (917) 566-6938 Cellular dantorch@aol.com

VIA TELECOPIER (954) 418-9800

December 20, 2006

Brenda Clark Globex Engineering & Development 6115 Lyons Road Coconut Creek, FL 33073

Re: Glades Landfill, LLC, <u>Permit Modification Application</u>

Dear Ms. Clark:

CC:

Linda Tarasco

As you know, I am General Counsel to both Glades Landfill, LLC ("Glades") and to DTG Holdings, LLC ("DTG"), Florida Limited Liability Companies, and write in response to certain questions you posed to me regarding the ownership and authorized persons of these companies. On or about May 31, 2006, DTG acquired all of the Membership interests of Glades, and is the sole Owner/Member of Glades, as indicated on the Articles of Amendment to the Articles of Organization of Glades Landfill, LLC dated August 2, 2006 and filed with and accepted by the Florida Department of Corporations.

Accordingly, DTG is the "legal person" authorized to act on behalf of Glades, and has done so by appointing and authorizing Linda Tarasco and Vincent Gojcaj, each being managing members of DTG, to act as the Managing Members of Glades. Ratification of this appointment is evidenced by the "DTG Holdings, LLC Consent of Members" dated June 1, 2006, which is a Resolution adopted by the Members of DTG and which was filed with and accepted by the Florida Department of Corporations. Please note that the references contained therein to "Glades" and "Glades, LLC," as defined terms, are each intended to mean Glades Landfill, LLC, the Permitted entity.

I hope this sufficiently answers your questions. If you have further questions or need additional information, please call me.

ery truly yours, Daniel S. Torchio

**RECEIVED - D.E.P.** 

DEC 22 2006

SOUTH DISTRICT

#### ARTICLES OF AMENDMENT TO ARTICLES OF ORGANIZATION OF GLADES LANDFILL, LLC

#### A Florida Limited Liability Company

#### FIRST: The Articles of Organization were filed on November 29, 2001, and assigned number L01000020582.

SECOND: This Amendment is submitted to amend the following:

> ARTICLE II of the existing Articles of Organization shall be substituted and Replaced with the following:

#### ARTICLE II ADDRESS

The mailing address and street address of the principal office of the Limited Liability Company is i/c/o Howard E. Nelson, P.A., Bilzin Sumberg, 200 South Biscayne Boulevard, Suite 2500, Miami, Florida 33131-5340.

THIRD: The Authorized Representative of the Limited Liability Company shall hereafter be:

> i/c/o Howard E. Nelson, P.A., Bilzin Sumberg, 200 South Biscayne Boulevard, Suite 2500, Miami, Florida 33131-5340

FOURTH:

ARTICLE VI shall be added to the Articles of Organization as follows

# ARTICLE VI MEMBERS/MANAGING MEMBERS

The name and address of the Member/Managing Member of the Company DTG Holdings, LLC, a Florida Limited Liability Company having is: a registered office address at i/c/o Howard E. Nelson, P.A., Bilzin Sumberg, 200 South Biscayne Blvd., Suite 2500, Miami, Florida 33131-5340.

Except as so modified and amended hereby, the Articles of Organization FIFTH: of Glades Landfill, LLC filed on November 29, 2001, shall continue to remain in full force and effect. 06 AUG -8 AM 10: 34

Dated: August 2, 2006

Linda Tarasco, Managing Member

# DTG HOLDINGS LLC

#### **CONSENT OF MEMBERS**

The undersigned, representing a majority of ownership units as Members of DTG Holdings LLC, a Florida limited liability company (the "<u>Company</u>") and sole Member of Glades Landfill, LLC, a Florida limited liability company, hereby unanimously consent to the adoption of the following resolution and to the actions contemplated thereby, which resolution shall be deemed to have the full force and effect as a resolution adopted at a duly called meeting of the Members of the Company at which a quorum was present and acting throughout.

**RESOLVED**:

That in connection with the operation and day to day affairs of Glades Landfill, LLC ("<u>Glades</u>"), a Florida limited liability company, the following persons shall be authorized to act on behalf of and

to bind Glades, LLC, as Managing Members of Glades, LLC, to

<u>wit</u>:

LINDA TARASCO and VINCENT GOJCAJ, and said powers and authority shall be valid and enforceable by the act of either one or both of

the aforesaid Managing Members of Glades, LLC; and, it is further

**RESOLVED**: That the Managing Members of Glades, LLC hereby appointed are and shall be, singularly and collectively, authorized to execute and deliver any and all such agreements, documents, instruments, certificates and papers and to take any and all such actions as such Managing Member may deem advisable or appropriate in order to carry out the foregoing resolution.

IN WITNESS WHEREOF, the undersigned Members of the Company has signed this Written Consent as of the 1<sup>st</sup> day of June, 2006.

<0 Linda Tarasco, Managing Member

Augustine Gojcaj, Managing Member

Vincent Gojcaj, Managing Member

# ATTACHMENT C

# SPECIFICATIONS

SEP 0 7 2006

Prepared for:

Glades Landfill, LLC

111 Route 110, Suite 220 East Farmingdale, New York 11735

# **SPECIFICATIONS**

# PERMIT MODIFICATION APPLICATION

# FOR THE GLADES LANDFILL, LLC

# **GLADES COUNTY, FLORIDA**

JEP II AND DISIDIES

Prepared By:



# GLOBEX Engineering & Development

6115 Lyons Road Coconut Creek, Florida 33073 (954) 571-9200

Project No. 1895 September 2006

Bienda am Imila Clark 4 september 2006 

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1895/F060620 Revised 21 December 2006 Globex Engineering & Development

RECEIVED - D.E.P. DEC 2 2 2006

SOUTH DISTRICT

# **SECTION 02200**

# EARTHWORK

# PART 1 GENERAL

# **1.01 DESCRIPTION OF WORK**

- A. The Contractor shall furnish all labor, materials, tools, supervision, transportation, and installation equipment necessary to perform all earthwork related work as specified herein, as shown on the Drawings, and in accordance with the Construction Quality Assurance (CQA) Plan.
- B. The Contractor shall be prepared to construct the earthworks in conjunction with other construction activities, i.e., geosynthetics.
- C. The work of this section shall include, but not necessarily be limited to: excavating, hauling, backfilling, compacting, and grading soil materials. The work of this section may pertain in whole or in part to construction of the following: landfill cells; perimeter berms; surface-water berms; temporary drainage swales, drainage ditches, anchor trenches, culverts, access roads, pipes, and disposal and stockpiling of surplus materials. The work of this section also includes dewatering and protection. Earthwork shall conform to the dimensions, lines, grades and sections specified on the Drawings.

# **1.02 RELATED SECTIONS**

- A. Section 02711 Protective Cover
- B. Section 02712 Geonet
- C. Section 02716 Geocomposite
- D. Section 02771 Polyethylene Geomembrane

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# SECTION 02200: EARTHWORK

E. Section 02772 - Geosynthetic Clay Liner

# 1.03 REFERENCES

A. CQA Plan.

B.	Late	st version of Ame	rican Society for Testing and Materials (ASTM) standards:
	1.	ASTM D 422.	Standard Method for Particle-Size Analysis of Soils.
	2.	ASTM D 698.	Standard Test Methods for Moisture-Density Relations of
			Soils and Soil-Aggregate Mixtures Using a 5.5-lb (2.49-
			kg) Rammer and 12-in. (305-mm) Drop.
	3.	ASTM D 1557.	Standard Test Methods for Moisture-Density
		(Modified)	Relations of Soils and Soil-Aggregate Mixtures Using a
			10.0-lb (4.54-kg) Rammer and 18-in. (457-mm) Drop.
	4.	ASTM D 2216.	Standard Method for Laboratory Determination of Water
			(Moisture) Content of Soil, Rock, and Soil-Aggregate
			Mixtures.
	5.	ASTM D 2487.	Standard Test Method for Classification of Soils for
			Engineering Purposes.
	6.	ASTM D 2922.	Standard Test Methods for Density of Soil and Soil-
			Aggregate In Place by Nuclear Density Methods (Shallow
			Depth).
	7.	ASTM D 3017.	Standard Test Method for Water Content of Soil and Rock
			In Place by Nuclear Methods (Shallow Depth).
	8.	ASTM D 4220.	Standard Practices for Preserving and Transporting Soil
			Samples.
	9.	ASTM D 4318.	Standard Test Method for Liquid Limit, Plastic Limit, and
			Plasticity Index of Soils.
	10.	ASTM D 2937.	In-Place Density as a Check on Nuclear Densometer
			Measurements.

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#### SECTION 02200: EARTHWORK

# 1.04 **DEFINITIONS**

- A. The following are brief definitions of terminology associated with earth work at this site.
  - 1. Soil: Those natural materials that constitutes the media below the ground surface.
  - 2. Subgrade: The natural media below the ground surface.
  - 3. Vegetative Layer: Natural soil constructed in a layer. Vegetative cover consists of soils that promote growth of grass or other vegetation.
  - 4. Subbase: Soil layer constructed in a layer below a synthetic material. The soil layer surface presents an acceptable level of smoothness for placement of synthetic material.
  - 5. Structural fill: Soil compacted in layers to construct a soil structure.
  - 6. Grading. Operations required to smooth and "dress" areas to design lines, profiles and grades.
  - 7. Fill: Soil used in the construction of a soil structure.
  - 8. Spoil: Soil unsuitable for construction of a soil structure.

#### 1.05 SUBMITTALS AND QUALIFICATIONS

- A. For each soil type specified in Part 2 of this Section, the Contractor shall submit to the Owner the following information and samples a minimum of 14 days prior to starting construction:
  - 1. The proposed material source.
  - 2. The results of grain-size analyses conducted on the proposed material in accordance with ASTM D 422.
  - 3. The results of liquid and plastic limit tests conducted on the proposed material in accordance with ASTM D 4318.
  - 4. The results of a moisture-density relation test (ASTM D 698).
  - 5. A 50-pound sample of each of the proposed soils or authorization to access the proposed source(s) for sampling.
- B. The Contractor shall notify the Owner's Representative and CQA Consultant in writing at least 7 days in advance of intention to perform the work of this Section.

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#### SECTION 02200: EARTHWORK

# 1.06 CONSTRUCTION QUALITY ASSURANCE

- A. All earth work shall be performed in accordance with the requirements of this Specification and the CQA Plan.
- B. All earth work shall be monitored as outlined in the CQA Plan.
- C. The Contractor shall be aware of the activities outlined in the CQA Plan and account for these CQA activities in the construction schedule.

# 1.07 EXISTING CONDITIONS

A. The approximate locations of all known underground and above ground utility lines and structures are either shown on the Drawings or provided by the Owner. The Contractor shall immediately notify the CQA Consultant if other utility lines or structures, not shown on the plans, are encountered in the excavation.

# PART 2PRODUCTS

# 2.01 MATERIALS

- A. Soil used in the construction of subbase, berms, or other soil structures shall consist of relatively homogeneous, natural soils that are free of any metals, trees, stumps, peat, unacceptable organic matter or deleterious material. Minimal amount of roots in the soil is allowed at Engineer's approval.
- B. The soil shall be classified according to the United Soil Classification System (USCS) as SP, SW, SM, SC, ML, CL, CH, or MH material.
- C. The upper 1 foot of subgrade or subbase beneath the liner system shall not contain unbreakable particles larger than 0.75 inches in the largest dimension provided the percentage of particles by weight greater than the US standard sieve No. 4 is no greater than 15 percent and particles larger than the US standard sieve No. 4 are subangular, subrounded, or rounded. The maximum allowable unbreakable particle size for soil material placed at depth greater than 1 foot beneath the liner system is 3 inches with the percentage by weight of particles larger than the US

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#### SECTION 02200: EARTHWORK

standard sieve No. 4 no greater than 25 percent.

- D. The structural fill shall have sufficient internal friction angle to provide long-term stable slopes. Suitability of the structural fill shall be approved by the Engineer by performing shear strength laboratory tests and slope stability analysis.
- E. The rock placed around the leachate collection pipes shall be quartz or granitebased rounded river rock, washed or free of deleterious material. The gradation shall comply with the requirements for No. 57 aggregate as specified in the Florida Department of Transportation's (FDOT) Standard Specifications for Road and Bridge Construction (2004), or other materials as approved by the Engineer.
- F. Use of any material other than specified here shall be at the approval of the Engineer.

# PART 3EXECUTION

### 3.01 FAMILIARIZATION

- A. Prior to implementing any work described in this Section, the Contractor shall become thoroughly familiar with the site, the site conditions, and all portions of the work falling within this Section and the CQA Plan.
- B. Inspection:
  - 1. Prior to implementing any of the work in this Section, the Contractor shall carefully inspect the installed work of all other Sections and verify that all work is complete to the point where the installation of this Section may properly commence without adverse impact.
  - 2. If the Contractor has any concerns regarding the installed work of other Sections, the Contractor should immediately notify the Owner's Representative in writing within 48 hours of the site visit. Failure to notify the Owner's Representative or continuance with earthworks will be construed as Contractor's acceptance of the related work of all other Sections.

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#### **SECTION 02200: EARTHWORK**

# 3.02 FIELD QUALITY CONTROL

- A. The minimum frequency and details of quality control testing are provided in the CQA Plan. The Contractor shall take this testing frequency into account in planning his construction schedule.
- B. Sampling locations shall be selected by the CQA Consultant. If necessary, the location of routine in-place moisture content and dry density test shall be determined using a non-biased sampling plan.
- C. A special testing frequency shall be used at the discretion of the CQA Consultant when visual observations of construction performance indicate a potential problem.
- D. All perforations resulting from testing the soil layers shall be filled with soil compacted to the satisfaction of the CQA Consultant.
- E. If a defective area is discovered in the earthwork, the CQA Consultant shall immediately determine the extent and nature of the defect. If the defect is indicated by an unsatisfactory test result, the CQA Consultant shall determine the extent of the defective area by additional tests, observations, a review of records, or other means that the CQA Consultant deems appropriate.
- F. After determining the extent and nature of a defect, the Contractor shall correct the deficiency to the satisfaction of the CQA Consultant. The cost of corrective actions shall be borne by the Contractor.
- G. Additional testing shall be performed to verify that the defect has been corrected before any additional work is performed by the Contractor in the area of the deficiency.

# 3.03 SITE PREPARATION

A. The Contractor shall develop access to the construction area in accordance with

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#### SECTION 02200: EARTHWORK

the requirements of the Drawings and any Supplemental Specifications.

- B. The Contractor shall install silt fences immediately down-slope of each area to be disturbed prior to the beginning of work in that area. The Contractor shall maintain the silt fences for the duration of construction. Accumulated sediment behind the silt fences shall be disposed of by the Contractor in an area designated by the Owner's Representative.
- C. All brush, vegetation, rubbish, and other objectionable material shall be removed from the construction area and disposed of in an area designated by the Owner's Representative.
- D. All topsoil shall be removed from the construction area and stockpiled in areas identified by Owner's Representative.
- E. Diversion ditches, either permanent or temporary, shall be constructed in accordance with the Drawings. The Contractor shall be responsible for constructing diversion ditches as required to divert run-on around the construction area. The construction of temporary ditches not shown on the Drawings shall not be undertaken until the Contractor's plan for constructing the ditches is approved by the Owner's Representative.

# 3.04 STOCKPILING

- A. Prior to the start of excavation, the Contractor shall present a plan to the Owner's representative to indicate areas of excavation, sequence of excavation, and the anticipated classification of the excavated material. The Contractor shall take into account that the stockpiling portion of the excavation plan may be modified during construction based on the results of conformance testing of the excavated material by the CQA Consultant.
- B. Excavated materials classified as fill shall be stockpiled in designated areas free of incompatible soil, clearing debris, or other objectionable materials. Stockpile areas shall be approved by the Owner's Representative.

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#### SECTION 02200: EARTHWORK

- C. Excavated material classified as spoil shall be segregated from fill and stockpiled or disposed of in the manner shown on the Drawings or as specified by the Owner's Representative.
- D. Stockpiles of fill or spoil shall be no steeper than 3H:1V (horizontal:vertical) or other slope approved by the Engineer, graded to drain, sealed by tracking parallel to the slope with a dozer or other means approved by the Owner's Representative. The stockpiles shall be dressed daily during periods when fill is removed from the stockpile. The Contractor may cover fill stockpiles with plastic sheeting or other material approved by the Owner's Representative in order to preserve the moisture content of the fill.
- E. Stockpiles that will remain out of active use for a period greater than seven months shall either be covered as described in Part 3.04.D. above or stabilized by seeding or sodding.

# 3.05 EXCAVATION AND SUBGRADE PREPARATION

- A. After excavation or stripping to design grades, the CQA Consultant will inspect the subgrade. The CQA Consultant will identify areas that require additional excavation of weak materials. Such excavation shall be backfilled with structural fill. Backfill shall be placed and compacted in accordance with the requirements given in Part 3.07 below.
- B. If required, the Contractor shall scarify the portion of the subgrade on the base of the cell to a depth of not less than 8 inches and compact it in accordance with the requirements for structural fill.
- C. Excavation shall not be considered complete, and no fill shall be placed on the subgrade, until the Owner's Representative confirms that the elevations and grades shown on the Drawings have been achieved in the field. The Contractor shall be responsible for notifying the CQA Consultant that the excavation (or a significant portion thereof) is complete. Contractor shall plan for the time

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required for the CQA Consultant to confirm the elevations and grades of the excavation.

# 3.06 SURPLUS MATERIAL

A. The Contractor shall dispose of the surplus excavated soils at the direction of the Owner's Representative.

# 3.07 PERIMETER BERM, ACCESS ROADS, AND STRUCTURAL FILL

- A. The berms, access roads, and structural fill shall be constructed to the lines and grades shown on the Drawings.
- B. The fill shall meet the requirements of Part 2.01 of this Section.
- C. The fill shall be placed in a loose lift that results in a compacted lift thickness of 6 to 8 inches.
- D. Each lift shall be compacted to at least 95 percent of the maximum dry density measured in accordance with the standard procedure described in ASTM D 698. The dry density and moisture content shall be measured in accordance with ASTM D 2922, and ASTM D 3017, respectively.
- E. If the moisture content of the fill is not suitable for proper compaction (+/- 3 percent of optimum moisture content as determined by ASTM D 698), the soil shall be moisture conditioned and reworked, as appropriate. Wetting shall be accomplished using a water truck and spray nozzle, unless the Owner's Representative approves an alternative method. During wetting or drying, the soil shall be regularly disced or otherwise mixed so that uniform moisture conditions are obtained.
- F. The Contractor shall moisture-condition the fill in either the stockpile area or work area.

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#### SECTION 02200: EARTHWORK

# 3.08 SURVEY CONTROL

- A. The Contractor shall survey the location and elevation of the excavation. He shall also survey the location and elevation of the top of subgrade. The allowable tolerance in the cell base area (outside of the leachate collection swale) is 0.1 ft; and the allowable tolerance for the bottom of the leachate collection swales is 0.03 ft.
- B. The Contractor shall provide Record Drawings of the location and elevation of the excavation and the top of subgrade, in accordance with the requirements of the CQA Plan. The Contractor shall submit Record Drawings to the Owner's Representative at least 48 hours prior to the start of fill placement. The Contractor may submit a partial Record Drawings to obtain approval for a portion of work.
- C. The Owner may supply surveying for QA purposes and record drawings. The Contractor provides surveying for QC purposes.

# 3.09 FIELD QUALITY CONTROL

- A. The CQA Consultant will perform soil moisture, dry unit weight, and lift thickness tests in the field on each lift of fill material to evaluate compliance with this Specification. Testing will be carried out in accordance with the project CQA Plan.
- B. If the CQA Consultant's tests indicate work does not meet the requirements of the specifications, the CQA Consultant will establish the extent of the nonconforming area. The nonconforming area shall be reworked by the Contractor at his own expense until acceptable test results are obtained.
- C. The Contractor shall be aware of all field CQA testing activities, as these may affect his schedule.

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#### SECTION 02200: EARTHWORK

# 3.10 **PROTECTION OF WORK**

- A. The Contractor shall use all means necessary to protect all materials and all partially-completed and completed work of this section.
- B. In the event of damage, the CQA Consultant will identify areas requiring repair, and the Contractor shall make all repairs and replacements necessary to the approval of the CQA Consultant at no additional cost to Owner.
- C. At the end of each day, the Contractor shall verify that the entire work area was left in a state that promotes surface drainage off and away from the area and from finished work. If threatening weather conditions are forecast, compacted surfaces shall be seal-rolled to protect finished work.

# 3.11 PUMPING AND DRAINAGE

- A. At all times during construction, the Contractor shall provide and maintain proper equipment and facilities to remove all water entering excavations and keep such excavations dry so as to obtain a satisfactory subgrade to allow the construction of the fill and installation of the liner system.
- B. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and pumped from the excavation to the perimeter drainage ditch or to pond in order to maintain the excavation bottom free from standing water.
- C. Drainage shall be disposed of only in an area approved by the Owner's Representative. Drainage shall be disposed of in a manner which prevents flow or seepage back into the excavated area.
- D. The Contractor shall install and maintain all erosion control features, (i.e., silt fences around all areas down slope of soil disturbance unless a drainage ditch exists at the boundary of the disturbed area). Other areas requiring silt fences shall be identified by the Owner's Representative during construction. Silt fences

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# SECTION 02200: EARTHWORK

shall not be removed until the contained areas are successfully revegetated.

# 3.12 PRODUCT PROTECTION

- A. The Contractor shall use all means necessary to protect all prior work, including all materials and completed work of other Sections.
- B. In the event of damage, the Contractor shall immediately make all repairs and replacements necessary, to the approval of the Owner's Representative and at no additional cost to the Owner.
- C. Small perforations in the structural fill resulting from in-situ density testing shall be backfilled by the CQA Consultant.

# 3.13 **REVEGETATION**

A. At the end of construction, disturbed areas with exposed soil and other areas designated on the Drawings shall be regraded and revegetated, as specified by the Owner's Representative.

# [END OF SECTION]

Technical Specification Medley Landfill

# SECTION 02711

# **PROTECTIVE COVER**

# PART 1 GENERAL

#### **1.01 DESCRIPTION OF WORK**

- A. The Contractor shall furnish all labor, materials, tools, supervision, transportation, and installation equipment necessary for the construction of the protective cover, as specified herein, as shown on the Drawings, and in accordance with the Construction Quality Assurance (CQA) Plan.
- B. The Contractor shall be prepared to construct the protective cover in conjunction with the earthworks and the installation and construction of the other components of the liner system.

# **1.02 RELATED SECTIONS**

- A. Section 02200 Earthwork
- B. Section 02716 Geocomposite

#### 1.03 **REFERENCES**

- A. CQA Plan.
- B. Latest version of American Society for Testing and Materials (ASTM) standards:
  - 1. ASTM D 422. Standard Method for Particle-Size Analysis of Soils.
  - 2. ASTM D 698. Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using a 5.5-pound Rammer and 12-inch Drop.
  - 3. ASTM D 2434. Standard Test Method for Permeability of Granular Soils (Constant Head).

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#### SECTION 02711: PROTECTIVE COVER

4. ASTM D 4373. Standard Test Method for Calcium Carbonate Content of Soils.

#### 1.04 SUBMITTALS

- A. The Contractor shall submit the following information and samples to the Owner's Representative a minimum of 14 days prior to the start of construction of the protective layer:
  - 1. The proposed material source or sources.
  - 2. A 100-pound sample of each proposed soil or authorization to access the borrow source or sources for sampling.
- B. The Contractor shall notify the Owner's Representative and CQA Consultant in writing a minimum of 7 days prior to starting construction of the protective cover. The notice shall state the material to be used, the equipment to be used, the date and time that placement operations will start, and the name of the person in the field who will be in charge of the construction of the protective cover.

# 1.05 CONSTRUCTION QUALITY ASSURANCE

- A. The installation of the protective cover shall be monitored as outlined in the CQA Plan.
- B. The Contractor shall be aware of the activities outlined in the CQA Plan and shall account for these CQA activities in the construction schedule.

# PART 2PRODUCT

# 2.01 MATERIAL FOR PROTECTIVE COVER

A. The protective cover material shall be free of any metals, trees, stumps, concrete, construction debris, peat, unacceptable organic matter or deleterious material. Minimal amount of roots in the protective cover material is allowed at Engineer's approval.

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#### SECTION 02711: PROTECTIVE COVER

- B. The protective cover material shall be classified as SW or SP in accordance with the Unified Soil Classification System (USCS) and shall not be gap graded. The material shall have less than 5 percent by weight passing a No. 200 U.S. standard sieve, and no greater than 15 percent of subangular, subrounded, or rounded fine gravel (particle size between U.S. standard sieves #4 and ¾-in.).
- C. The protective cover soil shall have no greater than 15 percent loss of weight, when tested according to ASTM D 4373.
- D. The hydraulic conductivity of the protective cover soil shall be equal or greater than  $1 \times 10^{-3}$  cm/s under the design load for the landfill. Tire chips no greater than 2 inches in dimension with no protruding wires may be used in lieu of soil for the upper foot of the protective cover. Other granular material approved by the regulatory agency may be used in the upper foot of the protective cover.

# PART 3EXECUTION

# 3.01 FAMILIARIZATION

A. Prior to implementing any of the work described in this Section, the Contractor shall become thoroughly familiar with the site, the site conditions, and all portions of the work falling within this Section and the CQA Plan.

## B. Inspection:

- 1. Prior to implementing any of the work in this Section, the Contractor shall carefully inspect the installed work of all other Sections and verify that all work is complete to the point where the installation of this Section may properly commence without adverse impact.
- 2. If the Contractor has any concerns regarding the installed work of other Sections, the contractor should immediately notify the Owner's Representative in writing within 48 hours of the site visit. Failure to notify the Owner's Representative or installation of the protective cover will be

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#### SECTION 02711: PROTECTIVE COVER

construed as Contractor's acceptance of the related work of all other Sections.

#### 3.02 FIELD QUALITY CONTROL

- A. Frequency:
  - 1. The minimum frequency of quality control testing that apply to the soil component of the protective cover is outlined below. The Contractor shall take this testing frequency into account in planning his construction schedule. The frequency of testing shall apply to conformance testing of onsite material or material delivered to the site.
    - a. Sieve Analysis (ASTM D 422) at 1 per 5,000 cubic yards (minimum 1 per source).
    - b. Carbonate Content (ASTM D 4373) at 1 per 10,000 cubic yards (minimum 1 per source).
    - c. Hydraulic Conductivity (ASTM D 5084) at 1 per 10,000 cubic yards (minimum 1 per source).

#### 3.03 INSTALLATION

- A. The protective cover shall be placed directly on top of the leachate collection drainage layer geocomposite as shown on the Drawings. The protective cover shall be placed using a low ground-pressure dozer in accordance with the requirements of this Section. The tracked equipment shall operate only over previously placed protective cover material. The Contractor shall not operate equipment directly on the geocomposite.
- B. The soil shall not be compacted other than tracked by a low ground-pressure dozer used to spread the material.
- C. Equipment used over protective cover shall follow the thickness guidelines presented below:

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# SECTION 02711: PROTECTIVE COVER

Maximum Allowable Equipment Ground Pressure (psi)	Thickness of Protective Cover Material over Geocomposite (in.)
<5	12
<10	18
<20	24
>20	36

# 3.04 PRODUCT PROTECTION

- A. The Contractor shall use all means necessary to protect all prior work, including all materials and completed work of other Sections.
- B. In the event of damage, the Contractor shall immediately make all repairs and replacements necessary, to the approval of the Owner's Representative and CQA Consultant and at no additional cost to the Owner.

# [END OF SECTION]

#### SECTION 02712: GEONET

#### GEONET

### PART 1 GENERAL

# 1.01 **DESCRIPTION OF WORK**

- A. The Contractor shall furnish all labor, materials, tools, supervision, transportation, and equipment necessary for the installation of geonet in the leachate storage pond, as specified herein, as shown on the Drawings, and in accordance with the Construction Quality Assurance (CQA) Plan.
- B. The Contractor shall be prepared to install the geonet in conjunction with earthworks and other components of the liner system.

# 1.02 RELATED SECTIONS

- A. Section 02714 Geotextile
- B. Section 02771 Polyethylene Geomembrane
- C. Section 02772 Geosynthetic Clay Liner

#### 1.03 **REFERENCES**

- A. CQA Plan.
- B. Latest version of American Society for Testing and Materials (ASTM) standards:
  - 1. ASTM D 1505. Standard Test Method for Density of Plastics by the Density-Gradient Technique.
  - 2. ASTM D 4716. Standard Test Method for Constant Head Hydraulic Transmissivity (In-Plane Flow) of Geotextiles and Geotextile Related Products.
  - 3. ASTM D 1603. Standard Test Method for Carbon Black in Olefin Plastics.

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#### SECTION 02712: GEONET

4. ASTM D 5199. Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes.

# 1.04 QUALIFICATIONS

- A. The Contractor shall provide the services of a Geonet Manufacturer and Installer, who shall meet the following qualifications. The Contractor shall, however, accept and retain full responsibility for all materials and installation and shall be held responsible for any defects in the completed system.
  - 1. Manufacturer:
    - a. The Geonet Manufacturer shall be responsible for the production and
      - delivery of geonet rolls and shall be a well-established firm with more than two years experience in the manufacture of geonet. The Manufacturer shall submit a statement certifying minimum property values of the proposed geonet and the tests used to determine those properties.

# 2. Installer:

- a. The Installer shall be responsible for field handling, storing, deploying, seaming or joining, temporary restraining (against wind), anchoring systems, and other site aspects of the geonet.
- b. The Installer shall be trained and qualified to install geonet. The Installer's qualifications will require the CQA Consultant's approval.

# 1.05 SUBMITTALS

- A. The Contractor shall submit to the Owner's Representative and CQA Consultant in writing the following documentation on the raw materials used to manufacture the geonet prior to transporting any geonet to the site:
  - 1. Copies of quality control certificates issued by the Resin Supplier including production dates of the resin used to manufacture geonet for the project.
  - 2. Results of tests conducted by the Geonet Manufacturer to verify the quality of the resin used to manufacture the geonet rolls assigned to the project.
  - 3. Certification that no reclaimed polymer is added to the resin during the

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#### SECTION 02712: GEONET

manufacture of the geonet to be used in this project.

- B. The Contractor shall submit to the Owner's Representative and CQA Consultant the following information on geonet production:
  - 1. Manufacturing quality control certificates for each shift's production, signed by responsible parties employed by the Manufacturer (such as the production manager), and notarized.
  - 2. The quality control certificate shall include:
    - a. roll numbers, lot or batch numbers, and identification;
    - b. sampling procedures; and
    - c. results of quality control tests, including descriptions of test methods used.
  - 3. The tests to be performed are outlined in Part 2.02 of this Section.

# 1.06 CONSTRUCTION QUALITY ASSURANCE

- A. The installation of the geonet shall be monitored as outlined for geonet in the CQA Plan.
- B. The Contractor shall be aware of the activities outlined in the CQA Plan and shall account for these CQA activities in the installation schedule.

# PART 2PRODUCT

## 2.01 GEONET PROPERTIES

- A. The Manufacturer shall furnish geonet having properties that comply with the required property values shown below in Table 02712-1. The Manufacturer shall provide test results for these procedures, as well as a certification that the materials meet or exceed the specified values.
- B. In addition to the property values listed in Table 02712-1, the geonet shall:
  - 1. Retain their structure during handling, placement, and long-term service.
  - 2. Be capable of withstanding outdoor exposure for at least one year.

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# SECTION 02712: GEONET

- 3. Not be manufactured from any reclaimed polymer.
- 4. Be chemically inert when immersed in the leachate from a typical sanitary landfill.

## 2.02 MANUFACTURING QUALITY CONTROL

- A. The geonet shall be manufactured with quality control procedures that meet or exceed generally accepted industry standards.
- B. The Contractor shall require that the Geonet Manufacturer sample and test the geonet to demonstrate that the material conforms to the requirements of this Section.
- C. Any geonet sample that does not comply with this General Specification shall result in rejection of the roll from which the sample was obtained. The Contractor shall replace any rejected rolls at no additional cost to the Owner.
- D. If a geonet sample fails to meet the quality control requirements of this Specification or any Supplemental Specifications, the Contractor shall require that the geonet Manufacturer sample and test each roll manufactured, in the same lot or batch, or at the same time, as the failing roll. Sampling and testing of rolls shall continue until a pattern of acceptable test results is established.
- E. Additional sample testing may be performed, at the Geonet Manufacturer's discretion and expense, to more closely identify any non-complying rolls and/or to qualify individual rolls.
- F. The Contractor shall require that the Geonet Manufacturer sample and test the geonet at the frequency specified in the manufacturer's quality control protocol to demonstrate that its properties conform to the values specified in Table 02712-1. At a minimum, the following manufacturing quality control tests shall be performed:

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#### SECTION 02712: GEONET

<u>Test</u>

Procedure

DensityASTM D 1505ThicknessASTM D 5199Carbon Black ContentASTM D 1603

- G. The hydraulic transmissivity test (ASTM D 4716) in Table 02712-1 shall be performed on at least one sample from the rolls manufactured for the project. The Contractor shall provide test results to the CQA Consultant demonstrating that the Geonet Manufacturer performed the tests and acceptable results were obtained.
- H. The Contractor shall require that the Geonet Manufacturer comply with the certification and submittal requirements of the CQA Plan.

# 2.03 LABELING

- A. Geonet shall be supplied in rolls wrapped in protective covers and labeled with the following information.
  - 1. manufacturer's name;
  - 2. product identification;
  - 3. batch or lot number;
  - 4. roll number; and
  - 5. roll dimensions.

# 2.04 TRANSPORTATION

A. Transportation of the geonet shall be the responsibility of the Contractor. The Contractor shall be liable for all damages to the materials incurred prior to and during transportation to the site.

# 2.05 HANDLING AND STORAGE

A. Handling, storage, and care of the geonet prior to and following installation at the

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#### SECTION 02712: GEONET

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 liner system by the CQA Consultant.

B. The Contractor shall be responsible for storage of the geonet at the site. The geonet shall be stored off the ground and out of direct sunlight, and shall be protected from mud, dirt, dust, and excessive heat or cold. Any additional storage procedures required by the manufacturer shall be the Contractor's responsibility.

# PART 3 EXECUTION

# 3.01 FAMILIARIZATION

A. Prior to implementing any of the work described in this Section, the Contractor shall become thoroughly familiar with all portions of the work falling within this Section and CQA Plan.

# B. Inspection:

- 1. Prior to implementing any of the work in this Section, the Contractor shall carefully inspect the installed work of all other Sections and verify that all work is complete to the point where the installation of this Section may properly commence without adverse impact.
- 2. If the Contractor has any concerns regarding the installed work of other Sections, he/she shall notify the Owner's Representative in writing within 48 hours of his site inspection. Failure to inform the Owner's Representative in writing or installation of the geonet will be construed as Contractor's acceptance of the related work of all other Sections.

# 3.02 CONFORMANCE TESTING

A. Upon delivery to the site, or at the location of the manufacturer, samples of the geonet shall be removed by the CQA Consultant and sent to the laboratory

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#### SECTION 02712: GEONET

selected by the Owner for testing to ensure conformance to these Specifications.

- B. Samples and tests shall be selected by the CQA Consultant in accordance with this Section and the procedures outlined in the CQA Plan.
- C. Samples shall be taken at the rate of one sample per 100,000 square feet with a minimum of one sample per lot.
- D. The CQA Consultant may increase the frequency of sampling as outlined in the CQA Plan in the event that test results do not comply with Part 2.01 of this Section. This additional testing shall be performed at the expense of the Contractor.
- E. As a minimum, the following tests will be performed: polymer density (ASTM D 1505); thickness (ASTM D 5199); carbon black content (ASTM D 1603), and transmissivity (ASTM D 4716).
- F. Any geonet that are not certified in accordance with Part 1.05 of this Section, or that conformance testing indicates do not comply with Part 2.01 of this Section shall be rejected and replaced with new material, by the Contractor at no additional cost to the Owner.

# 3.03 HANDLING AND PLACEMENT

- A. The Contractor shall handle all geonet in such a manner as to ensure the geonet is not damaged in any way.
- B. The Contractor shall take any necessary precautions to prevent damage to underlying layers during placement of the geonet.
- C. In the presence of wind, all geonet shall be weighted with sandbags or the equivalent. Such sandbags shall be installed during placement and shall remain until replaced with cover material.

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#### SECTION 02712: GEONET

- D. On side slopes, the geonet shall be secured in the anchor trench and then rolled down the slope in such a manner as to continually keep the geonet in tension. Geonet can be placed in the horizontal direction (i.e., across the slope) in some special locations (e.g., if an extra layer of geonet is required at the toe of a slope, this extra layer of geonet can be placed in the horizontal direction). Such locations shall be approved by the Owner's Representative.
- E. If necessary, the geonet shall be positioned by hand after being unrolled to minimize wrinkles.
- F. Care shall be taken during placement of geonet not to entrap dirt or excessive dust in the geonet that could cause clogging of the drainage system, and/or stones that could damage the adjacent liner. If dirt or excessive dust is entrapped in the geonet, it should be hosed clean prior to placement of the next material on top of it. Care shall be exercised when handling sandbags, to prevent rupture or damage of the sandbags.
- G. Geonet shall only be cut using manufacturer recommended procedures.
- H. Unless otherwise specified, geonet shall not be welded to liners.
- I. Tools shall not be left on or in the geonet.

#### 3.04 JOINING

- A. Adjacent rolls of geonet shall be overlapped by at least 4 inches; these overlaps shall be secured by using polymeric ties.
- B. Tying shall be achieved by plastic fasteners, or polymer braid. Tying devices shall be white or yellow for easy inspection. Metallic devices shall not be used.
- C. Tying shall be every 5 feet along the slope, every 2 feet across the slope, every 6 inches in the anchor trench and every 6 feet on horizontal surfaces.

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#### SECTION 02712: GEONET

#### 3.05 REPAIR

A. Any holes or tears in the geonet shall be repaired by placing a patch extending 1 foot beyond the edges of the hole or tear. The patch shall be secured to the original geonet by tying every 6 inches with approved tying devices. If the hole or tear width across the roll is more than 50 percent of the width of the roll, the damaged area shall be cut out and the two portions of the geonet shall be joined in accordance with Part 3.04 of this Section.

# 3.06 PLACEMENT OF SOIL MATERIALS

A. Soil shall never be placed in direct contact with geonet. Geonet shall be separated from soil materials by a geomembrane or a geotextile. The only exception to this shall be where gravel surrounds the leachate collection and detection pipes, as shown on the Drawings.

- B. The Contractor shall place all soil materials in such a manner as to ensure that:
  - 1. the geonet and underlying lining materials are not damaged;
  - 2. minimal slippage occurs between the geonet and underlying layers; and
  - 3. excess tensile stresses are not produced in the geonet.
- C. Unless otherwise specified by the CQA Consultant, all equipment operating on soil material overlying the geonet shall comply with the following:

Thickness of	
<b>Overlying Compacted Fill</b>	
in.	
12	
18	
24	
36	

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#### SECTION 02712: GEONET

# 3.07 PRODUCT PROTECTION

- A. The Contractor shall use all means necessary to protect all prior work, and all materials and completed work of other Sections.
- B. In the event of damage, the Contractor shall immediately make all repairs and replacements necessary, to the approval of the Owner's Representative and at no additional cost to the Owner.

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# SECTION 02712: GEONET

# **TABLE 02712-1**

# **GEONET PROPERTIES**

PROPERTIES	QUALIFIERS	<u>UNITS</u>	SPECIFIED VALUES	TEST METHOD
Polymer Compound Composition	minimum	%	95% polyethyle by weight	ene
Density <sup>(1)</sup>	minimum	g/cm <sup>3</sup>	0.935	ASTM D 1505
Carbon Black Content	range	0⁄0	2 - 3	ASTM D1603
Nominal Thickness	minimum	mils	200	ASTM D 5199
Transmissivity <sup>(2)</sup>	minimum	$m^2/s$	3 x 10 <sup>-4</sup>	ASTM D 4716

Notes:

1. The density of the net polymer shall not exceed that of the geomembrane.

2. Transmissivity of the geonet shall be measured using water at 68°F with a gradient of not less than 0.01, under a compressive stress of not less than 15,000 psf between a needlepunched nonwoven geotextile with a minimum mass per unit area of 6 oz/yd2 and a textured HDPE geomembrane. The specimen shall be maintained under the compressive load for a period of 100 hours before measurements are taken. Measurements shall be taken at 0.25 hr, 0.5 hr, 1 hr, 24 hr, and 100 hr.

3. Any variation to these specifications must be at Engineer's approval.

# [END OF SECTION]

# 1559/F050036\_specifications

Technical Specifications Medley Landfill

# **SECTION 02714**

# GEOTEXTILE

# PART 1 GENERAL

#### **1.01 DESCRIPTION OF WORK**

- A. The Contractor shall furnish all labor, materials, tools, supervision, transportation, and installation equipment necessary for the installation of geotextile, as specified herein, as shown on the Drawings, and in accordance with the Construction Quality Assurance (CQA) Plan.
- B. The Contractor shall be prepared to install geotextile in conjunction with the earthwork and other components of the liner system.

#### **1.02 RELATED SECTIONS**

- A. Section 02711 Protective Cover
- B. Section 02716 Geocomposite
- C. Section 02771 Polyethylene Geomembrane
- D. Section 02772 Geosynthetic Clay Liner

# **1.03 REFERENCES**

- A. CQA Plan.
- B. Latest version of American Society for Testing and Materials (ASTM) standards:
  - 1. ASTM D 4491. Standard Test Method for Water Permeability of Geotextiles by the Permittivity Method.

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# SECTION 02714: GEOTEXTILE

2.	ASTM D 4533.	Standard Test Method for Trapezoid Tearing Strength of
		Geotextiles.
3.	ASTM D 4632.	Standard Test Method for Breaking Load and Elongation
		of Geotextiles (Grab Method).
4.	ASTM D 4751.	Standard Test Method for Determining Apparent Opening
		Size of a Geotextile.
5.	ASTM D 4833.	Standard Test Method for Index Puncture Resistance of
		Geotextiles, Geomembranes, and Related Products.

# 1.04 QUALIFICATIONS

- A. The Contractor shall provide the services of a Geotextile Manufacturer, Fabricator, and Installer, who shall meet the following qualifications. The Contractor shall, however, accept and retain full responsibility for all materials and installation and shall be held responsible for any defects in the completed system.
- B. Manufacturer of Geotextiles:
  - 1. The Geotextile Manufacturer shall be responsible for the production and delivery of geotextile rolls and shall be a well-established firm with more than two years experience in the manufacture of geotextiles. The Manufacturer shall submit a statement to the Owner's Representative and CQA Consultant certifying minimum property values of the proposed geotextiles and the tests used to determine those properties.
- C. Fabricators of Geotextiles:
  - 1. If a Fabricator is used, the Fabricator shall submit the following a minimum of 14 days prior to delivery of geotextile to the site:
    - a. Results of quality control tests on seams.
    - b. Certification that the minimum average roll values of seams comply with the specifications.

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#### SECTION 02714: GEOTEXTILE

# D. Installer:

- 1. The Installer shall be responsible for field handling, storing, deploying, seaming or connecting, temporary restraining (against wind), anchoring, and other site aspects of the geotextiles.
- 2. The Installer shall be trained and qualified to install geotextiles. The installer's qualifications will require the CQA Consultant's approval.

# 1.05 SUBMITTALS

- A. The Contractor shall submit to the Owner's Representative and CQA Consultant the following information on geotextile production:
  - Manufacturing quality control certificates for each batch of resin and each shift's production. The certificates shall be signed by responsible parties employed by the Manufacturer (such as the production manager), and notarized.
  - 2. The quality control certificate shall include:
    - a. lot, batch, or roll numbers and identification;
    - b. sampling procedures; and
    - c. results of quality control tests, including a description of the test methods used.

# 1.06 CONSTRUCTION QUALITY ASSURANCE

- A. The installation of the geotextile shall be monitored specified in this section and as outlined in the CQA Plan.
- B. The Contractor shall be aware of the activities outlined in the CQA Plan and shall account for these CQA activities in the installation schedule.

# PART 2PRODUCTS

# 2.01 GEOTEXTILE PROPERTIES

A. Unless otherwise noted on the Drawings, geotextile suppliers shall furnish

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#### **SECTION 02714: GEOTEXTILE**

materials whose "Minimum Average Roll Values", as defined by the Federal Highway Administration (FHWA), meet or exceed the criteria specified in Tables 02714-1 and 02714-2. The manufacturer shall provide test results for these procedures, as well as a certification that the material properties meet or exceed the specified values. The geotextiles provided by the supplier shall be stock products. The supplier shall not furnish products specifically manufactured to meet the specifications of this project unless authorized by the Engineer.

- B. The geotextile shall be needlepunched non-woven. The geotextile that will be placed over studded geomembrane shall have a burnished side. The burnished side shall be in contact with the studded geomembrane.
- C. In addition to the property values listed in Table 02714-1 the geotextile shall:
  - 1. Retain their structure during handling, placement, and long-term service.
  - 2. Be capable of withstanding direct exposure to sunlight for a minimum of 90 days with no measurable deterioration.

# 2.02 MANUFACTURING QUALITY CONTROL

- A. The Manufacturer shall sample and test the geotextile material at the frequency established in the manufacturer's quality control protocol to demonstrate that the material conforms to the requirements in Part 2.01 of this Section.
- B. Samples that do not meet the specified properties shall result in rejection of the applicable rolls.
- C. At the Manufacturer's discretion and expense, additional testing of individual rolls may be performed to more closely identify the non-complying rolls and/or to qualify individual rolls.

#### 2.03 PACKING AND LABELING

A. Geotextiles shall be supplied in rolls wrapped in relatively impermeable and opaque protective covers.

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# SECTION 02714: GEOTEXTILE

- B. Geotextile rolls shall be marked or tagged with the following information:
  - 1. manufacturer's name;
  - 2. product identification;
  - 3. lot or batch number;
  - 4. roll number; and
  - 5. roll dimensions.
- C. If any special handling is required, it shall be so marked on the geotextile itself; e.g., "This Side Up" or "This Side Against Soil to be Retained".

# 2.04 TRANSPORTATION

A. Transportation of the geotextiles is the responsibility of the Contractor. The Contractor shall be liable for all damages to the materials incurred prior to and during transportation to the site.

#### 2.05 HANDLING AND STORAGE

- A. Handling, storage, and care of the geotextiles 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 liner system by the Owner's Representative.
- B. The Contractor shall be responsible for storage of the geotextile material at the site.
- C. The geotextiles shall be protected from sunlight, moisture, excessive heat or cold, puncture, or other damaging or deleterious conditions. The geotextile shall be protected from mud, dirt and dust. Any additional storage procedures required by the Manufacturer shall be the Contractor's responsibility.

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#### SECTION 02714: GEOTEXTILE

# PART 3EXECUTION

# 3.01 FAMILIARIZATION

A. Prior to implementing any of the work described in this Section, the Contractor shall become thoroughly familiar with all portions of the work falling within this Section.

#### B. Inspection:

- 1. Prior to implementing any of the work in this Section, the Contractor shall carefully inspect the installed work of all other Sections and verify that all work is complete to the point where the installation of this section and the CQA Plan may properly commence without adverse impact.
- If the Contractor has any concerns regarding the installed work of other Sections, he/she shall notify the Owner's Representative in writing within 48-hours of his site inspection. Failure to inform the Owner's Representative in writing or installation of the geotextiles will be construed as Contractor's acceptance of the related work of all other Sections.

# 3.02 CONFORMANCE TESTING

- A. Upon delivery to the site or at the location of the manufacturer, samples of the geotextile shall be removed by the CQA Consultant and sent to a laboratory selected by the Owner for testing to ensure conformance to this Section.
- B. Samples shall be selected by the CQA Consultant in accordance with this Section and the procedure outlined in the CQA Plan.
- C. Samples shall be taken at the rate of one sample per lot or one per 100,000 square feet, whichever is greater.
- D. The CQA Consultant may increase the frequency of sampling as outlined in the CQA Plan in the event that test results do not comply with requirements specified in Part 2.01 of this Section. This additional testing shall be performed at the

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#### SECTION 02714: GEOTEXTILE

expense of the Contractor.

E. Any geotextiles that are not certified in accordance with Part 1.05 of this Section, or that conformance testing indicates do not comply with Part 2.01 of this Section shall be rejected and replaced with new material in accordance with the CQA Plan, at no additional cost to the Owner.

# 3.03 HANDLING AND PLACEMENT

- A. The Contractor shall handle all geotextile in such a manner as to ensure they are not damaged in any way.
- B. The Contractor shall take any necessary precautions to prevent damage to underlying layers during placement of the geotextile.
- C. After unwrapping the geotextile from its opaque cover, the geotextile shall not be left exposed for a period in excess of 90 days unless a longer exposure period is approved by the Engineer, based on a formal demonstration from the Contractor that the geotextile is stabilized against U.V. degradation for a period in excess of 90 days.
- D. If white colored geotextile is used, precautions shall be taken against "snowblindness" of personnel.
- E. The Contractor shall take care not to entrap stones, excessive dust, or moisture in the geotextile during placement.
- F. The Contractor shall weight all geotextiles with sandbags, or the equivalent, in the presence of wind. Such sandbags shall be installed during placement and shall remain until replaced with protective cover or other components of the liner system.
- G. The Contractor shall examine the entire geotextile surface after installation to ensure that no potentially harmful foreign objects are present. The Contractor

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#### SECTION 02714: GEOTEXTILE

shall remove any such foreign objects and shall replace any damaged geotextile.

# 3.04 SEAMS AND OVERLAPS

- A. All geotextiles shall be continuously sewn (i.e., spot sewing is not allowed). Geotextiles shall be overlapped a minimum 6 inches prior to seaming. No continuous horizontal seams in excess of the panel width shall be allowed on slopes steeper than 5 horizontal to 1 vertical (i.e., seams shall be along, not across, the slopes).
- B. Polymeric thread, with chemical resistance properties equal to or exceeding those of the geotextile, shall be used for all sewing. The seams shall be sewn using Stitch Type 401. The seam type shall be Federal Standard Type SSN-1.

#### 3.05 REPAIR

- A. Any holes or tears in the geotextile shall be repaired as follows:
  - 1. On slopes steeper than 5 horizontal to 1 vertical, a patch made from the same geotextile shall be double seamed into place (with each seam 0.5 inch apart and no closer than 2 inches from any edge). Should any tear exceed 10 percent of the width of the roll, that roll shall be removed from the slope and replaced with new material.
  - 2. On slopes flatter than or equal to 5 horizontal to 1 vertical, a patch made from the same geotextile shall be spot-seamed in place with a minimum of 1 foot overlap in all directions.
- B. Care shall be taken to remove any soil or other material which may have penetrated the torn geotextile.

#### 3.06 PLACEMENT OF SOIL MATERIALS

- A. The Contractor shall place all soil materials on top of a geotextile, in such a manner as to ensure that:
  - 1. the geotextile and underlying materials are not damaged;

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#### **SECTION 02714: GEOTEXTILE**

- 2. minimum slippage occurs between the geotextile and underlying layers; and
- 3. excess stresses are not produced in the geotextile.

# 3.07 **PRODUCT PROTECTION**

- A. The Contractor shall use all means necessary to protect all prior work and materials and completed work of other Sections.
- B. In the event of damage, the Contractor shall immediately make all repairs and replacements necessary, to the approval of the CQA Consultant and at no additional cost to the Owner.

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SECTION 02714: GEOTEXTILE

# **GEOTEXTILE PROPERTIES TABLE 02714 - 1**

PROPERTIES	QUALIFIER	NITS	SPECIFIED VALUES <sup>(1)</sup>	TEST METHOD
ſype		: • ;	needlepunched nonwoven	ł
Polymer composition	ımınını	%	95 polypropylene or polyester by weight	
Filter Requirements				
Apparent Opening Size	maximum	(mm)	$0_{95} \leq 0.21$	ASTM D4751
Hydraulic Conductivity	minimum	(cm/s)	0.1	ASTM D4491
Mechanical Requirements <sup>(2)</sup>				
Grab Strength Tear Strength Puncture Strength	minimum minimum minimum	ll dl lb	160 65 80	ASTM D 4632 ASTM D 4533 ASTM D 4833

Notes:

All values represent minimum average roll values (i.e., any roll in a lot should meet or exceed the values in this table).
Minimum value measured in machine and cross machine direction.
Any variation to these specifications must be at Engineer's approval.

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[END OF SECTION]

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# **SECTION 02716**

#### GEOCOMPOSITE

# PART 1 GENERAL

#### **1.01 DESCRIPTION OF WORK**

- A. The Contractor shall furnish all labor, materials, tools, supervision, transportation, and equipment necessary for the installation of geocomposite as specified herein, as shown on the Drawings, and in accordance with the Construction Quality Assurance (CQA) Plan.
- B. The Contractor shall be prepared to install the geocomposite in conjunction with earthworks and other components of the liner system.

#### **1.02 RELATED SECTIONS**

- A. Section 02200 Earthwork
- B. Section 02711 Protective Cover
- C. Section 02771 Polyethylene Geomembrane

#### **1.03 REFERENCES**

- A. CQA Plan.
- B. Latest version of American Society for Testing and Materials (ASTM) standards:
  - 1. ASTM D 1505. Standard Test Method for Density of Plastics by the Density-Gradient Technique.
  - 2. ASTM D 4491. Standard Test Method for Water Permeability of Geotextiles by the Permittivity Method.
  - 3. ASTM D 4533. Standard Test Method for Trapezoid Tearing Strength of

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#### SECTION 02716: GEOCOMPOSITE

Geotextiles.

4.	ASTM D 4632.	Standard Test Method for Breaking Load and Elongation
		of Geotextiles (Grab Method).
5.	ASTM D 4716.	Standard Test Method for Constant Head Hydraulic
		Transmissivity (In-Plane Flow) of Geotextiles and
		Geotextile Related Products.
6.	ASTM D 4751.	Standard Test Method for Determining Apparent Opening
		Size of a Geotextile.
7.	ASTM D 4833.	Standard Test Method for Index Puncture Resistance of
		Geotextiles, Geomembranes, and Related Products.
8.	ASTM D 5199.	Standard Test Method for Measuring Nominal Thickness
		of Geotextiles and Geomembranes.
9.	ASTM D 5261.	Standard Test Method for Measuring Mass per Unit Area
		of Geotextiles.

# 1.04 QUALIFICATIONS

- A. The Contractor shall provide the services of a Geocomposite Manufacturer and Installer, who shall meet the following qualifications. The Contractor shall, however, accept and retain full responsibility for all materials and installation and shall be held responsible for any defects in the completed system.
  - 1. Manufacturer:
    - a. The Geocomposite Manufacturer shall be responsible for the production and delivery of geocomposite rolls and shall be a wellestablished firm with more than one year of experience in the manufacture of geocomposite. The Manufacturer shall submit a statement to the Owner's Representative and CQA Consultant listing:
      - i. Certified minimum property values of the proposed geocomposite and the tests used to determine those properties.
      - ii. Production capacity available and projected delivery dates for this project.
  - 2. Installer:
    - a. The Installer shall be responsible for field handling, storing, deploying, seaming or joining, temporary restraining (against wind), anchoring

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#### SECTION 02716: GEOCOMPOSITE

systems, and other site aspects of the geocomposite.

b. The Installer shall be trained and qualified to install geocomposite.

# 1.05 SUBMITTALS

- A. The Contractor shall submit to the Owner's Representative and CQA Consultant in writing prior to transporting any geocomposite rolls to the site the following documentation on the raw materials used to manufacture the geocomposite components:
  - 1. Copies of quality control certificates issued by the resin supplier including production dates of the resin.
  - 2. Results of tests conducted to verify the quality of the resin used to manufacture the geocomposite components assigned to the project.
  - 3. Certification that no reclaimed polymer is added to the resin during the manufacture of the geocomposite components assigned to the project.
- B. The Contractor shall submit to the Owner's Representative and CQA Consultant copies of the quality control certificates issued by the geotextile manufacturer. The certificates shall include product identification, roll numbers, lot or batch numbers, and results of quality control tests including descriptions of test methods used.
- C. The Contractor shall submit to the Owner's Representative and CQA Consultant copies of the quality control certificates issued by the geonet manufacturer. The certificates shall include product identification, roll numbers, lot or batch numbers, and results of quality control tests including description of test methods used.

#### 1.06 CONSTRUCTION QUALITY ASSURANCE

- A. The installation of the geocomposite shall be monitored as outlined in the CQA Plan.
- B. The Contractor shall be aware of the activities outlined in the CQA Plan and shall

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#### SECTION 02716: GEOCOMPOSITE

account for these CQA activities in the installation schedule.

# PART 2 PRODUCT

#### 2.01 GEOCOMPOSITE PROPERTIES

- A. The Manufacturer shall furnish geocomposite having properties that comply with the required property values shown in Tables 02716-1. The Manufacturer shall provide certification that the materials meet or exceed the specified values.
- B. In addition to the property values listed in Tables 02716-1, the geocomposite shall:
  - 1. Retain their structure during handling, placement, and long-term service.
  - 2. Be capable of withstanding outdoor exposure for a minimum of 90 days with no measurable deterioration.
  - 3. Be chemically inert when immersed in the leachate from a typical sanitary landfill.
- C. The interface shear strength of the geocomposite at the interface of the upper and lower geotextiles and the materials in contact with the geotextiles for long-term stability of slopes shall be approved by the Engineer by performing laboratory tests and slope stability analysis.

# 2.02 MANUFACTURING QUALITY CONTROL

- A. The geocomposite shall be manufactured with quality control procedures that meet generally accepted industry standards.
- B. The Geocomposite Manufacturer shall sample and test the geocomposite rolls to demonstrate that the material conforms to the requirements of this Section.
- C. Any geocomposite sample that does not comply with this Section shall result in rejection of the roll from which the sample was obtained. The rejected roll shall not be used.

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- D. If a geocomposite sample fails to meet the quality control requirements of this Section or any Supplement Specifications provided by the Engineer, the Manufacturer shall be required to sample and test the rolls manufactured before and after the rejected roll. Sampling and testing of rolls shall continue until substandard rolls are identified. Substandard rolls shall not be used.
- E. The geocomposite shall be tested by the Manufacturer for quality control, at the typical frequencies used at manufacturer's plant to evaluate its physical and mechanical properties as presented in Table 02716-1. At a minimum, the following manufacturing quality control tests shall be performed:

#### **Geonet Component**

Specific gravity Thickness Carbon black

Geotextile Component

Mass per unit area Apparent opening size Permittivity Grab strength Tear strength Puncture strength

#### Geocomposite

Peel strength Hydraulic Transmissivity

# 2.03 LABELING

- A. Geocomposite shall be supplied in rolls wrapped in relatively impermeable and opaque protective covers.
- B. Geocomposite rolls shall be labeled with the following information.
  - 1. manufacturer's name;
  - 2. product identification;

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- 3. lot or batch number;
- 4. roll number; and
- 5. roll dimensions.
- C. If any special handling is required, it shall be so marked on the geotextile component e.g., "This Side Up" or "This Side Against Soil To Be Retained".

#### 2.04 TRANSPORTATION

A. The party responsible for the transport of geocomposite rolls shall be liable for all damages to the materials incurred during transportation to the site.

# 2.05 HANDLING AND STORAGE

- A. Handling, storage, and care of the geocomposite following delivery to the site and 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's Representative.
- B. The Contractor shall be responsible for storage of the geocomposite at the site. The geocomposite shall be stored off the ground and out of direct sunlight, and shall be protected from excessive heat or cold, mud, dirt, and dust. Any additional storage procedures required by the manufacturer shall be the Contractor's responsibility.

#### PART 3EXECUTION

#### 3.01 FAMILIARIZATION

A. Prior to implementing any of the work described in this Section, the Contractor shall become thoroughly familiar with all portions of the work falling within this Section and the CQA Plan.

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- B. Inspection:
  - 1. Prior to implementing any of the work in this Section, the Contractor shall carefully inspect the installed work of all other Sections and verify that all work is complete to the point where the installation of this Section may properly commence without adverse impact.
  - 2. If the Contractor has any concerns regarding the installed work of other Sections, he/she shall notify the Owner's Representative in writing within 48 hours of his site inspection. Failure to inform the Owner's Representative in writing or installation of the geocomposite will be construed as Contractor's acceptance of the related work of all other Sections.

# 3.02 CONFORMANCE TESTING

- A. Upon delivery to the site or at the location of the manufacturer, samples of the geocomposite shall be removed by the CQA Consultant or the CQA Laboratory Representative and sent to the laboratory selected by the CQA Consultant for testing to ensure conformance to these Specifications.
- B. Samples and tests shall be selected by the CQA Consultant in accordance with this Section and the procedures outlined in the CQA Plan.
- C. Samples shall be taken at the rate of one sample per 100,000 square feet with a minimum of one sample per lot. Rolls from previous construction activities shall be re-tested, unless quality control documentation from the manufacturer and conformance test results, acceptable to the CQA Consultant, are available.
- D. The CQA Consultant may increase the frequency of sampling as outlined in the CQA Plan in the event that test results do not comply with Part 2.01 of this Section. This additional testing shall be performed at the expense of the party responsible for furnishing the material.
- E. Any geocomposite that is not certified in accordance with Part 1.05 of this Section, or that conformance testing indicates the material does not comply with Part 2.01 of this Section shall be rejected. The rejected material shall not be

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# SECTION 02716: GEOCOMPOSITE

used. The rejected material shall be replaced with acceptable material at the cost of the party responsible for furnishing the material.

# 3.03 HANDLING AND PLACEMENT

- A. The Contractor shall handle all geocomposite in such a manner as to ensure the geocomposite are not damaged in any way.
- B. The Contractor shall take any necessary precautions to prevent damage to underlying layers during placement of the geocomposite.
- C. In the presence of wind, all geocomposite shall be weighted with sandbags or the equivalent. Such sandbags shall be installed during placement and shall remain until replaced with cover material.
- D. On side slopes, the geocomposite shall be secured in the anchor trench and then rolled down the slope in such a manner as to continually keep the geocomposite in tension.
- E. If necessary, the geocomposite shall be positioned by hand after being unrolled to minimize wrinkles.
- F. Care shall be taken during placement of geocomposite not to entrap dirt or excessive dust in the geonet component of the geocomposite that could cause clogging of the drainage system, and/or stones that could damage the adjacent liner. If dirt or excessive dust is entrapped in the geocomposite, it should be cleaned prior to placement of the next material on top of it. Care shall be exercised when handling sandbags, to prevent rupture or damage of the sandbags.
- G. Geocomposite shall only be cut using Manufacturer's recommended procedures.
- H. Unless otherwise specified, geocomposite shall not be welded to liners.
- I. Tools shall not be left on, in, or under the geocomposite.

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- J. After unwrapping the geocomposite from its opaque cover, the geocomposite shall not be left exposed for a period in excess of 90 days unless a longer exposure period is approved by the Engineer, based on a formal demonstration from the Contractor that the geotextile component of the geocomposite is stabilized against U.V. degradation for a period in excess of 90 days.
- K. If white colored geotextile is used in the geocomposite, precautions shall be taken against "snowblindness" of personnel.

# 3.04 SEAMS AND OVERLAPS

A. The geocomposite components are not bonded together at the ends and edges of the rolls. Each component will be secured or seamed to the like component at overlaps.

#### B. Geonet Component:

- 1. The geonet components shall be overlapped by at least 4 inches. These overlaps shall be secured by spot welding or tying.
- 2. Tying shall be achieved by plastic fasteners or polymer braid. Tying devices shall be white or yellow for easy inspection. Metallic devices shall not be used.
- 3. Tying shall be every 5 feet down the slope, every 2 feet across the slope, every 6 inches in the anchor trench and every 6 feet on horizontal surfaces.

# C. Geotextile Components:

- 1. The bottom layers of geotextile shall be folded back or overlapped. The top layers of geotextiles shall be continuously sewn (i.e., spot sewing is not allowed). Geotextiles shall be overlapped a minimum of 4 inches prior to seaming.
- 2. No horizontal seams shall be allowed on slopes steeper than 10 horizontal to 1 vertical.
- 3. Polymeric thread, with chemical resistance properties equal to or exceeding those of the geotextile component, shall be used for all sewing. The seams

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#### SECTION 02716: GEOCOMPOSITE

shall be sewn using Stitch Type 401. The seam type shall be Federal Standard Type SSN-1.

# 3.05 **REPAIR**

- A. Any holes or tears in the geocomposite (damaged geonet) shall be repaired by placing a geocomposite patch extending 1 ft beyond the edges of the hole or tear. The patch shall be secured by tying fasteners through the bottom geotextile and the geonet of the patch, and through the top geotextile and geonet on the slope. The patch shall be secured every 6 inches with approved tying devices. A strip of loose geotextile shall be placed at the perimeter of the patch and heat sealed to the top geotextile of the patch and geocomposite needing repair. If the hole or tear width across the roll is more than 50 percent of the geonet shall be joined in accordance with Subsection 3.04 above.
- B. Any damage to the upper geotextile (no damage to geonet) shall be repaired by placing a geotextile patch over the damaged area and lystering. No hole due to overheating during lystering is allowed.

# 3.06 PLACEMENT OF SOIL MATERIALS

- A. The Contractor shall place all soil materials in such a manner as to ensure that:
  - 1. the geocomposite and underlying liner system materials are not damaged;
  - 2. minimal slippage occurs between the geocomposite and underlying layers; and
  - 3. excess tensile stresses are not produced in the geocomposite.
- B. Unless otherwise specified by the Engineer, all equipment operating on soil material overlying the geocomposite shall comply with the following:

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Maximum Allowable	Thickness of		
Equipment Ground Pressure		<b>Overlying Fill</b>	
Psi		in.	
<5		12	
<10		18	
<20		24	
>20		36	

# 3.07 PRODUCT PROTECTION

- A. The Contractor shall use all means necessary to protect all prior work, and all materials and completed work of other Sections.
- B. In the event of damage, the Contractor shall immediately make all repairs and replacements necessary, to the approval of the Owner's Representative and at no additional cost to the Owner.

# SECTION 02716: GEOCOMPOSITE

# TABLE 02716-1LINING SYSTEM GEOCOMPOSITE PROPERTIES

PROPERTIES	QUALIFIERS	UNITS	<b>SPECIFIED</b> <b>VALUES</b> (1)	TEST METHOD
Geonet Component:				
Polymer composition	minimum	%	95% polyethyle by weight	ne
Polymer density	minimum	g/cm <sup>3</sup>	0.935	ASTM D1505
Geotextile Component:				
Polymer composition	minimum	0⁄0	95 polyester or polypropylene	
Apparent opening size (for filter applications or	maximum 1ly)	mm	O <sub>95</sub> < 0.21	ASTM D 4751
Hydraulic conductivity	minimum	cm/s	0.1	ASTM D 4491
Grab strength <sup>(2)</sup> Tear strength <sup>(2)</sup> Puncture strength	minimum minimum minimum	lb lb lb	160 65 80	ASTM D 4632 ASTM D 4533 ASTM D 4833
Geocomposite Compon	ent			
Transmissivity <sup>(3)</sup> Peel strength	minimum minimum	m²/s g/in.	3 x 10 <sup>-4</sup> 500	ASTM D 4716 ASTM D 7005

(Continued on next page)

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# SECTION 02716: GEOCOMPOSITE

# TABLE 02716-1 (continued)LINING SYSTEM GEOCOMPOSITE PROPERTIES

#### NOTES:

1. All values represent minimum average roll values (i.e., any roll in a lot should meet or exceed the values in this table).

2. Minimum value measured in machine and cross machine direction.

3. Transmissivity of the geocomposite drainage layer shall be measured using water at 68°F with a gradient of not less than 0.01, under a compressive stress of not less than 15,000 psf. For the test, the geocomposite shall be sandwiched between a layer of sand and a textured HDPE geomembrane. The specimen shall be maintained under the compressive load for a period of 100 hours before measurements are taken. Measurements shall be taken at 0.25 hr, 0.5 hr, 1 hr, 24 hr, and 100 hr.

4. Any variation to these specifications must be at Engineer's approval.

# [END OF SECTION]

# **SECTION 02771**

#### POLYETHYLENE GEOMEMBRANE

# PART 1 GENERAL

# 1.01 DESCRIPTION OF WORK

- A. The Contractor shall furnish all labor, materials, tools, supervision, transportation, and installation equipment necessary for the installation of polyethylene geomembranes (PE) as specified herein, as shown on the Drawings, and in accordance with the Construction Quality Assurance (CQA) Plan.
- B. The Contractor shall be prepared to install the geomembranes in conjunction with earthworks and other components of the liner system.

### **1.02 RELATED SECTIONS**

- A. Section 02200 Earthwork
- B. Section 02711 Protective Cover
- C. Section 02716 Geocomposite
- D. Section 02772 Geosynthetic Clay Liner

# 1.03 **REFERENCES**

A. CQA Plan.

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B. Latest version of the American Society for Testing and Materials (ASTM) standards:

1. ASTM D 6693. Standard Test Method for Determining Tensile Properties of Non-Reinforced Polyethylene and Non-Reinforced Flexible Polypropylene Geomembranes.

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2.	ASTM D 1004.	Standard Test Method of Initial Tear Resistance of
		Plastic Film and Sheeting.
3.	ASTM D 1505.	Standard Test Methods for Density of Plastics by
		Density-Gradient Technique.
4.	ASTM D 5397.	Standard Test Method for Environmental Stress
		Cracking of Ethylene Plastics.
5.	ASTM D 4218.	Standard Test Method for Determination of Carbon
		Black Content in Polyethylene Compounds By the
		Muffle-Furnace Technique.
6.	ASTM D 5994.	Standard Test Method for Measuring Nominal
		Thickness of Geotextiles and Geomembranes.
7.	ASTM D 5596.	Standard Test Method for Microscopic Evaluation of
		the Dispersion of Carbon Black in Polyolefin
		Geosynthetics.
8.	ASTM D 4716.	Determining the (In-plane) Flow Rate per Unit Width
		and Hydraulic Transmissivity of Geosynthetic Using a
		Constant Head.
9.	ASTM D 4833.	Standard Test Method for Index Puncture Resistance
		of Geotextiles, Geomembranes, and Related Products.

10. GRI Test Method GM12

# 1.04 QUALIFICATIONS

# A. Contractor:

- 1. The Contractor shall provide the services of a Geomembrane Manufacturer, Fabricator (if necessary), and Installer, who shall meet the following qualifications. The Contractor shall, however, accept and retain full responsibility for all materials and installation and shall be responsible for any defects in the completed geomembranes.
- 2. The Contractor shall be responsible for providing the following qualifying information required of proposed Manufacturer, Fabricator and Installer to the Owner's Representative and CQA Consultant in writing for his sole approval prior to the confirmation of any Contractual agreements.

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# B. Manufacturer:

1. The Geomembrane Manufacturer shall be responsible for the production of geomembrane rolls from resin and shall have sufficient production capacity and qualified personnel to meet the demands (e.g., quantity production and quality control) of the project.

2. The Manufacturer shall submit the following information to the Owner's Representative and CQA Consultant in writing:

a. Corporate background and information.

b. Manufacturing capabilities, including:

i. information on plant size, equipment, personnel, number of shifts per day, and capacity per shift;

ii. daily production quantity available for this Contract;

iii. manufacturing quality control procedures; and

iv. list of material properties, including certified test results, to which are attached liner samples.

c. A list of at least ten completed facilities for which the Manufacturer has manufactured polyethylene geomembrane with a minimum combined quantity of  $5,000,000 \text{ ft}^2$ . The following information shall be provided for each facility:

i. name, location, and purpose of facility, and date of installation;

ii. names of Owner, Project Manager, Engineer, Contractor, Fabricator (if any), and Installer; and

iii. thickness and surface area of geomembrane manufactured.

d. Origin (resin supplier's name, resin production plant) and identification (brand name, number) of the polyethylene resin.

C. Geomembrane Fabricator:

- 1. The Fabricator shall submit the following information to the Engineer in writing:
  - a. Corporate background and information.
  - b. Copy of Geomembrane Fabricator's letter of approval or license by the

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Manufacturer.

- c. Fabrication capabilities, including:
  - i. factory size, equipment, personnel, number of shifts per day, and capacity per shift;
  - ii. daily fabrication quantity available for this Contract;
  - iii. quality control procedures; and
  - iv. samples of fabricated seams, a certified list of minimum values for seam properties, and the test methods employed.

d. A list of at least ten completed facilities for which the Fabricator has fabricated polyethylene geomembrane panels with a minimum combined quantity of  $5,000,000 \text{ ft}^2$ . The following information shall be provided for each facility:

i. the name, location, and purpose of facility, and date of installation;

- ii. the names of the Owner, Project Manager, Engineer, Contractor, Manufacturer, Installer, and the name of a contact at the site who can discuss the project;
- iii. the names and qualifications of the Fabricator's supervisor(s);
- iv. thickness and surface area of geomembrane fabricated; and
- v. type of seaming and type of seaming apparatus used.
- e. Resumes of all personnel who will perform seaming operations on this project including dates and duration of employment.
- 2. 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 100,000 ft of geomembrane seams using the same type of apparatus to be used for this project.
- D. Installer:
  - 1. The Installer shall be responsible for field handling, storing, deploying, seaming, temporarily restraining (against wind), and other site aspects of the geomembranes and other components of the liner system. The Installer may also be responsible for transportation of these materials to the site, and for anchoring systems.

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- 2. The Installer shall submit to the Owner's Representative and CQA Consultant in writing the following information:
  - a. Corporate background and information.
  - b. Copy of installer's letter of approval or license by the Manufacturer and/or Fabricator.
  - c. Installation capabilities, including:
    - i. information on equipment and personnel;
    - ii. average daily production anticipated for this project;
    - iii. quality control procedures; and
    - iv. samples of field seams, a certified list of minimum values for seam properties, and the test methods employed.
  - d. A list of at least ten completed facilities for which the Installer has installed polyethylene geomembrane with a minimum combined quantity of 5,000,000  $\text{ft}^2$ . The following information shall be provided for each facility:
    - i. the name and purpose of the facility, its location, and dates of installation;
    - ii. the names of the Owner, Project Manager, Engineer, Contractor, Manufacturer, Fabricator (if any), and the name of a contact at the facility who can discuss the project;
    - iii. name and qualifications of the Installer's supervisor(s);
    - iv. thickness and surface area of installed geomembrane;
    - v. type of seaming and type of seaming apparatus used;
    - vi. duration of installation; and

vii. type of system the installer constructed.

- e. Resumes of all personnel who will perform seaming operations on this project, including dates and duration of employment.
- f. Resume of the installation supervisor to be assigned to this project, including dates and duration of employment. The superintendent shall have supervised the installation of a minimum of 2,000,000  $\text{ft}^2$  of polyethylene geomembrane and 500,000  $\text{ft}^2$  of geotextile and geosynthetic clay liner and must also exhibit good management skills.
- All personnel performing seaming operations shall be qualified by

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#### SECTION 02771: POLYETHYLENE GEOMEMBRANE

experience or by successfully passing seaming tests.

- a. At least one seamer shall have experience seaming a minimum of 5,000,000 ft<sup>2</sup> of polyethylene geomembrane using the same type of seaming apparatus to be used at this site. Seamers with such experience will be designated "master seamers" and shall provide direct supervision over less experienced seamers.
- b. All seaming personnel shall have seamed at least  $100,000 \text{ ft}^2$  of polyethylene geomembrane using the same type of seaming apparatus to be used at this site.

# 1.05 SUBMITTALS

- A. Prior to transporting any geomembrane to the site, the Contractor shall submit to the Owner's Representative and CQA Consultant in writing the following documentation on the resin used to manufacture the geomembranes:
  - 1. Copies of quality control certificates issued by the resin supplier including production dates of the resin used to manufacture the geomembrane for the project.
  - 2. Results of tests conducted by the Geomembrane Manufacturer to verify the quality of the resin used to manufacture the geomembrane rolls assigned to the project.
  - 3. Certification that no reclaimed polymer is added to the resin during the manufacture of the geomembrane to be used in this project. The use of polymer recycled during the manufacturing process may be permitted if performed with appropriate cleanliness and if the recycled polymer does not exceed 2% by weight of the total polymer weight.
- B. The Contractor shall submit to the Owner's Representative and CQA Consultant the following documentation on geomembrane roll production prior to the shipment of the geomembrane rolls.
  - 1. Manufacturing certificates for each shift's production of geomembrane, signed by responsible parties employed by the Manufacturer (such as the production manager), and notarized.

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- 2. The quality control certificate shall include:
  - a. roll numbers, lot or batch numbers, and product identification;
  - b. results of quality control tests, including descriptions of the test methods used.
- C. Prior to commencement of the installation, the Contractor shall submit to the Owner's Representative:
  - 1. 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 Drawings. The layout shall be adequate for use as a construction plan and shall include dimensions, details, etc.
  - 2. Installation schedule.
  - 3. A list of personnel who shall perform field seaming operations and details of their prior experience along with resumes.
- D. During the installation, the Contractor shall be responsible for the timely submission to the Owner's Representative and CQA Consultant of:
  - 1. Quality control documentation.
  - 2. Subbase acceptance certificates, signed by the installer, daily for each area to be covered by the geomembrane.
- E. Upon completion of the installation, the Contractor shall be responsible for the submission to the Owner's Representative and CQA Consultant of:
  - 1. Geomembrane installation certification.
  - 2. Warranties from the Manufacturer, Fabricator, and Installer.
- F. A Certificate of Calibration less than 12 months old shall be submitted for the field tensiometer used by the Contractor in the field.

# 1.06 CONSTRUCTION QUALITY ASSURANCE

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- A. The installation of the geomembranes shall be monitored as outlined in the CQA plan.
- B. The Contractor shall be aware of the activities in the CQA Plan and shall account for these CQA activities in the installation schedule.

# PART 2 PRODUCTS

# 2.01 **RESIN**

- A. The geomembrane shall be manufactured from new, first-quality polyethylene resin, and shall be designed and manufactured specifically for use in geomembranes. Reclaimed polymer shall not be added to the resin; however, the use of polymer recycled during the manufacturing process shall be permitted if performed within appropriate deadlines and if the recycled polymer does not exceed 2 percent by weight of the total polymer weight.
- B. The resin shall comply with the following PE specified properties:
  - 1. Specific Gravity: 0.94 minimum (ASTM D1505)
  - 2. Carbon Black Content: 2.0 to 3.0 percent

# 2.02 GEOMEMBRANE PROPERTIES

- A. The Geomembrane Manufacturer shall furnish geomembranes having properties that comply with the required property values shown in Table 02771-1.
- B. In addition to the property values listed in Table 02771-1, the geomembranes shall:
  - 1. contain a maximum of 2 percent by weight of additives, fillers, or extenders (not including carbon black);
  - 2. not have striations, roughness, pinholes, or bubbles on the surface or in the interior;
  - 3. be produced so as to be free of holes, blisters, modules, undispersed raw

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materials, or any sign of contamination by foreign matter; and

4. be manufactured in a single layer (thinner layers shall not be welded together to produce the final required thickness).

### 2.03 MANUFACTURING QUALITY CONTROL

- A. Resin:
  - 1. The Geomembrane Manufacturer shall sample and test the resin to demonstrate that the resin complies with the Specifications. The Manufacturer shall certify in writing that the resin does meet the Specifications, and shall be held liable for any non-compliance.
  - 2. Any geomembrane manufactured from noncomplying resin shall be rejected.
  - 3. Additional conformance testing, as defined in this Section and in the CQA Plan, may be required at the CQA Consultant's discretion. If the Manufacturer's and the CQA Consultant's test results differ, the tests shall be repeated by the CQA Consultant, and the Manufacturer shall be allowed to monitor this testing. The results of this latter series of tests will prevail, provided that the applicable test methods, as detailed in this Section and the CQA Plan, have been followed.
  - 4. The Manufacturer shall comply with the submittal requirements of Part 1.05 of this Section and the CQA Plan.
- B. Rolls:
  - 1. The Manufacturer shall continuously monitor geomembranes during the manufacturing process for inclusions, bubbles, or other defects.
  - 3. Geomembrane rolls shall not be used unless the rolls are subjected to continuous spark testing by the manufacturer at the factory and no defect have been found.
  - 2. No geomembrane shall be accepted which exhibits any defects.
  - 3. The Manufacturer shall continuously monitor the geomembrane thickness during the manufacturing process.
  - 4. No geomembrane shall be accepted which fails to meet the specified

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minimum thickness.

- 5. The Manufacturer shall sample for laboratory testing the manufactured geomembrane at the typical frequencies used at manufacturer's plant to demonstrate that its properties conform to the values specified in Tables 02771-1.
  - a. Samples taken from stored rolls shall be taken across the entire width of the roll.
  - b. Samples taken at the time of manufacturing can be obtained from the end of the roll.
  - c. Unless otherwise specified, samples shall be 3 ft long by the roll width. The Manufacturer shall mark the machine direction on the samples with an arrow.
  - d. As a minimum, the following tests shall be performed:
    - i. density
    - ii. thickness
    - iii. tensile strength at yield (if applicable)
    - iv. elongation at yield (if applicable)
    - v. tensile strength at break
    - vi. elongation at break
    - vii. carbon black content
    - viii. carbon black dispersion
    - viii. asperity height (studded material)
    - ix. transmissivity (studded material)
- 6. Samples not meeting the specified properties shall result in the rejection of the applicable rolls as described in this Section and the CQA Plan. The rejected roll shall not be used.
- 7. In the event of a roll failure, rolls manufactured before and after the rejected roll shall be samples and tested. This procedure will be repeated until the substandard rolls are identified. The substandard rolls shall not be used.
- 8. The Manufacturer must certify test results that have been performed on geomembrane sheets made from the same type of resin to be used for this project.

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### C. Manufacturing Plant Visit:

- 1. The Manufacturer shall permit the CQA Consultant to visit the manufacturing plant for project specific visits. If possible, such visits will be prior to or during the manufacturing of the geomembrane rolls for the specific project.
- 2. During the visit, the CQA Consultant may:
  - a. review the manufacturing process, quality control procedures, laboratory facilities, and testing procedures;
  - b. verify that properties guaranteed by the Manufacturer comply with the specifications;
  - c. verify that the measurements of properties by the Manufacturer are properly documented and test methods used are acceptable;
  - d. spot inspect geomembrane rolls for evidence of holes, blisters, or any sign of contamination by foreign matter;
  - e. review packaging and transportation procedures to verify that these procedures are not damaging the geomembrane; and
  - f. verify that roll packages are labeled in compliance with Part 2.05 of this Section.

### 2.04 GEOMEMBRANE SUPPLY

A. The geomembrane shall be supplied to the site in rolls.

### 2.05 LABELING

- A. Geomembrane shall be labeled with the following information.
  - 1. thickness of the material;
  - 2. length and width of the roll or factory panel;
  - 3. names of Manufacturer and Fabricator;
  - 4. directions to unroll the material;
  - 5. product identification;

6. lot or batch number; and

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7. roll number.

### 2.06 TRANSPORTATION

A. The party responsible for furnishing the material shall be liable for all damages to the materials incurred during transportation to the site.

### 2.07 HANDLING AND STORAGE

- A. Handling, storage, and care of the geomembranes following delivery to the site and 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 work by the Owner's Representative.
- B. The Contractor shall be responsible for storage of the geomembrane at the site. During storage, the geomembrane shall be protected from excessive heat or cold, puncture, cutting, or other damaging or deleterious conditions. The geomembrane shall be stored in accordance with any additional requirements of the Manufacturer.
- C. The Owner shall provide adequate storage facilities.

### PART 3INSTALLATION OF GEOMEMBRANES

### 3.01 EARTHWORK

- A. Surface Preparation
  - 1. The Installer shall provide certification in writing that the surface on which the geomembrane will be installed is acceptable. This certification of acceptance shall be given to the CQA Consultant prior to commencement of geomembrane installation in the area under consideration.
  - 2. Special care shall be taken to maintain the prepared soil surface.

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- 3. No geomembrane shall be placed onto an area which has been softened by precipitation or which has cracked due to desiccation. The soil surface shall be observed daily to evaluate the effects of desiccation cracking and/or softening.
- 4. Any damage to the soil surface caused by installation activities shall be repaired at the Contractor's expense.
- B. Crest Anchorage System:
  - 1. The anchor trench shall be excavated prior to geomembrane placement to the lines, grades, and configuration shown on the Drawings.
  - 2. No loose soil shall be allowed beneath the geomembrane.
  - 3. The anchor trench shall be backfilled and compacted after the geosynthetics have been installed in the trench. Care shall be taken when backfilling the trenches to prevent any damage to the geomembrane.
  - 4. Slightly rounded corners shall be provided in the trench where the geomembrane adjoins the trench to avoid sharp bends in the geomembrane.

### **3.02 CONFORMANCE TESTING**

- A. Upon delivery to the site or at the location of the Manufacturer, samples of the geomembrane shall be removed by the CQA Consultant or the CQA laboratory representative for testing to ensure conformance with these Specifications.
- B. Samples shall be selected by the CQA Consultant in accordance with this Section and with the procedures outlined in the CQA Plan. The CQA Consultant may increase the frequency of sampling at his/her discretion in the event that test results do not comply with this Section and the CQA Plan.
- C. Any geomembranes that are not certified in accordance with this Section, or that conformance testing indicates do not comply with this Section shall be rejected and not used in the construction.
- D. Samples shall be taken at a frequency of one sample per lot or one sample per

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 $100,000 \text{ ft}^2$  of material, whichever requires a greater number of samples. Rolls from previous construction activities shall be re-tested, unless quality control documentation from the manufacturer and conformance test results for each roll is provided.

E. If a sample fails a conformance test that is conducted by the CQA Consultant:

- 1. An additional sample from the suspect roll will be collected and analyzed by the CQA Consultant to confirm nonconformance.
- 2. The Contractor shall replace any roll of geomembrane that is confirmed to be in nonconformance with the Specifications with a roll that meets Specifications.
- 3. The Contractor shall remove conformance samples for testing by a laboratory under the direction of the CQA Consultant from the two rolls at the site having manufacturer's roll numbers closest to that of the failed roll, one of which having a larger number and the other having a lesser number. These two samples must both conform to the Specifications. This procedure is repeated until substandard rolls are identified. The substandard rolls shall not be used in the construction. This additional conformance testing will be at the expense of the Manufacturer.

### **3.03 GEOMEMBRANE DEPLOYMENT**

A. Layout Drawings:

1. The Contractor shall produce layout drawings prior to geomembrane deployment. These drawings shall indicate the geomembrane configuration, dimensions, details, locations of seams, etc. Field seams shall be differentiated from factory seams (if any). The layout drawings must be approved by the Owner's Representative prior to the installation of any geomembranes. The layout drawings, as modified and/or approved by the Owner's Representative, shall become part of these specifications.

B. Field Panel Identification:

1. A geomembrane field panel is defined as follows:

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- a. If the geomembrane is not fabricated into factory panels, a field panel is a roll or a portion of roll cut in the field.
- b. If the geomembrane is fabricated into factory panels, a field panel is a factory panel or a portion of factory panel cut in the field.
- 2. Each field panel must be given an identification code (number or letternumber) consistent with the layout plan. This identification code shall be agreed upon by the CQA Consultant and 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.
- C. Field Panel Placement:
  - 1. Field panels shall be installed as approved or modified at the location and positions indicated in the layout drawings.
  - 2. Field panels shall be placed one at a time, and each field panel shall be seamed immediately after its placement.
  - 3. Geomembranes shall not be placed when the ambient temperature is below 32°F, unless otherwise authorized by the Owner.
  - 4. Geomembranes shall not be placed during any precipitation, in the presence of excessive moisture (e.g., fog, dew), in an area of ponded water, or in the presence of excessive winds.
  - 5. The Contractor shall employ placement methods which ensure that:
    - a. No vehicular traffic shall be allowed on the geomembrane.
    - b. Equipment used shall not damage the geomembrane by handling, trafficking, leakage of hydrocarbons, or other means.
    - c. Personnel working on the geomembrane shall not smoke, wear damaging shoes, or engage in other activities which could damage the geomembrane.
    - d. The method used to unroll the panels shall not scratch or crimp the geomembrane and shall not damage the supporting soil.
    - e. The prepared surface underlying the geomembrane shall not be allowed to deteriorate after acceptance, and shall remain acceptable up to the time of geomembrane placement.
    - f. The method used to place the panels shall minimize wrinkles

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(especially differential wrinkles between adjacent panels).

- g. Temporary loads and/or anchors (e.g., sand bags, tires), not likely to damage the geomembrane, shall be placed on the geomembrane to prevent uplift by wind (in high winds, continuous loading is recommended along panel edges to minimize the risk of wind flow under the panels).
- h. The geomembrane shall be especially protected from damage in heavily trafficked areas.
- 6. Any field panel or portion thereof which becomes seriously damaged (torn, twisted, or crimped) shall be replaced with new material at no cost to the Owner. Less serious damage may be repaired at the CQA Consultant's option and at no cost to the Owner. Damaged panels or portions of damaged panels which have been rejected shall be removed from the work area.

### 3.04 FIELD SEAMING

### A. Seam Layout:

1. In general, seams shall be oriented parallel to the line of maximum slope, i.e., oriented down, not across, the slope. In corners and at odd-shaped geometric locations, the number of field seams shall be minimized. No horizontal seam on the slope shall be constructed greater than 5 ft from the toe of the slope, except where approved by the CQA Consultant. No seams shall be located in an area of potential stress concentration.

### B. Personnel:

1. All personnel performing seaming operations shall be qualified as indicated in this Section. No seaming shall be performed unless a "master seamer" is present.

### C. Weather Conditions for Seaming:

1. Unless authorized in writing by the CQA Consultant, seaming shall not be attempted at ambient temperatures below 32°F or above 104°F. At ambient

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temperatures between 32°F and 40°F, seaming shall be allowed if the geomembrane is preheated either by the sun or a hot air device, and if there is no excessive cooling from wind. At ambient temperatures above 40°F, no preheating shall be required. In all cases, the geomembrane shall be dry and protected from wind damage.

- 2. If the Contractor wishes to use methods which may allow seaming at ambient temperatures below 32°F or above 104°F, he shall use a procedure approved by the Engineer. In addition, an addendum to the Contract between the Owner and the Contractor shall be required which shall specifically state 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.
- 3. Ambient temperatures shall be measured 6 in. above the geomembrane surface.
- D. Overlapping and Temporary Bonding:
  - 1. Geomembrane panels shall be overlapped a minimum of 3 in. for extrusion welding and 4 in. for fusion welding, but in any event, sufficient overlap shall be provided to allow peel tests to be performed on the seam.
  - 2. The procedure used to temporarily bond adjacent panels together shall not damage the geomembrane. The temperature of the air at the nozzle of spot welding apparatus shall be controlled such that the geomembrane is not damaged.

### E. Seam Preparation:

- 1. Prior to seaming, the seam area shall be clean and free of moisture, dust, dirt, debris of any kind, and foreign material.
- 2. 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 manner that does not damage the geomembrane.
- 3. Seams shall be aligned with the fewest possible number of wrinkles and "fishmouths".

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- F. General Seaming Requirements:
  - 1. Seaming shall extend to the outside edge of panels to be placed in the anchor trench.
  - 2. 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.
  - 3. If seaming operations are carried out at night, adequate illumination shall be provided. Night seaming will only be permitted if approved by the Owner's Representative.
  - 4. Fishmouths or wrinkles at the seam overlaps shall be cut along the ridge of the wrinkle 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 that extends a minimum of 6 in. beyond the cut in all directions.
- G. Seaming Process:
  - 1. Approved processes for field seaming are extrusion welding and fusion welding. The primary method of welding shall be fusion. Seaming equipment shall not damage the geomembrane. Only apparatus which the Owner's Representative and CQA Consultant have specifically approved by make and model shall be used. Proposed alternate processes shall be documented and submitted to the Engineer for approval.
  - 2. Extrusion Equipment and Procedures:
    - a. The Contractor shall maintain at least one spare operable seaming apparatus on site.
    - b. Extrusion welding apparatus shall be equipped with gauges giving the temperature in the apparatus and at the nozzle.
    - c. Prior to beginning a seam, the extruder shall be purged until all heatdegraded extrudate has been removed from the barrel. Whenever the extruder is stopped, the barrel shall be purged of all heat-degraded extrudate.
    - d. The Contractor shall provide documentation regarding the extrudate to the Owner's Representative and CQA Consultant and shall certify that

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the extrudate is compatible with the specifications, and consists of the same resins as the geomembrane.

- e. The electric generator shall be placed on rub or scrub sheets. A smooth insulating plate or fabric shall be placed beneath the hot welding apparatus after use.
- 3. Fusion Equipment and Procedures:
  - a. The Contractor shall maintain at least one spare operable seaming apparatus on site.
  - b. Fusion-welding apparatus shall be automated vehicular-mounted devices equipped with gauges giving the applicable temperatures and pressures
  - c. Fusion cross seams shall be extrusion welded a minimum distance of 6 in. from the point of intersection.
  - d. A movable protective layer may be used directly below each geomembrane overlap to be seamed to prevent the buildup of moisture between the sheets.
  - e. The electric generator shall be placed on a smooth base such that no damage occurs to the geomembrane. A smooth insulating plate or fabric shall be placed beneath the hot welding apparatus after use.
- H. Trial Seams:
  - 1. 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 every five (5) hours, for each seaming apparatus used that day. Trial seams shall be made under the same conditions as actual seams. The trial seam sample shall be at least 5 ft long by 1 ft wide (after seaming) with the seam centered lengthwise. Seam overlap shall be as indicated in this Section.
  - 2. Six specimens, each 1.0 in. wide, shall be cut from the trial seam sample by the Contractor. Three specimens shall be tested in shear and three in peel, using a field tensiometer. The test specimens shall not fail in the seam. If a specimen fails, the entire operation shall be repeated. If the additional specimen fails, the seaming apparatus shall not be accepted and shall not be

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

- 3. 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 CQA Consultant and, if they fail the tests, the procedure indicated in this Section 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.
- I. Nondestructive Seam Continuity Testing:
  - 1. The Contractor shall nondestructively test all field seams over their full length using a vacuum test, air pressure test (for double fusion seams only), or other approved method. No vacuum testing shall be used on fusion seams unless approved by the Owner's Representative. Continuity testing shall be carried out as the seaming work progresses, not at the completion of all field seaming. The installer shall complete any required repairs in accordance with this Section. The following procedures shall apply to locations where seams cannot be nondestructively tested:
    - a. If the seam is accessible to testing equipment prior to final installation, the seam shall be nondestructively tested prior to final installation.
    - b. If the seam cannot be tested prior to final installation, the seaming operations shall be observed by the CQA Consultant for uniformity and completeness.
  - 2. Vacuum Testing:

i.

- a. The equipment shall comprise the following:
  - 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.

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- ii. A steel vacuum tank and pump assembly equipped with a pressure controller and pipe connections.
- iii. A rubber pressure/vacuum hose with fittings and connections.
- iv. A bucket and applicator.
- v. A soapy solution.

b. The following procedures shall be followed:

- i. Energize the vacuum pump and reduce the tank pressure to approximately 5 psi gauge.
- ii. Wet a strip of geomembrane seam approximately 4 in. by 48 in. with the soapy solution.
- iii. Place the box over the wetted area.
- iv. Close the bleed valve and open the vacuum valve.

v. Ensure that a leak tight seal is created.

- vi. Examine the geomembrane through the viewing window for the presence of soap bubbles for not less than 10 seconds.
- vii. If no bubbles appear after 10 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 in. overlap, and repeat the process.
- viii. All areas where soap bubbles appear shall be marked with a marker that will not damage the geomembrane and repaired in accordance with this Section.

### 3. Air Pressure Testing (For Double Fusion Seams Only):

- a. The following procedures are applicable to those processes which produce a double seam with an enclosed space.
- b. The equipment shall comprise the following:
  - i. An air pump (manual or motor driven), equipped with a pressure gauge, capable of generating and sustaining a pressure between 30 and 35 psi, mounted on a cushion to protect the geomembrane.
  - ii. A rubber hose with fittings and connections.
  - iii. A sharp hollow needle, or other approved pressure feed device.

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- c. The following procedures shall be followed:
  - i. Seal both ends of the seam to be tested.
  - ii. Insert needle, or other approved pressure feed device, into the tunnel created by the fusion weld.
  - iii. Insert a protective cushion between the air pump and the geomembrane.
  - iv. Energize the air pump to a pressure between 30 and 35 psi, close valve, allow approximately 2 minutes for the pressure to stabilize between 30 and 35 psi, and sustain the pressure for not less than 5 minutes.
  - v. If loss of pressure exceeds 3 psi, or does not stabilize, locate faulty area and repair in accordance with this Section.
  - vi. At the conclusion of the pressure test, the end of the seam furthest from the pressure gauge is cut. A decrease in gauge pressure must be observed or the air channel will be considered "blocked" and the test will have to be repeated after correcting the blockage.

Remove needle, or other approved pressure feed device, and seal repair in accordance with this Section.

J. Destructive Testing:

vii.

- 1. Destructive seam tests shall be performed on samples collected from selected locations to evaluate seam strength and integrity. Destructive test shall be carried out as the seaming work progresses, not at the completion of all field seaming.
- 2. Sampling:
  - a. Destructive test samples shall be collected at a minimum average frequency of one test location per 500 ft of seam length. Test locations shall be determined during seaming, and may be prompted by suspicion of excess crystallinity, contamination, offset seams, or any other potential cause of imperfect seaming. The CQA Consultant will be responsible for choosing the locations. The Contractor shall not be informed in advance of the locations where the seam samples will be

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taken. The Owner reserves the right to increase the sampling frequency.

b. Samples shall be cut by the Contractor at the locations designated by the CQA Consultant 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 panel layout drawing. All holes in the geomembrane resulting from the destructive seam sampling shall be immediately repaired in accordance with the repair procedures described in this Section. The continuity of the new seams in the repaired areas shall be tested according to this Section.

c. Two strips 1 in. wide and 12 in. long with the seam centered parallel to the width shall be taken. The strips shall be spaced a clear distance of 3.5 ft apart. These samples shall be tested in the field in accordance with this Section. If these samples pass the field test, a laboratory sample shall be taken. The laboratory sample shall be at least 1 ft wide by 3.5 ft long with the seam centered lengthwise. The sample shall be cut into three parts and distributed as follows:

- i. One portion 1 ft long to the Contractor for laboratory testing.
- ii. One portion 1.5 ft long to the CQA Consultant for laboratory testing.
- iii. One portion 1 ft long to the Owner for archival storage.
- 3. Field Testing:
  - a. The two 1 in. wide strips shall be tested in the field, by tensiometer, for peel and shear respectively. If any field test sample fails to pass, then the procedures outlined in Part 3.04-J.5 of this Section and the CQA Plan shall be followed.
- 4. Laboratory Testing:
  - a. Testing by the CQA Consultant shall include "Seam Strength" and "Peel Adhesion". The minimum acceptable values to be obtained in these tests are those indicated in Tables 02771-4 through 02771-6. At least 5 specimens shall be tested for each test method. Specimens shall be selected alternately by test from the samples (i.e., peel, shear, peel,

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shear...). The CQA Consultant shall provide test results no more than 24 hours after the samples are received at the laboratory.

5. Destructive Test Failure:

ii.

a. The following procedures shall apply whenever a sample fails a destructive test, whether the test is conducted by the Owner's laboratory, the Contractor's laboratory, or by a field tensiometer. The Contractor shall have two options:

i. The Contractor can reconstruct the seam (e.g., remove the old seam and reseam) between any two passed test locations.

The Contractor can trace the welding path to an intermediate location, a minimum of 10 ft from the location of the failed test (in each direction) and take a small sample for an additional field test at each location. If these additional samples pass the tests, then full laboratory 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 150 ft of reconstructed seam, a sample taken from within the reconstructed zone must pass Whenever a sample fails, the CQA destructive testing. Consultant may require additional tests for seams that were formed by the same seamer and/or seaming apparatus or seamed during the same time shift.

### K. Defects and Repairs:

1. The geomembrane will be inspected before and after seaming for evidence 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 inspection. The geomembrane surface shall be swept or washed by the Contractor if surface contamination inhibits inspection. The

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Contractor shall ensure that an inspection of the geomembrane precedes any seaming of that Section.

- 2. Each suspect location, both in seam and non-seam areas, shall be nondestructively tested using the methods described in Part 3.04-I of this Section, as appropriate. Each location which fails nondestructive testing shall be marked by the CQA Consultant and repaired by the Contractor.
- 3. When seaming of a geomembrane is completed (or when seaming of a large area of a geomembrane is completed) and prior to placing overlying materials, the CQA Consultant shall identify all excessive geomembrane wrinkles. The Contractor shall cut and reseam all wrinkles so identified. The seams thus produced shall be tested like any other seams.
- 4. Repair Procedures:
  - a. Any portion of the geomembrane exhibiting a flaw, or failing a destructive or nondestructive test, shall be repaired by the Contractor. Several repair procedures exist. The final decision as to the appropriate repair procedure shall be agreed upon between the CQA Consultant and the Contractor. The procedures available include:
    - i. patching, used to repair holes, tears, seam intersections, undispersed raw materials, and contamination by foreign matter;
    - ii. abrading and reseaming, used to repair small sections of extruded seams;
    - iii. spot seaming, used to repair minor localized flaws and surface damage;
    - iv. capping, used to repair long lengths of failed seams;
    - v. removing failed seam lengths and replacing with a strip of new material seamed into place (typically used with long lengths of fusion seams); and
    - vi. when sufficient overlap exists (1.5 in. or more), heat tacking the fusion seam flap and placement of an extrusion weld along the outer edge of the upper geomembrane sheet.
  - b. In addition, the following shall be satisfied:
    - i. surfaces of the geomembrane which are to be repaired shall be

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abraded no more than one hour prior to the repair;

- ii. studs in a structured geomembrane shall be grinded to establish an area to perform the repair;
- iii. all surfaces must be clean and dry at the time of repair;
- iv. all seaming equipment used in repair procedures must be approved;
- v. the repair procedures, materials, and techniques shall be approved in advance, for the specific repair, by the CQA Consultant and Contractor;
- vi. patches or caps shall extend at least 6 in. beyond the edge of the defect, and all corners of patches shall be rounded with a radius of at least 3 in.; and

vii. the geomembrane below large caps shall be appropriately cut to avoid water or gas collection between the two sheets.

- 5. Repair Verification:
  - a. Each repair shall be numbered and logged and shall be nondestructively tested, as appropriate. Repairs which pass the nondestructive test shall be taken as an indication of an adequate repair. Failed tests will require the repair to be redone and retested until a passing test results. At the discretion of the CQA Consultant, destructive testing may be required on large caps.

### 3.05 MATERIALS IN CONTACT WITH THE LINER

- A. The Contractor shall take all necessary precautions to ensure that the geomembrane is not damaged during its installation or during the installation of other components of the liner system or by other construction activities. Installation on rough surfaces, such as concrete, shall be performed carefully. If approved by the Engineer, additional loosely placed geotextile sections may be used by the Contractor to protect the geomembrane.
- B. Granular materials shall not be placed on the geomembranes at ambient temperatures below 40°F or above 104°F, unless otherwise specified. A

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geotextile or other cushion approved by the Engineer shall be installed between angular aggregate and the geomembrane.

C. Equipment shall not be driven directly on the geomembrane. Unless otherwise specified by the CQA Consultant, all equipment operating on materials overlying the geomembrane shall comply with the following:

Maximum Allowable	Thickness of Overlying
Equipment Ground Pressure (psi)	Compacted Fill (in.)
<5	12
<10	18
<20	24
>20	36

D. In heavily trafficked areas such as access ramps, and in areas trafficked by rubber tire vehicles, the thickness of overlying compacted fill should be at least 3 ft.

### E. Appurtenances:

- 1. Installation of the geomembrane in sump areas, and connection of the geomembrane to appurtenances shall be made according to the specifications. Extreme care shall be taken while seaming around sumps and appurtenances since neither nondestructive nor destructive testing may be feasible in these areas. The Contractor shall ensure that the geomembrane has not been visibly damaged while making connections to sumps and appurtenances.
- 2. All clamps, slips, bolts, nuts, or other fasteners used to secure the geomembrane to each appurtenance shall be at least as durable as the geomembrane.

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- A. The Contractor shall retain all ownership and responsibility for the geomembrane until accepted by the Owner's Representative.
- B. The geomembrane shall be accepted by the Owner's Representative when:
  - 1. the installation is finished;
  - 2. all documentation of installation is completed including the CQA Consultant's final report;
  - 3. verification of the adequacy of all field seams and repairs, including associated testing, is complete; and
  - 4. written certification documents, including record drawings, sealed by a Professional Engineer currently registered in the State in which the project is located, have been received by the Owner.

### **3.07 PRODUCT PROTECTION**

- A. The Contractor shall use all means necessary to protect all prior work and all materials and completed work of other Sections.
- B. In the event of damage, the Contractor shall make all repairs and replacements necessary, to the approval of the Owner's Representative and at no additional cost to the Owner.

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### **SECTION 02771:** POLYETHYLENE GEOMEMBRANE

### **TABLE 02771-1** LINING SYSTEM TEXTURED HDPE GEOMEMBRANE PROPERTIES

PROPERTIES	QUALIFIERS	UNITS	SPECIFIED VALUES (1)	TEST METHOD
Physical Properties				
Thickness	minimum average	mils	60	ASTM D 5994
	lowest individual value	mils	54	ASTM D 5994
Density	minimum	g/cm <sup>3</sup>	0.94	ASTM D 1505
Mechanical Properties				
Tensile Properties (each	direction)			
Tensile Strength (yield)	minimum	lb/in.	132	ASTM D 6693 Type IV
Tensile Strength (break)	minimum	lb/in.	132	ASTM D 6693 Type IV
Elongation (yield)	minimum	%	13	ASTM D 6693 Type IV
Elongation (break)	minimum	%	350	ASTM D 6693 Type IV
Tear Resistance	minimum	lb	45	ASTM D 1004
Puncture Resistance	minimum	lb	120	ASTM D4833
		(Continued or	n next page)	

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### **SECTION 02771:** POLYETHYLENE GEOMEMBRANE

### TABLE 02771-1 (Continued) LINING SYSTEM TEXTURED HDPE GEOMEMBRANE PROPERTIES

PROPERTIES	QUALIFIERS	UNITS	SPECIFIED VALUES (1)	TEST METHOD
Environmental Proper	ties			
Carbon Black Content	range	%	2.0 - 3.0	ASTM D 4218
Carbon Black Dispersic	on N/A	none	Cat. 1&2 (9 of 10) Cat. 3 (1 of 10)	ASTM D 5596
Environmental Stress Crack	minimum	hrs.	200	ASTM D 5397

NOTE:

1. All values represent minimum average roll values (i.e., any roll in a lot should meet or exceed the values in this table).

2. Any variation to these specifications must be at Engineer's approval.

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# TABLE 02771-2 LINING SYSTEM HDPE GEOMEMBRANE SEAM PROPERTIES

PROPERTIES	QUALIFIERS	SLINU	SPEC VAJ FUSION	CIFIED LUES EXTRUSION	TEST METHOD
Shear Strength	minim	ıdd	120	120	ASTM D 6392
Peel Adhesion	minim	ppi	91	78	ASTM D 6392
Peel Separation	maximum	0⁄0	25	25	
NOTE:					

If the manufacturers' certified minimum or maximum values are more stringent than the specified values herein, the manufacturers' certified minimum or maximum value shall become the specified value. 

2. Any variation to these specifications must be at Engineer's approval.

## [END OF SECTION]

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### **SECTION 02772**

### **GEOSYNTHETIC CLAY LINER**

### PART 1 GENERAL

### **1.01 DESCRIPTION OF WORK**

- A. The Contractor shall furnish all labor, materials, tools, supervision, transportation, and equipment necessary for installation of the geosynthetic clay liner, as specified herein, as shown on the Drawings, and in accordance with the Construction Quality Assurance (CQA) Plan.
- B. The Contractor shall be prepared to install the geosynthetic clay liner in conjunction with other components of the liner system.
- C. Sufficient geosynthetic clay liner shall be provided to cover all areas indicated on the drawings, including overlaps, and repairs.

### **1.02 RELATED SECTIONS**

- A. Section 02200 Earthwork
- B. Section 02771 Polyethylene Geomembrane

### **1.03 REFERENCES**

- A. CQA Plan.
- B. Latest version of American Society for Testing and Materials (ASTM) standards:

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1. ASTM D 5887. Measurement of Index Flux Through Saturated Geosynthetic Clay Liner Specimens Using a Flexible Wall Permeameter.

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### SECTION 02772: GEOSYNTHETIC CLAY LINER

### 1.04 QUALIFICATIONS

- A. The Contractor shall be experienced in the installation of geosynthetic clay liners.
- B. In the event the Contractor uses Subcontractors, the same party shall install the polyethylene geomembrane and the geosynthetic clay liner.

### 1.05 SUBMITTALS

- A. Prior to shipment of the geosynthetic clay liner, the Contractor shall provide the Owner's Representative and CQA Consultant with a certificate signed by an authorized representative of the Manufacturer stating that the product supplied meets the properties specified in Part 2 of this Section. The certificate shall include:
  - 1. roll numbers, lot or batch numbers, and product identification, and
  - 2. results of quality control tests, including a description of test methods used.
- B. Uncertified material shall not be used.

### 1.06 CONSTRUCTION QUALITY ASSURANCE

- A. The installation of the geosynthetic clay liner shall be monitored as outlined for bentonite geocomposite in the CQA Plan.
- B. The Contractor shall be aware of the activities in the CQA Plan and shall account for these CQA activities in the installation schedule.

### **PART 2PRODUCTS**

### 2.01 **PROPERTIES**

A. The manufacturer shall supply geosynthetic clay liners having properties that have the following properties:

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### SECTION 02772: GEOSYNTHETIC CLAY LINER

- 1. The hydraulic conductivity of the geosynthetic clay liner shall be no greater than 1 x  $10^{-7}$  cm/s, when measured in a flexible wall permeameter in accordance with the standard procedure included in ASTM D 5887. Hydration and consolidation of the specimen shall occur for a minimum of 48 hours, using a 5 psi pressure difference between the cell pressure and the back pressure, before commencement of the test. The test shall be conducted under a 2 psi pressure differential. The test shall continue until steady state condition is reached or a minimum of two pore volumes of permeant fluid has passed through the specimen.
- 2. The bentonite used to fabricate the mat shall have the following properties:
  - a. the bentonite shall be a minimum 90 percent sodium montmorillonite.
  - b. the bentonite at zero percent moisture content shall be applied to the geotextile at the rate of 0.83 lb per sq ft (minimum).
- 3. The bentonite shall be encapsulated between two nonwoven geotextiles, and needlepunched to produce a reinforced GCL.
- 4. The interface shear strength of the geosynthetic clay liner at the interface of the upper and lower geotextiles with the materials in contact with the geotextiles for long-term stability of slopes shall be approved by the Engineer by performing laboratory tests and slope stability analysis.
- 5. The internal shear strength of the geosynthetic clay liner for long-term stability of slopes shall be approved by the Engineer by performing laboratory tests and slope stability analysis.

### 2.02 PACKING AND LABELING

- A. Geosynthetic clay liners shall be supplied in rolls wrapped in relatively impermeable and opaque protective covers and marked or tagged with the following information:
  - 1. manufacturer's name;
  - 2. product identification;
  - 3. lot or batch number;
  - 4. roll number; and
  - 5. roll dimensions.

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### 02772-3

### SECTION 02772: GEOSYNTHETIC CLAY LINER

### 2.03 TRANSPORTATION

A. The party responsible for the transport of the material shall be liable for all damages to the materials incurred during transportation of the material to the site.

### 2.04 MANUFACTURING QUALITY CONTROL

- A. The geosynthetic clay liner shall be subject to quality control and conformance testing to assure that the materials provided meet the minimum performance requirements.
  - 1. Quality Control Tests
    - a. All materials shall be tested in accordance with the Manufacturer's quality control program. This testing shall be performed by the Manufacturer. Samples not satisfying the specifications shall result in the rejection of the roll from which sample was collected. In the event of rejection of a roll, the rolls manufactured before and after the rejected roll shall be sampled and tested. This procedure will continue until all substandard rolls are identified. Substandard rolls shall not be used.
    - b. The Manufacturer shall certify the quality of the rolls.
    - c. The quality control certificate shall include:
      - i. Roll numbers, lot or batch numbers, and product identification; and
      - ii. Results of all quality control tests, including a description of test methods used.

### PART 3EXECUTION

### 3.01 FAMILIARIZATION

A. Prior to implementing any of the work described in this Section, the Contractor shall become thoroughly familiar with all portions of the work falling within this Section including the CQA Plan.

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### 02772-4

### SECTION 02772: GEOSYNTHETIC CLAY LINER

- B. Inspection:
  - 1. Prior to implementing any of the work in this Section, the Contractor shall carefully inspect the installed work of all other Sections and verify that all work is complete to the point where the installation of this section may properly commence without adverse impact.
  - 2. If the Contractor has any concerns regarding the installed work of other Sections, the Contractor should immediately notify the Owner's Representative in writing within 48 hours of his site inspection. Failure to inform the Owner's Representative in writing or the installation of the geosynthetic clay liner panels will be construed as Contractor's acceptance of the related work of all other Sections.

### 3.02 CONFORMANCE TESTING

- A. Upon delivery to the site or at the location of the Manufacturer, samples of the geosynthetic clay liner shall be collected by the CQA Consultant or CQA laboratory representative for testing to ensure conformance to these Specifications.
- B. Sample locations shall be selected by the CQA Consultant in accordance with this Section and the procedures outlined in the CQA Plan.
- C. Samples shall be taken at the rate of one sample per 100,000 ft<sup>2</sup> and a minimum of one sample per lot. Rolls from previous construction activities shall be retested, unless quality control documentation from the manufacturer and acceptable conformance test results are available. Rolls prom previous construction activities will be used only if the rolls are in acceptable condition and the CQA Consultant approves the use.
- D. The CQA Consultant may increase the frequency of sampling as outlined in the CQA Plan in the event that test results do not comply with Part 2 of this Section. The party responsible for furnishing the material shall be bear the cost of

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### SECTION 02772: GEOSYNTHETIC CLAY LINER

additional testing.

### **3.03 STORAGE AND PROTECTION**

- A. Handling, storage, and care of the geosynthetic clay liner following delivery to the site and prior to and following installation is the responsibility of the Contractor, until final acceptance of the liner system by the Owner.
- B. The geosynthetic clay liner shall be protected from moisture, excessive heat or cold, puncture, or other damaging or deleterious conditions. The geosynthetic clay liner shall be stored off the ground, out of direct sunlight, and protected from precipitation. Any additional storage procedures required by the manufacturer shall be the Contractor's responsibility.

### 3.04 HANDLING AND PLACEMENT

- A. The Contractor shall handle all geosynthetic clay liners in such a manner as to ensure they are not damaged in any way.
- B. In the presence of wind, all geosynthetic clay liners shall be sufficiently weighted with sandbags or the equivalent. Such sandbags shall be installed during placement and shall remain until replaced with cover material.
- C. Geosynthetic clay liners shall be cut using a utility blade in a manner recommended by the Manufacturer. Care should be taken to prevent damage to any underlying liner system components during cutting.
- D. During placement, care shall be taken not to entrap stones, or moisture under the geosynthetic clay liner. Care shall be taken not to walk on or drag equipment across the exposed geosynthetic clay liner.
- E. Any geosynthetic clay liner damaged by stones or other foreign objects, or installation activities shall be replaced at no additional cost to the Owner.

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### SECTION 02772: GEOSYNTHETIC CLAY LINER

- F. If white colored geotextile is used to encapsulate the bentonite, precautions shall be taken against "snowblindness" of personnel.
- G. The geosynthetic clay liner shall not be installed on a saturated subgrade or in standing water. Installation of geosynthetic clay liner in a moist condition shall be at the approval of the Engineer.
- H. The geosynthetic clay liner shall not be installed during precipitation or other conditions that may cause hydration of the geosynthetic clay liner.
- I. The geosynthetic clay liner shall be installed as indicated by the Manufacturer or by the design.
- J. Geomembrane installation shall immediately follow the geosynthetic clay liner installation. All geosynthetic clay liner that is placed during a day's work shall be covered with geomembrane before the Contractor leaves the site at the end of the day.
- K. Geomembrane shall not be placed on a geosynthetic clay liner which is hydrated.
- L. All geomembrane seams shall be welded after each geomembrane panel is placed. Heat sealing of the seam alone is not acceptable unless approved by the Owner's Representative and CQA Consultant.
- M. All geomembrane defects and destructive sample locations shall be immediately repaired.
- N. Protective cover overlying the liner system shall immediately follow the installation of the geomembrane and other geosynthetics. The geosynthetic clay liner shall be removed and replaced if it becomes hydrated before the protective cover is placed.
- O. All hydrated geosynthetic clay liner shall be removed and replaced with new

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### SECTION 02772: GEOSYNTHETIC CLAY LINER

material by the Contractor at no additional cost to the Owner.

### 3.05 OVERLAPS

- A. All geosynthetic clay liners shall be overlapped. Along the length of the mat, the overlap shall be a minimum of 6 inches. Along the width of the mat, the overlap shall be a minimum of 12 inches.
- B. The overlaps shall not be nailed or stapled to the underlying materials.

### 3.06 MATERIALS IN CONTACT WITH THE GEOSYNTHETIC CLAY LINER

- A. The Contractor shall place all materials above the geosynthetic clay liner in such a manner as to ensure that the geosynthetic clay liner is not damaged.
- B. Only equipment approved by the Engineer may be driven directly on the geosynthetic clay liner for installation of other materials above the geosynthetic clay liner. A minimum thickness of 1 ft of soil is required between a low ground-pressure dozer and the geosynthetic clay liner. A minimum thickness of 2 ft of soil is required between rubber-tired vehicles and the geosynthetic clay liner. In areas of heavy vehicle traffic, such as access ramps, the soil thickness should be at least 3 ft. In any case, the following shall be complied with:

Thickness of Overlying Soil
(in.)
12
18
24
36

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### SECTION 02772: GEOSYNTHETIC CLAY LINER

C. Installation of the geosynthetic clay liner in appurtenant areas, and connections to appurtenances shall be made according to the Drawings. The Contractor shall ensure that the geosynthetic clay liner is not damaged while working around the appurtenances.

### 3.07 REPAIR

- A. Any holes or tears in the geosynthetic clay liner shall be repaired by placing a geosynthetic clay liner patch over the hole; the patch shall overlap the edges of the hole or tear by at least 1 ft in all directions.
- B. Care shall be taken to remove any soil or other material which may have penetrated the torn geosynthetic clay liner.
- C. All repairs shall be made at no additional cost to the Owner.
- D. Patches shall not be nailed or stapled.

### **3.08 PRODUCT PROTECTION**

- A. The Contractor shall use all means necessary to protect all prior work, and all materials and completed work of other Sections.
- B. In the event of damage, the Contractor shall immediately make all repairs and replacements necessary to the approval of the Owner's Representative and at no additional cost to the Owner.

### [END OF SECTION]

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Prepared for:

**Glades Landfill, LLC** 

1985 E. State Road 78 NW Moore Haven, Florida 33471



### **ADDENDUM TO OPERATION PLAN**

### LEACHATE MANAGEMENT

### FOR THE GLADES LANDFILL, LLC GLADES COUNTY, FLORIDA

Prepared By:



GLOBEX Engineering & Development 6115 Lyons Road Coconut Creek, Florida 33073 (954) 571-9200

Project No. 1895 November 20**RECEIVED - D.E.P.** Revised December 2006 DEC **2 2** 2006

**SOUTH DISTRICT** 

Brenda am Smith Clath 21 December 2006

### Operation Plan Addendum Glades Landfill, LLC

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### ATTACHMENTS

Attachment A: Typical Pump Specification Attachment B: Submersible Level Sensors

### 1895/F060356

### 1. INTRODUCTION

This addendum to the Operation Plan provides a description of the management of the leachate collection system at the Glades Landfill. The Glades Landfill is a construction and demolition (C&D) debris waste disposal facility. The rules for C&D debris disposal and recycling are addressed under Rule 62-701.730 of the Florida Administrative Code (FAC). In accordance with Rule 62-701.730(4)(a) of the FAC, the Florida Department of Environmental Protection has required a liner and leachate collection system. The leachate collection system at the Glades Landfill will be operated in accordance with the requirements of Rule 62-701.500(8) of the FAC.

### 2. OPERATION PLAN

The Operation Plan for the GLADES LANDFILL, LLC was prepared by SCS Engineers of Tampa, Florida, dated January 2005, and was approved by the Florida Department of Environmental Protection (FDEP) on 5 January 2006 (Operation Plan). This Addendum to the Operation Plan provides written, detailed instructions for the daily operation of the leachate collection system (Operation Plan Addendum). In accordance with the requirements of 62-701.500(2) of the FAC, this Operation Plan Addendum shall be kept at or near the landfill facility and shall be accessible to the landfill operator. This Operation Plan Addendum shall be substantially complied with at all times, and will be revised if the operations of the leachate collection system change.

### 3. LEACHATE MANAGEMENT

### 3.1 Leachate Monitoring

The landfill operator is responsible for monitoring the leachate level in the waste disposal area. The monitoring data will be made available to FDEP upon request.

The landfill operator will also sample and analyze the landfill leachate. The leachate sample shall be collected annually in March and analyzed for the parameters listed in Rule 62-701.510(8)(c) of the FAC. The sample shall be collected from a location in the leachate force main, prior to discharge to the leachate storage ponds. The results of the analysis shall be reported in accordance with Rule 62-701.510(9)(a) of the FAC, within thirty days of receipt of the completed data from the laboratory.

### 3.2 **Operation and Maintenance**

In accordance with the requirement of Rule 62-701.500(8)(b) of the FAC, the landfill operator is responsible for the operation of the leachate collection and removal system

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and for maintaining the system as designed for the design period. Prior to operation, the sump, cleanout pipes, leachate collection pumps and control panel will be inspected for proper operation. The leachate collection system, including the pumps and controls will be inspected on a weekly basis during operation to assure proper operation of the system. The landfill operator will monitor information from the control panel on the leachate head on top of the liner and volume of leachate removed from the active disposal area on a daily basis to confirm proper operation of the system. Pumps located in active areas, or areas without final cover, will be inspected on a monthly basis to confirm normal operation. Additional inspection, preventative maintenance, and checking of the electrical components are performed in a manner and frequency in accordance with manufacturer's recommendations.

The leachate shall be collected as necessary so that water quality standards and criteria are not violated. If the leachate is classified as a hazardous waste, it shall be managed in accordance with Chapter 62-730 of the FAC.

### 3.2.1 Leachate Collection System

Each C&D debris waste disposal cell area includes a lining system. The lining system includes a leachate collection system (LCS), which provides for the effective collection of leachate accumulating on the geomembrane liner. The purpose of the LCS, in combination with the geomembrane liner, is to collect and convey leachate to the sumps.

The LCS for the waste disposal area consists of:

- LCS geocomposite drainage layer covering the entire cell area; and
- LCS pipe including an 8-in. nominal diameter perforated high density polyethylene (HDPE) pipe embedded in pipe bedding material (gravel, FDOT No. 57 aggregate).

The LCS is overlain by a 2-ft thick protective cover layer consisting of granular material. In accordance with Rule 62-701.400(3)(d)3, FAC, the upper foot of the protective cover layer may consist of tire chips.

The C&D waste disposal area is graded such that leachate is conveyed to a swale area. From the swale area, the leachate is conveyed to a sump. The leachate will be removed from the sump, via the leachate collection riser pipe, to the leachate force main. The leachate pumps will be located outside the leachate riser pipes on the landfill berm to allow for ease of pump maintenance and repair (see Attachment A for typical information on pump).

### 3.2.2 Leachate Removal and Transfer

The leachate pump is controlled by a submersible level sensors located inside the riser pipe (see Attachment B for typical information on submersible level sensor). The pumps discharge the leachate from the sumps to the leachate storage ponds via a force main. The force main is located in the landfill perimeter berms and extends from the C&D waste disposal area to the leachate storage ponds.
The force main consists of a 10-in. nominal diameter HDPE pipe with an SDR of 17. The leachate force main has been sized to handle the flow from the pumps and future cells.

### 3.2.3 Leachate Disposal

Leachate from the landfill will be transferred to one of two leachate storage ponds located north of Phase I. The design of the leachate storage ponds is presented in Sheet 7 of the Engineering Drawings. The leachate storage ponds, which will store more than 80,000 gallons of leachate, have been designed in accordance with the requirements of Rule 62-701.400(4) of the Florida Administrative Code (FAC).

The leachate storage ponds are equipped with pumps for the removal of the leachate through the truck loading pad, as shown in Sheet 8 of the Engineering Drawings. The leachate will be removed from the site via a tanker truck. A leachate pump is located just beyond the leachate storage ponds for the removal of leachate to the tanker truck. Approximately one tanker truck (6,000 gallons) of leachate shall be removed from the site on a daily basis. This rate will vary depending on rainfall and evaporation.

The pump for the removal of leachate from the storage pond will have an approximate capacity of 400 gallons per minute (gpm). This pump capacity will provide adequate capacity to pump the leachate from the storage pond.

The leachate will be removed from the site by Cliff Berry Incorporated for disposal at a permitted waste water treatment facility.

#### 3.2.4 LCS Maintenance

The LCS includes leachate collection pipes and cleanout pipes. The collection pipes will be cleaned and maintained, as necessary, through the side slope cleanout risers. The LCS collection pipe cleanout risers can be accessed at the top of the perimeter berms.

The LCS pipes may be cleaned by flushing. Flushing is accomplished by inserting a selfpropelled nozzle attached to the end of a hose into the cleanout riser and the LCS pipe. The nozzle is used to flush the pipes with pressurized water. The existing pipe cleaning systems in the market may clean pipes to approximately 1,600 ft length. Therefore, cleaning of the proposed LCS pipes is achievable.

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Operation Plan Addendum Glades Landfill, LLC

# 3.2.5 Collection System Cleaning/Inspection

In accordance with the requirements of Rule 62-701.500(8)(h) of the FAC, new leachate collection system shall be water pressure cleaned or inspected by video recording after construction but prior to initial placement of wastes. Existing leachate collection systems shall be water pressure cleaned or inspected by video recording at the time of permit renewal. Results of the collection system cleanings or inspections shall be available to FDEP upon request.

#### 3.3 Leachate Discharge – Off-Site

In accordance with the requirements of Rule 62-701.500(8)(c) of the FAC, leachate collected from the Glades Landfill will be discharged to an off-site treatment plant. The leachate will be removed from the site and discharged by Cliff Berry, Inc., an environmental firm with over 30 years of experience in the collection and disposal of liquid wastes.

Glades Landfill will provide FDEP with notification should the method for leachate removal and disposal be changed.

#### 3.4 Leachate Treatment – On-Site

In accordance with the requirements of Rule 62-701.500(8)(d) of the FAC, Glades Landfill is not currently proposing to treat leachate on-site. Glades Landfill will provide FDEP with notification and a request for permit modification should on-site leachate treatment and/or recirculation be proposed.

#### 3.5 Contingency Plan

In accordance with the requirements of Rule 62-701.500(8)(e) of the FAC, a description of the methods for handling leachate collection, removal, and treatment problems such as interruptions of discharges to a treatment plant is presented in the following subsections.

#### **3.5.1** Interruption of Power

In the event that the main power service to the landfill is interrupted for more than 24 hours, the leachate collection and leachate removal systems will be drained into tanker

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Operation Plan Addendum Glades Landfill, LLC

trucks, equipped with pumps, and hauled to the waste water treatment plant for disposal. Alternatively, portable generators may be used as an alternative power supply.

## **3.5.2** Interruption of Discharge

In the event of an interruption of discharge to the treatment plant, the leachate removal pumps in the waste disposal area will be shut off to stop flow of leachate to the leachate storage ponds. The operator will assess the situation to determine the duration of the interruption. The information will be reported to FDEP. The waste disposal area has a tremendously large storage capacity of leachate above the liner before leachate reaches the perimeter berm top elevation. Any interruption at the wastewater treatment plant is expected to end before storage capacity above the liner is completely used up. The leachate ponds would also be used for the removal and/or storage of leachate.

# 4. LEACHATE RECORDING

#### 4.1 Leachate Quantities

In accordance with the requirements of Rule 62-701.500(8)(f) of the FAC, the quantities of leachate collected by the leachate collection and removal system will be recorded in gallons per day before transport off-site. This quantity will be included in the operating record.

### 4.2 <u>Recording Rain Gauge</u>

In accordance with the requirements of Rule 62-701.500(8)(g) of the FAC, a recording rain gauge shall be installed, operated, and maintained to record precipitation at the landfill. The precipitation records shall be included in the operating record. The precipitation records shall be recorded and maintained by the permittee to compare with leachate generation rates.

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# ATTACHMENT A

# TYPICAL PUMP INFORMATION

# **SLIGO SYSTEMS**

# **SERIES 5 PUMPS**

#### **FEATURES**

- Enclosed, high chrome iron impellers, with replaceable / adjustable high chrome iron Wear rings increases wear resistance when pumpage contains abrasive particles.
- 2. Double inside mechanical seals with silicon carbide faces, running in an oil filled chamber and further protected by a lip seal running against a replaceable, 403 stainless steel shaft sleeve, provides for the most durable seal design available.
- 3. Highly efficient, continuous duty air filled, copper wound motor with class B or F insulation, minimizes the cost of operation.

- Double shielded, permanently lubricated, high temperature C3 ball bearings rated for a B-10 life of 60,000 hours, extend operational life.
- Top discharge, flow-thru design enables operation at low water levels for extended periods.

## APPLICATIONS

- 1. Residential, commercial, industrial wastewater and construction site drainage.
- 2. Effluent transfer.
- 3. Decorative waterfalls and fountains.
- 4. Raw water supply from rivers or lakes.
- 5. Leachate Pump



**TECHNICAL** 

B SPECIFICATIONS	STANDARD	B OPTIONS
Discharge Size	2" ~ 4" Not (50 ~ 100 mm)	
Horsepower Range	7.5 Hp. ~ 40 Hp. (5.5 ~ 30 kW)	
Performance Range Capacity	30 ~ 364 Gpm. (.11 ~ 1.37 m <sup>3</sup> /min)	
Head	70 Ft. ~ 400 Ft. (21. ~ 122 m)	
Maximum water temperature	104 °F. (40 °C.)	
Materials of Construction		
Casing	Cast Iron	
Impeller	High Chrome Iron Casting	
Shaft	420 Stainless Steel	
Motor Frame	Cast Iron	
Fasteners	304 Stainless Steel	
Mechanical Seal	With seal pressure relief ports	
Upper Seal	Silicon Carbide/Carbon	
Lower Seal	Silicon Carbide/Silicon Carbide	
Elastomers	NBR (Nitrile Rubber)	
Impeller Type	Enclosed, two-stages	
Solids Handling Capability	Double stages	
	1/3" (8.5 mm), 1/4" (6 mm, 7.5 HP)	
Bearings	Prelubricated, Double Shielded	
Motor Nomenciature		
Type, Speed, Hz	Air Filled, 3600 Rpm, 60 Hz.	
Voltage, Phase	208/230/460/575 V., 3 Phase	
Insulation	Class B, F (40 Hp.)	
Accessories	Submersible Power Cable 50' (15 m)	Length as Required
Opprotional Made	Manual	
	Manual	



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# ATTACHMENT B

# SUBMERSIBLE LEVEL SENSORS

# ABOVE GRADE LEVEL SENSOR (AGLS)

A SIMPLIFIED MAINTENANCE ALTERNATIVE TO SUBMERSIBLE LEVEL SENSORS





# DESCRIPTION

The Sligo Systems Above Grade Level Sensor (AGLS) is a highly accurate and reliable means of measuring remote sump liquid levels. The only components that go into the sump or riser are the solid HDPE flow tube and atmospheric vent tube.

A variable speed pneumatic pump is used to pressurize the flow tube, producing a small stream of bubbles at bottom of the sump or inlet of of the pump. By measuring the pressure in the flow tube and the pressure of the sump atmosphere, the fluid level in the sump can be accurately calculated.

All electronics and sensor elements are contained in an above grade NEMA 4X enclosure and away from the hazardous sump atmosphere. This configuration provides easy access for maintenance and troubleshooting. No more pulling pumps to resolve level sensor issues.

# FEATURES

- All components easily accessible in above grade NEMA4X enclosure
- Automatic and manual flow tube purge
- Variable speed pnuematic pump automatically maintains constant bubble rate regardless of sump liquid level
- Differential pressure measurment method automatically corrects for gas vacuum extraction
- Automatic flow tube leak detection with a larm
- No electronics in hazardous environment eliminates need for intrinsically safe barriers
- o Real-time LCD sump level display
- O Single, double and triple configurations available
- Multiple output options: 4-20 mA, 0-5 VDC, RS-485, Ethernet
- Available setpoint control with output relays

# SPECIFICATIONS

Power:	100-240VAC, 1.5A
Range:	0-138"WCTypical
Accuracy:	0.1"
Sense Tubes:	0.25" HDPE Up To 500' Length
Connectors:	0.25" Push Fit
Temperature:	0 - 140 degF
Humidity:	0-95%NonCondensing



123 North Orchard Street – Suite 1B Ormond Beach, FL 32174 386-615-8780 386-673-2293 fax www.sligosystems.com

# APPENDIX E

CLIFF BERRY, INC. TRANSPORTATION AND DISPOSAL LICENSING INFORMATION WASTEWATER DISPOSAL AGREEMENT

> RECEIVED - D.E.P. DEC 2 2 2006 SOUTH DISTRICT

# **CBI Miami Wastewater Pretreatment Facility**

The Cliff Berry, Inc. (CBI) Miami Wastewater Pretreatment (Miami Terminal) is South Florida's largest commercial wastewater treatment plant. CBI provides the most comprehensive wastewater treatment services to the cruise industry, utilities and major oil companies. The plant has a capacity to process in excess of 288,000 gallons of oily wastewater per day. The facility is permitted by DERM to discharge  $\geq$ 6.3 million gallons per month of treated water to the public operated treatment works (POTW).

The treated waste is batch tested for compliance with maim-Dade Department of Environmental Resources Management (DERM) and the Environmental Protection Agency (EPA) regulated pollutant standards prior to discharge to Miami-Dade Water and Sewer Department (POTW).

Our in house "State of the Art" laboratory is centered around a Perkin Elmer Gas Chromatograph. The laboratory is supervised by a degreed chemist with more than fifteen years of experience in wastewater treatment, processing and disposal. Upon completion of treatment and discharge of the wastewater, a "Certificate of Disposal" is available to each client to certify compliance with local, state and federal regulatory agencies.

The CBI Miami Facility is efficient, clean and utilized oil/water separation, aeration and clarification techniques. This technology allows CBI to treat wastewater from a variety of industrial clients.



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P.Ø3

# **GENERAL FACILITY INFORMATION**

Facility Name:

Address:

Telephone: Fax: Web:

Site Management:

Facility Size:

Facility Capacity:

**Property Size:** 

Hours of Operation:

Number of Employees:

EPA Identification No.:

Federal ID No.:

Standard Industrial Classification (SIC) Code:

Corporation Status:

Property Ownership:

Cliff Berry, Inc. - Miami Terminal

3033 NW North River Drive Miami, Florida 33142

305-638-2030 305-638-0610 cliffberryinc.com

Cliff Berry, II – President Phillip Pierre-Louis, Facility Manager

~ 17,300 s.f. warehouse space ~ 6,700 s.f. office space

1.3 million gallons, 10 day T/A

~ 3.39 acres

6am - 11 pm; 24/7

15

FLD 058560699

65-0511114

1799 - Construction - Special Trade

Cliff Berry, Inc. is a privately held Florida Corporation

Facility is owned and operated by Cliff Berry, Inc. (CBI) PO Box 13079 851 Eller Drive Fort Lauderdale, FL 33316

			Evnication Data
Ttie	(asuing Agency		incomorated 1971
Centificate of Incorporation	Florida Dept. of State	¥2	
Basic Order Agreement Removal and Disposing of OIL and/or HAZARDOUS substance spilt within the	United States Coast Guard U.S. Department of Transportation	BOA No. DTCG84-91-A-70012	A/A
7thCoast Guard District Hazardous Matenals Certilicate of Registration	NS DOT	060904 \$53 003MO	06/30/2007
Use Weste Transportar	FDEP - Cert of Approval	ID No. FLD 000 831 156	12/31/2006
Dischame Cleanin Omanization	FLDEP	DCO	06/30/2007
BioMedical Wasie Transporter Annual Operating Permit	Florida Department of Health	06-64-03953	60/2008
Hazardous Material Management Facility	Broward, OPEP	HTS-00083-01	04/22/2007
License Hazardous Waste Transporter-Ft.Lauderdale	DEP	FLR-000083071	12/31/2006
Weete Transporter License, Sludge, grease trap, ship sewage, Disposal Haz material, Used Oit, RCRA, Photochemical, NonHaz Solids/liquids, Contaminated Solis	Broward, DPEP	WT-05-0002	02/28/2007
Uquid Waste Transporter	DERM	LW-000104-2005-2008 WO-WO	03/31/2007
Liquid Waste Transporter	DEAM	LW-000391-2005-2006 HW/HW	03/12/002
Liquid Waste Transporter	DERM	LW-00382-2005-2006 RF	03/31/2007
Liquid Waste Transporter	DERM	LW-000642-2005-2005 BW/BW	08/31/2007
Liquid Waste Transporter	DEAM	LW-000455-2005-2008 ST	03/31/2007
Storage Tank Registration-Dania	FOEP	Placcard #252799 Fac. ID 9808092	06/30/2007
Used Oil Transporter, Transfer Facility, Filter Transporter, Transfer Facility, Processor, Miarri	FDEP	FLD058560699	08/30/2007

CBI Transportation & Disposal, Waste Hauling Licenses

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		Document Number	Expiration Date
Title	Issuing Agency		DR/POD7
Storage Tank Registration - Miami	FDEP	Placard # 252/95 Fac. 10 5030132 Certificate of Finanacial Responsibility	0000000
Industrial Waste Pretreatment	DERM	IW P-000108-2005/2008	05/31/2007
Annual Operating Permit - Miami Private Sanitary Sawer	DERM	PSO-000513-2005-2006 PVT - 2	09/30/2006
Annual Operating Fernike Finance Used Oil Transporter, Transfer Facility, Filter Transporter, Filter Transfer Facility - Fort Pierce	дШ	Registration FLR 000 009 266	06/30/2007
Used Oil Transporter, Transfer Facility, Filter Transporter, Filter Transfer Facility -	FOEP	FLR000119784	08/30/2007
Jacksonville Used Oil Transforter, Transfer Facility, Filter Transporter, Filter Transfer Facility - Cocoa	d L L L	FLR000119792	06/30/2007
Used Oil Transporter, Transfer Facility, Filter Transporter, Filter Transfer Facility-Dania	EDE	Registration FLR 000083071	06/30/2007
Storage Tank Registration - Fort Pierce	FDEP - Tanks	Placard # 252797 Fac. ID 9600156 Certilicate of Financial Responsibility	06/30/2007
Storage Tank Registration - Fort Pierce	FDEP – Tanks	Placard # 252795 Fac. ID 8516137 Certificate of Financial Responsibility	08/30/2001
Used Oil Processing Facility-Tampa	FDEP	Registration FLR 000 013 888	04/12/2009
Used Oil Transporter, Transfer Facility, Filter	FDEP	Registration FLR 000 013 888	06/30/2007
Transporter, Filler Iransfer Faculty - 1 ampä. Waste Hauler Discharge Permit	BCCWWS	Permit No. 1117-04	00/30/2008
Storage Tank Registration - Tampa	FDEP - Tanks	Placard # 252798 Fac. ID 9802425 Certificate of Financial Responsibility	06/30/2007
Used Oil and Material Processing Facility, Miami	DEP	FLD 058560699, Permit No. 77628-HO-003	02/12/2008
Hazardous Waste Transporter-Miami	DEP	FLD 058560639	12/31/2008

CBI Transportation & Disposal, Waste Hauling Licenses

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TOTAL P.05

# Cliff Berry Inc.

# WASTEWATER DISPOSAL AGREEMENT

This agreement, made this <u>18</u> day of <u>December</u>, 20<u>06</u>, is between Cliff Berry, Inc., a Florida corporation, also known herein as "CBI", located at 851 Eller Drive Port Everglades, FL 33316 and <u>Calades Landfill</u>, <u>LLC</u>, herein known as "Customer".

# 1.0 DESCRIPTION OF WORK

CBI agrees to provide Customer with treatment and disposal for non-hazardous wastewater and non-hazardous oily wastewater. Cliff Berry Inc. represents that it will perform such services in full compliance with all applicable local, state, and federal laws, ordinances, and regulations. Customer's wastewaters may be delivered to CBI's Treatment Facility in Miami, FL via railcar or tank trucks of various sizes. Upon completion of the QA/QC work, CBI will off-load the contents of the tankers for processing. Upon request, a Certificate of Disposal will be provided for each load processed.

# 2.0 WASTEWATER SPECIFICATIONS

As described in attached Waste Profile Sheet. Note: Updated waste profiles will be required annually.

#### 3.0 PRICING

Customer agrees to pay CBI 4.35 per gallon for wastewaters disposed of at CBI's Miami facility. Any wastewater received by CBI that does not meet the solids parameters as described in section 2.0 Wastewater Specifications will be subject to the following surcharge schedule:

<u>% SOLIDS</u>

# SURCHARGE AMOUNT

0 - 2 >2 - 4 >4 - 6 >6 - 8	none \$0.03/gallon \$0.06/gallon \$0.10/gallon case by case
>08	

- The percent solids (EPA Method 160.3) will be determined during the offloading process as described in section 4.0 below.
- Wastewaters that do not conform to the Waste Profile Sheet referred to in section 2 above will be handled on a case-by-case basis.

<b>.</b>	The condition is	\$ 110,00	per hour	portal	to	portal.	
r ¥	This rate does not	include	fuel sure	harge 3	or	waste	briffs.

## 4.0 OFF-LOADING

Volume of all loads entering the CBI Miami Facility will be verified, sampled and tested for Profile conformance prior to off-loading. After completing this QA/QC process, the Customer's truck will be off-loaded in a timely manner. Following off-loading, CBI and the Customer's driver will verify that the tanker is empty. The driver will sign a receipt of delivery, verifying the discharged amount and cost per gallon for disposal.

# 5.0 SCHEDULING

CBI strives to minimize the time our Customers are at the Miami Facility to off-load. In support of this commitment, CBI requests our Customers provide the Miami Facility with notification of scheduled loads a minimum of two (2) hours prior to offloading. Should Customer fail to notify CBI a minimum of two (2) hours prior to offloading, CBI will not be able to assure the timeliness of the off-load cycle.

# 6.0 AVAILABILITY

The normal operating hours of the CBI Miami Facility are between 7 am and 5 pm Monday thru Friday. Separate arrangements must be made with the plant manager for scheduling loads outside these hours by calling (954) 410-9572. Should CBI find it necessary to secure the Miami Facility, for a holiday or maintenance, CBI will post this information at the facility no less than two days in advance of the facility closing.

# 7.0 INSURANCE

As per attached certificate.

# 8.0 PAYMENTS

Payment is due within 30 days of invoice date. A charge of 1 1/2% per month, 18% per annum will be added monthly to balances unpaid 30 days after date of invoice. Collection costs and/or reasonable attorney's fees will be due in the event any collection process becomes necessary.

#### 9.0 TERMS

This agreement will continue in effect for a period of one year from the date signed and thereafter until terminated by either party on at least thirty days written notice.

# 10.0 CONTRACT REPRESENTATIONS

This contract represents the entire agreement between CBI and Customer. It may be amended only by written agreement between the parties.

#### CUSTOMER

CLIFF BER	RY, INCORPORATED	AR.A
вү: ()	andy to the	
DATE:	12-18-06	

BY:		
DATE	·	

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