



Florida Department of Environmental Regulation

Northeast District • Suite 200, 7825 Baymeadows Way • Jacksonville, Florida 32256-7577 • 904-448-4300

Bob Martinez, Governor

Dale Twachtmann, Secretary

John Shearer, Assistant Secretary
Ernest Frey, Deputy Assistant Secretary

NORTHEAST DISTRICT - JACKSONVILLE

TO: Jeremy Tyler JT
FROM: Michael Eaton ME
DATE: September 20, 1990
SUBJECT: Trail Ridge Landfill, Inc.
DER #161821182

The above WRM permit application is in conjunction with MSSW permit application No. 182117 to facilitate the construction of a solid waste landfill in the vicinity of Maxville. The DER jurisdictional wetlands on the site comprise road side drainage ditches which have been excavated below groundwater level or are vegetatively connected to waters of the State. These ditches are to be filled as part of the construction of an access road to the landfill site. A number of culverts will be installed to maintain drainage at appropriate areas along the road. A total of 1.61 acres will be lost due to road construction. However, the applicant proposes the creation of 4.76 acres of hardwood swamp mitigation at a ratio of 2.8C:1D.

A significant amount of site specific information has been generated by the applicant as part of application submittal for the WRM and MSSW permits. This information accurately describes the on-site conditions and was verified by an on-site inspection conducted 7/18/90. A formal Application Appraisal Report would not add to or detract from this body of information. This submittal is attached for your review as well as the permit application drawings.

Although the areas to be filled for the road construction are primarily ditch habitat they contribute significantly to water quality by providing stormwater treatment for upland runoff. For this reason mitigation would be required for their loss. The mitigation proposed by the applicant, creation of 4.76 acres of hardwood swamp, adequately compensates for the loss of the jurisdictional ditches. This mitigation is also offered as an off-set to encroachment in USACOE and SJRWMD wetlands.

Based on the type of habitat being eliminated and the mitigation being offered, permit issuance is recommended for this project.

It is also recommended that the MSSW mitigation plan be appended as a specific condition of the permit, if issued.

ME/eml



England-Thims & Miller, Inc.

Consulting & Design Engineers
3131 St Johns Bluff Road So Jacksonville, FL 32216
904-642-8990

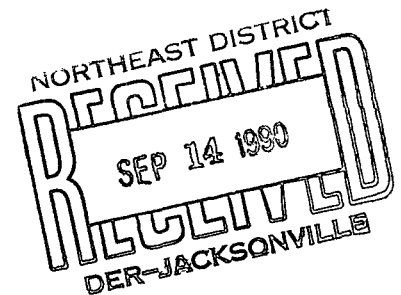
PRINCIPALS

James E England, P.E., President
Robert E Thims, VPres, Sec
Douglas C Miller, P.E., V Pres
N Hugh Mathews, P.E., V Pres
James M Robinson, P.E., V Pres

September 14, 1990

Mrs. Mary C. Nogas, P.E.
Supervisor, Solid Waste
Department of Environmental Regulation
7825 Baymeadows Way
Suite 200
Jacksonville, Florida 32256-7577

Reference: Trail Ridge Landfill Plan "A"
ET&M NO. E89-113



Dear Mrs. Nogas:

Enclosed is the proof of publication from the Florida Publishing Company for the above referenced project. The legal advertisement was in the September 8, 1990 (Saturday) issue.

If you have any questions, please call.

Sincerely,

ENGLAND, THIMS & MILLER, INC.

Douglas C. Miller, P.E.
Vice President

DCM:kl

Page 2 of 2
NORTH FLA DISTRICT
RECEIVED
SEP 26 1990
REGISTERED
DEER-JACKSONVILLE

ATTACHMENT NO. 2

RESPONSE TO

REVIEW MEMORANDUM

DATED AUGUST 22, 1990

FROM: Michael Eaton

SUBJECT: RAI Questions for Wetland Review of MSSW Application

REFERENCE: Trail Ridge Landfill - Plan "A"

QUESTION 1: Please demonstrate the effect the borrow area will have on the adjacent wetlands. Indicate pre and post conditions in relation to the seasonal high and low groundwater elevation as well as the effect on surface water drainage patterns.

RESPONSE 1: The North Borrow Area is proposed to be constructed totally in an upland area with a 50' minimum setback between the excavation and wetland boundary. The borrow area will be excavated in the "wet". No dewatering or lowering of the groundwater is proposed.

The surficial groundwater elevations vary from 1+ foot to 4+ feet below ground surface depending on the location season and climatic conditions. A berm surrounding the borrow area is designed to elevation 125.0 or 1 foot above natural ground which ever is higher. This berm serves two purposes. First to prevent the lowering of groundwater elevation due to excavation on the east side of the borrow area. Second to prevent surface runoff from entering the borrow area.

The surface water drainage patterns in the North Borrow Area are controlled primarily by two ditch systems. (See attached Drawing No. 24A marked in red). The existing ditch systems intercept surface and groundwater drainage west of the North Borrow Area and discharge east of the Borrow Area. These ditches, which are located in the adjacent jurisdictional wetlands, are the primary control mechanism for surface and groundwater flow in the wetlands. No changes are occurring in these ditch systems.

QUESTION 2: Please please demonstrate that a 50-foot minimum buffer around the borrow area and the wetlands is sufficient to not alter the groundwater or surface water drainage patterns of the adjacent wetlands.

RESPONSE 2: See response to Question No. 1.

QUESTION 3: Please provide detailed information about the stormwater pump system and its effects on the receiving wetlands. Please include frequency of pumping, volume of discharge, location of discharge pipe, erosion control, and the current environmental condition of the receiving wetland.

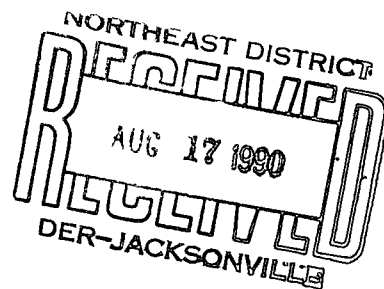
RESPONSE 3: The stormwater pump stations are designed to pump the volume from the first 1" of stormwater runoff from the upland drainage area in 72 hours or less after a rainfall event. The total volume of discharge after a design rainfall event is 7.28 AC-FT - Class I and 3.97 AC-FT - Class III.

The frequency of pumping is designed to be within 72 hours after a rainfall event. However, the pump station can be operated manually or programmed to run on any schedule.

The wetland irrigation piping is located at the upland edge of the wetland boundary as shown on Drawing No. 25. Erosion is controlled by adjusting the individual 2" value to each irrigation area such that water slowly trickles from the perforated pipe at a non-eroding velocity. Excess water is discharged at the control structure. If no wetland irrigation is desired, then all water is discharged at the outlet control structure.

At the time of initial operation and As-Built Certification of the Water Management System, a on-site inspection will be made with the applicant and Florida Department of Environmental Regulation. At that time a review of site conditions will be made including the desirability of irrigating the wetlands or discharging directly to the surficial outfall. Subsequent to the initial operation decision, an independent environmental consultant shall perform an inspection each quarter for two years and recommend the continuance or modification to the operating procedure. Upon approval from Florida Department of Environmental Regulation, those operating procedures will be implemented.

The existing wetland may be characterized as a series of shallow, depressional wetland pockets within planted pine plantation. These pockets are separated from each other and from DER wetlands to the east by areas of nonlisted, upland vegetation, primarily gallberry (Ilex glabra). The vegetation of these pockets consists of scattered slash pine (Pinus elliottii), St. John's wort (Hypericum fasciculatum), bog button, and red root (Lachnanthes caroliniana). These wetland pockets are rarely inundated and have a seasonally high water table. The entire wetland area provides only marginal wildlife habitat and is rather marginal or transitional in nature.



FLORIDA PUBLISHING COMPANY

Publisher

JACKSONVILLE, DUVAL COUNTY, FLORIDA

STATE OF FLORIDA }
COUNTY OF DUVAL }

Before the undersigned authority personally appeared _____

Mary Ann Lanehart

who on oath says that he is

Legal Advertising Rep.

of The Florida Times-Union,

a daily newspaper published at Jacksonville in Duval County, Florida, that the

attached copy of advertisement, being a Legal Notice

in the matter of Application For permit

in the _____ Court,

was published in THE FLORIDA TIMES-UNION in the issues of _____

July 20, 1990

Affiant further says that the said The Florida Times-Union is a newspaper published at Jacksonville, in said Duval County, Florida, and that the said newspaper has heretofore been continuously published in said Duval County, Florida, The Florida Times-Union each day, has been entered as second class mail matter at the postoffice in Jacksonville, in said Duval County, Florida, for a period of one year next preceeding the first publication of the attached copy of advertisement, and affiant further says that he has neither paid nor promised any person, firm or corporation any discount rebate, commission or refund for the purpose of securing this advertisement for publication in said newspaper

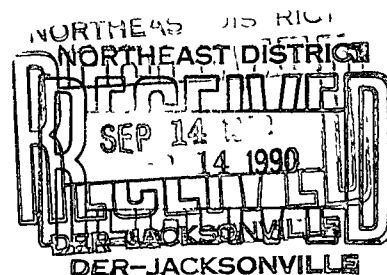
Sworn to and subscribed before me
this _____ day of _____

Mary A. Walsh
A.D. 19
Notary Public,
State of Florida at Large

My Commission Expires

Mary Ann Lanehart

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
"NOTICE OF APPLICATION"
The Department of Environmental Regulation announces receipt of an application for permit from Trail Ridge Landfill, Inc. to construct and operate Class I and Class III Landfills and associated facilities in accordance with Florida Administrative Code Rule 17-701. The proposed project is located in a portion of Sections 17, 18 and 20 together with Section 19, all lying in Township 3 South, Range 23 East, Jacksonville, Duval County, Florida.
This application is being processed and is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at the Department of Environmental Regulation, Northeast District, 3426 Bills Road, Jacksonville, Florida, 32207.



FLORIDA PUBLISHING COMPANY

Publisher

JACKSONVILLE, DUVAL COUNTY, FLORIDA

STATE OF FLORIDA }
COUNTY OF DUVAL }

Before the undersigned authority personally appeared _____

Molly Strain

who on oath says that he is

a legal advertising rep

of The Florida Times-Union,

a daily newspaper published at Jacksonville in Duval County, Florida, that the

attached copy of advertisement, being a legal notice

in the matter of State of Florida-Dept. of Environmental
Regulation

in the _____ Court,

was published in THE FLORIDA TIMES-UNION in the issues of _____
September 8th, 1990 (Sat.)

Affiant further says that the said The Florida Times-Union is a newspaper published at Jacksonville, in said Duval County, Florida, and that the said newspaper has heretofore been continuously published in said Duval County, Florida, The Florida Times-Union each day, has been entered as second class mail matter at the postoffice in Jacksonville, in said Duval County, Florida, for a period of one year next preceeding the first publication of the attached copy of advertisement, and affiant further says that he has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in said newspaper

Sworn to and subscribed before me
this 12th day of

September

A.D. 1990

Mary G. Walsh
Notary Public,
State of Florida at Large

Molly Strain

My Commission Expires

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
"NOTICE OF APPLICATION"

The Department of Environmental Regulation announces receipt of an application for permit from Trail Ridge Landfill, Inc. to construct and operate Class I and Class III Landfills and associated facilities in accordance with Florida Administrative Code Rule 17-701, to be known as Trailridge Landfill Plan "A". The proposed project is located in a portion of Sections 17, 18 and 20 together with Section 19, all lying in Township 3 South, Range 23 East, Jacksonville, Duval County, Florida.

This application is being processed and is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at the Department of Environmental Regulation, Northeast District, 7825 Baymeadows Way, Suite B200, Jacksonville, Florida, 32256-7577.



England-Thims & Miller, Inc.

Consulting & Design Engineers
3131 St Johns Bluff Road So Jacksonville, FL 32216
904-642-8990

PRINCIPALS

James E. England, P.E., President
Robert E. Thims, V.Pres., Sec
Douglas C. Miller, P.E., V.Pres
N. Hugh Mathews, P.E., V.Pres
James M. Robinson, P.E., V.Pres

September 11, 1990

Mrs. Mary C. Nogas, P.E.
Supervisor, Solid Waste
Department of Environmental Regulation
Northeast District
7825 Baymeadows Way - Suite 200
Jacksonville, Florida 32256-7577

Reference: Trail Ridge Landfill Plan "A" - Class I and Class III
Request for Additional Information
FDER # 184444
ET&M NO. E89-113-9

Dear Ms. Nogas:

Pursuant to your letter of August 23, 1990, please find attached the responses to your request for additional information on Attachment Nos. 1 and 2. Attachment No. 3 required no response.

Please note a revised Closure and Post-Closure Cost Estimate has been submitted for your approval.

I trust this additional information is satisfactory and completes the Trail Ridge Landfill Plan "A" application file.

If I can be of further service, please do not hesitate to contact me.

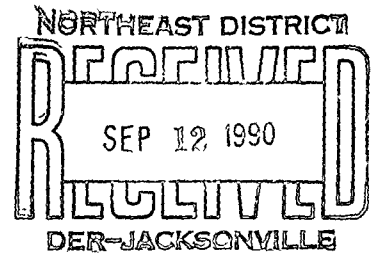
Sincerely,

ENGLAND, THIMS & MILLER, INC.

Douglas C. Miller, P.E.
Vice President

Attachments: RAI Response No. 1 and No. 2

- Enclosures:
1. Revised Drawings Nos. 17, 18, 19, 20, 25 and 34
 2. Borrow Calculations
 3. Appendix IX (revised)
 4. Claymax Manufactures Data
 5. Reference Page 172; "Design, Construction and Monitoring of Sanitary Landfills"
 6. Amendment No. 1 to QA/QC Manual
 7. Drawing No. 24A - Marked in Red
 8. Appendix XIV - Closure and Post Closure Cost Estimate (Revised)
 9. Letter from Ellis & Associates (Settlement Calculations)



APPENDIX XIV
CLOSURE AND POST CLOSURE COST ESTIMATE
(REVISED 9-11-90)

APPENDIX XIV

TRAIL RIDGE LANDFILL
CLOSURE AND POST CLOSURE ESTIMATE

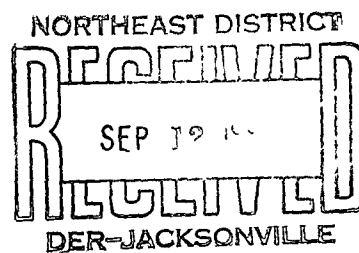
CLOSURE

\$ 645,979	Top Soil 176 acres x 43,560 S.F./ACRE x 0.5 FT divided by 27 C.F/C.Y. x 1.3 x \$3.50/C.Y.
2,030,219	Clay Liner 176 acres x 43,560 S.F./ACRE x 1.0 FT divided by 27 C.F/C.Y. x 1.3 x \$5.50/C.Y.
1,937,939	Cover Soil 176 acres x 43,560 S.F./ACRE x 1.5 FT divided by 27 C.F/C.Y. x 1.3 x \$3.50/C.Y.
100,000	Seed and Mulch (200 acres at \$500 per acre)
35,000	Closure Certification
<u>3,000,000</u>	Gas Collection System
\$7,749,133	Total Closure

POST CLOSURE

\$ 200,000	Security, fencing, etc. (\$10,000 per year)
120,000	Erosion Repair (1,500 C.Y. per year at \$4.00/C.Y.)
40,000	Surface Water Control (\$2,000 per year)
240,000	Leachate Collection System (\$12,000 per year)
5,329,000	Leachate Disposal (\$266,450 per year) 100 gal/day/acre x \$.05/gal
240,000	Gas Collection System (\$12,000 per year)
<u>800,000</u>	Water Quality Monitoring (\$40,000 per year)
\$ 6,969,000	Total Post Closure
<u>-----</u>	
\$14,718,133	Total Closure and Post Closure

Note: A twenty year period is assumed for post closure.
All cost estimates are 1990 Dollars



DESIGN, CONSTRUCTION, AND MONITORING OF SANITARY LANDFILL

Amalendu Bagchi

Wisconsin Department of Natural Resources



WILEY

A WILEY-INTERSCIENCE PUBLICATION

JOHN WILEY & SONS

NEW YORK • CHICHESTER • BRISBANE • TORONTO • SINGAPORE

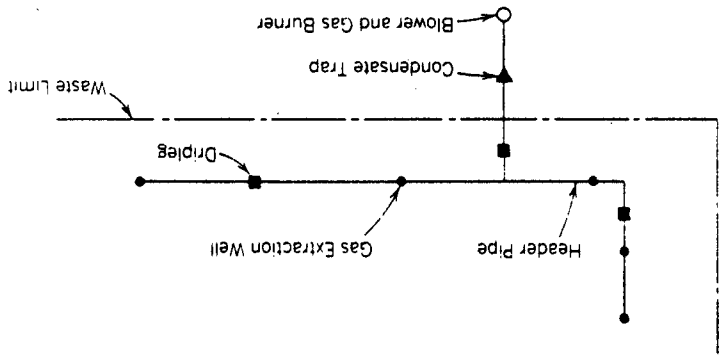


FIG. 8.26. Typical layout of active gas venting system elements.

Extraction Well. Spacing of extraction wells is a key issue in extracting landfill gas efficiently. They should be spaced such that their zone of influence overlaps. As shown in Fig. 8.27, a 27% overlap can be obtained by installing the extraction wells on the corners of equilateral triangles of side $1.73R$ and a 100% overlap can be obtained by installing the extraction wells on the corner of a regular hexagon of side R . A square array would provide a 60% overlap. Thus, spacing of extraction wells is given by

$$\text{Spacing} = (2 - Q_1/100)R \quad (8.23)$$

in which R = the radius of influence of gas extraction wells and Q_1 = the required overlap.

The zone of influence of a gas extraction system should be determined from actual field study. An extraction well should be installed within the landfill with gas probes at regular distances from the well (Fig. 8.28) Short-term and/or long-

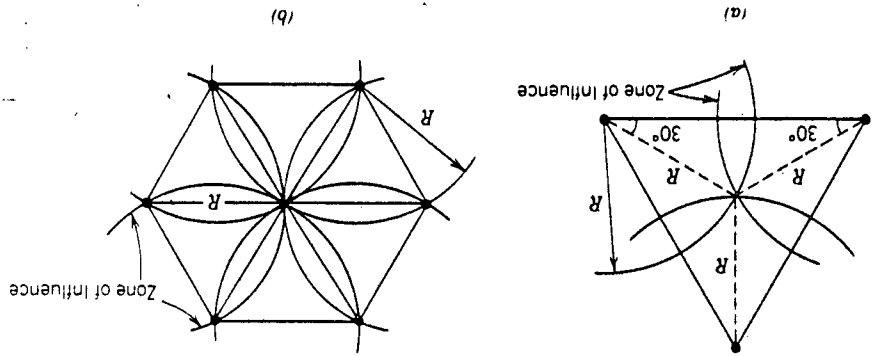


FIG. 8.27. Positioning of gas extraction well for complete overlap: (a) triangular array; (b) hexagonal array. Solid circles indicate locations of gas extraction wells.

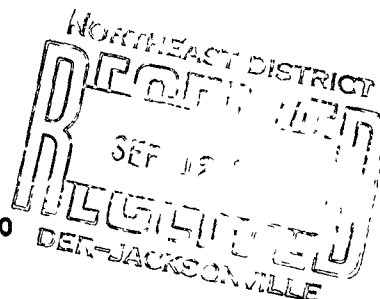
FIG. 8.28. Short-term and/or long-term tests of the landfill gas probe. The probe should be installed at regular distances from the well. The probe should be installed at regular distances from the well. The probe should be installed at regular distances from the well.

ATTACHMENT NO. 1

RESPONSE TO

REVIEW MEMORANDUM

DATED AUGUST 23, 1990



FROM: Mary Nogas
Emerson Raulerson

REFERENCE: TRAIL RIDGE LANDFILL - PLAN "A"

QUESTION 1: Please confirm that the bottom elevation of the North Borrow Area is 50.

RESPONSE 1: The bottom elevation of the North Borrow Area is 50.0.

QUESTION 2: Please provide supporting calculations for the amount of borrow material that is available at the site; the amount needed, and the amount of dirt needed for final cover.

RESPONSE 2: The calculations for the borrow material available and the borrow material required for landfill construction are attached.

QUESTION 3: Please justify using a 300-foot zone of influence for gas vents instead of the 300-foot centers that the Department normally requires.

RESPONSE 3: A 300-foot hexagonal array provides a 100% overlap versus a 60% overlap for 300-foot centers. (see attachment)

QUESTION 4: The first page of Appendix IX (i.e., HELP Model Summary) lists the soil transmissivity of the geodrain as $2.2 \times 10^{-4} \text{ m}^2/\text{sec}$ instead of 2.2×10^{-3} as indicated on page 8-2, Section C, Part 1. Please clarify.

RESPONSE 4: Due to the change in D.E.R. regulations regarding liner designs, a revised arrangement for the components of the liner is proposed. This has necessitated remodelling the H.E.L.P. computer program. This is attached. The correct transmissivity of the geodrain is $1.1 \times 10^{-3} \text{ m}^2/\text{sec}$ @ 7000 psf. Enclosed are results of transmissivity tests performed to verify data of the PN-3000 Geonet. Please note Appendix IX has been replaced in its entirety.

RESPONSE 8: As shown in the revised Leachate Collection Performance narrative attached, we would propose to use a thickness of 0.25 IN and Soil Texture Class No. 17 default characteristics for the Flexible Membrane Liner with Claymax. However, by setting the Liner Leakage Fraction to 0.000 for the primary liner renders this a moot point since the H.E.L.P. model shows no drainage taking place below the primary liner.

QUESTION 9: Please provide the Department with the Claymax manufacturer's "technical data," including data analyzing the effect the expanding Claymax will have on the geonet.

RESPONSE 9: The technical data from the Claymax manufacturer is attached. The liner cross-section has been modified to include claymax only below the secondary 60 mil HDPE liner. Therefore no claymax is located above the geonet. Revised drawings are attached.

QUESTION 10: Please submit information justifying the porosities, field capacities, wilting points, and permeabilities for the Claymax and geonet.

RESPONSE 10: Enclosed are manufacturers data concerning the Claymax and Geonet. By utilizing the supplemental methodology with the H.E.L.P. no data was entered for the Flexible Membrane Liner with Claymax. By setting the Liner Leakage Fraction equal to zero for the Primary Liner, no drainage is allowed, therefore the underlying layers is not considered. The data inputted for the Geonet, excluding the porosity and the saturated hydraulic conductivity value was obtained from default Soil Texture Class 1 since this demonstrated the highest conductivity value. The 19.6 cm/sec value used in the H.E.L.P. model for the Geonet was obtained as illustrated below:

$$\begin{aligned} \text{Hydraulic Transmissivity} &= 1.1 \times 10^{-3} \text{ m}^2/\text{sec} \\ \text{Thickness} &= 0.22 \text{ in} = 0.5588 \text{ cm} \\ &= .0011 \text{ m}^2/\text{sec} \times \frac{(100 \text{ cm})^2}{\text{m}^2} = 11 \text{ cm}^2/\text{sec} \\ 11 \text{ cm}^2/\text{sec} \div 0.5588 \text{ cm} &= \underline{19.6 \text{ cm/sec}} \end{aligned}$$

QUESTION 11: Please indicate how the soil characteristics were obtained for Layer 3 of the HELP Model Liner Analysis.

RESPONSE 11: These characteristics have been revised to be consistant with the 24" soil blanket in the Final Cover Analysis. This is default Soil Texture Class No. 5 adjusted for compaction.

QUESTION 12: It appears that Layers 1 and 2 of the HELP Model Final cover Analysis utilize identical soil characteristics. However, it is also indicated that one is a vertical percolation layer and the other a lateral drainage layer. Please explain.

RESPONSE 12: Layer 1 and Layer 2 are the same soils. However Layer 2 has been adjusted for compaction therefore its classification as a lateral drainage layer.

QUESTION 13: Please note that the Department has not yet received proof of publication.

RESPONSE 13: A publication request has been transmitted to the Florida Times Union. Proof of Publication will be submitted to the Department upon receipt.

QUESTION 14: Please explain what the values of 104.4495, 20.1227, 46.6775, and 54.7967 inches of settlement refer to in the submittal dated July 17, 1990.

RESPONSE 14: The computer program used to calculate settlements requires soil information be input to a depth equal two times the width of the foundation below the ground surface. For the particular site, the only compressible soils which will be subject to settlement are located to depths of approximately 85 to 130 feet below the ground surface which corresponds to approximately three to five percent of the width of the landfills. Therefore, in order to permit the computer program to generate settlements for various soil layers, a dummy layer of soil was input in order to provide data corresponding to a depth of two times the width of the landfill. The indicated settlements from the computer program included the settlement associated with the dummy layer. The settlements reported in our calculations subtracted the settlement associated with the dummy layer from the total settlement calculated from the computer program. The resulting settlement is representative of the settlement which can be expected from the compressible soil deposits located above the Hawthorne formation at the site.

QUESTION 15: Please indicate how special wastes will be handled (i.e., a leak-proof container for oil and batteries kept off the ground) and the necessary storage space required based upon the amount of each of the various wastes to be stored at any time.

RESPONSE 15: One City of Jacksonville Standardized leak-proof receptacle for waste oil will be provided. Additional containers may be provided based on demand. Batteries will be temporarily stored above grade on a concrete pad. A 0.5 +/- acre area northwest of the scale house has been designated for temporary storage of white goods. This area can store approximately 500 +/- appliances. Adequate room is available for expansion to the east if demand dictates.

A 0.5 +/- acre area southwest of the scale house has been designated for waste oil receptacles (1), battery storage area (375 s.f.) and non-contract hauler receptacles (6). Adequate area for expansion exists to the south and west if demand dictates.

See revised drawing No. 34 for site plan.

QUESTION 16: Please indicate whether any portion of the "white goods storage area" will be paved since it is going to be used for storing many other types of special wastes.

RESPONSE 16: The white goods area and non-contract hauler area will not be paved but will consist of a 6" thick crushed aggregate base. The waste oil receptacle and battery storage area will consist of a 15' X 30' concrete pad 4" thick with a 12" concrete curbing.

QUESTION 17: Please provide documentation which would support your request for a six (6) month installation period for the gas vents.

RESPONSE 17: Based on previous gas well installation experience it is anticipated that the Trail Ridge gas wells up to 140' deep can be installed at the rate of 3 per week. Phase VI of the landfill required 36 wells be installed. This would require 3 months of actual well construction. The drilling and construction of gas wells 36" in diameter by 140 feet deep is highly specialized with limited contractors available. Therefore 90 days has been allowed to schedule and mobilize the gas well contractor. Therefore it is reasonable to request gas well installation be completed within 6 months of final cover. However, every effort will be made to install wells as soon and as quickly as possible.

QUESTION 18: Please indicate that a spotter will be present at the Class III area at all times the landfill is open.

RESPONSE 18: A spotter will be present at the Class III area at all times during landfilling operations.



J & L TESTING COMPANY, INC.
Geotechnical Geomembrane and Geosynthetic Testing

MATERIALS:

NSC 60 mil HDPE
PN-3000 Geonet

FLUID: Water

UNIT NO.: 1

TEMPERATURE: 60° F

SECTION:

UPPER LOAD PLATE

HDPE

GEONET

HDPE

LOWER LOAD PLATE

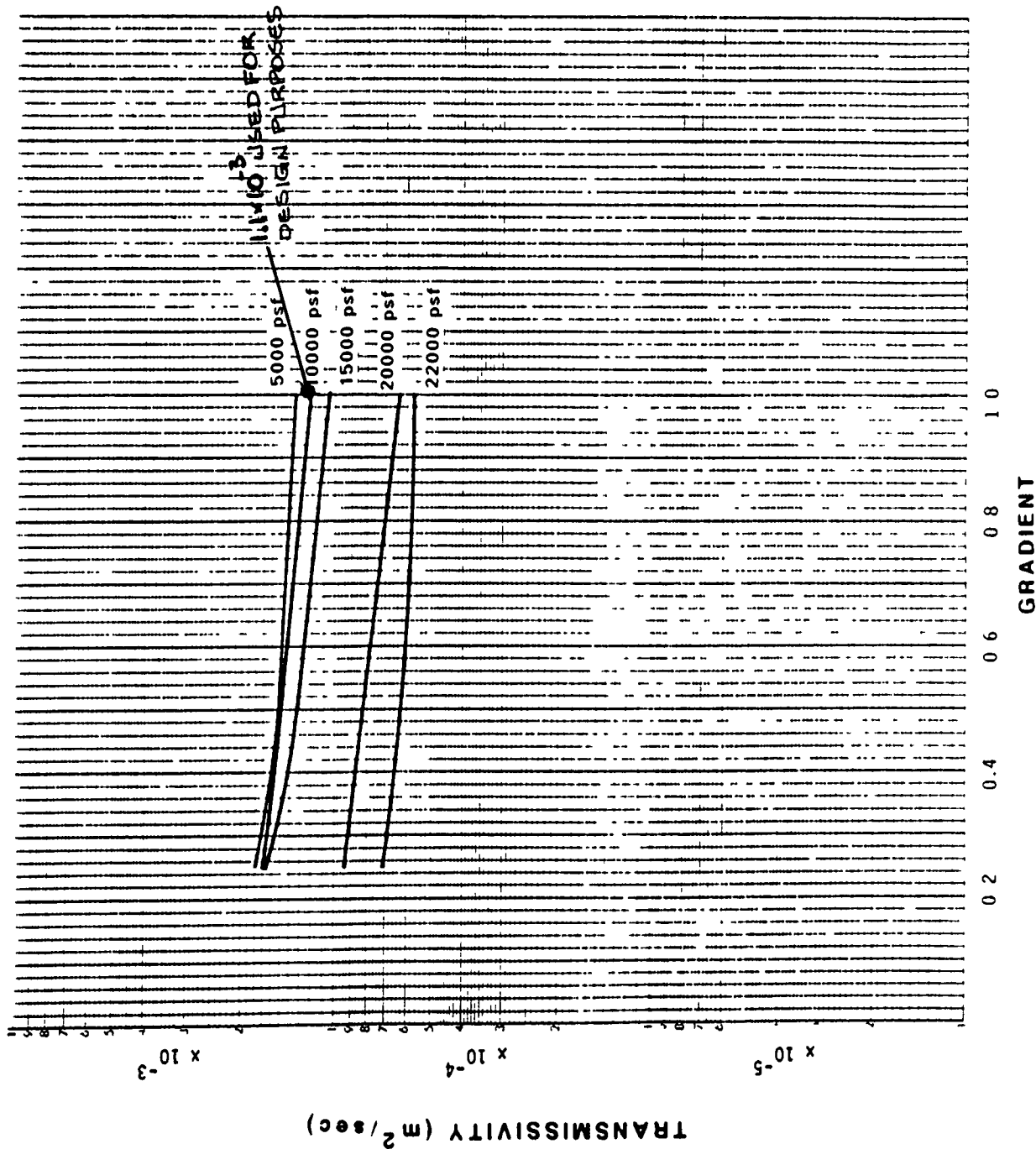
TRANSMISSIVITY TEST RESULTS

WASTE MANAGEMENT OF NORTH AMERICA

PROJECT NO 89R454-01

DATE March 11, 1989

FIGURE 1 A

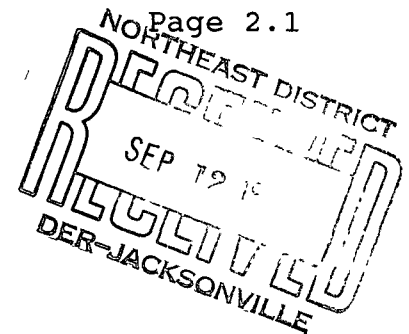


ATTACHMENT NO. 2

RESPONSE TO

REVIEW MEMORANDUM

DATED AUGUST 22, 1990



FROM: Michael Eaton

SUBJECT: RAI Questions for Wetland Review of MSSW Application

REFERENCE: Trail Ridge Landfill - Plan "A"

QUESTION 1: Please demonstrate the effect the borrow area will have on the adjacent wetlands. Indicate pre and post conditions in relation to the seasonal high and low groundwater elevation as well as the effect on surface water drainage patterns.

RESPONSE 1: The North Borrow Area is proposed to be constructed totally in an upland area with a 50' minimum setback between the excavation and wetland boundary. The borrow area will be excavated in the "wet". No dewatering or lowering of the groundwater is proposed.

The surficial groundwater elevations vary from 1± foot to 4± feet below ground surface depending on the location season and climatic conditions. A berm surrounding the borrow area is designed to elevation 125.0 or 1 foot above natural ground which ever is higher. This berm serves two purposes. First to prevent the lowering of groundwater elevation due to excavation on the east side of the borrow area. Second to prevent surface runoff from entering the borrow area.

The surface water drainage patterns in the North Borrow Area are controlled primarily by two ditch systems. (See attached Drawing No. 24A marked in red). The existing ditch systems intercept surface and groundwater drainage west of the North Borrow Area and discharge east of the Borrow Area. These ditches, which are located in the adjacent jurisdictional wetlands, are the primary control mechanism for surface and groundwater flow in the wetlands. No changes are occurring in these ditch systems.

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RESPONSE 2: See response to Question No. 1.

QUESTION 3: Please provide detailed information about the stormwater pump system and its effects on the receiving wetlands. Please include frequency of pumping, volume of discharge, location of discharge pipe, erosion control, and the current environmental condition of the receiving wetland.

RESPONSE 3: The stormwater pump stations are designed to pump the volume from the first 1" of stormwater runoff from the upland drainage area in 72 hours or less after a rainfall event. The total volume of discharge after a design rainfall event is 7.28 AC-FT - Class I and 3.97 AC-FT - Class III.

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The wetland irrigation piping is located at the upland edge of the wetland boundary as shown on Drawing No. 25. Erosion is controlled by adjusting the individual 2" value to each irrigation area such that water slowly trickles from the perforated pipe at a non-eroding velocity. Excess water is discharged at the control structure. If no wetland irrigation is desired, then all water is discharged at the outlet control structure.

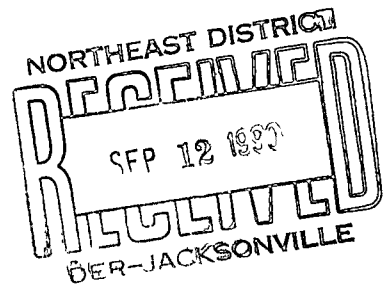
At the time of initial operation and As-Built Certification of the Water Management System, a on-site inspection will be made with the applicant and Florida Department of Environmental Regulation. At that time a review of site conditions will be made including the desirability of irrigating the wetlands or discharging directly to the surficial outfall. Subsequent to the initial operation decision, an independent environmental consultant shall perform an inspection each quarter for two years and recommend the continuance or modification to the operating procedure. Upon approval from Florida Department of Environmental Regulation, those operating procedures will be implemented.

The existing wetland may be characterized as a series of shallow, depressional wetland pockets within planted pine plantation. These pockets are separated from each other and from DER wetlands to the east by areas of nonlisted, upland vegetation, primarily gallberry (Ilex glabra). The vegetation of these pockets consists of scattered slash pine (Pinus elliotii), St. John's wort (Hypericum fasciculatum), bog button, and red root (Lachnanthes caroliniana). These wetland pockets are rarely inundated and have a seasonally high water table. The entire wetland area provides only marginal wildlife habitat and is rather marginal or transitional in nature.

TRAIL RIDGE LANDFILL - PLAN A

AMENDMENT NO. 1

TO



QUALITY ASSURANCE MANUAL FOR THE INSTALLATION OF GEOSYNTHETIC LINING SYSTEMS.

1.0 PURPOSE

The purpose of this amendment is to supplement the Waste Management of North America, Inc., "Quality Assurance Manual For The Installation of Geosynthetic Lining Systems" to include two layers of constructed base on which the primary and secondary Geosynthetic Lining System will be installed.

2.0 BASE CONSTRUCTION

2.1 SUBGRADE

The contractor shall prepare the subgrade for base construction by grading the subgrade 6" below the base grades shown on the construction drawings.

2.1.1 FILL

Fill required to construct the subgrade to final grade shall be a clean sand (A-3 or better) placed loose in 12" lifts and compacted to 95% density @ +/- 2% optimum moisture (ASTM D2922; ASTM D1557).

2.1.2 FINISHED SUBGRADE

Finish grade shall be 6" below the base grades shown on the construction drawings. Finish grade shall be rolled and compacted to be free of roots, stones, protrusions or other irregularities.

2.1.3 TESTING (BY SOILS QUALITY ASSURANCE CONSULTANT)

The finished subgrade shall be compacted to 95% density at +/- 2% of optimum moisture (ASTM D2922; ASTM D1557). One density test per 10,000 S.F. of finished subgrade shall be required. In addition 1 density test per 10,000 S.F. per 12" lift shall be required in fill areas.

2.2 COMPACTED SUB BASE (LAYER NO. 1)

The contractor shall prepare the compacted subbase to meet the base grades shown on the construction drawings.

2.2.1 **MATERIAL**

The material for the 6" compacted sub base shall consist of a clayey fine sand with a saturated hydraulic conductivity of less than or equal to 1×10^{-5} cm/sec.

2.2.2 **INSTALLATION**

The compacted sub base shall be installed in one 6" lift on top of the prepared subgrade. The sub base shall be rolled and compacted to the finish base grades shown on the construction drawings. A registered land surveyor shall verify all lines and grades and prepare an as-built base grade survey.

2.2.3 **TESTING (BY SOILS QUALITY ASSURANCE CONSULTANT)**

The material shall be compacted to 90% maximum dry density as defined by the Standard Proctor Test (ASTM D-698). One test shall be conducted for each 10,000 S.F. of subbase. The material shall be sampled and tested to provide a saturated hydraulic conductivity of 1×10^{-5} cm/sec or less. (COE.EM 1110-2-1906).

2.2.4 **RE-TESTING**

Any areas that do not pass the minimum specifications outlined above shall be re-tested in the same general location. If the second test results indicate that the material still does not meet the minimum specifications, the area shall be scarified, re-compacted and re-tested. If the third test results indicated substandard material, the material shall be removed and replaced with suitable material.

2.3 **BENTONITE BASE (LAYER NO. 2)**

2.3.1 **MATERIAL**

The bentonite base shall consist of a manufactured bentonite sheet 0.25 in. thick. The bentonite sheet shall include a minimum of 1 lb per sq. ft. sodium montmorillonite (90% montmorillonite, min.) between a primary backing of polypropylene and cover fabric of 100% spunlace polyester.

2.3.2 **INSTALLATION**

The bentonite sheets shall be installed in accordance with the manufactures recommendation.

2.3.2.1 ORIENTATION

All seams on side slopes must be perpendicular to the excavation bottom. Seams in the base of the landfill shall be laid parallel to the leachate collection pipe. The first sheet shall be laid at the leachate collection trench, proceeding up the slope with subsequent sheets to form a shingle effect. The stenciled polypropylene side of the bentonite sheets shall be facing up.

2.3.2.2 ANCHORING

The bentonite sheets shall be anchored 18" deep in the perimeter anchor trench as detailed on the construction documents. The bentonite sheets shall be pulled tight to eliminate any creases or irregularities. Sand bags shall be used to provide temporary anchoring during installation.

2.3.2.3 SEAMING

The bentonite sheets are self seaming and shall be overlapped a minimum of 6".

2.3.2.4 REPAIRS

Repairs to any tear or cut in a bentonite sheet shall be accomplished by covering the area with an additional layer of bentonite sheet with a minimum of 6" overlap on all sides.

2.3.2.5 STORAGE

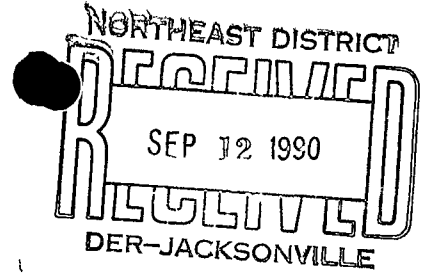
The bentonite sheets shall be stored in rolls temporarily on-site, at a dry location. Each roll shall be encased in a plastic covering sealed at each end. Multiple rolls shall be covered with a plastic tarp.

Prior to installation each roll shall be inspected for damage due to moisture or handling. Damaged rolls shall be marked rejected and separated from the remaining stockpile.

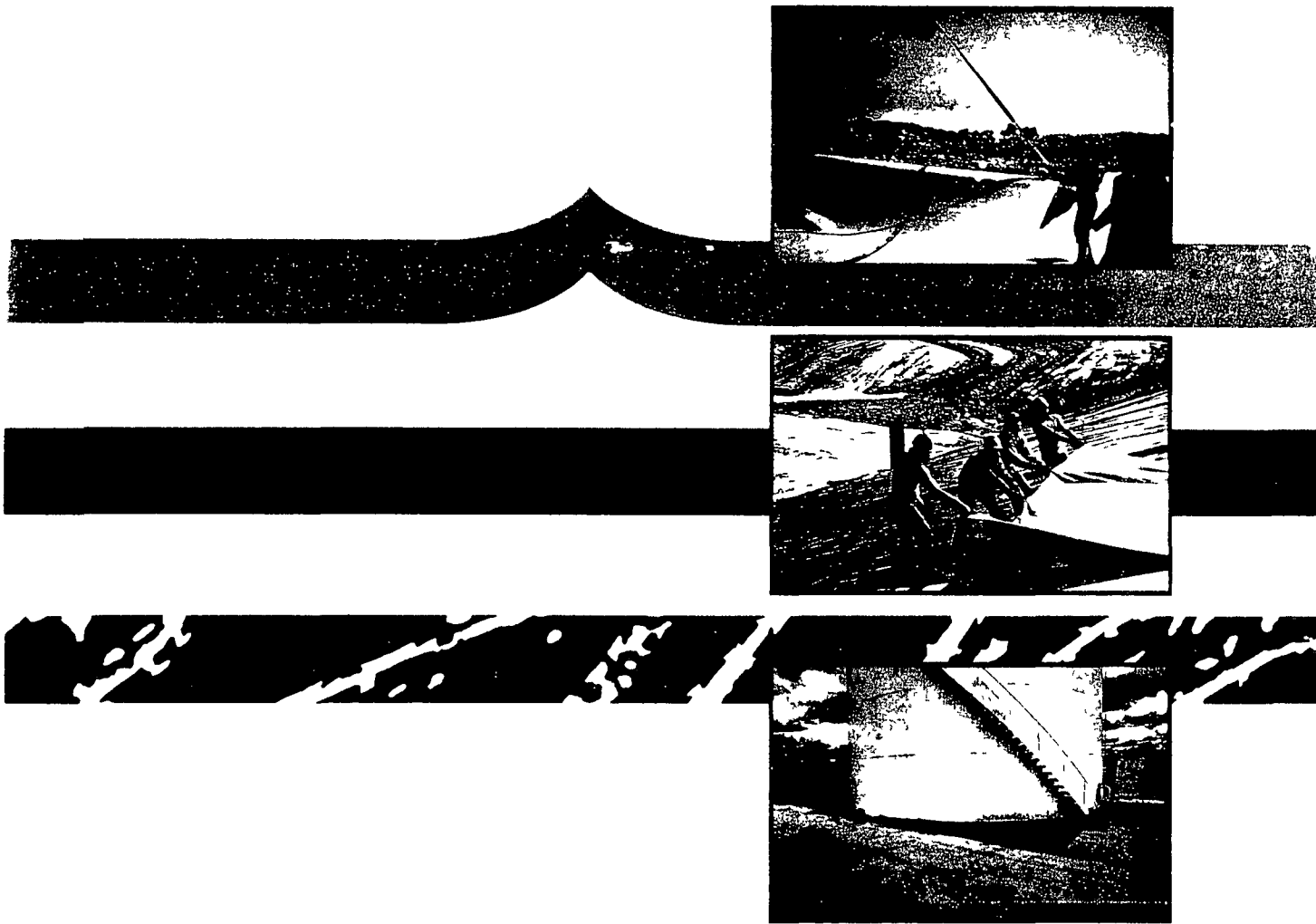
2.3.2.6 COVERING

The bentonite sheets shall be covered after installation with the secondary 60 mil HDPE liner. If the HDPE liner can not be installed immediately following the installation of the bentonite sheet a temporary plastic tarp shall be installed.

The bentonite sheets shall not be installed in standing water or during rainfall. If the bentonite sheet becomes wet during installation it shall be inspected and replaced if necessary.



CLAYMAX®



**CLAYMAX® IS THE STATE-OF-THE-ART GEOCOMPOSITE LINER FOR
THE WATER AND WASTE CONTAINMENT INDUSTRY. CLAYMAX® . . .
THE IMPERMEABLE BARRIER OF BENTONITE CLAY IN CARPET FORM.**

CLAYMAX® liner is the optimum impermeable liner for the water and waste containment industry.

CLAYMAX PRODUCT SPECIFICATION

Sodium Bentonite Content	1.0 lbs. per square foot
Thickness	1/4 inch
Liner Dimensions	13.5 feet x 82 feet
Effective Area Covered	1059.5 square feet (assume 6 overlap along one side and one end)
Roll Weight/Unit	1130 lbs. (minimum)
Permeability Coefficient	2×10^{-10} cm per second @ 35 head pressure

LABORATORY TEST DATA

Procedure — Six inches of silica sand covering CLAYMAX liner in a triaxial cell under thirty-five feet of water head pressure

GROUP	PERMEANT	PERMEABILITY
Water	De Aired Water	2×10^{-10} cm/sec
Alkali	20% Hydrated Lime (pH 14)	6×10^{-10} cm/sec
Acid	1% Acetic Acid (pH 1)	2×10^{-10} cm/sec
Calcium	Calcium Chloride (10%)	2×10^{-9} cm/sec
Calcium	Calcium Lignosulfonate	2×10^{-9} cm/sec
Alcohol	Ethyl Alcohol (10%)	2×10^{-9} cm/sec
Petrols	Unleaded Gasoline	4×10^{-10} cm/sec
Petrols	No. 6 Fuel Oil	3×10^{-9} cm/sec
Petrols	10% Ethanol Gasoline	3×10^{-9} cm/sec
Petrols	9.5% Butyl Gasohol	3×10^{-9} cm/sec
Landfill Leachate	BOD:200 Sewage Leachate	8×10^{-10} cm/sec

The above test performance data were produced under laboratory conditions. The actual performance characteristics may vary. No performance warranty is express or implied.

PACKAGING AND SHIPPING

Roll Content	1107.0 square feet
Roll Weight	1135 lbs. (approx.) wrapped
Roll Size	14.5 feet long (PVC wrapped) x 18 diameter (approx.)

Fresh water ponds, waste lagoons, municipal landfills/caps, tank farm containments, irrigation canals and earthen dams



CLAYMAX® liner is a flexible polypropylene bentonite sandwich providing a uniform layer of clay in carpet form creating a cost-effective solution for any liquid containment sealing problem.

E.P.A. regulations for waste containment specify that lagoon/landfill liners be composed of a heavy plastic membrane layer (HDPE) on top of a thick layer of **compacted clay (3 feet minimum)**. Because a single sheet of **CLAYMAX liner exceeds this requirement**, it has been specified and installed as 'the clay layer' in several landfills in the United States and Europe.

CLAYMAX® liner is the state-of-the-art geocomposite liner that ingeniously combines the durability of woven polypropylene fabric with the impermeability of a pound-per-square-foot of an inert mineral, sodium bentonite (montmorillonite).

Sodium bentonite, the mineral component in CLAYMAX liner, is a high-swelling clay that swells to form a monolithic seal when hydrated with fresh water. The CLAYMAX liner has **self-sealing seams** and an overall **self-healing** ability if ripped or punctured. In its hydrated (swollen) state, the clay will swell up to 15 times its dry volume providing tremendous impermeability and a great resistance to all chemicals. In a typical installation, the 1/4-inch CLAYMAX liner sheet will swell 1/2-to-1 inch resulting in the **equivalent permeability of 30 feet of compacted clay.**

EQUIPMENT REQUIRED The CLAYMAX liner must be installed with the **stenciled polypropylene side up (facing the operator)**. The polypropylene protects and supports the system on installation. The liner can either be pulled from a roll suspended at the top of a slope, or the free end may first be secured in a locking trench and the suspended roll can be backed down the slope and across the excavation by the supporting vehicle.

Suspending and unrolling CLAYMAX liner is facilitated by inserting a heavy-duty 3-inch diameter steel pipe through the 3 1/2-inch roll core on which CLAYMAX liner is shipped. This pipe should be 16-18 feet long to accommodate the hoisting chains from the lifting vehicle (any type of vehicle with a fork or front-end bucket). A spreader bar is required to ensure roll clearance and to prevent damage to roll edges.

Quality control of CLAYMAX liner seams requires an on-site inspection of a uniform 6-inch overlap and supervision of backfilling to prevent aggregate from opening seams.

Salomon Inc.

A Sud-Chemie AG Company
150 River Road
Suite L-3B
Montville, NJ 07045
Telephone: 201-335-8300
Telex: 96-1470

contact

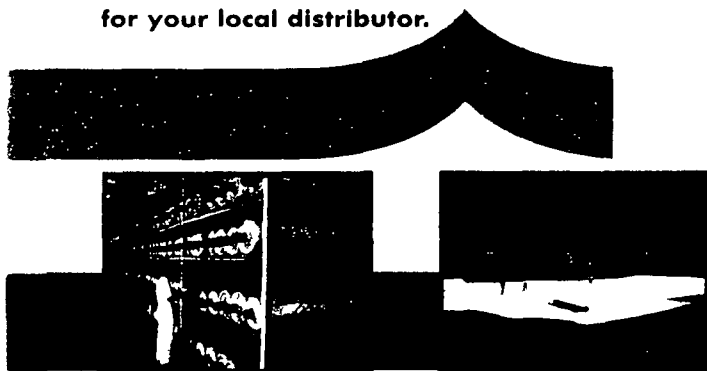
James Clem Corporation
444 North Michigan Avenue, Suite 1610
Chicago, IL 60611 USA

Phone: 312-321-6255

FAX: 312-321-6258

Telex: 543408

for your local distributor.



CLAYMAX Liner Inventory

Decorative Pond



Leachate Collection Pond
(Secondary Liner)

CAUTIONARY INSTRUCTIONS CLAYMAX liner may be damaged by exposure to water turbulence or hazardous or toxic substances hazardous or solid wastes soil or other contaminants in water and should not be used for containment of these constituents without prior evaluation CLAYMAX liner must be inspected for damage if exposed to any of those substances or conditions and, if damaged, must be repaired or replaced immediately CLAYMAX liner must be installed in accordance with plan and specification requirements, prepared by a professional engineer

All drawings are intended solely as a guide and for general information only

All test performance data were produced under laboratory conditions and are not intended as a substitute

for tests of the specific liquid or leachate that may come in contact with CLAYMAX liner All test performance data are subject to James Clem Corporation's limitation of warranties James Clem Corporation recommends that the purchaser perform site specific tests of CLAYMAX liner

LIMITATION OF WARRANTIES: James Clem Corporation warrants that CLAYMAX liner meets James Clem Corporation's specifications James Clem Corporation disclaims any other warranties, express or implied, as to CLAYMAX liner, including all warranties of merchantability and fitness for any particular purpose James Clem Corporation is not liable for any incidental or consequential damages of any kind James Clem Corporation assumes no liability for CLAYMAX liner's per-

CLAYMAX® LIQUID CONTAINMENT LINER

ADVANTAGES

Economical and easy to install
Minimal labor required
All seams are simple overlap seams
Liner can be cut and trimmed with a utility knife

GENERAL CHARACTERISTICS

Self-healing/Self-sealing
Natural sealant actuated by water
Porous protection layers allowing quicker hydration
Water-soluble adhesive
Factory-uniform continuous bentonite layer
Minimum 1 lb bentonite per sq ft
Totally flexible
Compatible for use with plastic liners and other multiple liner systems
Rolled goods for convenient storage
Standard sheet sizes 13½' x 82' and custom lengths available
Relatively resistant to environmental and biological attack

INSTALLATION ADVANTAGES

Uncomplicated installation requiring
No seam welding or sewing
No special equipment or cutting tools
No geotextile or other special protection
May be staked or nailed
Simple overlap seams
Accommodates complex configurations
No bentonite loss when cut or trimmed
Virtually no waste material

formance or for injuries resulting from the use of CLAYMAX liner, including any liability resulting from the purchaser's engineering, design construction and installation

GENERAL INSTALLATION INFORMATION: CLAYMAX liner should never be installed in standing water

Exposure to turbulent water may also cause damage

If exposed to any of these substances or conditions, CLAYMAX liner must be inspected and, where necessary, immediately repaired or replaced

If rainfall commences during installation or while under construction, cover with plastic sheeting to provide interim protection

To insure its integrity, CLAYMAX liner must be protected by and remain buried under a minimum of

6' to 8" of backfill or aggregate Backfill must be compacted with rubber tired or conventional rolling equipment to an 85% Modified Proctor

All illustrations are intended solely as a guide and are for general information only Contact James Clem Corporation for

- ▲ Containment installation instructions on slopes greater than 3 to 1
- ▲ Installations where CLAYMAX liner must resist extreme hydrostatic pressure that may require a double layer of CLAYMAX liner
- ▲ Temporary containment applications
- ▲ Suitability for secondary containment applications

Any unusual CLAYMAX liner application procedures not covered in this brochure must be approved in writing by James Clem Corporation prior to the installation

The information contained in this brochure supercedes all information printed prior to 5/88

**See James Clem Corporation's
below-grade bentonite waterproofing catalog
in Sweet's section 07100/CLE
BuyLine 3527.**

1 PRODUCT NAME

CLAYMAX LC™, CLAYMAX CR™
Liner System for Liquid Con-
tainment

(Formerly ENVIROMAT)

2. MANUFACTURER

Clem Environmental
Corporation (CEC)

P O Box 88, Gordon Road

Fairmount, Georgia 30139

Phone (404) 337-5316/17

(312) 321-6255/56 (in IL)

Telex 543408

Fax (404) 337-2215

(312) 321-6258 (in IL)

3. PRODUCT DESCRIPTION

Basic Use: CLAYMAX LC™ is a specially constructed, flexible, impermeable liner system which utilizes the mineral sodium bentonite clay and the geotextile polypropylene Sodium bentonite is a high swelling smectite which gives CLAYMAX LC™ the ability to heal itself if ripped or punctured. In a hydrated (swollen) state, the clay has tremendous impermeability and a great resistance to all chemicals acids, bases and hydrocarbons The bentonite swells to form an impermeable barrier upon contact with fresh water

CLAYMAX LC™ liner system can be used in construction applications for the containment or exclusion of liquid. These applications include fresh water ponds, waste lagoons, municipal landfills (including caps), tank farm containments, earthen irrigation canals, industrial containments and earthen dams. Seaming is accomplished by a simple overlap with adjoining material since the hydrated bentonite swells to form an impermeable bond Minor damage is self-healing and major cuts or tears are easily and effectively repaired using patches of CLAYMAX LC™ material

CLAYMAX LC™ is manufactured 13 5 feet wide and 82 feet long, rolled onto cores This allows for easy handling at the job site Longer material can be furnished upon request No special installation tools or fasteners are

required and CLAYMAX LC™'s flexibility speeds installation The material can be cut with a utility knife to fit around protrusions (pipes, tanks, etc)

CLAYMAX LC™ is designed for fast installation with a minimum of manpower, equipment and site preparation on both large and

SPEC
DATA

This Spec Data sheet conforms to editorial style prescribed by The Construction Specifications Institute. The manufacturer is responsible for technical accuracy.

Product Specification (Typical)—CLAYMAX LC™		
Bentonite Content	1 0 lbs per square foot Liner	
Thickness	¼ inch	
Liner Dimensions	13 5 feet x 82 feet	
Effective Area Covered	1059 5 square feet (assume 6" overlap along one side and one end)	
Roll Weight/Unit	1130 lbs (minimum)	
Permeability Coefficient	1 x 10 ⁻⁹ cm per second @ 35' head pressure	
*Longer rolls available on special order		
Laboratory Test Data		
Procedure—Six inches of sand covering CLAYMAX LC™ in a triaxial cell under thirty-five feet of water head pressure		
Group	Permeant	Permeability
Water	De-Aired Water	2 x 10 ⁻¹⁰ cm/sec
Alkali	20% Hydrated Lime (pH 14)	6 x 10 ⁻¹⁰ cm/sec
Acid	1% Acetic Acid (pH 1)	2 x 10 ⁻¹⁰ cm/sec
Calcium	Calcium Chloride (10%)	2 x 10 ⁻⁹ cm/sec
Alcohol	Ethyl Alcohol (10%)	2 x 10 ⁻⁹ cm/sec
Petrols	Unleaded Gasoline	4 x 10 ⁻¹⁰ cm/sec
Petrols	No 6 Fuel Oil	3 x 10 ⁻⁹ cm/sec.
Petrols	10% Ethanol Gasohol	3 x 10 ⁻⁹ cm/sec.
Petrols	9 5% Butyl Gasohol	3 x 10 ⁻⁹ cm/sec
Petrols	100% Benzine	4 x 10 ⁻¹⁰ cm/sec
The above test performance data were produced under laboratory conditions The actual performance characteristics may vary No performance warranty is express or implied		
Packaging and Shipping		
Roll Content	1107 0 square feet	
Roll Weight	1135 lbs (approx) wrapped	
Roll Size	14 5 feet long (PVC wrapped) x 18" diameter (approx)	
Material Specifications		
Primary Backing (Typical Properties)—Polypropylene is nonbiodegradable and inert to most chemicals, acids and alkalis		
Color	Natural white	
Filler Fiber	Nylon	
Substrate	24 x 10 Delustered woven polypropylene, non-toxic, water permeable	
Weight	4 oz per square yard	
Tensile Strength	78 lbs per inch (minimum)	
Grab Strength (ASTM D-1682)	Warp 95 lbs , Fill 70 lbs.	
Mullen Burst Strength (ASTM D774)	250 25 lbs per square inch	
Puncture Strength (½" mandril ASTM D3787 MOD)	249 lbs	
Melting Point	329° F	
Elongation (ASTM D-1682)	Warp 15%, Fill 18%	
Shrinkage		
Hot Water	Nil	
Dry (20 min @ 270°F)	2%	
Cover Fabric	100% spunlace polyester, open weave allows for expansion of bentonite	
Weight	1 oz per square yard	
Grab Strength	Warp 30 lbs , Fill 13 6 lbs	
Burst Strength	35 lbs per square inch	
Bentonite (Sodium Montmorillonite)		
Sizing	Specially graded, 6 mesh and 30 mesh granules	
Mineralogical Composition	90% Montmorillonite (min)	
Adhesive	Water soluble, non-toxic	
Storage	On dry ground under roof or other protective covering	
The manufacturer reserves the right to change product specifications and instructions/limitations without notice Information contained herein supersedes previously printed material (11/87)		

The ten point Spec Data® format has been reproduced from publications copyrighted by CSI 1964 1965 1966 1967 and used by permission of The Construction Specifications Institute inc Alexandria VA 22314

small job sites. It affords a maximum of containment protection with none of the problems usually associated with other liner products. CLAYMAX™ is flexible, requires no special seam sealing, is self-healing and self-sealing while being extremely resilient and damage resistant.

Composition of Materials: CLAYMAX LC™ is a multi-layered liner system consisting of a layer of tough, durable and flexible heavy woven polypropylene, (on one side) coated with sodium bentonite clay. The bentonite is covered with a layer of thin polyester scrim which protects the bentonite layer during transportation and installation.

Sizes: CLAYMAX LC™ is supplied in rolled sheets. The material is 13.5 feet wide and 82 feet long. The material is rolled on 3½ inch roll cores. Special lengths may be ordered.

4. TECHNICAL DATA

Refer to Specification Table on page 1.

CLAYMAX LC™'s active ingredient, natural sodium bentonite, has the ability to swell in the presence of water to a volumetric expansion of 15 times resulting in a 6 fold increase in weight. Actual installation swelling is minimized by weight of aggregate cover material to only 2 to 3 times the original volume. Further expansion is possible into any voids in the material.

Limitations: CLAYMAX LC™ liner material MUST be protected with 6-12 inches (max. 12 inches on slopes) of backfill or aggregate cover material. If backfill is used, it should be compacted with wheeled, rolling equipment.

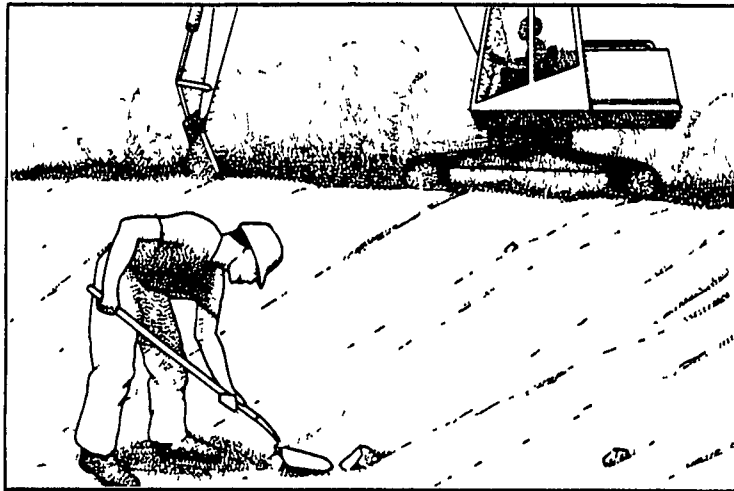
Containment installations, with slopes greater than two to one should be discussed with CEC.

CLAYMAX LC™ must be stored in a dry place.

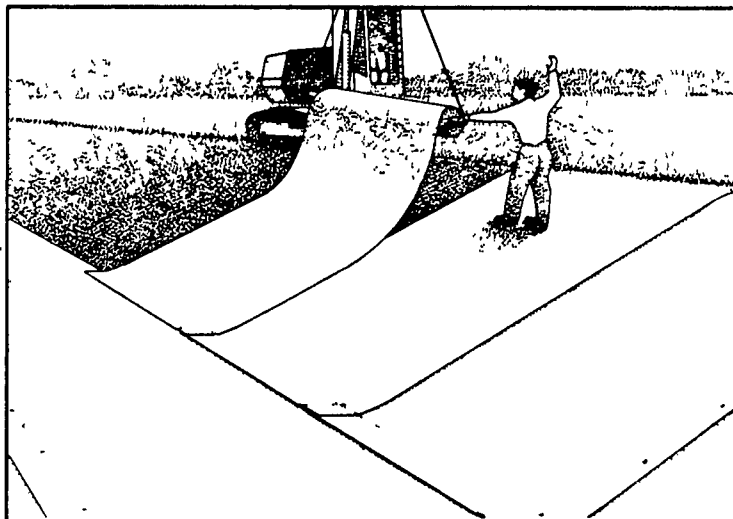
In soils of high alkalinity, acidity or brine condition (or other ground water contamination), samples should be submitted to CEC for analysis and CEC will issue any necessary special installation instructions.

Where installation of CLAYMAX LC™ sheets must resist extreme hydrostatic pressure, a double layer may be required. Please

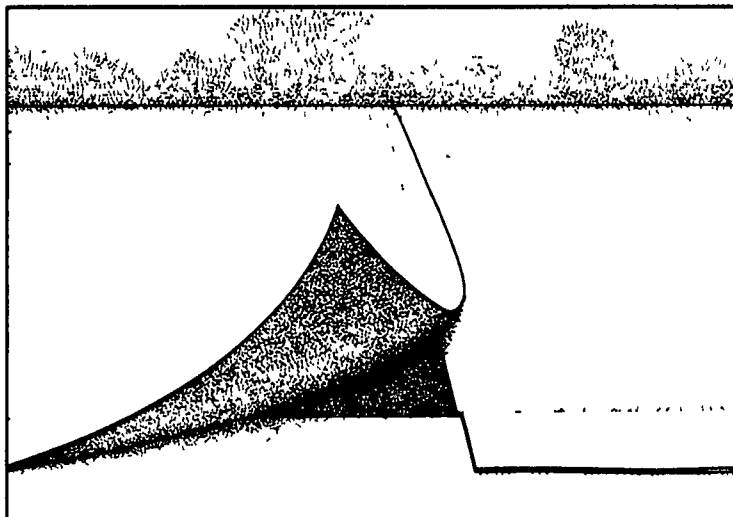
Advantages • Flexibility allows rapid and easy installation • A small crew can easily perform the installation • All seams are simple overlap seals • CLAYMAX provides for complete inspectability of liner seal integrity prior to covering • Liner is sufficiently resilient to support installation personnel and light-weight equipment • Liner can be cut and trimmed with a utility knife



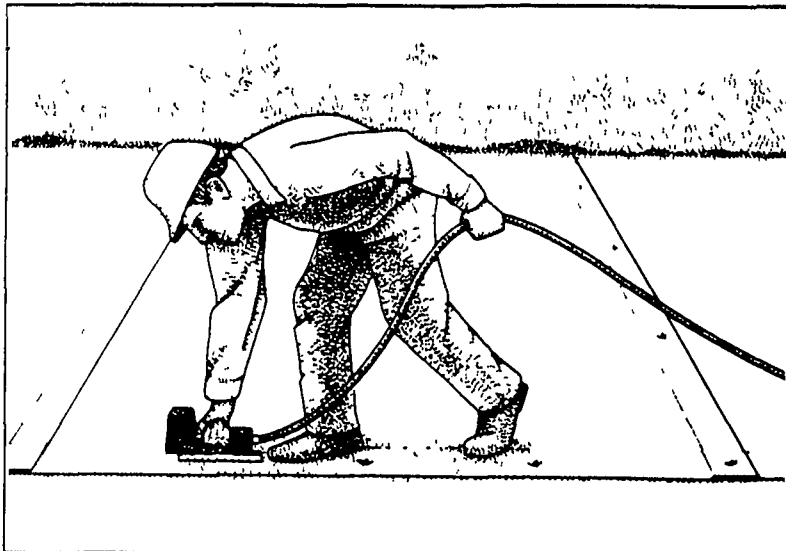
Site Preparation. Excavation should be well contoured, all rocks, vegetation and protrusions larger than 2 inches in diameter should be removed.



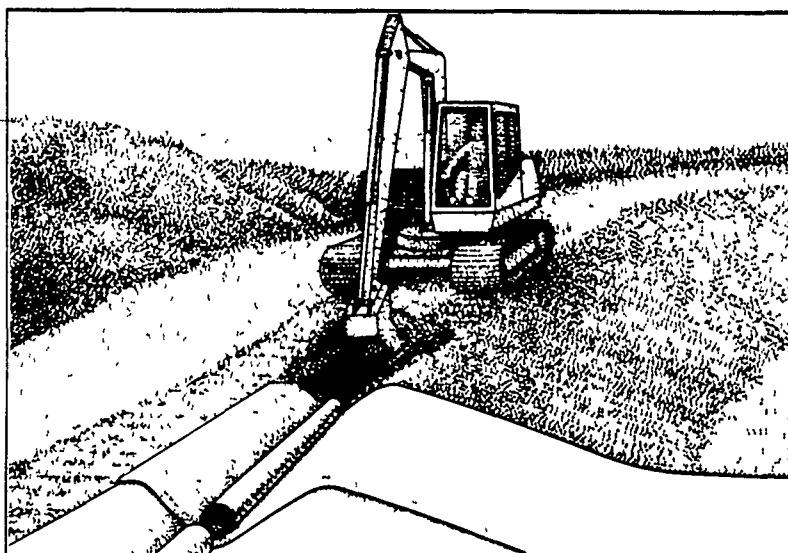
Installing adjoining rolls of CLAYMAX requires a 6-inch overlap. All seaming on slopes must be vertical and perpendicular to the base.



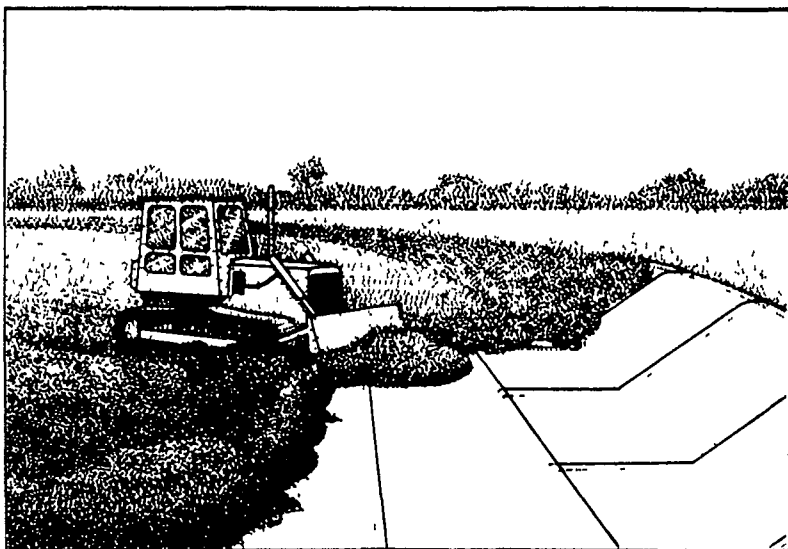
Detail of the 6-inch overlap, all soil must be removed from the overlap area of the liner to ensure a monolithic seal.



The 6-inch seams may be stapled or pinned to base soil to prevent seam opening during the backfill process



Anchoring Each CLAYMAX roll must be locked into trenches at the top of the slope, covered with fill and compacted to prevent slippage.



Covering Backfill should always be pushed forward with equipment operating on the backfill. Cover material (other than aggregate) should be compacted after placement.

consult CEC or your local distributor when this condition exists

Special installation application procedures for CLAYMAX™ must be approved in writing by the manufacturer prior to installation

CLAYMAX LC™ which has been damaged by precipitation prior to backfill protection **MUST BE REPLACED** if seal integrity is to be maintained.

5. INSTALLATION

Site Preparation: The pond, lagoon, tank farm enclosure or canal excavation dimensions should be determined allowing for final addition of not more than the required 6-12 inches of soil or aggregate cover material. Ideally, the excavation should be well contoured with slopes that are a maximum of three to one. All vegetation, protrusions and rocks larger than 2 inches in diameter should be removed and the entire excavation should be compacted to 90% optimum density. Minor surface irregularities, however, can be accommodated. Compaction can be accomplished using either conventional rolling equipment or wheeled vehicles. Use of sheepsfoot rolling equipment is not recommended. A liner locking trench must be provided at the top of all slopes.

Orientation: It is essential to install CLAYMAX LC™ so that all seams of the material laid on slopes are perpendicular to the pond bottom. This will prevent seam displacement during cover material placement.

Anchoring: All CLAYMAX LC™ "runs" must be locked into trenches at the top of the slopes, covered with fill and compacted to prevent slippage. The locking trench should be 24 inches back horizontally from the top of the slope. The trench should have a minimum depth of 18 inches and a width of at least 12 inches for slopes up to three to one. Greater slopes would require a revised locking trench design.

Seaming: It is essential that the first and succeeding rolls of CLAYMAX LC™ be pulled tight to smooth out creases or irregularities in the "runs". CLAYMAX LC™ should always be installed with the polypropylene side up,

showing the stenciled trademark CLAYMAX™. Once the first "run" has been laid adjoining "runs" need only be laid with a 6-inch overlap on each side. Be certain that all dirt is removed from the overlap area of the mat. The 6-inch seams may be stapled (with uncrimped staples) or pinned to the base soil to prevent seam openings during the installation process.

Repairing: Irregular shapes, cuts or tears in installed CLAYMAX LC™ are easily accommodated by covering such areas with sufficient CLAYMAX™ to provide a 6-inch overlap on all adjoining CLAYMAX™. These repair pieces should be pinned in place to hold the material until cover material has been placed.

Covering: Cover material (no more than 6-12 inches of aggregate or backfill) should be applied as roll "runs" are completed to afford maximum protection against damage from personnel or equipment. Correctly installed, CLAYMAX™ is sufficiently resilient to support installation personnel. Care should be exercised to prevent seam damage or "run" slippage, and backfill should always be pushed forward with equipment operating on the backfill. Cover material (other than aggregate) should be compacted after placement.

Handling Suggestions: CLAYMAX LC™ MUST be pulled from the top of the roll and installed polypropylene side UP (stencilled

CLAYMAX™ this side). The liner can be either pulled from a roll suspended at the top of a slope or the free end may first be secured and the suspended roll can be backed down the slope and across the excavation by the supporting vehicle. Suspending and unrolling CLAYMAX LC™ is facilitated by inserting a heavy-duty 3-inch diameter steel pipe through the 3½ inch roll core on which CLAYMAX™ is shipped. This pipe should be 16 or 17 feet long to accommodate the hoisting chains from the lifting vehicle which may be wheeled power equipment with either forks or front-end bucket. A spreader bar may be required to ensure roll clearance and to prevent damage to roll edges.

Installation Precautions: CAUTION—*CLAYMAX LC™ should not be installed in standing water or while heavy rain is falling.

6. AVAILABILITY AND COST

Availability: CLAYMAX LC™ liquid containment system is available through a worldwide network of distributors and approved installers. Contact the manufacturer, or your local CLAYMAX LC™ representative, to order.

Cost: Material cost will vary depending on such factors as "point-of-use location." For current cost information, contact your local CLAYMAX™ representative. For the name, address and

telephone number of the representative in your area, contact the manufacturer.

7. WARRANTY

CLAYMAX LC™ waterproofing system is normally warranted by the installing contractor who can make specific details available upon request.

8. MAINTENANCE

No maintenance is required when CLAYMAX LC™ is installed in accordance with the manufacturer's instructions; however, the protective cover layer (backfill) must be maintained and repaired as necessary.

9. TECHNICAL SERVICES

Clem Environmental Corporation (CEC), will provide, on request, necessary technical assistance in the evaluation of installation applicability. On-site installation assistance is also available from the manufacturer.

10. FILING SYSTEMS

SPEC-DATA® II

Sweet's 02770/AIM, Buyline 3526

Additional information is available from the manufacturer upon request.

The information and recommendations contained herein are based on data which is believed to be reliable but all such information and recommendations are given without guarantee or warranty.

2.0 PLAN FOR INSTALLING LINER SYSTEM

2.1 Limits for Placement of Liner

The liner will be installed as shown on the excavation drawings and to the limits defined in the anchor trench detail (see Detail 7, Figure 30). The distance from the edge of waste for areas to receive future liner extensions is 25 feet as shown in the interim berm detail (see Detail 6, Figure 30). The edge of the liner is protected utilizing plywood, a protective HDPE layer, and protective soil cover as shown in the detail.

For the perimeter berm (outer edge of liner), a minimum distance of 15 feet is maintained between the waste and end of the liner (see Detail 7, Figure 30). The edge of the liner will be marked using surveying stakes.

2.2 Subbase

Following the preparation of the subgrade, a minimum 6 inch-thick layer of subbase materials will be placed. All areas will be excavated a minimum of 12-inches for topsoil removal. Once all unsuitable materials have been removed, each area will be proof-rolled, and following approval of the surface by the engineer, the subgrade will be filled to a depth of 6-inches below the grades shown on the excavation drawings.

The subbase layer will then be constructed using sandy soils obtained from the Turkey Hill Borrow Area and approved by the engineer. The Borrow soil will be placed and spread in 6- to 9- inch thick loose lifts. The subbase lift will then be compacted to at least 95 percent of its Standard Proctor maximum dry density. The compaction operations will be controlled by performing periodic field density determinations and comparing the results with appropriate Standard Proctor moisture-density relationships

that will also be obtained during construction. The subbase layers will be placed and compacted until the surface reaches the bottom grade shown on the excavation drawings.

The material used for the subbase will be the granular with no particles larger than 1/2 inch. Compaction will be performed by vibratory roller, or equal equipment. The resulting subbase will be smooth and free of debris, rock, plant materials, and other foreign material. Density tests and gradation tests will be done during construction at the frequency given in Form 23 in Section 1.0 of this Application.

The sump locations are the lowest elevation point in each of the cells. The bottom of the subbase at each cell's sump location has been positioned to be at least 8-feet above the seasonal high groundwater elevation and at least 8-feet above the regional groundwater elevation. The groundwater elevations used to set this low point were determined from wells and piezometers (see Figure 3-12).

From the sump point, the subbase is graded to maintain a minimum 2 percent slope. The maximum slope occurs at the interim berms at 50 percent (2 horizontal to 1 vertical), see Form 38, Request for Equivalency in Section 11.0.

2.3 Liners

The HDPE double liner system will be constructed at the locations shown on the excavation drawings. Construction will conform with the guidelines set forth in Waste Management of North America, Inc.'s (WMNA) "Specification Guidelines for the Procurement and Installation of Geosynthetic Lining Systems," dated June 1986, and all other applicable manufacturer's recommendations. A brief

summary of the proposed construction guidelines is presented below:

- o The liner installation contractor will be approved and/or licensed by the geomembrane manufacturer, and have the necessary personnel and equipment to perform the work.
- o All personnel performing field liner seaming will be qualified by experience or by passing field seaming tests. A master seamer, having at least 1,000,000 square feet of seaming experience, must be present during all seaming operations.
- o Geomembrane placement will not proceed when the ambient air temperature is below 40°F (unless other authorized), or in the presence of excessive moisture (e.g., precipitation, fog, dew, ponded water, etc.), or in the presence of excessive winds.
- o The liner installation contractor will take precautions to avoid damage to the geomembrane during placement. The geomembranes will be placed to minimize wrinkles, and will be sufficiently loaded and/or anchored (e.g., sandbags, tires, etc.) to prevent uplift by wind. Any geomembrane panels damaged during placement or subsequent activities will be repaired or replaced.
- o Field seams will be orientated parallel to (down) slopes, and will not be located in areas of potential stress concentrations to the extent possible. Adjacent geomembrane panels will be overlapped a sufficient distance to permit peel tests to be performed on all field seams. Typical minimum overlap limits are 3-inches for extrusion-welded seams and 5-inches for fusion-welded seams.
- o Field seams will be joined by extrusion or fusion welds, using only equipment and materials specifically approved. Prior to seaming the entire seam area will be free of moisture, dirt, dust, foreign material, and debris of any kind.

QA/QC observations and testing during all HDPE liner installations will be performed in accordance with the

"Quality Assurance Manual for the Installation of Geosynthetic Lining Systems" prepared by WMNA and dated June 1986. All manufacturer's recommendations and installation procedures, in addition to the details presented in the drawings will be followed. Also, refer to Part III of this section for details of the QA/QC Plan.

The HDPE liners required for the landfill expansion will be installed by a contractor experienced in HDPE liner installation and licensed to perform installations by the liner manufacturer. An independent QA/QC inspector will be retained to oversee the HDPE liner installations to assure conformance with WMNA guidelines. In addition, a representative from the liner manufacturer will supervise the installation to assure conformance to manufacturer's specifications. A brief summary of the proposed QA/QC inspection procedures is presented below:

- o Individual HDPE liner rolls will be inspected as they are unrolled for sheet thickness and the presence of blemishes or irregularities.
- o All field seams will be non-destructively tested throughout their entire length to demonstrate water-tightness. In addition, test specimens (coupons) will be removed from the field seams at specified intervals for destructive testing. Each specimen will be tested to determine the bonded seam strength.
- o All areas requiring repair and/or cap strip placement will be rewelded under the observation of the QA/QC inspector and be non-destructively tested to assure water-tightness.
- o An independent QA consultant will be retained to observe and document the geomembrane installation to assure that the geosynthetic liner system is properly constructed. Final acceptance of the geosynthetic liner system will be based on certification by the QA consultant that the geosynthetic materials have been properly installed.

Following approval of a lined area by the QA/QC inspector, overlying layers of geosynthetic or soil materials will be placed.

2.4 Leachate Detection and Collection Zones

The leachate detection zone will be constructed above the secondary liner. This drainage system will consist of a geonet over the floor and side slopes of the cell.

Installation of a geonet will follow Waste Management's "Specific Guidelines for the Procurement and Installation of Geosynthetic Lining Systems," and is summarized below:

- o Generally, geonets shall be installed in such a manner to minimize wrinkles. To achieve this, anchor trenches, sand bags, and hand positioning shall be utilized.
- o Dirt, excessive dust or stones shall be prevented from becoming entrapped in the geonet. Dirt or excessive dust shall be swept and hosed clean prior to placement of the next component.
- o Geonets shall not be welded to geomembranes unless otherwise specified.
- o Geonets shall only be cut with scissors.

When joining adjacent geonets according to construction drawings and specifications. As a minimum the following minimum requirements shall be met:

- o Adjacent rolls shall be overlapped by at least 4-inches.
- o These overlaps shall be secured by spot welding or tying.
- o Tying can be achieved by strings, plastic fasteners, or polymer braid. Tying devices shall be white or yellow for easy inspection. Metallic devices are not allowed.

- o Spot welding or tying shall be every 5-feet along the slope, every 2-feet across the slope, and every 6-inches in the anchor trench.
- o In the corners of the side slopes or rectangular landfill, where overlaps between perpendicular geonet strips are required, an extra layer of geonet shall be unrolled along the slope, on top of the previously installed geonets, from top to bottom of the slope.
- o When more than one layer of geonet is installed, joints shall be staggered.

Any holes or tears in the geonet shall be patched. The patch shall extend 2-feet beyond the edges of the hole or tear and be secured to the original geonet by spot welding or tying every 6-inches. If the tear or hole width across the roll is more than 50 percent the width of the rolls, the damaged area shall be cut out and the two remaining portions joined as specified above.

An inclined up-slope HDPE riser will extend from the sump to the top of the perimeter berm. The riser will be perforated in its end to permit entry of liquids. If steady-state flow occurs in quantities sufficient to make removal with a vacuum truck unfeasible, a submersible well pump with automatic on/off sensors will be installed. Details are shown on Figure 26.

2.5 Protective Cover

The protective cover/primary leachate collection system will consist of a minimum 18-inch thick layer of fine gravel and 6-inch thick layer of select free draining material with an incised coarse gravel and perforated pipe drain network (Figure 27). The side slopes will consist of geonet drainage system constructed in the same manner as outlined in Part D of this Narrative.

During construction, the granular material used in the primary leachate collection system will be tested per the schedule in the Form 23 (located in Section 1.0 of the Phase I Application).

The pipe drains will consist of 6-inch-diameter laterals and Schedule 80 PVC laterals spaced on 100-foot centers which will connect into an 8-inch-diameter Schedule 80 PVC central collector pipe (see Figure 28). The minimum slope on the pipes will be two percent. The pipes will connect to an up-slope riser which is contained within the lined area. Pipe spacing has been selected so that the hydraulic head required for the anticipated leachate flow will remain well below 12-inches for average conditions. The proposed drainage system layout is shown in the excavation drawings. The up-slope riser detail and drainage material gradation requirements are shown on Figures 25 and 26.

The up-slope risers will be equipped with submersible pumps which will automatically turn on and shut off to minimize head buildup on the liner. The liquids will be conveyed from the risers to a forcemain perimeter header line. The disposition of the collected leachate is discussed in Section 5.0 of the Phase II Application.

2.6 Final Cover and Grading

2.6.1 Clay Cap

In the 3 hor.:1 ver. portions of the final cover the final cover will consist of a 12-inch-thick compacted clay layer, a 6-inch drainage layer, and a 24-inch-thick vegetative cover layer (see Detail 18, Figure 32). Both the compacted soil layer and the vegetative cover layer will be constructed from fill obtained onsite or from the Turkey Hill Borrow Area. The 12-inch intermediate cover layer may be constructed prior to final cover construction.

The 12-inch thick compacted clay cover will be constructed from clay soils obtained at the Turkey Hill Borrow Area or other sources. The layer will be constructed in a series of compacted lifts, each with a maximum thickness of 8-inches prior to compaction. Soil moisture will be modified as necessary to bring the moisture content to about -1 percent and +3 percent of optimum moisture. Each clay lift will be compacted utilizing a sheepsfoot (or similar acting) roller to at least 95 percent of its Standard Proctor maximum dry density. The compaction operations will be monitored by performing periodic field density determinations and comparing the results with appropriate Standard Proctor moisture-density relationships also obtained during construction. Refer to the QA/QC Plan Part II in this section. The clay cover fill will provide a continuous smooth compacted surface with placement of the final lift.

Following completion of the clay cover layer, a 6-inch drainage layer will be installed above the 1-foot clay cover. The vegetative cover soils (24-inch) will be placed above the drainage layer. The vegetative cover soils will be spread in up to 12-inch loose lifts and lightly compacted to the grades shown on the drawings. The surface of the vegetative cover soils will be furrowed parallel to the final cover slopes to minimize erosion potential and maximize moisture retention. The vegetative cover soils will be properly prepared and vegetated in as short a time as practical following placement. Fertilizer and/or limestone will be applied and incorporated into the soil as necessary. The surface will then be seeded and mulched as outlined in Section 4.0, Form 16.

2.6.2 Synthetic Cap

The top, low-slope portion of the landfill will be capped with a synthetic liner and a geonet will serve as the drainage layer. See Section 2.3 and 2.4 for the procedures to be used.

Final cover will be placed as soon as practical after the working areas reach final grades. The final cover will be placed in any case, within one year of attaining final refuse elevation. Sequencing of the final cover will correspond to the staging of the landfill as discussed in Section 1.0.

The benches will be constructed in the final cover as shown in Figure 4 and 5. The bench will be constructed to maintain the minimum cover with Mirimat lined or grass-lined ditches to prevent erosion into the cover.

3.0 QUALITY ASSURANCE PLAN FOR CONSTRUCTION AND
INSTALLATION OF LINERS

3.1 Qualifications of Independent QA Personnel (describe
experience and training)

The Geosynthetic Quality Assurance Consultant will be a well-established engineering firm incorporated (or otherwise registered) in the United States. The Geosynthetic Quality Assurance Consultant will hold: an "umbrella" coverage as required by statute and/or contractual agreement. The Geosynthetic Quality Assurance Consultant will be experienced with geosynthetics, including geomembranes, geonets, geogrids, and geotextiles. The Geosynthetic Quality Assurance Consultant will be experienced in the preparation of quality assurance documentation, including quality assurance forms, reports, certifications, and manuals.

The Geosynthetic Quality Assurance Consultant will provide the following, in writing to the Owner:

- o Corporate background and information.
- o Proof of "umbrella" insurance coverage as required by statute and/or proposed contractual agreement.
- o Quality assurance capabilities:
 - a summary of the firm's experience with geosynthetics, including geomembranes, geonets, geogrids, and geotextiles
 - a summary of the firm's experience in quality assurance, including installation quality assurance of geomembranes, geogrids, geonets, and geotextiles
 - a summary of quality assurance documentations and methods used for the firm, including sample quality assurance forms, reports, certifications, and manuals prepared by the firm.

The Geosynthetic Quality Assurance Engineer will hold at least a B.S. engineering degree and be registered as a Professional Engineer in the state in question. He shall also comply with the experience requirements listed for the Geosynthetic Quality Assurance Consultant. The Geosynthetic Quality Assurance Engineer will also be specifically experienced in the installation of geosynthetics and will be trained and certified by the Geosynthetic Quality Assurance Consultant in the duties and responsibilities associates with geosynthetic quality assurance. Some of the duties of the Geosynthetic Quality Assurance Engineer may, in some cases, be assigned to another individual who is assigned as the full-time onsite resident manager in charge of the Quality Assurance Monitors. In such cases, this onsite manager will meet the installation-related experience requirements listed for the Geosynthetic Quality Assurance Engineer. Geosynthetic Quality Assurance Monitors will be quality assurance personnel who have been specifically trained in quality assurance of geosynthetics.

The Geosynthetic Quality Assurance Consultant will provide the following, in writing, to the Owner:

- o Resumes of personnel to be involved in the project including the Geosynthetic Quality Assurance Engineer, the onsite manager (if different than the Geosynthetic Quality Assurance Monitors.
- o Proof of professional registration (or ability to be registered) in the project state of the engineer to be designated the Geosynthetic Quality Assurance Engineer, as well as proof of B.S., M.S., or Ph. D. engineering degree.
- o Proof of quality assurance experience of quality assurance personnel with emphasis on geomembranes, geonets, geotextiles, and geogrids.

3.2 Quality Assurance for Subbase

The following procedures will be used during construction:

- a. Laboratory and field testing will be done in accordance with the schedule shown in Form 23 in Section 1.0 of the Phase II Application.
- b. The Construction Quality Assurance (CQA) Monitor will inspect the subbase construction.
- c. Compaction will be performed by a vibratory roller, or equal equipment, to a dry density equal to or greater than 95 percent of the maximum dry density obtained in a Standard Proctor compaction test. The resulting subbase will be smooth and free of debris, rock, plant materials, and other foreign material.
- d. The CQA Monitor will survey representative lifts to ensure that facility dimensions, side slopes, and bottom slopes are as specified in the design. The final subbase configuration will be surveyed by a registered land surveyor.
- e. Upon completion of the subbase layer, the Geosynthetic liner installer will provide a certification of acceptance of the surface preparation to the Geosynthetic Quality Assurance Monitor prior to the liner system installation. This certification will accompany the monitor's daily field notes from the subbase construction phase.

3.3 Quality Assurance of Synthetic Liners

The following procedures will be used during liner placement. Additional details are provided in Attachment G.

- a. Prior to installation of any geomembrane material, the manufacturer will provide the project manager and the Geosynthetic Quality Assurance Consultant with the following information:
 - o The origin (resin supplier's name, resin production plant) identification (brand name, number), and production date of the resin
 - o A copy of the quality control certificates issued by the resin supplier
 - o Reports on the tests conducted by the manufacturer and/or the Geosynthetic Quality Assurance Laboratory to verify the quality of the resin used to manufacture the geomembrane rolls assigned to the considered facility (these tests should include specific gravity ASTM D7921 Method A or ASTM D1505) and melt index (ASTM D1238 Condition 190/2.16)
 - o A statement that no reclaimed polymer is added to the resin (however, the use of polymer recycled during the manufacturing process may be permitted if done with appropriate cleanliness and if recycled polymer does not exceed 2 percent by weight)

In addition, the Geosynthetic Quality Assurance Monitor will inspect the material delivery and "spotting" unloading and onsite transport and storage; onsite conformance testing to verify thickness of geomembranes and geonets; and all placement operations.

b. The Geosynthetic Quality Assurance Consultant will verify that:

- o A qualified land surveyor has verified all lines and grades
- o A qualified geotechnical engineer, normally the soils quality assurance consultant has verified that the supporting soil meets the density specification.
- o The surface to be lined has been rolled and compacted so as to be free of irregularities, protrusions, loose soil, and abrupt changes in grade
- o The surface of the supporting soil does not contain stones that may be damaging to the geomembrane
- o There is no area excessively softened by high water content

The installer will certify in writing that the surface on which the geomembrane will be installed is acceptable. The certificate of acceptance will be given by the installer to the project manager prior to commencement of geomembrane installation in the area under consideration. The Geosynthetic Quality Assurance Consultant will be given a copy of this certificate by the project manager.

c. The Geosynthetic Quality Assurance Consultant will observe the following:

- o Any equipment used does not damage the geomembrane by handling, trafficking, excessive heat, leakage of hydrocarbons, or other means

- o The prepared surface underlying the geomembrane has not deteriorated since previous acceptance, and is still acceptable immediately prior to geomembrane placement
- o Any geosynthetic elements immediately underlying the geomembranes are clean and free of debris
- o All personnel working on the geomembrane do not smoke, wear damaging shoes, or engage in other activities that could damage the geomembrane
- o The method used to unroll the panels does not cause scratches or crimps in the geomembrane and does not damage the supporting soil
- o The method used to place the panels minimizes wrinkles (especially differential wrinkles between adjacent panels)
- o Adequate temporary loading and/or anchoring (e.g., sand bags, tires), not likely to damage the geomembrane, has been placed to prevent uplift by wind (in case of high winds, continuous loading, e.g., by adjacent sand bags, is recommended along edges of panels to minimize risk of wind flow under the panels)
- o Direct contact with the geomembrane is minimized (i.e., the geomembrane is protected by geotextiles, extra geomembrane, or other suitable materials in areas where excessive traffic may be expected)

The Geosynthetic Quality Assurance Manager will inform the project manager if the above conditions are not fulfilled.

- d. Geomembrane placement will not proceed at an ambient temperature below 40°F (5°C) unless otherwise authorized. Geomembrane placement will not be done 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.

The Geosynthetic Quality Assurance Consultant will verify that the above conditions are fulfilled. Additionally, the Geosynthetic Quality Assurance Consultant will check that the supporting soil has not been damaged by weather conditions.

The Geosynthetic Quality Assurance Manager will inform the project manager if the above conditions are not fulfilled.

- e. The anchor trench will be excavated by the earthwork contractor (unless otherwise specified) to the lines and widths shown on the design drawings, prior to geomembrane placement. The Geosynthetic Quality Assurance Consultant will verify that the anchor trench has been constructed according to design drawings.
- f. The Geosynthetic Quality Assurance Consultant will verify that field panels are installed at the location indicated on the designer's layout plan, as approved or modified.

Field panels may be installed using any one of the following schedules:

- All field panels are placed prior to field seaming (in order to protect the subgrade from erosion by rain)

- Field panels are placed one at a time and each field panel is seamed immediately after its placement (in order to minimize the number of unseamed field panels exposed to wind)
 - Any combination of the above
- g. The Geosynthetic Quality Assurance Consultant will inspect each panel, after placement and prior to seaming, for damage. The Geosynthetic Quality Assurance Manager will advise the project manager which panels, or portions of panels, should be rejected, repaired, or accepted. Damaged panels or portions of damaged panels that have been rejected will be marked and their removal from the work area recorded by the Geosynthetic Quality Assurance Consultant.
- h. Approved processes for field seaming are extrusion welding and fusion welding. The Geosynthetic Quality Assurance Consultant will log apparatus temperatures, ambient temperatures, and geomembrane surface temperatures at appropriate intervals for the extrusion welding apparatus. Also, the Geosynthetic Quality Assurance Consultant will log ambient, seaming apparatus, and geomembrane surface temperatures as well as seaming apparatus pressures for the fusion welding apparatus.

After the entire liner seaming is complete, the Geosynthetic Quality Assurance Consultant will verify that the seaming procedures were done according to the specifications.

- i. The Geosynthetic Quality Assurance Consultant will observe all non-destructive seam continuity testing and all destructive seam testing. Destructive samples are collected and tested for seam strength at the Geosynthetic Quality Assurance Laboratory. The results of the tests are then presented to the consultant before covering the liner.
- j. Upon completion of the synthetic liner system installation, the geosynthetic monitor will review all of the field notes and test results. Barring discrepancies from the design specifications and no outstanding failed panels, seams, etc. that have yet to be repaired, the Geosynthetic Quality Assurance Monitor will inform the CQA Monitor to proceed with the next phase of construction.

3.4 Quality Assurance of Protective Cover

The following procedures will be used during placement of the protective cover.

- a. Samples will be taken and analyzed in accordance with the schedule shown in Form 23 in Section 1.0 of the Phase II Application.
- b. Continuous inspection by the Geosynthetic Quality Assurance Monitor will minimize the potential for damage to the synthetic liner.
- c. Equipment used for placing a granular material will not be driven directly on the geomembrane. A minimum thickness of eighteen inches of granular material is specified between

construction equipment and the geomembrane. In heavily trafficked areas, such as access ramps, granular material should be at least three feet.

- d. The CQA Monitor will conduct a survey of the protective liner in order to document that the entire 24 inches of protective cover has been placed over the entire lined area.
- e. The CQA Monitor will review the field notes and verify that the cover extends to and beyond the liner limits.

3.5 Quality Assurance of the Leachate Collection Systems

- a. Continuous inspection and periodic surveying by the CQA Monitor will ensure that the pipes are placed in the specified locations and at the specified grades, respectively.
- b. Testing of pipe joints and testing of solid wall pipes will be made by the contractor under the inspection of the CQA Monitor.
- c. The Geosynthetic Quality Assurance Consultant will verify that the geotextiles were installed to the limits indicated in the designer's layout plan. In addition, the Geosynthetic Quality Assurance Consultant and fabricator will verify that adequate seaming and overlapping of the geotextiles were accomplished to satisfy the Geosynthetic Quality Assurance Plan. Finally, the Geosynthetic Quality Assurance Monitor will continuously inspect the installation to assure no damage to the synthetic layers and geotextiles has occurred during construction.

- d. THE CQA Monitor will verify that the structures are as designed by taking appropriate measurements and noting the material with which it is constructed.
- i. The mechanical and equipment installation will be inspected by the CQA Monitor to ensure that the equipment is installed in accordance with the design specifications and manufacturer's recommendations. The equipment manifests will be checked by the CQA Monitor to ensure that the equipment brought to the site is as the design specified.

3.6 Quality Assurance of the Final Cover System

- a. The final cover foundation will be proof-rolled, prior to placement of the final cover, under the inspection of the CQA Monitor.
- b. Lab testing will be done in accordance with the procedures outlined in the Form 23 in Section 1.0 of the Phase II Application.
- c. The CQA Monitor will continuously monitor the cover system construction to ensure it is constructed to the designer's specifications.
- d. The CQA Monitor will continuously inspect the drainage layer and collection system construction in order to verify that the dimensions and slopes are as the design specified.
- e. The CQA Monitor will continuously inspect the 2-foot soil cover layer construction. Since this layer will be constructed in one lift,

overcompaction will not be a concern. Random elevation checks will be conducted by the CQA Monitor to verify the thickness and slope of the cover is what the designer specified.

- f. The CQA Monitor will continuously inspect the 2-foot soil cover seeding process to ensure it is carried out according to the design specifications. The CQA Monitor will document the tilling depth, application rate of additives, and equipment used. The seeding process will occur during adequate growing conditions.

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BORROW MATERIAL

REQUIRED FOR LANDFILL CONSTRUCTION
TRAIL RIDGE LANDFILL - PLAN "A"

CLASS I LANDFILL

* Final Cover (24") $254,750 \text{ CY/FT} \times 2 \text{ FT} = 509,500 \text{ CY}$

Daily and intermediate cover (10)% $21,829,350 \text{ CY} \times 10\% = 1,182,935 \text{ CY}$

*This is wrong
but the right
value was used
to obtain this anyway*

2,692,435 CY

CLASS III LANDFILL

* Final Cover (24") $45,750 \text{ CY/FT} \times 2 = 91,500 \text{ CY}$

Weekly Cover (5%) $2,200,350 \text{ CY} \times 5\% = 110,017 \text{ CY}$

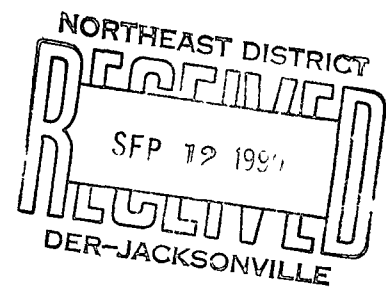
201,517 CY

TOTAL BORROW REQUIRED $2,893,952 \text{ CY}$

**** TOTAL BORROW PROVIDED** $3,110,300 \text{ CY}$

* Clay portion of cap shall be imported from off-site.

** See Trail Ridge Landfill - Excavation Volumes Calculations



APPENDIX IX

**HELP MODEL, SUMMARY
(REVISED 9-11-90)**

LEACHATE COLLECTION PERFORMANCE

The performance of the proposed landfill was analyzed by using a widely used computer model, HELP. The HELP Model, Hydrologic Evaluation of Landfill Performance, (Schroeder et al. 1984a; 1986b) performs a sequential daily analysis to determine runoff, evapotranspiration, percolation and lateral drainage from the landfill to obtain daily, monthly, and annual water balances. The model was developed by the U.S. Army Engineers Waterway Experiment Station, Vicksburg, Mississippi for the U. S. Environmental Protection Agency.

Analysis of the Trail Ridge project consisted of two parts. The first involved the evaluation of the liner system to meet current Florida Department of Environmental Regulation (FDER) rules of not allowing the hydraulic head on the liner to be more than 1 inch. This type of constraint necessitated the use of a synthetic geodrain directly above the two 60 mil liners to facilitate rapid lateral drainage of leachate to the collection system. By using this material, which exhibits high flow capacity, the peak daily hydraulic head has been calculated to be 0.0088 inch on the primary liner. This was based on a worst case scenario of 6 feet of municipal waste with 6 inches of cover, with no rainfall being allowed to be diverted outside of the leachate collection system.

As stated above, Analysis No. 1 consisted of modeling the worst case scenario to determine the maximum depth of hydraulic head anticipated on the primary liner system. Eight layers were used in the HELP Model.

- | | |
|------------------------|---|
| <u>LAYER ONE (TOP)</u> | - 6" Daily Cover
VERTICAL PERCOLATION LAYER
Soil Texture Class No. 5 adjusted
for compaction |
| <u>LAYER TWO</u> | - 6' compacted municipal waste
VERTICAL PERCOLATION LAYER
Soil Texture Class No. 18 |
| <u>LAYER THREE</u> | - 2' soil blanket over liner
VERTICAL PERCOLATION LAYER
Soil Texture Class No. 5 adjusted
for compaction |

LAYER FOUR

- Geodrain
LATERAL DRAINAGE LAYER
Transmissivity $1.1 \times 10^{-3} \text{ m}^2/\text{sec}$
Thickness = 0.22 in.
Porosity 0.700 vol/vol
Field Capacity 0.045 vol/vol - Soil
Texture Class No. 1
Wilting Point 0.02 vol/vol - Minimum
Value
National Seal Company PN 3000
7000 PSF Loading

LAYER FIVE

- 60 mil HDPE liner with Geodrain
FLEXIBLE MEMBRANE LINER WITH BARRIER
SOIL LINER

LAYER SIX

- Geodrain
LATERAL DRAINAGE LAYER

LAYER SEVEN

- 60 mil HDPE with Claymax
FLEXIBLE MEMBRANE LINER WITH BARRIER
SOIL LINER
Soil Texture Class No. 17

LAYER EIGHT

- 6" compacted base
VERTICAL PERCOLATION LAYER
Soil Texture Class No. 15 adjusted
for compaction

RESULTS OF ANALYSIS ONE

By setting the Liner Leakage Eraction for Layer Five (Primary Liner) equal to zero, the head from Layer Four's lateral drainage was computed to be $2.2 \times 10^{-4} \text{ m}$ (0.0088 in). Once this maximum head was established, the leakage rate was determined for one hole ($1 \times 10^{-5} \text{ M}^2$) per acre. This rate was 9 GPAD. For conservative measures the leakage rate was also calculated based upon the geodrain being completely saturated. This provided a leakage rate of 46 GPAD.

The second analysis used 11 layers with the bottom 6 layers being the same as the bottom 6 layers of analysis #1 but the top layers have been added to reflect the final cover design incorporated in the proposed construction drawings.

LAYER ONE (TOP)

- 6" top soil
VERTICAL PERCOLATION LAYER
Soil Texture Class No. 5

LAYER TWO

- 18" compacted soil
LATERAL DRAINAGE LAYER
Soil Texture Class No. 5 adjusted for
compaction

LAYER THREE

- 12" clay
BARRIER SOIL LINER
Soil Texture Class No. 16

LAYER FOUR

- 12" intermediate soil cover
VERTICAL PERCOLATION LAYER
Soil Texture Class No. 5 adjusted for
compaction

LAYER FIVE

- 100' compacted municipal waste
VERTICAL PERCOLATION LAYER
Soil Texture Class No. 18

LAYER SIX

- 2' soil blanket over liner
VERTICAL PERCOLATION LAYER

LAYER SEVEN

- Geodrain
LATERAL DRAINAGE LAYER

LAYER EIGHT

- 60 mil HDPE flexible membrane liner
and Geonet
FLEXIBLE MEMBRANE LINER WITH BARRIER
SOIL LINER

LAYER NINE

- Geodrain
LATERAL DRAINAGE LAYER

LAYER TEN

- 60 MIL HDPE flexible membrane liner with
Claymax
FLEXIBLE MEMBRANE LINER WITH BARRIER
SOIL LINER

LAYER ELEVEN

- 6" Compacted base
VERTICAL PERCOLATION LAYER

RESULTS OF ANALYSIS TWO

By setting the Liner Leakage Fraction for Layer Eight (Primary Liner) equal to zero, no head from Layer Seven's lateral drainage was exhibited. Conclusion: The leachate is absorbed in the upper layers.

NOTE: Rainfall data entered was based on twenty year data as provided by FDER.

PROJ NAME TRAIL RIDGE - PLAN "A"PROJ NO 89-113-9LEAKAGE RATE CALCULATIONS FOR LINER ANALYSIS

LATERAL DRAINAGE FROM LAYER 4 (PER H.E.L.P. MODEL)

LARGEST AVERAGE MONTHLY VALUE (SEPT.) = 4.0533 IN/MTH

AVERAGE ANNUAL TOTAL = 16.9584 IN/YEAR

$$4.0533 \text{ IN/MTH} > 16.9584 \text{ IN/YR}$$

$$4.0533 \text{ IN/MTH} = 3.9 \times 10^{-8} \text{ M/SEC}$$

$$Q (\text{IMPINGEMENT RATE}) = \underline{3.9 \times 10^{-8} \text{ M/SEC}}$$

$$H = L \left(\sqrt{\frac{Q}{K} + \tan^2 \beta} - \tan \beta \right)$$

H = HEAD ON PRIMARY DRAINAGE LAYER

Q = IMPINGEMENT RATE ($3.9 \times 10^{-8} \text{ M/SEC}$)K = HYDRAULIC CONDUCTIVITY OF GEODRAIN ($19.6 \text{ cm/SEC} \approx 0.2 \text{ M/SEC}$) $\tan \beta$ = BASE SLOPE (2% = 0.02)L = DRAINAGE LENGTH (150 FT = 45.72 M \approx 46 M)

$$H = 46 \left(\sqrt{\frac{3.9 \times 10^{-8}}{0.2} + (0.02)^2} - 0.02 \right)$$

$$= 0.00022 \text{ M}$$

$$= \underline{0.0088 \text{ IN}}$$



PROJ NAME TRAIL RIDGE

PROJ NO 89-113-9

ASSUMPTION: 1 HOLE/AC

$$AREA = 0.1 \text{ cm}^2 = 1 \times 10^{-5} \text{ m}^2$$

$$Q = 0.6 A \sqrt{2gH}$$

Q = LEAKAGE RATE THROUGH PRIMARY LINER

A = AREA OF HOLE ($1 \times 10^{-5} \text{ m}^2$)

$$g = 9.8 \text{ m/sec}^2$$

H = HEAD ($2.2 \times 10^{-4} \text{ m}$ - SEE PREVIOUS SHEET)

$$Q = 0.6 (1 \times 10^{-5}) \sqrt{2(9.8)(2.2 \times 10^{-4})}$$

$$= 3.94 \times 10^{-7} \text{ m}^3/\text{SEC}/\text{HOLE}$$

$$3.94 \times 10^{-7} \text{ m}^3/\text{SEC}/\text{HOLE} \times 1 \text{ HOLE}/\text{AC} \times 1 \text{ AC}/4047 \text{ m}^2$$

$$Q = 9.74 \times 10^{-11} \text{ m}^3/\text{SEC}$$

$$Q = 9 \text{ GAL}/\text{AC}/\text{DAY}$$

FOR CONSERVATIVE MEASURES, ASSUME THE GEODRAIN IS SATURATED.
HEAD ON PRIMARY LINER = 0.22 IN = 0.0058 M

$$Q = 0.6 (1 \times 10^{-5}) \sqrt{2(9.8)(0.0058)}$$

$$= 2.02 \times 10^{-6} \text{ m}^3/\text{SEC} \div 4047$$

$$= 5.0 \times 10^{-10} \text{ m}^3/\text{SEC}$$

$$Q = 46.2 \text{ GAL}/\text{AC}/\text{DAY}$$

TRAIL RIDGE LANDFILL (PLAN A) - FINAL COVER ANALYSIS (2% SLOPE)
TYPE I SOLID WASTE
E89 - 113 - 9 SEPTEMBER 7, 1990

FAIR GRASS

LAYER 1

VERTICAL PERCOLATION LAYER

THICKNESS	=	6.00 INCHES
POROSITY	=	0.4570 VOL/VOL
FIELD CAPACITY	=	0.1310 VOL/VOL
WILTING POINT	=	0.0580 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0653 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0010000000475 CM/SEC

LAYER 2

LATERAL DRAINAGE LAYER

THICKNESS	=	18.00 INCHES
POROSITY	=	0.3573 VOL/VOL
FIELD CAPACITY	=	0.1128 VOL/VOL
WILTING POINT	=	0.0580 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0635 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0007999999798 CM/SEC
SLOPE	=	2.00 PERCENT
DRAINAGE LENGTH	=	850.0 FEET

LAYER 3

BARRIER SOIL LINER

THICKNESS	=	12.00 INCHES
POROSITY	=	0.4300 VOL/VOL
FIELD CAPACITY	=	0.3660 VOL/VOL
WILTING POINT	=	0.2800 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.2886 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0000001000000 CM/SEC

LAYER 4

VERTICAL PERCOLATION LAYER

THICKNESS	=	12.00 INCHES
POROSITY	=	0.3573 VOL/VOL
FIELD CAPACITY	=	0.1128 VOL/VOL
WILTING POINT	=	0.0580 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0635 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0007999999798 CM/SEC

LAYER 5

VERTICAL PERCOLATION LAYER

THICKNESS	=	1200.00 INCHES
POROSITY	=	0.5200 VOL/VOL
FIELD CAPACITY	=	0.2942 VOL/VOL
WILTING POINT	=	0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1554 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0001999999949 CM/SEC

LAYER 6

VERTICAL PERCOLATION LAYER

THICKNESS	=	24.00 INCHES
POROSITY	=	0.3573 VOL/VOL
FIELD CAPACITY	=	0.1128 VOL/VOL
WILTING POINT	=	0.0580 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0635 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0007999999798 CM/SEC

LAYER 7

LATERAL DRAINAGE LAYER

THICKNESS	=	0.22 INCHES
POROSITY	=	0.7000 VOL/VOL
FIELD CAPACITY	=	0.0450 VOL/VOL
WILTING POINT	=	0.0200 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0225 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	19.6849994659424 CM/SEC
SLOPE	=	2.00 PERCENT
DRAINAGE LENGTH	=	150.0 FEET

LAYER 8

BARRIER SOIL LINER WITH FLEXIBLE MEMBRANE LINER

THICKNESS	=	0.22 INCHES
POROSITY	=	0.7000 VOL/VOL
FIELD CAPACITY	=	0.0450 VOL/VOL
WILTING POINT	=	0.0200 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0225 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	19.6849994659424 CM/SEC
LINER LEAKAGE FRACTION	=	0.00000000

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER	=	95.00
TOTAL AREA OF COVER	=	43560. SQ FT
EVAPORATIVE ZONE DEPTH	=	30.00 INCHES
UPPER LIMIT VEG. STORAGE	=	9.1734 INCHES
INITIAL VEG. STORAGE	=	1.5348 INCHES

SOIL WATER CONTENT INITIALIZED BY USER.

CLIMATOLOGICAL DATA

USER SPECIFIED RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR JACKSONVILLE FLORIDA

MAXIMUM LEAF AREA INDEX	=	3.30
START OF GROWING SEASON (JULIAN DATE)	=	37
END OF GROWING SEASON (JULIAN DATE)	=	4

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
-----	-----	-----	-----	-----	-----
53.20	55.10	61.30	67.70	74.10	79.00
81.30	81.00	78.20	69.50	60.80	54.80

— — — — —

[illegible]

100 101 102 103 104 105 106 107 108 109 110 111 112

STD. DEVIATIONS	1.70	2.18	2.39	2.31	2.48	2.07
	3.02	1.53	1.98	1.69	1.98	1.40

— — — — —

STD. DEVIATIONS	1.169	0.890	1.356	0.764	1.360	1.124
	1.260	0.637	1.764	0.790	0.542	0.778

• • • • •

STD. DEVIATIONS	0.437	0.506	0.594	2.039	1.619	1.048
	1.469	1.828	0.633	1.103	0.784	0.263

STD. DEVIATIONS	0.0050	0.0044	0.0039	0.0027	0.0000	0.0000
	0.0000	0.0000	0.0004	0.0003	0.0000	0.0010

10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1

STD. DEVIATIONS	0.0689	0.0600	0.0584	0.0405	0.0000	0.0000
	0.0000	0.0000	0.0187	0.0166	0.0000	0.0225

[illegible]

STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

PERCOLATION FROM LAYER 8

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 5

	(INCHES)	(CU. FT.)	PERCENT
PRECIPITATION	52.26 (6.568)	189711.	100.00
RUNOFF	16.139 (3.237)	58586.	30.88
EVAPOTRANSPIRATION	35.716 (4.029)	129650.	68.34
LATERAL DRAINAGE FROM LAYER 2	0.0144 (0.0127)	52.	0.03
PERCOLATION FROM LAYER 3	0.2553 (0.1675)	927.	0.49
LATERAL DRAINAGE FROM LAYER 7	0.0000 (0.0000)	0.	0.00
PERCOLATION FROM LAYER 8	0.0000 (0.0000)	0.	0.00
CHANGE IN WATER STORAGE	0.392 (2.182)	1423.	0.75

PEAK DAILY VALUES FOR YEARS 1 THROUGH 5

	(INCHES)	(CU. FT.)
PRECIPITATION	4.79	17387.7
RUNOFF	3.647	13239.3
LATERAL DRAINAGE FROM LAYER 2	0.0004	1.3
PERCOLATION FROM LAYER 3	0.0050	18.2
HEAD ON LAYER 3	5.7	
LATERAL DRAINAGE FROM LAYER 7	0.0000	0.0
PERCOLATION FROM LAYER 8	0.0000	0.0
HEAD ON LAYER 8	0.0	
SNOW WATER	0.00	0.0
MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.2253	
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.0579	

FINAL WATER STORAGE AT END OF YEAR 5

LAYER	(INCHES)	(VOL/VOL)
1	0.74	0.1241
2	1.47	0.0819
3	3.46	0.2886
4	1.70	0.1413
5	186.82	0.1557
6	1.53	0.0636
7	0.00	0.0225
8	0.00	0.0225
SNOW WATER	0.00	

TRAIL RIDGE LANDFILL (PLAN A) - LINER ANALYSIS (150 FT. CELL)
TYPE I SOLID WASTE
E89 - 113 - 9 SEPTEMBER 7, 1990

BARE GROUND

LAYER 1

VERTICAL PERCOLATION LAYER

THICKNESS	=	6.00 INCHES
POROSITY	=	0.3573 VOL/VOL
FIELD CAPACITY	=	0.1128 VOL/VOL
WILTING POINT	=	0.0580 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0635 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0007999999798 CM/SEC

LAYER 2

VERTICAL PERCOLATION LAYER

THICKNESS	=	72.00 INCHES
POROSITY	=	0.5200 VOL/VOL
FIELD CAPACITY	=	0.2942 VOL/VOL
WILTING POINT	=	0.1400 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.1554 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0001999999949 CM/SEC

LAYER 3

VERTICAL PERCOLATION LAYER

THICKNESS	=	24.00 INCHES
POROSITY	=	0.3573 VOL/VOL
FIELD CAPACITY	=	0.1128 VOL/VOL
WILTING POINT	=	0.0580 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0635 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0007999999798 CM/SEC

LAYER 4

LATERAL DRAINAGE LAYER

THICKNESS	=	0.22 INCHES
POROSITY	=	0.7000 VOL/VOL
FIELD CAPACITY	=	0.0450 VOL/VOL
WILTING POINT	=	0.0200 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0225 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	19.6849994659424 CM/SEC
SLOPE	=	2.00 PERCENT
DRAINAGE LENGTH	=	150.0 FEET

LAYER 5

BARRIER SOIL LINER WITH FLEXIBLE MEMBRANE LINER

THICKNESS	=	0.22 INCHES
POROSITY	=	0.7000 VOL/VOL
FIELD CAPACITY	=	0.0450 VOL/VOL
WILTING POINT	=	0.0200 VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.0225 VOL/VOL
SATURATED HYDRAULIC CONDUCTIVITY	=	0.0000001000000 CM/SEC
LINER LEAKAGE FRACTION	=	0.00000000

GENERAL SIMULATION DATA

SCS RUNOFF CURVE NUMBER	=	83.31
TOTAL AREA OF COVER	=	43560. SQ FT
EVAPORATIVE ZONE DEPTH	=	10.00 INCHES
POTENTIAL RUNOFF FRACTION	=	0.000000
UPPER LIMIT VEG. STORAGE	=	4.2238 INCHES
INITIAL VEG. STORAGE	=	1.0026 INCHES

SOIL WATER CONTENT INITIALIZED BY USER.

CLIMATOLOGICAL DATA

SYNTHETIC RAINFALL WITH SYNTHETIC DAILY TEMPERATURES AND
SOLAR RADIATION FOR JACKSONVILLE FLORIDA

MAXIMUM LEAF AREA INDEX	=	0.00
START OF GROWING SEASON (JULIAN DATE)	=	37
END OF GROWING SEASON (JULIAN DATE)	=	4

NORMAL MEAN MONTHLY TEMPERATURES, DEGREES FAHRENHEIT

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
-----	-----	-----	-----	-----	-----
53.20	55.10	61.30	67.70	74.10	79.00
81.30	81.00	78.20	69.50	60.80	54.80

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 5

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
-----	-----	-----	-----	-----	-----	-----
PRECIPITATION						

TOTALS	2.60	3.54	2.57	2.82	3.68	4.36
	7.46	9.03	8.11	2.39	2.64	3.05
STD. DEVIATIONS	1.70	2.18	2.39	2.31	2.48	2.07
	3.02	1.53	1.98	1.69	1.98	1.40
RUNOFF						

TOTALS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
STD. DEVIATIONS	0.000	0.000	0.000	0.000	0.000	0.000
	0.000	0.000	0.000	0.000	0.000	0.000
EVAPOTRANSPIRATION						

TOTALS	1.510	2.233	2.206	1.557	2.808	2.917
	4.337	4.350	4.179	2.431	1.692	2.085
STD. DEVIATIONS	0.597	0.743	0.952	1.139	1.419	0.621
	1.219	1.467	0.446	0.918	0.761	0.517
LATERAL DRAINAGE FROM LAYER 4						

TOTALS	0.5972	0.8141	1.1759	0.9616	1.0768	1.0802
	1.2483	2.1088	4.0533	1.9930	0.9967	0.8527
STD. DEVIATIONS	0.5245	0.5620	0.8422	0.8089	0.7078	0.6306
	0.7550	1.9844	2.4607	1.1736	0.5880	0.5524
PERCOLATION FROM LAYER 5						

TOTALS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
STD. DEVIATIONS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 5

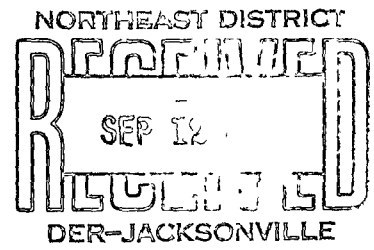
	(INCHES)	(CU. FT.)	PERCENT
PRECIPITATION	52.26 (6.568)	189711.	100.00
RUNOFF	0.000 (0.000)	0.	0.00
EVAPOTRANSPIRATION	32.305 (2.790)	117267.	61.81
LATERAL DRAINAGE FROM LAYER 4	16.9584 (9.7427)	61559.	32.45
PERCOLATION FROM LAYER 5	0.0000 (0.0000)	0.	0.00
CHANGE IN WATER STORAGE	2.998 (7.158)	10884.	5.74

PEAK DAILY VALUES FOR YEARS 1 THROUGH 5

	(INCHES)	(CU. FT.)
PRECIPITATION	4.79	17387.7
RUNOFF	0.000	0.0
LATERAL DRAINAGE FROM LAYER 4	0.3773	1369.6
PERCOLATION FROM LAYER 5	0.0000	0.0
HEAD ON LAYER 5	0.1	
SNOW WATER	0.00	0.0
MAXIMUM VEG. SOIL WATER (VOL/VOL)	0.3749	
MINIMUM VEG. SOIL WATER (VOL/VOL)	0.0881	

FINAL WATER STORAGE AT END OF YEAR 5

LAYER	(INCHES)	(VOL/VOL)
1	0.38	0.0635
2	23.05	0.3201
3	4.65	0.1936
4	0.01	0.0586
5	0.00	0.0225
SNOW WATER	0.00	



APPENDIX XIV
CLOSURE AND POST CLOSURE COST ESTIMATE
(REVISED 9-11-90)

Revised 9-11-90

APPENDIX XIV

TRAIL RIDGE LANDFILL
CLOSURE AND POST CLOSURE ESTIMATE

CLOSURE

\$ 645,979	Top Soil 176 acres x 43,560 S.F./ACRE x 0.5 FT divided by 27 C.F/C.Y. x 1.3 x \$3.50/C.Y.
2,030,219	Clay Liner 176 acres x 43,560 S.F./ACRE x 1.0 FT divided by 27 C.F/C.Y. x 1.3 x \$5.50/C.Y.
1,937,939	Cover Soil 176 acres x 43,560 S.F./ACRE x 1.5 FT divided by 27 C.F/C.Y. x 1.3 x \$3.50/C.Y.
100,000	Seed and Mulch (200 acres at \$500 per acre)
35,000	Closure Certification
<u>3,000,000</u>	Gas Collection System
\$7,749,133	Total Closure

POST CLOSURE

\$ 200,000	Security, fencing, etc. (\$10,000 per year)
120,000	Erosion Repair (1,500 C.Y. per year at \$4.00/C.Y.)
40,000	Surface Water Control (\$2,000 per year)
240,000	Leachate Collection System (\$12,000 per year)
5,329,000	Leachate Disposal (\$266,450 per year) <i>- includes transportation</i> 100 gal/day/acre x \$.05/gal
240,000	Gas Collection System (\$12,000 per year)
<u>800,000</u>	Water Quality Monitoring (\$40,000 per year)
\$ 6,969,000	Total Post Closure

\$14,718,133	Total Closure and Post Closure

Note: A twenty year period is assumed for post closure.
All cost estimates are 1990 Dollars

NORTH EAST DISTRICT
RECEIVED
SLY 15
DER-JACKSONVILLE

DESIGN, CONSTRUCTION, AND MONITORING OF SANITARY LANDFILL

Amalendu Bagchi

Wisconsin Department of Natural Resources



WILEY

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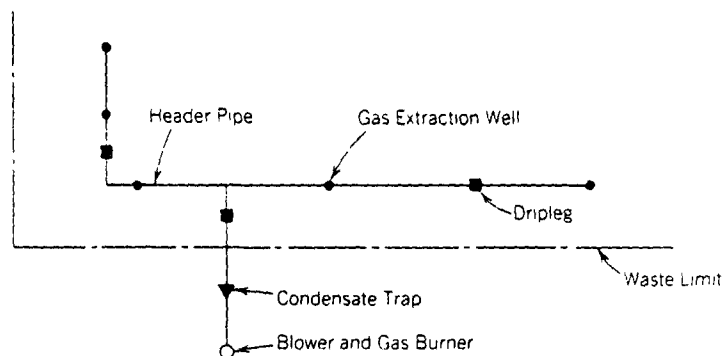


FIG 8 26 Typical layout of active gas venting system elements

Extraction Well Spacing of extraction wells is a key issue in extracting landfill gas efficiently. They should be spaced such that their zone of influence overlaps. As shown in Fig 8 27 a 27% overlap can be obtained by installing the extraction wells on the corners of equilateral triangles of side $1.73R$ and a 100% overlap can be obtained by installing the extraction wells on the corner of a regular hexagon of side R . A square array would provide a 60% overlap. Thus spacing of extraction wells is given by

$$\text{Spacing} = (2 - O_1/100)R \quad (8.23)$$

in which R = the radius of influence of gas extraction wells and O_1 = the required overlap

The zone of influence of a gas extraction system should be determined from actual field study. An extraction well should be installed within the landfill with gas probes at regular distances from the well (Fig 8 28). Short-term and/or long-

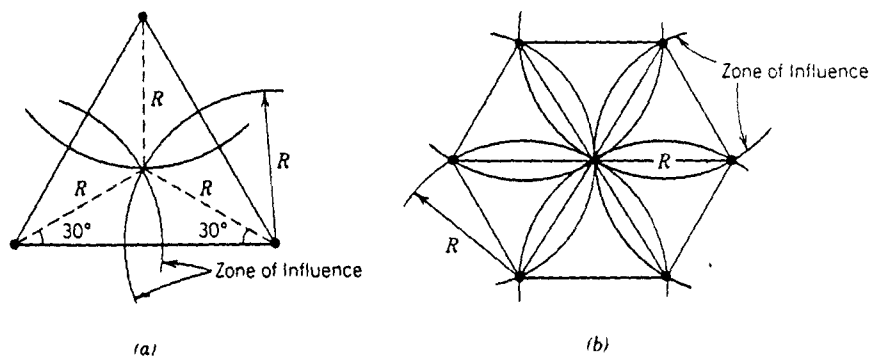


FIG. 8 27. Positioning of gas extraction well for complete overlap (a) triangular array (b) hexagonal array. Solid circles indicate locations of gas extraction wells

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England-Thims & Miller, Inc.

Consulting & Design Engineers
3131 St Johns Bluff Road So Jacksonville, FL 32216
904-642-8990



September 11, 1990

Mrs. Mary C. Nogas, P.E.
Supervisor, Solid Waste
Department of Environmental Regulation
Northeast District
7825 Baymeadows Way - Suite 200
Jacksonville, Florida 32256-7577

Reference: Trail Ridge Landfill Plan "A" - Class I and Class III
Request for Additional Information
FDER # 184444
ET&M NO. E89-113-9

Dear Ms. Nogas:

Pursuant to your letter of August 23, 1990, please find attached the responses to your request for additional information on Attachment Nos 1 and 2. Attachment No. 3 required no response.

Please note a revised Closure and Post-Closure Cost Estimate has been submitted for your approval.

I trust this additional information is satisfactory and completes the Trail Ridge Landfill Plan "A" application file.

If I can be of further service, please do not hesitate to contact me

Sincerely,

ENGLAND, THIMS & MILLER, INC.


Douglas C. Miller, P.E.
Vice President

Attachments: RAI Response No. 1 and No. 2

- Enclosures:
1. Revised Drawings Nos. 17, 18, 19, 20, 25 and 34
 2. Borrow Calculations
 3. Appendix IX (revised)
 4. Claymax Manufactures Data
 5. Reference Page 172; "Design, Construction and Monitoring of Sanitary Landfills"
 6. Amendment No. 1 to QA/QC Manual
 7. Drawing No. 24A - Marked in Red
 8. Appendix XIV - Closure and Post Closure Cost Estimate (Revised)
 9. Letter from Ellis & Associates (Settlement Calculations)

FOWLER, WHITE, GILLEN, BOGGS, VILLAREAL AND BANKER

ATTORNEYS AT LAW

TAMPA — ST PETERSBURG — CLEARWATER
FT MYERS — TALLAHASSEE

CABLE - FOWHITE
TELEX 52776
TELECOPIER
(904) 681-6036

SUITE 910
101 NORTH MONROE STREET
TALLAHASSEE, FLORIDA 32301
(904) 681-0411

MAILING ADDRESS
POST OFFICE BOX 11240
TALLAHASSEE, FLORIDA 32302

NORTHEAST
DECEMBER
SEP 10 1990
JULY 1990
DER-JACKSONVILLE

September 6, 1990

Mr. Michael J. Fitzsimmons
Waste Program Administrator
Florida Department of
Environmental Regulation
Northeast District
Suite B-200
7825 Bay Meadows Way
Jacksonville, FL 32256-7577

Re: DER File No. 161821182
Pending Dredge and Fill Permit Application

Dear Mr. Fitzsimmons:

This letter constitutes my request to be provided with written notification of any Department action, or intended agency action, on the above referenced file/permit. This permit is for, or associated with the Trailridge Landfill proposed by Waste Management for Duval County.

Thank you for your attention to this matter.

Sincerely,


Pamela Presnell Garvin

PPG:cab

FOWLER, WHITE, GILLEN, BOGGS, VILLAREAL AND BANKER, P A

ATTORNEYS AT LAW

TAMPA — ST PETERSBURG — CLEARWATER

FT MYERS — TALLAHASSEE

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(904) 681-0411

MAILING ADDRESS

POST OFFICE BOX 11240

TALLAHASSEE, FLORIDA 32302

September 6, 1990

Mr. Michael J. Fitzsimmons
Waste Program Administrator
Florida Department of
Environmental Regulation
Northeast District
Suite B-200
7825 Bay Meadows Way
Jacksonville, FL 32256-7577

*should
be → 182115*
Re: DER File No. 182117
Pending Class 3 Solid Waste Permit Application

Dear Mr. Fitzsimmons:

This letter constitutes my request to be provided with written notification of any Department action, or intended agency action, on the above referenced file/permit. This permit is for, or associated with the Trailridge Landfill proposed by Waste Management for Duval County.

Thank you for your attention to this matter.

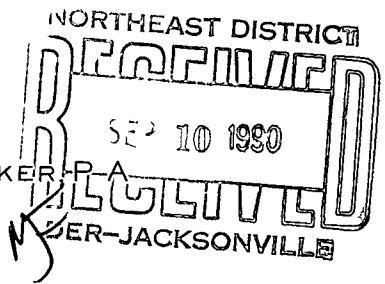
Sincerely,



Pamela Presnell Garvin

PPG: cab

FOWLER, WHITE, GILLEN, BOGGS, VILLAREAL AND BANKER, P.A.
ATTORNEYS AT LAW
TAMPA — ST PETERSBURG — CLEARWATER
FT MYERS — TALLAHASSEE



CABLE - FOWHITE
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101 NORTH MONROE STREET
TALLAHASSEE, FLORIDA 32301
(904) 681-0411

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POST OFFICE BOX 11240
TALLAHASSEE, FLORIDA 32302

September 6, 1990

Mr. Michael J. Fitzsimmons
Waste Program Administrator
Florida Department of
Environmental Regulation
Northeast District
Suite B-200
7825 Bay Meadows Way
Jacksonville, FL 32256-7577

Re: DER File No. 182116
Pending MSSW Permit Application

Dear Mr. Fitzsimmons:

This letter constitutes my request to be provided with written notification of any Department action, or intended agency action, on the above referenced file/permit. This permit is for, or associated with the Trailridge Landfill proposed by Waste Management for Duval County.

Thank you for your attention to this matter.

Sincerely,



Pamela Presnell Garvin

PPG:cab

FOWLER, WHITE, GILLEN, BOGGS, VILLAREAL AND BANKER,

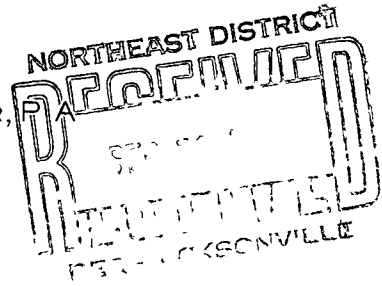
ATTORNEYS AT LAW

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FT MYERS — TALLAHASSEE

CABLE - FOWHITE
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TELECOPIER
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TALLAHASSEE, FLORIDA 32301
(904) 681-0411

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POST OFFICE BOX 11240
TALLAHASSEE, FLORIDA 32302



September 6, 1990

Mr. Michael J. Fitzsimmons
Waste Program Administrator
Florida Department of
Environmental Regulation
Northeast District
Suite B-200
7825 Bay Meadows Way
Jacksonville, FL 32256-7577

Should be → 182117
Re: DER File No. 182116
Pending Class 1 Solid Waste Permit Application

Dear Mr. Fitzsimmons:

This letter constitutes my request to be provided with written notification of any Department action, or intended agency action, on the above referenced file/permit. This permit is for, or associated with the Trailridge Landfill proposed by Waste Management for Duval County.

Thank you for your attention to this matter.

Sincerely,

Pamela Presnell Garvin

PPG: cab

FOWLER, WHITE, GILLEN, BOGGS, VILLAREAL AND BANKER, P.A.

ATTORNEYS AT LAW

TAMPA — ST PETERSBURG — CLEARWATER

FT MYERS — TALLAHASSEE

CABLE - FOWHITE

TELEX 52776

TELECOPIER

(904) 681-6036

SUITE 910

101 NORTH MONROE STREET

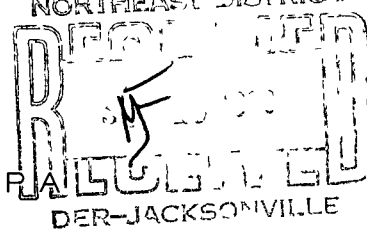
TALLAHASSEE, FLORIDA 32301

(904) 681-0411

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POST OFFICE BOX 11240

TALLAHASSEE, FLORIDA 32302



September 6, 1990

Mr. Michael J. Fitzsimmons
Waste Program Administrator
Florida Department of
Environmental Regulation
Northeast District
Suite B-200
7825 Bay Meadows Way
Jacksonville, FL 32256-7577

Re: DER File No. 184444
Pending Class 1 Solid Waste Permit Application

Dear Mr. Fitzsimmons:

This letter constitutes my request to be provided with written notification of any Department action, or intended agency action, on the above referenced file/permit. This permit is for, or associated with the Trailridge Landfill proposed by Waste Management for Duval County.

Thank you for your attention to this matter.

Sincerely,



Pamela Presnell Garvin

PPG: cab

FOWLER, WHITE, GILLEN, BOGGS, VILLAREAL AND BANKER, P.A.

ATTORNEYS AT LAW

TAMPA — ST PETERSBURG — CLEARWATER

FT MYERS — TALLAHASSEE

CABLE - FOWHITE

TELEX 52776

TELECOPIER

(904) 681-6036

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101 NORTH MONROE STREET

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(904) 681 0411

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POST OFFICE BOX 11240

TALLAHASSEE, FLORIDA 32302

NORTHEAST DISTRICT
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September 6, 1990

Mr. Michael J. Fitzsimmons
Waste Program Administrator
Florida Department of
Environmental Regulation
Northeast District
Suite B-200
7825 Bay Meadows Way
Jacksonville, FL 32256-7577

Re: DER File No. 184445
Pending Class 3 Solid Waste Permit Application

Dear Mr. Fitzsimmons:

This letter constitutes my request to be provided with written notification of any Department action, or intended agency action, on the above referenced file/permit. This permit is for, or associated with the Trailridge Landfill proposed by Waste Management for Duval County.

Thank you for your attention to this matter.

Sincerely,


Pamela Presnell Garvin

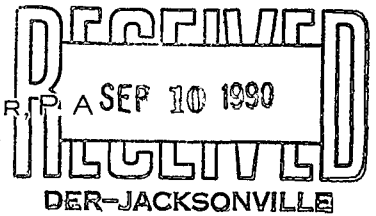
PPG:cab

FOWLER, WHITE, GILLEN, BOGGS, VILLAREAL AND BANKER, P.A.

ATTORNEYS AT LAW

TAMPA — ST PETERSBURG — CLEARWATER
FT MYERS — TALLAHASSEE

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TALLAHASSEE, FLORIDA 32302

September 6, 1990

Mr. Michael J. Fitzsimmons
Waste Program Administrator
Florida Department of
Environmental Regulation
Northeast District
Suite B-200
7825 Bay Meadows Way
Jacksonville, FL 32256-7577

Re: DER File No. 184447
Pending MSSW Permit Application

Dear Mr. Fitzsimmons:

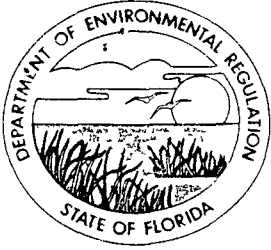
This letter constitutes my request to be provided with written notification of any Department action, or intended agency action, on the above referenced file/permit. This permit is for, or associated with the Trailridge Landfill proposed by Waste Management for Duval County.

Thank you for your attention to this matter.

Sincerely,

Pamela Presnell Garvin

PPG: cab



Florida Department of Environmental Regulation

Northeast District • 3426 Bills Road • Jacksonville, Florida 32207 • 904-798-4200

Bob Martinez, Governor

Dak Twachtmann, Secretary

John Shearer, Assistant Secretary

Ernest Frey, Deputy Assistant Secretary

August 23, 1990

CERTIFIED - RETURN RECEIPT

Mr. Dwayne Igou
Trail Ridge Landfill, Inc.
Post Office Box 6987
Jacksonville, Florida 32236

Dear Mr. Igou:

Duval County - Solid Waste
Trail Ridge Landfill, Class I & III Construction
Permit Application No. 184444
Request for Additional Information

The Department has reviewed the referenced permit application package, received in this office July 27, 1990, in accordance with Florida Administrative Code (FAC) Rule 17-4.055. The following reviews are enclosed:

Attachment 1, Review Memorandum dated August 23, 1990,
prepared by Mary C. Nogas, P.E., and Emerson Raulerson

Attachment 2, Review Memorandum dated August 22, 1990,
prepared by Michael Eaton and Jeremy Tyler

Attachment 3, Review Memorandum dated August 23, 1990,
prepared by Eric Silvers, P.G.

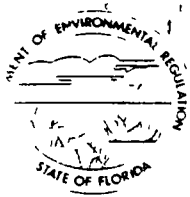
The information requested in these reviews is required in order for the Department to proceed with the processing of your application. Please provide the requested information within thirty (30) days from the date of receipt of this letter. Action on the permit application will be delayed until the requested information has been received by this office.

If you have any questions, please contact me at the letterhead address or telephone number.

Sincerely,

Mary C. Nogas, P.E.
Supervisor, Solid Waste

MCN:ml
Enclosures
cc: Douglas Miller, P.E.



State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

For Routing To Other Than The Addressee

To _____	Location _____
To _____	Location _____
To _____	Location _____
From _____	Date _____

Interoffice Memorandum

REVIEW MEMORANDUM

FROM: Mary Nogas
Emerson Raulerson

DATE: August 23, 1990

SUBJECT: Trail Ridge Landfill - Plan A

1. Please confirm that the bottom elevation of the North Borrow Area is 50.
2. Please provide supporting calculations for the amount of borrow material that is available at the site; the amount needed, and the amount of dirt needed for final cover.
3. Please justify using a 300-foot zone of influence for gas vents instead of the 300-foot centers that the Department normally requires.
4. The first page of Appendix IX (i.e., HELP Model Summary) lists the soil transmissivity of the geodrain as $2.2 \times 10^{-4} \text{ m}^2/\text{sec}$ instead of 2.2×10^{-3} as indicated on page 8-2, Section C, Part 1. Please clarify.
5. Please clarify what the leakage fraction is equal to on the second page of Appendix IX for Layer 7.
6. What will be the basis for determining what is an acceptable leak in the liner versus one which requires remediation.
7. Please modify the QAQC Plan to include details for Claymax, as this could not be found in the plan that was submitted.
8. In the original permit application, Appendix IX, paragraph 3, indicates that the thickness of the liner and Claymax that is inputted into the HELP Model has been increased by a factor of 10. In order to compensate for this, the permeability was to also have been increased by a factor of 10, from 10^{-8} to 10^{-7} centimeters per second. This, however, appears not to have been done and the permeability was left at 10^{-8} even though the thickness was increased. Please check.
9. Please provide the Department with the Claymax manufacturer's "technical data," including data analyzing the effect the expanding Claymax will have on the geonet.

10. Please submit information justifying the porosities, field capacities, wilting points, and permeabilities for the Claymax and geonet.
11. Please indicate how the soil characteristics were obtained for Layer 3 of the HELP Model Liner Analysis.
12. It appears that Layers 1 and 2 of the HELP Model Final Cover Analysis utilize identical soil characteristics. However, it is also indicated that one is a vertical percolation layer and the other a lateral drainage layer. Please explain.
13. Please note that the Department has not yet received proof of publication.
14. Please explain what the values of 104.4495, 20.1227, 46.6775, and 54.7967 inches of settlement refer to in the submittal dated July 17, 1990.
15. Please indicate how special wastes will be handled (i.e., a leak-proof container for oil and batteries kept off the ground) and the necessary storage space required based upon the amount of each of the various wastes to be stored at any time.
16. Please indicate whether any portion of the "white goods storage area" will be paved since it is going to be used for storing many other types of special wastes.
17. Please provide documentation which would support your request for a six (6) month installation period for the gas vents.
18. Please indicate that a spotter will be present at the Class III area at all times the landfill is open.



State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

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To _____	Location _____
To _____	Location _____
From _____	Date _____

Interoffice Memorandum

NORTHEAST DISTRICT - JACKSONVILLE

TO: Mary Nogas
THROUGH: Jeremy Tyler *JT*
FROM: Michael Eaton *ME*
DATE: August 22, 1990
SUBJECT: RAI Questions for Wetland Review of MSSW Application
Trail Ridge Landfill - Plan "A"

The following questions should be included in the RAI:

1. Please demonstrate the effect the borrow area will have on the adjacent wetlands. Indicate pre and post conditions in relation to the seasonal high and low groundwater elevation as well as the effect on surface water drainage patterns.
2. Please demonstrate that a 50-foot minimum buff around the borrow area and the wetlands is sufficient to not alter the groundwater or surface water drainage patterns of the adjacent wetlands.
3. Please provide detailed information about the stormwater pump system and its effects on the receiving wetlands. Please include frequency of pumping, volume of discharge, location of discharge pipe, erosion control, and the current environmental condition of the receiving wetland.

ME/eml



State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

For Routing To Other Than The Addressee

To	Location
To	Location
To	Location
From	Date

Interoffice Memorandum

NORTHEAST DISTRICT

TO: Mary C. Nogas, P.E.
Solid Waste Supervisor

THROUGH: Jay Carver *JCC*
Waste Cleanup Manager

FROM: Eric R. Silvers, P.G. *ERS*
Environmental Specialist

DATE: August 23, 1990

SUBJECT: Solid Waste - Duval County
Trailridge Landfill #2
Groundwater Monitoring

The groundwater monitoring plan for the referenced facility has been reviewed and is acceptable as proposed. To avoid any confusion the groundwater monitoring plan for the revised landfill design is essentially identical to the original monitoring plan plus the additional items requested in the July 15, 1990 RAI. It should be noted however that the phased installation of the monitoring wells has been modified to coincide with the revised landfill construction phases.

NORTHEAST DISTRICT
JAN 22 1991
ATTACHMENT NO. 2

RESPONSE TO DER-JACKSONVILLE

REVIEW MEMORANDUM

DATED AUGUST 22, 1990

FROM: Michael Eaton

SUBJECT: RAI Questions for Wetland Review of MSSW Application

REFERENCE: Trail Ridge Landfill - Plan "A"

QUESTION 1: Please demonstrate the effect the borrow area will have on the adjacent wetlands. Indicate pre and post conditions in relation to the seasonal high and low groundwater elevation as well as the effect on surface water drainage patterns.

RESPONSE 1: The North Borrow Area is proposed to be constructed totally in an upland area with a 50' minimum setback between the excavation and wetland boundary. The borrow area will be excavated in the "wet". No dewatering or lowering of the groundwater is proposed.

The surficial groundwater elevations vary from 1+ foot to 4+ feet below ground surface depending on the location season and climatic conditions. A berm surrounding the borrow area is designed to elevation 125.0 or 1 foot above natural ground which ever is higher. This berm serves two purposes. First to prevent the lowering of groundwater elevation due to excavation on the east side of the borrow area. Second to prevent surface runoff from entering the borrow area.

The surface water drainage patterns in the North Borrow Area are controlled primarily by two ditch systems. (See attached Drawing No. 24A marked in red). The existing ditch systems intercept surface and groundwater drainage west of the North Borrow Area and discharge east of the Borrow Area. These ditches, which are located in the adjacent jurisdictional wetlands, are the primary control mechanism for surface and groundwater flow in the wetlands. No changes are occurring in these ditch systems.

QUESTION 2: Please please demonstrate that a 50-foot minimum buffer around the borrow area and the wetlands is sufficient to not alter the groundwater or surface water drainage patterns of the adjacent wetlands.

RESPONSE 2: See response to Question No. 1.

QUESTION 3: Please provide detailed information about the stormwater pump system and its effects on the receiving wetlands. Please include frequency of pumping, volume of discharge, location of discharge pipe, erosion control, and the current environmental condition of the receiving wetland.

RESPONSE 3: The stormwater pump stations are designed to pump the volume from the first 1" of stormwater runoff from the upland drainage area in 72 hours or less after a rainfall event. The total volume of discharge after a design rainfall event is 7.28 AC-FT - Class I and 3.97 AC-FT - Class III.

The frequency of pumping is designed to be within 72 hours after a rainfall event. However, the pump station can be operated manually or programmed to run on any schedule.

The wetland irrigation piping is located at the upland edge of the wetland boundary as shown on Drawing No. 25. Erosion is controlled by adjusting the individual 2" value to each irrigation area such that water slowly trickles from the perforated pipe at a non-eroding velocity. Excess water is discharged at the control structure. If no wetland irrigation is desired, then all water is discharged at the outlet control structure.

At the time of initial operation and As-Built Certification of the Water Management System, a on-site inspection will be made with the applicant and Florida Department of Environmental Regulation. At that time a review of site conditions will be made including the desirability of irrigating the wetlands or discharging directly to the surficial outfall. Subsequent to the initial operation decision, an independent environmental consultant shall perform an inspection each quarter for two years and recommend the continuance or modification to the operating procedure. Upon approval from Florida Department of Environmental Regulation, those operating procedures will be implemented.

The existing wetland may be characterized as a series of shallow, depressional wetland pockets within planted pine plantation. These pockets are separated from each other and from DER wetlands to the east by areas of nonlisted, upland vegetation, primarily gallberry (Ilex glabra). The vegetation of these pockets consists of scattered slash pine (Pinus elliottii), St. John's wort (Hypericum fasciculatum), bog button, and red root (Lachnanthes caroliniana). These wetland pockets are rarely inundated and have a seasonally high water table. The entire wetland area provides only marginal wildlife habitat and is rather marginal or transitional in nature.

State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

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To _____	Location _____
To _____	Location _____
From _____	Date _____

interoffice Memorandum

NORTHEAST DISTRICT - JACKSONVILLE

TO: Mary Nogas
THROUGH: Jeremy Tyler *JT*
FROM: Michael Eaton *ME*
DATE: August 22, 1990
SUBJECT: RAI Questions for Wetland Review of MSSW Application
Trail Ridge Landfill - Plan "A"

The following questions should be included in the RAI:

1. Please demonstrate the effect the borrow area will have on the adjacent wetlands. Indicate pre and post conditions in relation to the seasonal high and low groundwater elevation as well as the effect on surface water drainage patterns.
2. Please demonstrate that a 50-foot minimum buff around the borrow area and the wetlands is sufficient to not alter the groundwater or surface water drainage patterns of the adjacent wetlands.
3. Please provide detailed information about the stormwater pump system and its effects on the receiving wetlands. Please include frequency of pumping, volume of discharge, location of discharge pipe, erosion control, and the current environmental condition of the receiving wetland.

ME/eml



Ellis & Associates, Inc.

A GREG A EDMONDS COMPANY

GEOTECHNICAL ENGINEERING
CONSTRUCTION MATERIALS TESTING

August 20, 1990

England, Thims & Miller, Inc.
3131 St. Johns Bluff Road
Jacksonville, Florida 32216

Attention: Mr. Joe Tarver, P.E.

Subject: Trail Ridge Landfill
Jacksonville, Florida
E&A Project No. 90-1125

Dear Joe,

We received your facsimile transmission of an Interoffice Memorandum from the Department of Environmental Regulations dated August 15, 1990. Item 3 of the memorandum required an explanation of settlement values shown on our calculations submitted July 17, 1990. The computer program used to calculate settlements requires soil information be input to a depth equal two times the width of the foundation below the ground surface. For the particular site, the only compressible soils which will be subject to settlement are located to depths of approximately 85 to 130 feet below the ground surface which corresponds to approximately three to five percent of the width of the landfills. Therefore, in order to permit the computer program to generate settlements for various soil layers, a dummy layer of soil was input in order to provide data corresponding to a depth of two times the width of the landfill. The indicated settlements from the computer program included the settlement associated with this dummy layer. The settlements reported in our calculations subtracted the settlement associated with the dummy layer from the total settlement calculated from the computer program. The resulting settlement is representative of the settlement which can be expected from the compressible soil deposits located above the Hawthorne formation at the site.

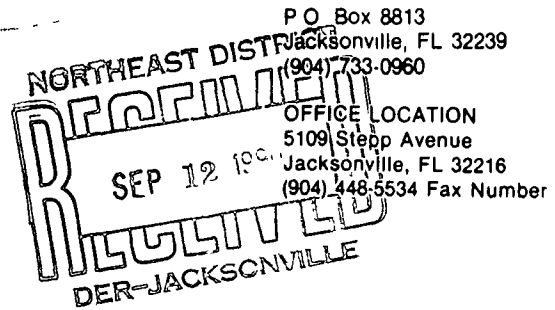
If additional explanation is required or if we can be of any additional service, please feel free to contact us.

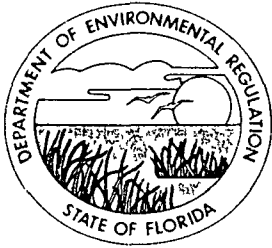
Very truly yours,

ELLIS & ASSOCIATES, INC.

Michael Lithman, P.E.
Engineering Manager
Registered, Florida No. 37583

ML/bim





Florida Department of Environmental Regulation

Northeast District • 3426 Bills Road • Jacksonville, Florida 32207 • 904-798-4200

Bob Martinez, Governor

Dale Twachtmann, Secretary

John Shearer, Assistant Secretary
Ernest Frey, Deputy Assistant Secretary

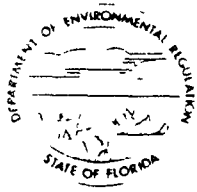
C O N F E R E N C E

SUBJECT: TRAIL RIDGE

DATE: 8-17-90

<u>NAME/TITLE</u>	<u>AFFILIATION</u>	<u>PHONE NUMBER</u>
ERIC R. SILVERS	FDER-JAY	904-798-4200
SCOTT A. WILD	ETM	904-642-8990
Michael Lithman	Ellis & Assoc.	904-733-0960
WARREN N. SMITH	WASTE MGT., INC.	305-771-9850
RHODES ROBINSON	ENVIRONMENTAL SERVICES INC.	904-636-8552
DEWAYNE IGOU	TRAIL RIDGE LANDFILL INC.	904-737-4800
Doug Miller	ETM	904-642-8990
Mary Nogas	FDER-Jax	904-798-4200
Emerson Paulson	" "	" "
JOE TARVER	ETM	(904) 642-8990
Michael EATON	FDER	904-798-4200

cc: Files



State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

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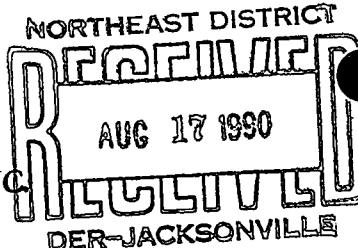
mc

Interoffice Memorandum

TO: Mary Nogas
FROM: Lee Marchman
DATE: August 17, 1990
Subject: Duval County -- MSSW Permitting
Trail Ridge Landfill (Plan A)

I have reviewed the above referenced project submission, and there appears to be no significant change to the stormwater management system from the previous plan.

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CONSPEC-BENJAMIN, INC.
55103 Phillips Highway
Jacksonville, Fla. 32207
904/731-3843



SPEC DATA
This Spec Data sheet conforms to editorial style prescribed by The Construction Specifications Institute. The manufacturer is responsible for technical accuracy.

WATERPROOFING
Below-Grade Geotextile/Bentonite Sheet

7

1. PRODUCT NAME

CLAYMAX FW™ Below-Grade Foundation Waterproofing System

(Formerly ENVIROMAT)

2. MANUFACTURER

Clem Environmental Corporation (CEC)
P O Box 88, Gordon Road
Fairmount, Georgia 30139
Phone (404) 337-5316/17
(312) 321-6255/56 (in IL)
Telex 543408
Fax (404) 337-2215
(312) 321-6258 (in IL)

3. PRODUCT DESCRIPTION

Basic Use: CLAYMAX FW™ is a specially constructed, flexible, impermeable below-grade foundation waterproofing system which utilizes the mineral sodium bentonite clay and the geotextile polypropylene. Sodium bentonite is a high swelling smectite which gives CLAYMAX FW™ the ability to heal itself if ripped or punctured. In a hydrated (swollen) state the clay has tremendous impermeability and a great resistance to all chemicals, acids, bases and hydrocarbons. The bentonite swells to form an impermeable barrier upon contact with fresh water. CLAYMAX FW™ has found a strong application in the foundation waterproofing industry due to the system's expansive nature and its ability to seal newly formed cracks in concrete. Because of its flexible nature, CLAYMAX FW™ can easily be wrapped around and into corners and is easily trimmed with a utility knife to fit around protrusions in the foundation without fear of loss or damage to the bentonite layer. The heavy woven polypropylene backing of CLAY-

MAX FW™ is extremely damage resistant making the use of protection boards unnecessary.

Each sheet of CLAYMAX FW™ is 4 5 feet wide and 13 5 feet long, allowing for easy handling at the job site. The material can be masonry-nailed into place immediately after foundation forms are removed, eliminating costly time delays waiting for concrete to cure. Minor damage to the material (occurring during handling or installation) can be easily repaired with patches and puncture holes are self-healing. Seaming is accomplished by simply overlapping adjacent sheets which self-seal upon hydration. Seaming requires only a two inch overlap due to the absence of the material shifting against a foundation.

The bentonite layer is protected during transport and installation by a spunlace, open weave, polyester scrim. Any shrinkage or settling cracks which occur in the concrete are immediately sealed by the confined expansion potential of the bentonite which allows it to expand into areas up to 1/8 inch wide.

CLAYMAX FW™ delivers a precise, factory-controlled thickness of sodium bentonite which can be applied to vertical foundation walls, under floor slabs, or as a cover for below-grade roof structures.

Composition of Materials: CLAYMAX FW™ is a multi-layered, below-grade waterproofing system consisting of a layer of tough, durable and flexible heavy woven polypropylene, coated (on one side) with bentonite clay granules. The bentonite is covered with a layer of thin polyester scrim which protects the bentonite layer during transportation and installation.

Sizes: CLAYMAX FW™ is supplied in rolled sheets. The material is 4 5 feet wide and 13 5 feet long. Each roll weighs 62 pounds.

4. TECHNICAL DATA

CLAYMAX FW™'s active ingredient, natural sodium bentonite, has the ability to swell in the presence of water to a volumetric expansion of 15 times resulting in a 6 fold increase in weight. Actual installation swelling is minimized by weight of aggregate cover material to only 2 to 3 times the original volume. Further expansion is possible into any voids in the material.

Limitations: CLAYMAX FW™ should not be used as an underlining for concrete slabs of less than 5 inches thickness without special instructions. Contact CEC or your local distributor for correct procedure.

In soils of high alkalinity, acidity or brine condition (or other ground water contamination), samples should be submitted to CEC for analysis and CEC will issue any necessary special installation instructions.

Where installation of CLAYMAX FW™ sheets must resist extreme hydrostatic pressure, a double layer may be required. Please consult CEC or your local distributor when this condition exists.

Special installation application procedures for CLAYMAX FW™ must be approved, in writing by the manufacturer prior to installation.

CLAYMAX FW™ which has been damaged by precipitation prior to backfill protection MUST

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May 1988
(Supersedes November 1987)

7

Below-Grade Geotextile/Bentonite Sheet

BE REPLACED if seal integrity is to
maintained

5. INSTALLATION

Preparation of Vertical Walls.

Exterior surfaces of vertical concrete walls and outer surfaces of below-grade roof structures, to be protected with CLAYMAX FW™, should be free of all voids and projections. Construction joints and irregularities in the concrete surface should be coated with bentonite sealing compound to a minimum depth of 1/8 inch and with a minimum edge overrun of 3 inches.

Installing Bottom Rows: Each of the CLAYMAX FW™ sheets has a dimension of 4 5 feet by 13 5 feet and is easily applied, polypropylene (heavy woven fabric stencilled as CLAYMAX™) side out, facing the operator and using masonry nails and washers as fasteners. The bottom row of CLAYMAX FW™ sheets should be wrapped to the bottom of the foundation footing and fitted as tightly as possible into inside corners. (Use cant of nonaqueous bentonite, using mastic where necessary.)

Subsequent Rows: As subsequent horizontal rows of sheets are applied above one another, care should be taken to stagger vertical joints and all adjacent sheets should overlap one another by a minimum of 2 inches. No protection board is required to protect CLAYMAX FW™. As installation allows, backfill material in maximum 4-foot "lifts" should be placed against the waterproofing system and compacted to 85% Modified Proctor. If this cannot be accomplished immediately, temporary protection against precipitation can be afforded by use of plastic film.

Corners and Patching: CLAYMAX FW™ sheets are light and flexible enough to be easily installed by two or three installers. The sheets are flexible enough to be folded around and into corners and may be easily cut and trimmed to fit around projecting pipes, tubes and ducting without fear of losing bentonite layer. Bentonite sealing compound should be used around such protrusions and strips of CLAYMAX FW™ should be used to seal cuts or tears in the sheet. Masonry nails and washers should be used to secure these strips.

Product Specifications (Typical)—CLAYMAX FW™

Bentonite Content	1 0 lbs per square foot
Sheet Thickness	1/4 inch
Sheet Dimensions	4 5 feet x 13 5 feet
Effective Area Covered	57 square feet (assume 2" overlap along one side and one end)
Sheet Weight/Unit	62 lbs (minimum)
Permeability Coefficient	1 x 10 ⁻⁹ cm per second @ 35' head pressure

Laboratory Test Data

Procedure—Six inches of sand covering CLAYMAX FW™ in a triaxial cell under thirty-five feet of water head pressure

Group	Permeant	Permeability
Water	De-Aired Water	2 x 10 ⁻¹⁰ cm/sec
Alkali	20% Hydrated Lime (pH 14)	6 x 10 ⁻¹⁰ cm/sec
Acid	1% Acetic Acid (pH 1)	2 x 10 ⁻¹⁰ cm/sec
Calcium	Calcium Chloride (10%)	2 x 10 ⁻⁹ cm/sec
Alcohol	Ethyl Alcohol (10%)	2 x 10 ⁻⁹ cm/sec
Petrols	Unleaded Gasoline	4 x 10 ⁻¹⁰ cm/sec
Petrols	No 6 Fuel Oil	3 x 10 ⁻⁹ cm/sec
Petrols	10% Ethanol Gasohol	3 x 10 ⁻⁹ cm/sec
Petrols	9 5% Butyl Gasohol	3 x 10 ⁻⁹ cm/sec
Petrols	100% Benzine	4 x 10 ⁻¹⁰ cm/sec

The above test performance data were produced under laboratory conditions. The actual performance characteristics may vary. No performance warranty is express or implied.

Packaging and Shipping

Pallet Content	2126 25 square feet (35 rolled sheets)
Pallet Total Weight	2200 lbs (approx)
Pallet Size	42" W x 54" L x 60" H
Pallet Cubic Volume	78 75 cubic feet

Material Specifications

Primary Backing (Typical Properties)—Polypropylene is nonbiodegradable and inert to most chemicals, acids and alkalis

Color	Natural white
Fabric	Delustered polypropylene, non-toxic, water permeable
Weight	4 oz per square yard
Filler Fiber	Nylon
Fabric Weight	6 8 ozs per square yard
Tensile Strength	78 lbs per inch (minimum)
Elongation (ASTM D-1682)	18%
Grab Strength (ASTM D-1682)	Warp 95 lbs , Weave 70 lbs
Mullen Burst Strength (ASTM D 774)	250 25 lbs per square inch
Puncture Strength (% mandril ASTM D3787 MOD)	249 lbs
Shrinkage	
Hot Water	Nil
Dry (20 min @ 270°F)	2%
Cover Fabric	100% spunlace polyester, open weave allows for expansion of bentonite
Weight	1 oz per square yard
Grab Strength	Warp 30 lbs , Fill 13 6 lbs
Burst Strength	35 lbs per square inch
Bentonite (Sodium Montmorillonite)	
Sizing	Specially graded, 6 mesh and 30 mesh granulars
Mineralogical Composition	90% Montmorillonite (min)
Adhesive	Water soluble, non-toxic
Storage	On dry ground under roof or other protective covering

The manufacturer reserves the right to change product specifications and instructions/limitations without notice. Information contained herein supersedes previously printed material (11/87)

Shipping: CLAYMAX FW™ sheets are supplied in palletized rolls of 13 5 feet long by 4 5 feet wide. The rolls are shipped on convenient wooden pallets for easy location spotting on a construction site. Each pallet contains approximately 2000 square feet of coverage. With a sheet weight of approximately 62 pounds, material can be rapidly and efficiently handled. Each pallet of material is plastic wrapped to afford temporary protection against precipitation during shipment and at the job site until more permanent storage is practical.

Other Applications: Underslab protection and curved below-grade roof structure are simply and easily protected by flexible CLAYMAX FW™ sheets. It is advised that only concrete slabs of at least 5 inches in thickness be laid over sheets to prevent possible slab shift. Slabs less than 5 inches in thickness may require an underlayer of coarse sand or fine gravel to provide voids into which bentonite can swell. The flexible nature of the sheets makes a "continuous" waterproofing envelope possible even when complex curves and corners are involved. CLAYMAX FW™ can be applied directly to concrete grouting, lagging, curved roof surfaces or sheet piling so concrete can be poured or shotcreted directly against the heavy fabric side of the sheet when necessary.

General Information: CLAYMAX FW™ is a below-grade foundation waterproofing system, flexible enough to fit into and around corners. It can be rolled over below-grade roof structures, cut or trimmed to accommodate pipes and ducting without fear of losing the bentonite layer and can be nailed in place when concrete forms are removed. Simple overlap seams form a permanent monolithic seal once the bentonite has been hydrated.

CLAYMAX FW™'s 4 5 x 13 5 foot sizing and approximate 62 pound unit weight allows for easy installation. CLAYMAX™'s flexible nature allows for a continuous waterproofing system.

Installation Precautions: CLAYMAX FW™ should not be installed during rainfall and may not be installed in standing water.

6. AVAILABILITY AND COST

Availability: CLAYMAX FW™ below-grade foundation waterproofing system is available through a worldwide network of distributors and waterproofing contractors. Contact the manufacturer, or your local CLAYMAX FW™ representative, to order.

Cost: Material cost will vary depending on such factors as "point-of-use location." For current cost information, contact your local CLAYMAX FW™ representative. For the name, address and telephone number of the

representative in your area, contact the manufacturer.

7. WARRANTY

CLAYMAX FW™ waterproofing system is normally warranted by the installing contractor who can make specific details available upon request.

8. MAINTENANCE

No maintenance is required when CLAYMAX FW™ is installed in accordance with the manufacturer's instructions.

9. TECHNICAL SERVICES

Clem Environmental Corporation will provide, upon request, necessary technical assistance in the evaluation of installation applicability. On-site installation assistance is also available from the manufacturer.

10. FILING SYSTEMS

SPEC-DATA® II
Sweet's 07100/AIM, Buyline 3527

Additional information is available from the manufacturer upon request.

The information and recommendations contained herein are based on data which is believed to be reliable but all such information and recommendations are given without guarantee or warranty.

1. PRODUCT NAME

CLAYMAX LC™, CLAYMAX CR™
Liner System for Liquid Con-
tainment

(Formerly ENVIROMAT)

2. MANUFACTURER

Clem Environmental
Corporation (CEC)

P O Box 88, Gordon Road
Fairmount, Georgia 30139

Phone (404) 337-5316/17
(312) 321-6255/56 (in IL)

Telex 543408

Fax (404) 337-2215
(312) 321-6258 (in IL)

3. PRODUCT DESCRIPTION

Basic Use: CLAYMAX LC™ is a specially constructed, flexible, impermeable liner system which utilizes the mineral sodium bentonite clay and the geotextile polypropylene Sodium bentonite is a high swelling smectite which gives CLAYMAX LC™ the ability to heal itself if ripped or punctured. In a hydrated (swollen) state, the clay has tremendous impermeability and a great resistance to all chemicals acids, bases and hydrocarbons. The bentonite swells to form an impermeable barrier upon contact with fresh water.

CLAYMAX LC™ liner system can be used in construction applications for the containment or exclusion of liquid. These applications include fresh water ponds, waste lagoons, municipal landfills (including caps), tank farm containments, earthen irrigation canals, industrial containments and earthen dams. Seaming is accomplished by a simple overlap with adjoining material since the hydrated bentonite swells to form an impermeable bond. Minor damage is self-healing and major cuts or tears are easily and effectively repaired using patches of CLAYMAX LC™ material.

CLAYMAX LC™ is manufactured 13 5 feet wide and 82 feet long, rolled onto cores. This allows for easy handling at the job site. Longer material can be furnished upon request. No special installation tools or fasteners are

required and CLAYMAX LC™'s flexibility speeds installation. The material can be cut with a utility knife to fit around protrusions (pipes, tanks, etc.).

CLAYMAX LC™ is designed for fast installation with a minimum of manpower, equipment and site preparation on both large and

SPEC DATA
This Spec Data sheet conforms to editorial style prescribed by The Construction Specifications Institute. The manufacturer is responsible for technical accuracy.

Product Specification (Typical)—CLAYMAX LC™		
Bentonite Content	1.0 lbs per square foot Liner	
Thickness	¼ inch	
Liner Dimensions	13 5 feet x 82 feet	
Effective Area Covered	1059 5 square feet (assume 6" overlap along one side and one end)	
Roll Weight/Unit	1130 lbs (minimum)	
Permeability Coefficient	1 x 10 ⁻⁹ cm per second @ 35' head pressure	
*Longer rolls available on special order		
Laboratory Test Data		
Procedure—Six inches of sand covering CLAYMAX LC™ in a triaxial cell under thirty-five feet of water head pressure		
Group	Permeant	Permeability
Water	De-Aired Water	2 x 10 ⁻¹⁰ cm/sec
Alkali	20% Hydrated Lime (pH 14)	6 x 10 ⁻¹⁰ cm/sec
Acid	1% Acetic Acid (pH 1)	2 x 10 ⁻¹⁰ cm/sec
Calcium	Calcium Chloride (10%)	2 x 10 ⁻⁹ cm/sec
Alcohol	Ethyl Alcohol (10%)	2 x 10 ⁻⁹ cm/sec
Petrols	Unleaded Gasoline	4 x 10 ⁻¹⁰ cm/sec
Petrols	No. 6 Fuel Oil	3 x 10 ⁻⁹ cm/sec
Petrols	10% Ethanol Gasohol	3 x 10 ⁻⁹ cm/sec
Petrols	9 5% Butyl Gasohol	3 x 10 ⁻⁹ cm/sec
Petrols	100% Benzene	4 x 10 ⁻¹⁰ cm/sec
The above test performance data were produced under laboratory conditions. The actual performance characteristics may vary. No performance warranty is express or implied.		
Packaging and Shipping		
Roll Content	1107 0 square feet	
Roll Weight	1135 lbs (approx.) wrapped	
Roll Size	14 5 feet long (PVC wrapped) x 18" diameter (approx.)	
Material Specifications		
Primary Backing (Typical Properties)—Polypropylene is nonbiodegradable and inert to most chemicals, acids and alkalis		
Color	Natural white	
Filler Fiber	Nylon	
Substrate	24 x 10 Delustered woven polypropylene, non-toxic, water permeable	
Weight	4 oz per square yard	
Tensile Strength	78 lbs per inch (minimum)	
Grab Strength (ASTM D-1682)	Warp 95 lbs, Fill 70 lbs	
Mullen Burst Strength (ASTM D774)	250 25 lbs per square inch	
Puncture Strength (½" mandril ASTM D3787 MOD)	249 lbs	
Melting Point	329° F	
Elongation (ASTM D-1682)	Warp 15%, Fill 18%	
Shrinkage		
Hot Water	Nil	
Dry (20 min @ 270°F)	2%	
Cover Fabric	100% spunlace polyester, open weave allows for expansion of bentonite	
Weight	1 oz per square yard	
Grab Strength	Warp 30 lbs, Fill 13 6 lbs	
Burst Strength	35 lbs per square inch	
Bentonite (Sodium Montmorillonite)		
Sizing	Specially graded, 6 mesh and 30 mesh granules	
Mineralogical Composition	90% Montmorillonite (min.)	
Adhesive	Water soluble, non-toxic	
Storage	On dry ground under roof or other protective covering	
The manufacturer reserves the right to change product specifications and instructions/limitations without notice. Information contained herein supersedes previously printed material (11/87).		

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NORTHEAST DISTRICT
AUG 17 1990
DEF-JACKSON

May 1988
(Supersedes November 1987)

small job sites. It affords a maximum of containment protection with none of the problems usually associated with other liner products. CLAYMAX™ is flexible, requires no special seam sealing, is self-healing and self-sealing while being extremely resilient and damage resistant.

Composition of Materials: CLAYMAX LC™ is a multi-layered liner system consisting of a layer of tough, durable and flexible heavy woven polypropylene, (on one side) coated with sodium bentonite clay. The bentonite is covered with a layer of thin polyester scrim which protects the bentonite layer during transportation and installation.

Sizes: CLAYMAX LC™ is supplied in rolled sheets. The material is 13.5 feet wide and 82 feet long. The material is rolled on 3½ inch roll cores. Special lengths may be ordered.

4. TECHNICAL DATA

Refer to Specification Table on page 1.

CLAYMAX LC™'s active ingredient, natural sodium bentonite, has the ability to swell in the presence of water to a volumetric expansion of 15 times resulting in a 6 fold increase in weight. Actual installation swelling is minimized by weight of aggregate cover material to only 2 to 3 times the original volume. Further expansion is possible into any voids in the material.

Limitations: CLAYMAX LC™ liner material MUST be protected with 6-12 inches (max 12 inches on slopes) of backfill or aggregate cover material. If backfill is used, it should be compacted with wheeled, rolling equipment.

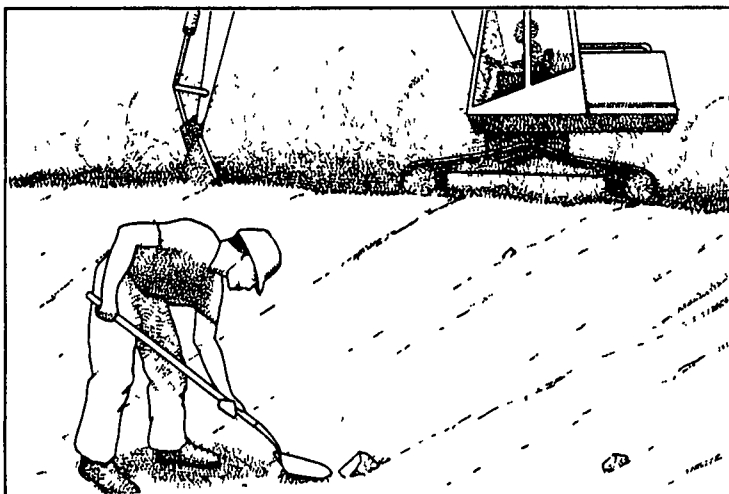
Containment installations, with slopes greater than two to one should be discussed with CEC.

CLAYMAX LC™ must be stored in a dry place.

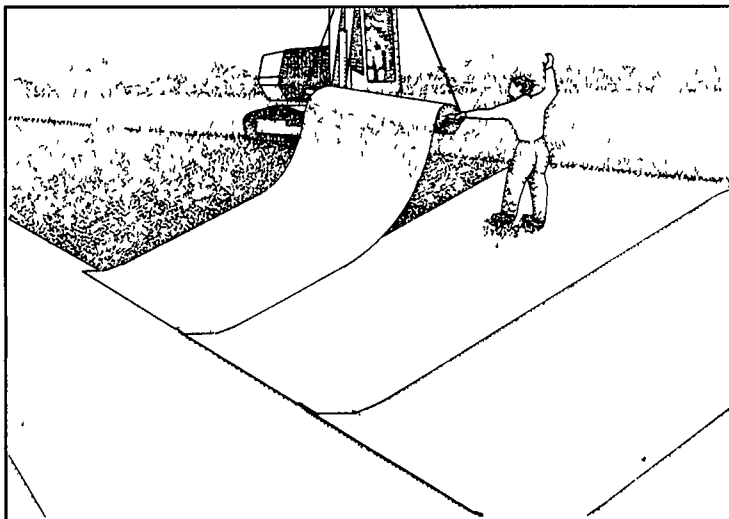
In soils of high alkalinity, acidity or brine condition (or other ground water contamination), samples should be submitted to CEC for analysis and CEC will issue any necessary special installation instructions.

Where installation of CLAYMAX LC™ sheets must resist extreme hydrostatic pressure, a double layer may be required. Please

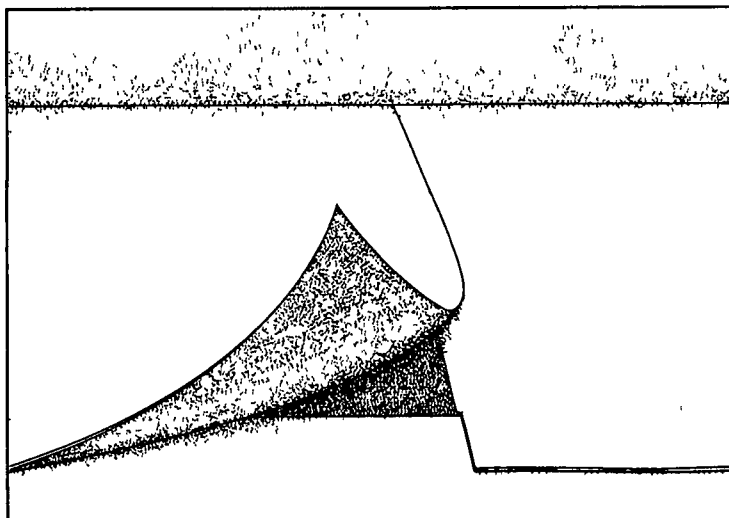
Advantages • Flexibility allows rapid and easy installation • A small crew can easily perform the installation • All seams are simple overlap seals • CLAYMAX provides for complete inspectibility of liner seal integrity prior to covering • Liner is sufficiently resilient to support installation personnel and light-weight equipment • Liner can be cut and trimmed with a utility knife



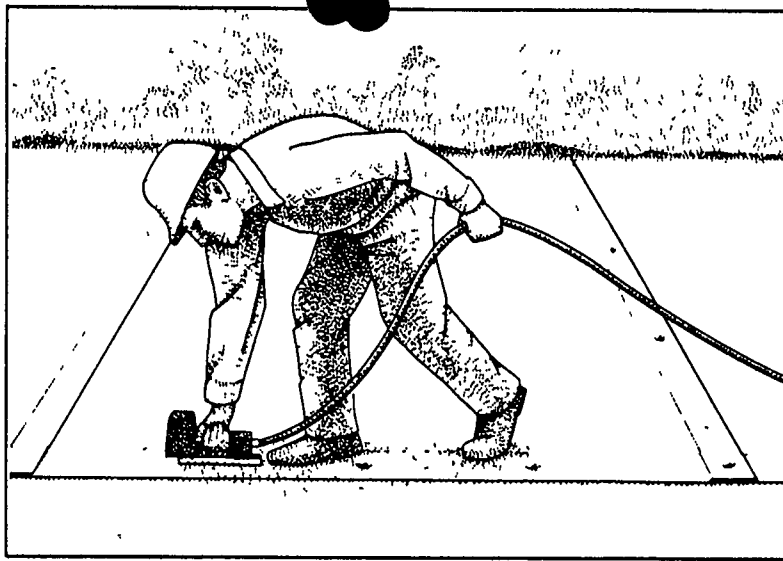
Site Preparation Excavation should be well contoured, all rocks, vegetation and protrusions larger than 2 inches in diameter should be removed.



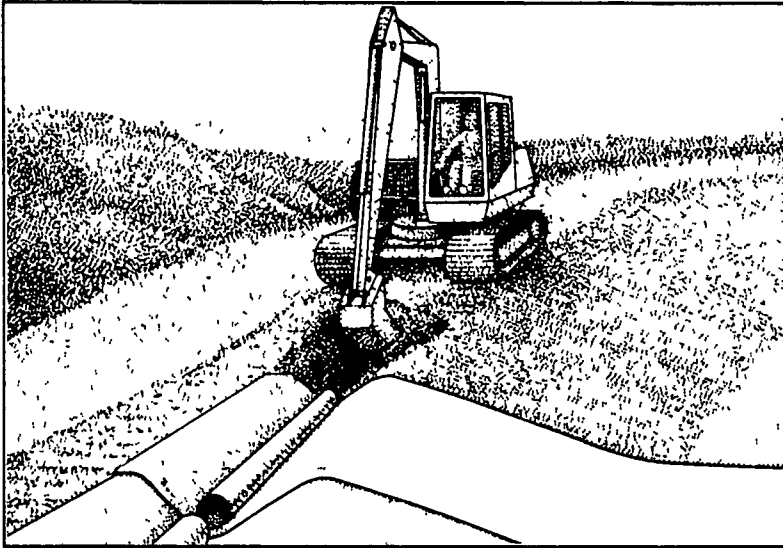
Installing adjoining rolls of CLAYMAX requires a 6-inch overlap. All seaming on slopes must be vertical and perpendicular to the base.



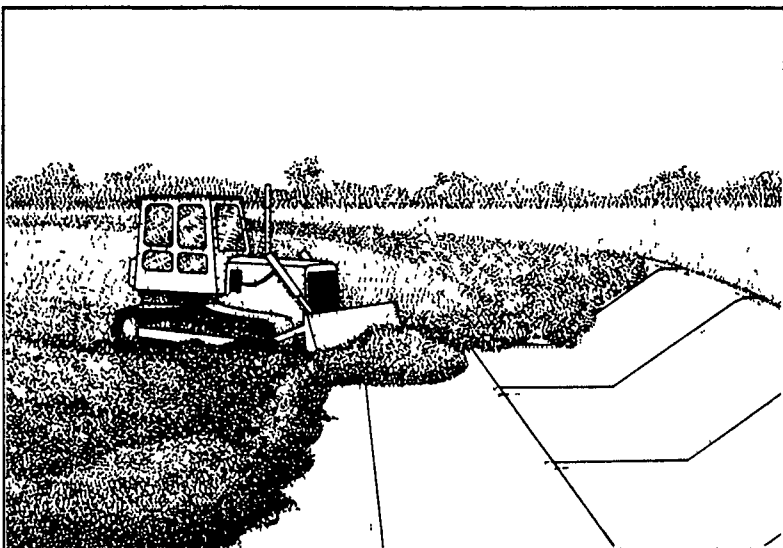
Detail of the 6-inch overlap, all soil must be removed from the overlap area of the liner to ensure a monolithic seal.



The 6-inch seams may be stapled or pinned to base soil to prevent seam opening during the backfill process



Anchoring Each CLAYMAX roll must be locked into trenches at the top of the slope, covered with fill and compacted to prevent slippage



Covering Backfill should always be pushed forward with equipment operating on the backfill. Cover material (other than aggregate) should be compacted after placement

Consult CEC or your local distributor when this condition exists

Special installation application procedures for CLAYMAX™ must be approved in writing by the manufacturer prior to installation

CLAYMAX LC™ which has been damaged by precipitation prior to backfill protection MUST BE REPLACED if seal integrity is to be maintained

5. INSTALLATION

Site Preparation: The pond, lagoon, tank farm enclosure or canal excavation dimensions should be determined allowing for final addition of not more than the required 6-12 inches of soil or aggregate cover material. Ideally, the excavation should be well contoured with slopes that are a maximum of three to one. All vegetation, protrusions and rocks larger than 2 inches in diameter should be removed and the entire excavation should be compacted to 90% optimum density. Minor surface irregularities, however, can be accommodated. Compaction can be accomplished using either conventional rolling equipment or wheeled vehicles. Use of sheepsfoot rolling equipment is not recommended. A liner locking trench must be provided at the top of all slopes.

Orientation: It is essential to install CLAYMAX LC™ so that all seams of the material laid on slopes are perpendicular to the pond bottom. This will prevent seam displacement during cover material placement.

Anchoring: All CLAYMAX LC™ "runs" must be locked into trenches at the top of the slopes, covered with fill and compacted to prevent slippage. The locking trench should be 24 inches back horizontally from the top of the slope. The trench should have a minimum depth of 18 inches and a width of at least 12 inches for slopes up to three to one. Greater slopes would require a revised locking trench design.

Seaming: It is essential that the first and succeeding rolls of CLAYMAX LC™ be pulled tight to smooth out creases or irregularities in the "runs". CLAYMAX LC™ should always be installed with the polypropylene side up,

showing the stenciled trade name CLAYMAX™. Once the first "run" has been laid adjoining "runs" need only be laid with a 6-inch overlap on each side. Be certain that all dirt is removed from the overlap area of the mat. The 6-inch seams may be stapled (with uncrimped staples) or pinned to the base soil to prevent seam openings during the installation process.

Repairing: Irregular shapes, cuts or tears in installed CLAYMAX LC™ are easily accommodated by covering such areas with sufficient CLAYMAX™ to provide a 6-inch overlap on all adjoining CLAYMAX™. These repair pieces should be pinned in place to hold the material until cover material has been placed.

Covering: Cover material (no more than 6-12 inches of aggregate or backfill) should be applied as roll "runs" are completed to afford maximum protection against damage from personnel or equipment. Correctly installed, CLAYMAX™ is sufficiently resilient to support installation personnel. Care should be exercised to prevent seam damage or "run" slippage, and backfill should always be pushed forward with equipment operating on the backfill. Cover material (other than aggregate) should be compacted after placement.

Handling Suggestions: CLAYMAX LC™ MUST be pulled from the top of the roll and installed polypropylene side UP (stenciled

CLAYMAX™ this side). The liner can be either pulled from a roll suspended at the top of a slope or the free end may first be secured and the suspended roll can be backed down the slope and across the excavation by the supporting vehicle. Suspending and unrolling CLAYMAX LC™ is facilitated by inserting a heavy-duty 3-inch diameter steel pipe through the 3½ inch roll core on which CLAYMAX™ is shipped. This pipe should be 16 or 17 feet long to accommodate the hoisting chains from the lifting vehicle which may be wheeled power equipment with either forks or front-end bucket. A spreader bar may be required to ensure roll clearance and to prevent damage to roll edges.

Installation Precautions: CAUTION—*CLAYMAX LC™ should not be installed in standing water or while heavy rain is falling.

6. AVAILABILITY AND COST

Availability: CLAYMAX LC™ liquid containment system is available through a worldwide network of distributors and approved installers. Contact the manufacturer, or your local CLAYMAX LC™ representative, to order.

Cost: Material cost will vary depending on such factors as "point-of-use location." For current cost information, contact your local CLAYMAX™ representative. For the name, address and

telephone number of the representative in your area, contact the manufacturer.

7. WARRANTY

CLAYMAX LC™ waterproofing system is normally warranted by the installing contractor who can make specific details available upon request.

8. MAINTENANCE

No maintenance is required when CLAYMAX LC™ is installed in accordance with the manufacturer's instructions, however, the protective cover layer (backfill) must be maintained and repaired as necessary.

9. TECHNICAL SERVICES

Clem Environmental Corporation (CEC), will provide, on request, necessary technical assistance in the evaluation of installation applicability. On-site installation assistance is also available from the manufacturer.

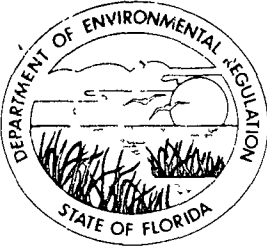
10. FILING SYSTEMS

SPEC-DATA® II
Sweet's 02770/AIM, Buyline 3526

Additional information is available from the manufacturer upon request.

The information and recommendations contained herein are based on data which is believed to be reliable but all such information and recommendations are given without guarantee or warranty.

DISTRIBUTED BY
CONSPEC-BENJAMIN, INC.
5510-3 Phillips Highway
Jacksonville, Fla. 32207
904/731-3843



Florida Department of Environmental Regulation

Northeast District • 3426 Bills Road • Jacksonville, Florida 32207 • 904-798-4200

Bob Martinez, Governor

Dale Twachtman, Secretary

John Shearer, Assistant Secretary
Ernest Frey, Deputy Assistant Secretary

August 15, 1990

CERTIFIED - RETURN RECEIPT

Mr. Dwayne Igou
Trail Ridge Landfill, Inc.
Post Office Box 6987
Jacksonville, FL 32236

Dear Mr. Igou:

Duval County - Solid Waste
Trail Ridge Landfill - Class I & III Construction
Permit Application No. 182117
Request for Additional Information

The Department has reviewed the response to the July 11, 1990 Request for Additional Information in accordance with Florida Administrative Code (F.A.C.) Rule 17-4.055. The following reviews are enclosed.

Attachment 1, Review Memorandum dated August 15, 1990, prepared by Mary C. Nogas, P.E. and Emerson Raulerson.

Attachment 2, Review Memorandum dated August 14, 1990, prepared by Eric R. Silvers, P.G.

Attachment 3, Review Memorandum dated July 9, 1990, prepared by Lee Marchman.

Attachment 4, Review Memorandum dated August 15, 1990, prepared by Mike Eaton.

The information requested in these reviews is required in order for the Department to proceed with the processing of your application. Please provide the requested information within thirty (30) days from receipt of this letter. Action on the permit application will be delayed until the requested information has been received by this office.

If you have any questions or immediate comments, please contact me at the letterhead address or telephone number.

Sincerely,

Mary C. Nogas, P.E.
Supervisor, Solid Waste

MCN:rs
Enclosure(s)
cc: Douglas Miller, P.E.



State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

For Routing To Other Than The Addressee	
To _____	Location _____
To _____	Location _____
To _____	Location _____
From _____	Date _____

Interoffice Memorandum

REVIEW MEMORANDUM

FROM: Mary C. Nogas, P.E.
Emerson Raulerson

DATE: August 15, 1990

SUBJECT: Duval County - Solid Waste
Trail Ridge Landfill - Class I & III Construction
Review of Permit Application No. 182117

- 1) Please modify the QAQC Plan to include details for Claymax, as this could not be found in the plan that was submitted.
- 2) The Department considers a 42,000 GPD leachate leakage rate through the leak detection layer as excessive. Please provide your rationale for suggesting this rate.
- 3) Please explain what the values of 104.4495, 20.1227, 46.6775 and 54.7967 inches of settlement refer to in the submittal dated July 17, 1990.
- 4) Please indicate how special wastes will be handled (i.e. a leak-proof container for oil and batteries kept off the ground) and the necessary storage space required based upon the amount of each of the various wastes to be stored at any time.
- 5) Please indicate whether any portion of the "white goods storage area" will be paved since it is going to be used for storing many other types of special wastes.
- 6) The cell dimensions appear to be excessive. Our calculations indicate that at the anticipated disposal rate this cell will have a density of 180 pounds per cubic yard. Please check.
- 7) Please provide documentation which would support your request for a six (6) month installation period for the gas vents.

- 8) In the original permit application Appendix IX, Paragraph three (3) indicates that the thickness of the liner and Claymax that is inputted into the HELP Model has been increased by a factor of ten (10). In order to compensate for this, the permeability was to also have been increased by a factor of ten (10), from 10^{-8} to 10^{-7} centimeters per second. This, however, appears not to have been done and the permeability was left at 10^{-8} even though the thickness was increased. Please check.
- 9) Please provide the Department with the Claymax manufacturer's "technical data", including data analyzing the effect the expanding Claymax will have on the geonet.
- 10) Please submit information justifying the porosities, field capacities, wilting points and permeabilities for the Claymax and geonet.
- 11) Please indicate how the soil characteristics were obtained for Layer 3 of the HELP Model Liner Analysis.
- 12) It appears that Layers 1 and 2 of the HELP Model Final Cover Analysis utilize identical soil characteristics. However, it is also indicated that one is a vertical percolation layer and the other a lateral drainage layer. Please explain.
- 13) Please note that the Department has not yet received proof of publication.
- 14) Please modify liner design to meet the new liner design standards of FAC 17-701.050(5)(d), which became applicable August 1, 1990.
- 15) Please provide information clearly showing that the Class III area complies with FAC 17-701.040(2)(g).



State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

For Routing To Other Than The Addressee	
To _____	Location _____
To _____	Location _____
To _____	Location _____
From _____	Date _____

Interoffice Memorandum

NORTHEAST DISTRICT

TO: Mary C. Nogas, P.E.
Solid Waste Supervisor

THROUGH: Michael J. Fitzsimmons *MF*
Waste Program Administrator

FROM: Eric R. Silvers, P.G. *ERS*
Environmental Specialist

DATE: August 14, 1990

SUBJECT: Solid Waste - Duval County
Trailridge Landfill
Groundwater Monitoring

The response to request for additional information for the referenced facility received July 16, 1990 has been reviewed and adequately addresses Departmental groundwater and surface water concerns. The Department would however like to clarify one issue which remains unclear. It is the Department's understanding that the phase II monitoring wells (B-16, B-17, B-29, B-30) shall be installed and placed into operation 90 days prior to the acceptance of waste in the phase II solid waste area.



State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

For Routing To Other Than The Addressee	
To _____	Location _____
To _____	Location _____
To _____	Location _____
From _____	Date _____

Interoffice Memorandum

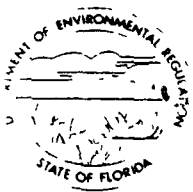
TO: Mary Nogas

FROM: Lee Marchman

DATE: July 9, 1990

SUBJECT: Duval County -- MSSW Permitting
Trail Ridge Landfill

I have reviewed the July 5 response to the July 2 Request for Additional Information, and it appears that all questions have been answered adequately. The stormwater section of the application may now be considered complete.



State of Florida
DEPARTMENT OF ENVIRONMENTAL REGULATION

For Routing To Other Than The Addressee	
To _____	Location _____
To _____	Location _____
To _____	Location _____
From _____	Date _____

Interoffice Memorandum

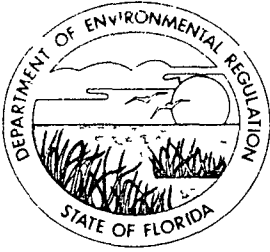
REVIEW MEMORANDUM

FROM: Mike Eaton

DATE: August 15, 1990

SUBJECT: Duval County - Solid Waste
Trail Ridge Landfill - Wetlands Review
Review of Permit Application No. 182117

- 1) Please explain in detail the monitoring of the adjacent wetlands during the six (6) to nine (9) month dewatering phases. What contingency plans will be utilized if the receiving wetland shows signs of hydric stress dewatering period?
- 2) Please explain how increasing the hydroperiod will affect the wetlands during the six (6) to nine (9) month dewatering phases. Relate anticipated impacts to the site specific vegetation which exists in the wetland.
- 3) Please explain the anticipated flow rate from the two (2) inch spreader pipe during dewatering and what measures will be utilized to prevent erosion from the buffer zone entering the receiving wetland.



Florida Department of Environmental Regulation

Northeast District • 3426 Bills Road • Jacksonville, Florida 32207 • 904-798-4200

Bob Martinez, Governor

Dale Twachtman, Secretary

John Shearer, Assistant Secretary
Ernest Frey, Deputy Assistant Secretary

August 10, 1990

Mr. Charles R. Long
Ms. M. Ellen Long
22002 Paul Coleman Road
Jacksonville, Florida 32234

Dear Mr. and Ms. Long:

Thank you for your August 7 letter to Ernie Frey about the proposed Trail Ridge Landfill.

The Department is carefully and thoroughly reviewing Waste Management's permit application for the proposed Trail Ridge Landfill. If the application indicates that the landfill will comply with all of the Department's regulations and environmental standards, the Department will issue an intent to permit the landfill. If the application indicates that the landfill will not meet all of the Department's regulations, the Department will issue an intent to deny the permit. In either case, Waste Management will be required to publish notice of the Department's proposed agency action in a newspaper of general circulation.


Within 14 days after publication of the notice, any person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative hearing in accordance with Section 120.57, Florida Statutes. Enclosed is a copy of Florida Administrative Code Rule 17-103.150(2) which explains the publication and petition requirements.

Your request for an administrative hearing on Waste Management's application is premature because the Department has not yet proposed any action on the application.

Let me assure you that the Department will not issue a permit to Waste Management unless it has reasonable assurances that the Trail Ridge Landfill will not adversely affect public health or the environment. The Department shares your concern for protecting the groundwater and the environment.

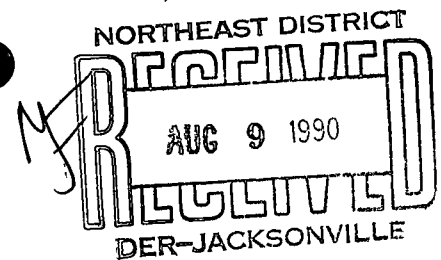
If you have any questions, please call me at 798-4200.

Sincerely,


Michael J. Fitzsimmons
Waste Program Administrator

MJF:ml

August 7, 1990



Mr. Ernie Frey
Fla. Dept. of Environmental Regulation
3426 Bills Road
Jacksonville, FL 32207

Re: Trail Ridge Landfill

Dear Mr. Frey:

Enclosed are petitions signed by 202 residents of Baker and Duval Counties who live in close proximity to and are opposed to, the proposed Waste Management Landfill on Trail Ridge. While we live in two different counties, we are all affected the same way by this landfill. Each person on these petitions hereby request an administrative hearing on the application by Waste Management, Inc. for DER permit for the Trail Ridge Landfill and request notice of the hearing date, time and place. In that the vast majority of those requesting this hearing work for a living, we request consideration in setting the date, time and location so that we can have an opportunity to attend.

We feel that we have very valid concerns for the effect of the proposed landfill on our local environment, including the quality of the groundwater, the large areas of wetlands, the impact on our creeks downstream from the landfill, our wildlife and other concerns.

We are also concerned that the City of Jacksonville is again demonstrating that it will consider locating a landfill directly on a county line without regard for the quality of life, quality of the environment, or adverse effect on property values for residents who have no say whatsoever in Duval County. We now understand how the residents of St. Johns County feel, and understand and appreciate what an emotional ordeal the Southeast Landfill has been for them.

We will fight this landfill every step of the way. Our administrative hearings and appeals will go on as long as grounds can be shown. Southeast has shown us that we can go on for a long time.

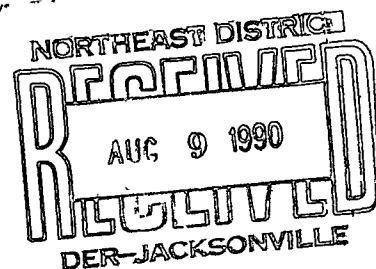
We appreciate your doing all that you can to protect our groundwater and environment and to stop this landfill.

Sincerely, *Charles R. Long*

M. Ellens

cc: Mr. Roosevelt Childress, U.S. Environmental Protection Agency
Mr. Warren Smith, Trail Ridge Landfill
Mr. Haynes Johnson, U.S. Environmental Protection Agency
Mr. Bert Helmer, U.S. Army Corps of Engineers
Mayor Tommy Hazouri
Mr. Douglas G. Wood, Department of Public Utilities

PETITION IN OPPOSITION
OF TRAIL RIDGE LANDFILL



WE, the undersigned wish to advise the City of Jacksonville, Florida, Department of Environmental Regulation and Waste Management of North America, Inc., of our opposition to the Trail Ridge Landfill. We believe the site to be unsuitable for a landfill in that it would adversely affect the wetlands which lie to the North, South and East of the site. The undersigned also fear contamination of ground water in the area and in the wetlands system originating at the site.

NAME	ADDRESS	PHONE #
Nick Jensen	8127 Pine St	289-7813
Roger Ottobro Sr.	8772 Maxville Blvd	
E.D. R. P.	Rt 15 Box 16 MAXVILLE	289-9734
Tom D. Harris	9135 Loest Rd	289-9615
J. Johnson	Rt 1 Box 2708 Glen St, MARY	259-3359
R.D. Thomas	9135 9135 Loest Rd	289-9929
Rose Thomas	9135-1 Loest Rd.	289-9929
Gayle Jensen	8727 Pine Street	289-7813
James Demmon	18600 Spaniard Rd	289-9459
Harry Padgett	18655 Carolina Ave	289-7260
Chadwell	MAXVILLE	
William Wilkinson	Rt. 15 Box 184	289-9866
Pete Wood	602 SR 217	289-9243
Kath Padgett	6034 St Rd 217	289-9832
Wray P. Cor	43761 Maxville Blvd	
Steve Padgett	11236 PA. Ave -JAX FL. 32234	289-9039
Karen Jeffers	8636 Maxville Blvd	289-9422
Hellis Jeffers	8636 Maxville Blvd.	289-9422
Barbara Walton	Rt. 15, Jax., Fl 32234	
Charlotte Curran	Rt 62 Box 1400 Jax 71 32265	
Cenna Harris		
Gregory M. Gentry	8139 MAGNOLIA JAX FL 32234	289-7727

11/15 1501 65

32234

267.332-

David D Murphy

RT 15 Box 169

32234

Johnny Padgett

RT 15 Box 827

32234

Donell K. Hunt

6367 Ranch Rd

289-7214

William C. Linn

Rt Box 994 Huxley

19019B Paul Coleman Rd

32234

PETITION IN OPPOSITION
OF TRAIL RIDGE LANDFILL

WE, the undersigned wish to advise the City of Jacksonville, Florida, Department of Environmental Regulation and Waste Management of North America, Inc., of our opposition to the Trail Ridge Landfill. We believe the site to be unsuitable for a landfill in that it would adversely affect the wetlands which lie to the North, South and East of the site. The undersigned also fear contamination of ground water in the area and in the wetlands system originating at the site.

NAME	ADDRESS	PHONE #
James Williams	8101 Maxville Blvd -	
Jeff Lindsey	RT 15 Box 187 Maxville Fla	289-7945
Ebene Dillon Jr	353 Pringle RD. Max. Fla	289-9381
Diane Dillon	18240 Ware Ave. Max. Fla	289-7347
Chris Stults	SR 22 Longbarrack Rd	289-9473
Carl Harris		
Kelly Thomas	18310 Main St. Max. Ft	289-9924
Jayme Howard	409 Pringle Rd Max. Ft.	289-7145
John Mackay	CLAY HILL FLA	282 4753
Jane "	" " "	" "
RAY	" " "	" "
Nancy K Rhoads	8710 McClelland Rd.	
James Allen	313 Albert Smith Maxville - FLA	
Denny McTeer	18601 SPANARD Dr.	289-9408
Mary A. Wellhausen	6213 Tobias Rd. Maxville	
Charles S Wellhausen	RT 1, Box 966 Lanier	782-13547
Wayne Hardie	9505 McClelland Rd	
Nikolisa Gordon	RT 5 Box 49	289-7284
John S. Summers III	RT. 2 Box 651 McClelland	
Timmy Dyer	RT 5 BOX 22 MAXVILLE FLA.	289-7288
Long K. Thomas	RT 15 Box 50C Maxville Fla	257 3711
Robert E. Brown		

PETITION IN OPPOSITION
OF TRAIL RIDGE LANDFILL

WE, the undersigned wish to advise the City of Jacksonville, Florida, Department of Environmental Regulation and Waste Management of North America, Inc., of our opposition to the Trail Ridge Landfill. We believe the site to be unsuitable for a landfill in that it would adversely affect the wetlands which lie to the North, South and East of the site. The undersigned also fear contamination of ground water in the area and in the wetlands system existing at the site.

NAME

Wanda J. Watson	16421 Normandy Blvd	289-7132
(Doris W) Clayton	Jacksonville Fla, 32234	
Suzie Harris	463 Pringle Rd Maxville Fla	
Ray W. G.	18729 Ware Ave.	
John D. Hain	3435 RUSTIC OAKS TR.	
Mark Murray		
Jim Smith	8374 MAXVILLE BLVD.	
James F. Hendricks	8425 Pine St MAX. FL	
Dawn Lane	7130 WHITE ALDER	742--
Eddie Lee	322 McClland Rd	
Betty Prime	Rt 62 Box 1408 MAXVILLE FL	289-9837
Debbie Waller	Rt 62 Box 1408 Max, FL	289-9837
MARK PRINGLE	5800 BEAR BRANCH	289- 1111
Dayle A. Waler	Rt. 15, Box 200-C	
Norma Padgett & family	8666 US 301 Maxville Fla	
Homer Shimas & family	18601 Normandy Blvd. Jax FL	259-7758
Miller	Rt 15 Box 121 Jax FL 32234	289-7758
Deana S. Masley	8737 Magnolia St. Jax 28-32234	
Gay Rogers Waller	5913 Long Branch Rd.	289-7535
Roger Francisco	Jax 32234	
P. D. Hume	8741 Palmetto Ave 32265	289-9688
John D. Jeff	52301	289-9742
	3036 Max Blvd	

PETITION IN OPPOSITION
OF TRAIL RIDGE LANDFILL

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NAME	ADDRESS	PHONE #
Melinda Warding	221 Claremore Ave. Jax, FL	695-9564
Njimi Pella	1872 Lending Rd., Jax, FL	786-9521
Jammy Rhodes	8450 Dramfell Rd. Jax, FL	781-5701
Samuel R. Dofar	20073 WEST 228 MAX, FLA	289-9678
James W Bentley	Rt 1 Box 552 Sanderson FLA 32067	289-9377
Richard L Kelly	Rt. 15 20027 WEST 228 MAX, FLA	289-7344
Long Bennett	5491 Nathan Hale Rd JAX, FL	777-1051
Cecil K Dyke	6055-8 ELMGROVE AVE	none
John D. Glaser	636 Chelving N	783-2616
William Hopson	PO Box 280 GLEN FL	781-3074
CRIE TAYLOR	8005 PIERRE DR. JAX, FL	781-1505
Frank Sutton	8877 Normal Rd Jax, FL	781-1837
Myrtle Coleman	Rt 10 Box 35 Jax FL 32234	289-7837
Harriett Padgett	9315 McClelland Rd Baldwin 32234	289-9382
Willard Padgett	9325 McClelland Rd. Baldwin 32234	289-9382
Rebecca Wright	9325 McClelland Rd. Baldwin	289-9382
J. H. Wright	9325 McClelland Rd. Baldwin	289-9382
Debbie Taylor	20073 west 228 MAX FLA	289-9678
Danny Bassell	10201 W. Beaver St.	786-0189

PETITION IN OPPOSITION
OF TRAIL RIDGE LANDFILL

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NAME	ADDRESS	PHONE #	County
CLARENCE TAYLOR	R1 15 BOX 32 MAXVILLE	289-9376	Duval
LEVEYN TAYLOR	20197 SR 228 W JAX	289-9376	Duval
VINCE TAYLOR	20197 SR 228 W. JAX.	289-9376	Duval
Kim Rhoden	20115 St. Rd. 228 W. Jax.	289-7928	Duval
Sherri Taylor	20117 SR 228 W Jax	289-9376	Duval
Markus Rhoden	20115 St. Rd. 228 W Jax	289-7928	Duval
Ann M Steele	17301 Normandy Jax	289-9195	Duval
W.E. Steele	17301 " Jax	289-9195	Duval
Gladys Southers	8512 Mayfield Blvd. Jax.	289-7599	Duval
Nadine Jacobson	13910 Normandy Jax	772-9808	Duval
Maddalena	7111ville long Branch Rd. Fla	289-9440	
Jane N. Smith	270 McClelland Rd. Baldwin	289-7028	
Luis May	20227 May Mac. Hwy	778-0295	
Shirley L. Kenney	13911 Mayfield Blvd. Jax 32221	289-7266	
Adelle Duffie	18799 Normandy Blvd. Jax 32234	289-7535	
Louise Pender	5321 Yellowwater Rd Jax 32234	289-7343	
Nelvie Bonner	7951 Mc Clelland Rd. Jax 32234	289-7343	
M. Eugene Bonner	795 Mc Clelland Rd Jax-32234	289-7952	
Elijah Fodgett	9301 Mc Clelland Rd Jax-32234	289-7952	
Betty Jean Fodgett	9301 Mc Clelland Rd Jax-32234		
Billy R. Godwin	9305 Mc Clelland Jax. 32234		
Marlene Godwin	9305 Mc Clelland Jax 32234		

PETITION IN OPPOSITION
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NAME	ADDRESS	PHONE #	Res.
Allen Long	22002 Paul Coleman Road	289-9252	yes
Rachel S Long	Mayville, FL 32234	"	yes
Brian Smith	7130 Dunson Rd Jon	772-1243	
Charles R Long	22002 Paul Coleman Rd Jay	289-9252	yes
Charles R Long	RT 15 Box 48B MAXVILLE, FL	289-9725	
Narcia Solomon	Rt. 15 Box 49 Mayville,	289-9284	
S. S. Solomon	" " " "	" "	
Just Lee	" " " "	" "	

PETITION IN OPPOSITION
OF TRAIL RIDGE LANDFILL

WE, the undersigned wish to advise the City of Jacksonville, Florida, Department of Environmental Regulation and Waste Management of North America, Inc., of our opposition to the Trail Ridge Landfill. We believe the site to be unsuitable for a landfill in that it would adversely affect the wetlands which lie to the North, South and East of the site. The undersigned also fear contamination of ground water in the area and in the wetlands system originating at the site.

NAME	ADDRESS	PHONE #	County
W. A. Stokes	PO Box 642 Macclenny	259-2664	Baker
R. M. Stokes	P.O. Box 642 Macclenny	259-2664	"
Vicky D. Champion	RT 15 Box 60-Macclenny	259-3590	Baker
George Champion	RT 15 Box 60 Macclenny FLA	259-3590	Baker
Buddy Champion	RT 15 Box 56 Macclenny, FLA	259-6795	Baker
Anna Champion	RT 15 Box 56 Macclenny Fla.	259-6795	Baker
Vickie Craig	RT 15 Box 62 Baldwin Fla.	259-4421	Baker
Mark Lindahl	RT 15 Box 60-E Baldwin	786-6030	Douglas
Rocky Fessler	RT 15 Box 61 Baldwin	259-2495	Baker
Betty Jussier	RT 15 Box 61 Baldwin	259-2495	Baker
Ernest John	RT 15 Box 63-B Baldwin	259-2495	Baker
Raymond John	RT 15 Box 16B Baldwin	259-5330	Baker
Joseph W. Jones	RT 15 Box 58C Jacksonville FL.	259-2666	Baker
Y.M. Hatcher	RT 15 Box 58E JAX, FLA	259-3935	Baker
Robert How	RT 15, Box 58E JAX, FLA.	259-3935	Baker
Sandra J. Frow	RT 15 Box 55 Baldwin, Fla.	259-4143	Baker
Karen Lafuse	RT 15 Box 55-B Baldwin Fla.	259-5179	Baker
Dea Lafuse Jr.	RT 15 Box 55-C Baldwin, Fla.	259-5179	B
D.J. Lafuse Sr.	RT 15 Box 55B } Baldwin Fla.	259-4048	B
Therese Harris	RT 15 Box 55 Baldwin Fla.	259-6231	B
Ala Marie Harris	RT 15 Box 55 Baldwin Fla.	259-6231	B
Landis Roberts	RT 15 Box 54 JAX 32234	259-3496	B
Jackie Smith	RT 15 Box 80 TALL. FL	259-7561	B
Jonathan C. Crump	RT 15 Box 54 JAX 32234	259-3496	B
Lee Crump	RT 15 Box 54 JAX 32234	259-3496	B
Leola Whiteland	RT 15 Box 54 JAX 32234	259-4178	B
Angela M. Crump	RT 15 Box 119 JAX 32234	259-4178	B
Lucia Wilkerson	RT 15 Box 119 JAX 32234	259-4178	B
Lewis & Edith Johnson	RT 15 Box 73 Macclenny Fla.	259-3479	B
James M. Johnson			

PETITION IN OPPOSITION
OF TRAIL RIDGE LANDFILL

With the undersigned wish to advise the City of Jacksonville, Florida, Department of Environmental Regulation and Waste Management of North America, Inc., of our opposition to the Trail Ridge Landfill. We believe the site to be unsuitable for a landfill in that it would adversely affect the wetlands which lie to the North, South and East of the site. The undersigned also fear contamination of ground water in the area and in the wetlands system originating at the site.

NAME	ADDRESS	PHONE #	County
Elmer Crews	Rt 15 Box 91 Jax. Fla. 32234	259-3035	B
William Crews	Rt 15 Box 91 Jax., Fla. 32234	259-3035	B
Shaun Baldwin	Rt 15 Box 91 Jax., Fla. 32234	259-3035	B
Shane Baldwin	Rt 15 Box 91 Jax., Fla. 32234	259-3035	B
Richard McCall	Rt 15 Box 91-c Jax Fla 32234	259-4641	B
Wanda McCall	Rt 15 Box 91-c Jax Fla 32234	259-4641	B
Natasha McCall	Rt 15 Box 91-c Jax Fla 32234	259-4641	B
Kee McCall	Rt 15 Box 91-c Jax Fla 32234	259-4641	B
Wayne Rush	Rt 15 Box 85 Jax Fla 32234	259-4564	B
Patty Rush	Rt 15 Box 85 Jax Fla 32234	259-4564	B
St Kimbrell	Rt 15 Box 90 Jax Fla 32234	259-3765	B
Xi Geannette Bullock	Rt 15 Box 43 Jax Fla. 32234	259-6216	B
Jackie Huggins	Rt. 15 Box 91-D Baldwin, FL 32234	259-6609	B
Frank Druw	Rt. 15 Box 91-D Baldwin, FL 32234	259-6609	B
Gat Druw	Rt. 15 Box 91-D Baldwin, FL 32234	259-6609	B
Jessica Druw	Rt. 15 Box 91-D Baldwin, FL 32234	259-6609	B
Ashley Druw	Rt. 15 Box 91-D Baldwin, FL 32234	259-6609	B
Chris Druw	P.O. Box 352, Moultrieburg, FL.	264-6781	B

PETITION IN OPPOSITION
OF TRAIL RIDGE LANDFILL

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NAME	ADDRESS	PHONE #	County
Johnny Straton	Rt 15 Box 107 Jax 32234	259-6984	B
Eana M. Straton	Rt 15 Box 107 Jax 32234	259-6984	B
Harold Straton	Rt 15 Box 105 Jax 32234	259-1116	B
Margie Straton	Rt 15 Box 105 Jax 32234	259-4716	B
Vanessa D. Johnson	Rt 15, Box 73 Mac, FL 32234	259-3479	B
Lawrence E. Shely	Rt 15, Box 69 Maxville FLA.	259-4272	B
Richard Wainwright	Rt 15, Box 95D 32234	259-3989	B
Shirley Wainwright	Rt 15 Box 95D "	259-3789	B
Thomas Douglas Loner	Rt 15 Box 95D 32234		
George + Wendy Kallie	P.O. Box 1061 Macclenny Fla 32063	259-6917	B
Vernie Alexander	P.O. Box 1061 Macclenny Fl.	259-6917	B
Paul Alexander	P.O. Box 1061 Macclenny Fl.	259-6917	B
Loetha White	Rt 15, Box 78 Baldwin, Fl.	259-6060	B
Angie White	Rt 15, Box 78 Baldwin, Fl.	259-6060	B
James White	Rt 15, Box 78 Baldwin - Fl.	259-6060	B
Shawn Burrudge	P.O. Box 114 Macclenny FL	259-7561	B
Elizabeth Burrudge	Rt 15 Box 79 Baldwin, Fla		
Kristi Child	Rt 15 Box 74 Baldwin FLA	259-3779	B
Michele R Connell	Rt 15 Box 74 Baldwin FLA	259-3779	B
Imy Proctor	Rt 15 Box 101 Baldwin FLA	259-3236	B
Craig Proctor	Rt 15 Box 101 Baldwin FLA	259-3236	B
Mrs Ralph J Reece Jr	Rt 15 Box 83 Jax Fl. 32234	259-4318	B
Patty Reeder + Wayne Reeder	Rt 15 Box 85 Jax FL 32234	259-4564	B
Edward T. Reeder	Rt 15 Box 84 Jax FL 32234	259-3881	B
Rick C. Hayner	Rt 15 Box 100 Jax FL 32234		
Melissa M. Hedman	Rt 15 Box 100 Jax FL 32234		
Rosie Higginbotham	Rt 15 Box 104 Jax FL 32234	259-4326	B
Angiel Baron	Rt 15 Box 109 Jax FL 32234		B
Lee Jute	Rt 15 Box 117 Jax 32234		B
Alb. L...	Rt 15 Box 117 Jax 32234	259-3085	B



England-Thims & Miller, Inc.

Consulting & Design Engineers
3131 St Johns Bluff Road So Jacksonville, FL 32216
904-642-8990

PRINCIPALS

James E England, P.E., President
Robert E Thims, V.Pres, Sec
Douglas C Miller, P.E., V Pres
N Hugh Mathews, P.E., V Pres
James M Robinson, P.E., V Pres

August 1, 1990

Department of Environmental Regulation
3426 Bills Road
Jacksonville, Florida 32207

Attention: Lee Marchman

Reference: Trail Ridge Landfill - Inward Gradient
Trail Ridge Landfill - Outward Gradient
ET&M NO. E89-113-8/9

Dear Mr. Marchman:

Please find enclosed six copies of the St. Johns River Water Management District's Notice of Receipt of Application for each of the above captioned projects. (The two sets of six copies are identical).

The inward gradient submittal was made on June 13, 1990 and has Permit Application Number 182117. The outward gradient submittal was made on July 27, 1990.

Please include these applications with each of the original submittals. If you have any questions or require any additional information, please do not hesitate to call.

Very truly yours,

ENGLAND, THIMS & MILLER, INC.

Scott A. Wild

SAW:k1

NOTICE OF RECEIPT OF APPLICATION

Pursuant to Section 373.413, Florida Statutes, and Chapter 40C-4, Florida Administrative Code, the applicant is required to provide the following information for the purpose of public notice. Failure to provide all information will result in an incomplete application. This information is in addition to that required in other portions of the application form.

Five copies of this form and all attachments must be submitted.

This section will be completed by the District.

Application Number: _____

Date of hearing, if any : _____

Earliest possible date for agency action: _____

Date to be posted: _____ Date to be removed: _____

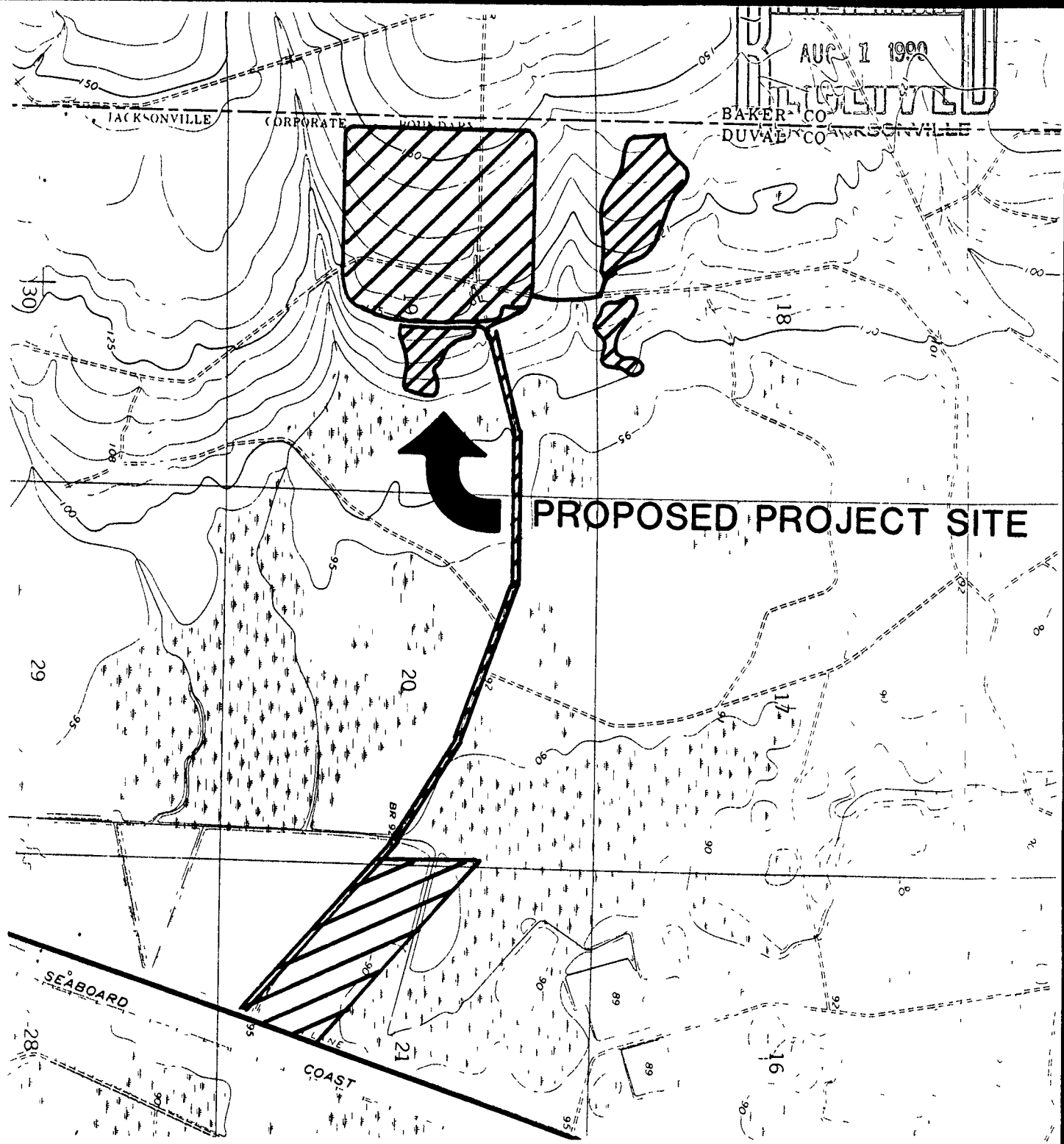
Written objections must be filed by: _____

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the volume of water to be contained on site: 30± (acre-feet),
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Persons interested in the above described application should contact the St. Johns River Water Management District at P. O. Box 1429, Palatka, Florida 32178-1429, or in person at its office on State Highway 100 West, Palatka, Florida, 904/328-8321. Written objections to the application may be made no later than the date specified above. Written objections should identify the objector by name and address, and fully describe the nature of the objection to the application. All timely filed written objections will be presented to the Board for consideration prior to the Board taking action on the application. Filing a written objection does not entitle one to a Chapter 120, Florida Statutes, administrative hearing. Only those persons whose substantial interests are affected by the application and who file a petition meeting the District's requirements after receipt of notice of intended action or final action may obtain an administrative hearing (see section 40C-1.511, F.A.C.). The requirements relating to timing and content of such petitions are set forth in Chapter 40C-1, F.A.C., Parts I and V.

AUG 1 1990

BAKER CO
DUVAL CO JACKSONVILLE



PROPOSED PROJECT SITE

QUADRANGLE MAP
OF MAXVILLE, FL.

SECTIONS 18, 19, 20, & 21

T-3-S, R-23-E

England-Thimms
& Miller, Inc.
Consulting & Design Engineers

TRAIL RIDGE LANDFILL

LOCATION MAP

PROJ. NO. E89-113

DATE

SCALE 1" = 2000'

DRAWING NO

NOTICE OF RECEIPT OF APPLICATION

Pursuant to Section 373.413, Florida Statutes, and Chapter 40C-4, Florida Administrative Code, the applicant is required to provide the following information for the purpose of public notice. Failure to provide all information will result in an incomplete application. This information is in addition to that required in other portions of the application form.

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Application Number: _____

Date of hearing, if any : _____

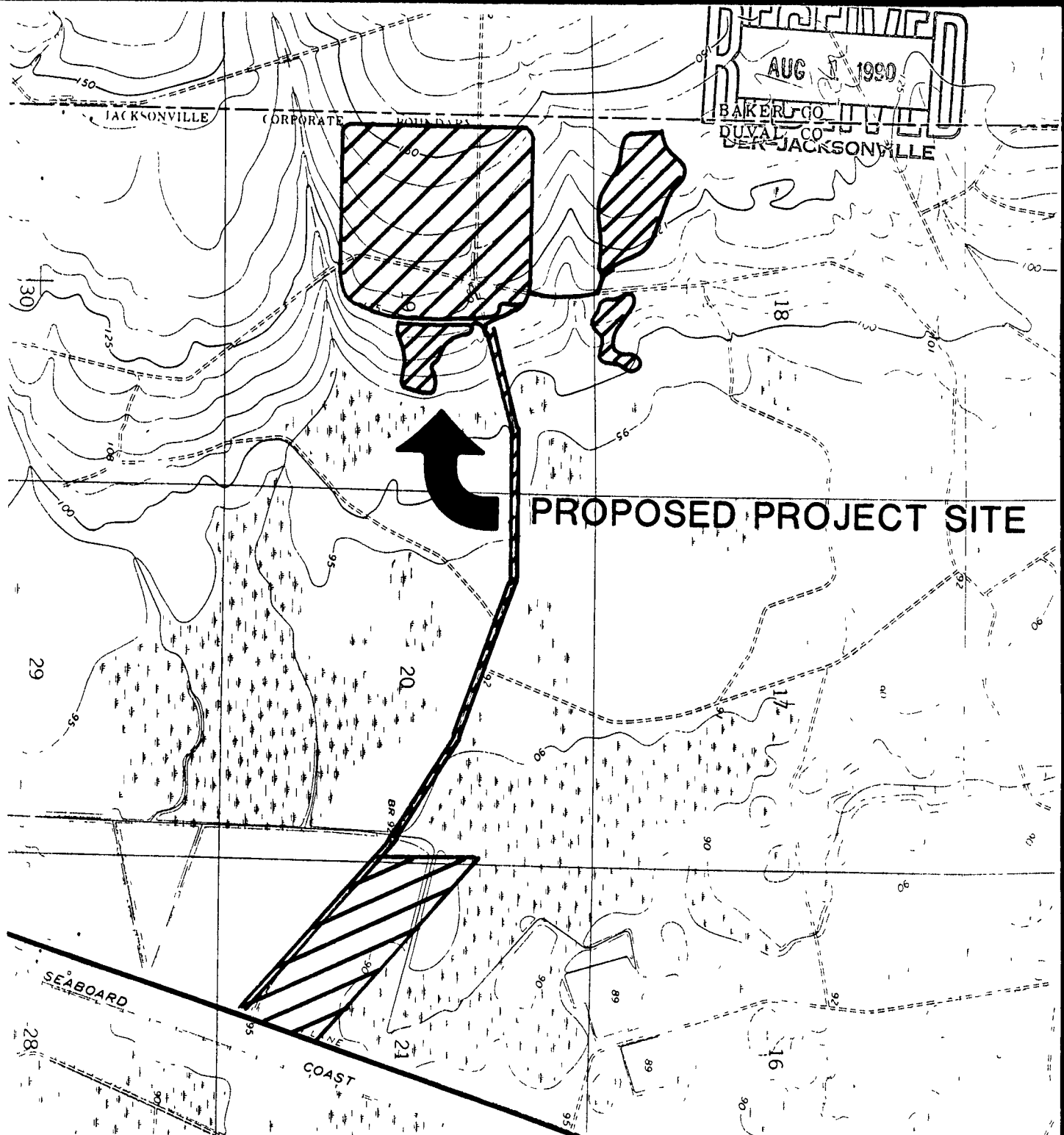
Earliest possible date for agency action: _____

Date to be posted: _____ Date to be removed: _____

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QUADRANGLE MAP
OF MAXVILLE, FL.

SECTIONS 18, 19, 20, & 21

T-3-S, R-23-E



England, Thims
& Miller, Inc.
Consulting & Design Engineers

TRAIL RIDGE LANDFILL

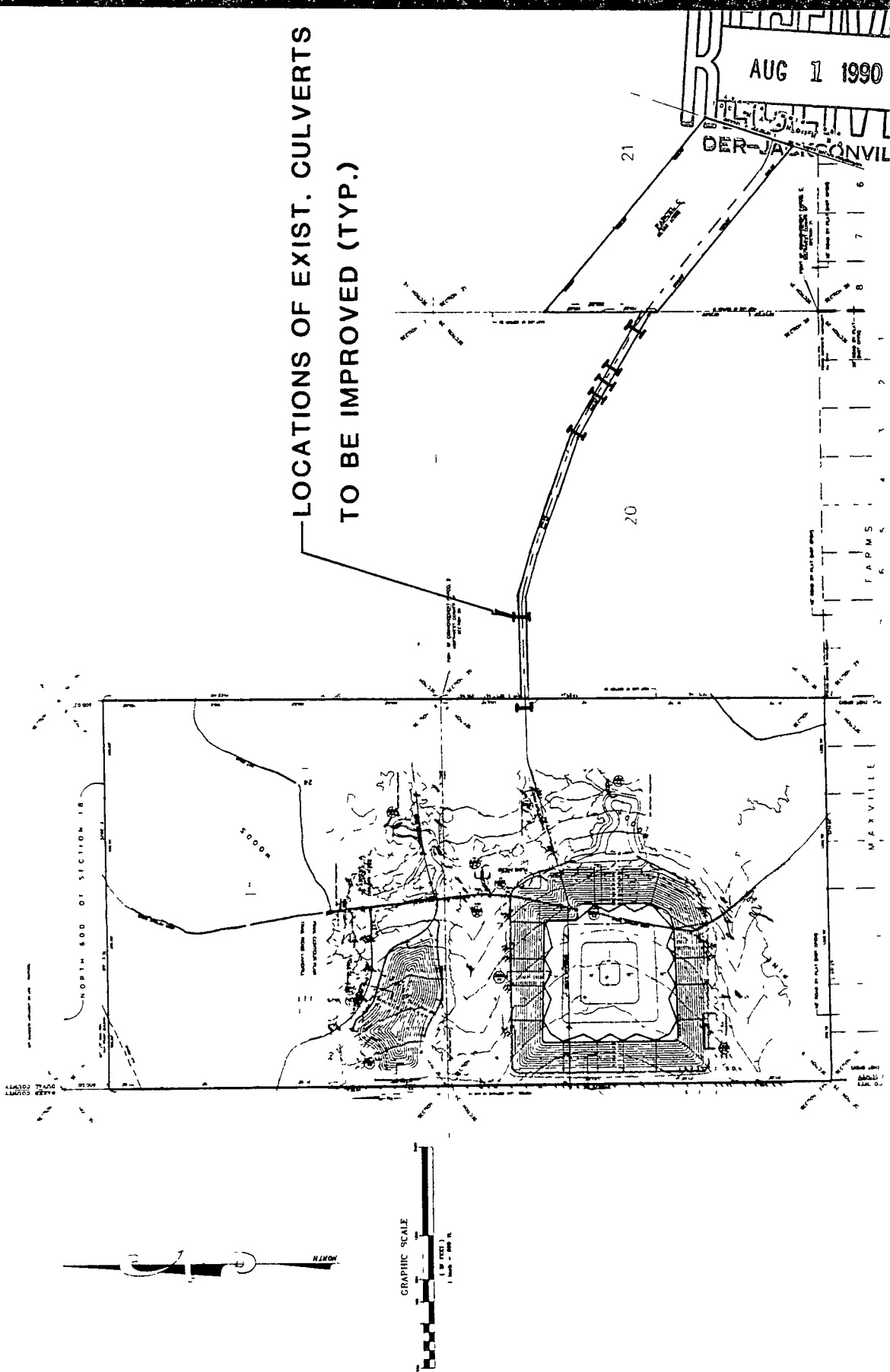
LOCATION MAP

PROJ. NO. E89-113

DATE

SCALE 1" = 2000'

DRAWING NO



PROJ. NO. 89-113
DATE
SCALE 1" = 2000'
DRAWING NO.

PLAN VIEW
TRAIL RIDGE LANDFILL

**England-Thims
& Miller, Inc.**
Consulting & Design Engineers
3131 St. Johns Bluff Rd. SE, Jacksonville, FL 32216

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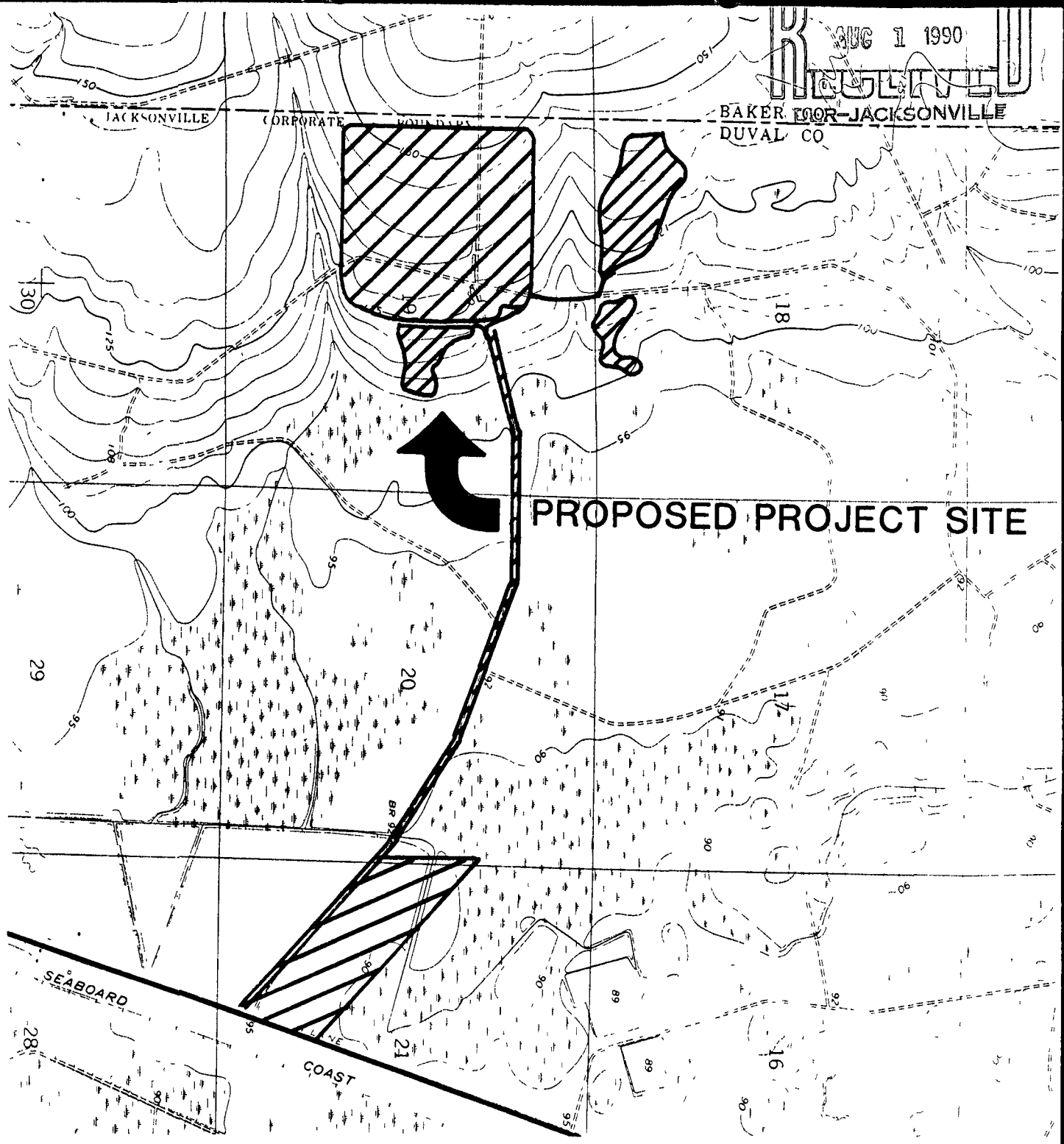
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AUG 1 1990

BAKER TOW- JACONVILLE
DUVAL CO



QUADRANGLE MAP
OF MAXVILLE, FL.

SECTIONS 18,19,20, & 21

T-3-S, R-23-E



TRAIL RIDGE LANDFILL

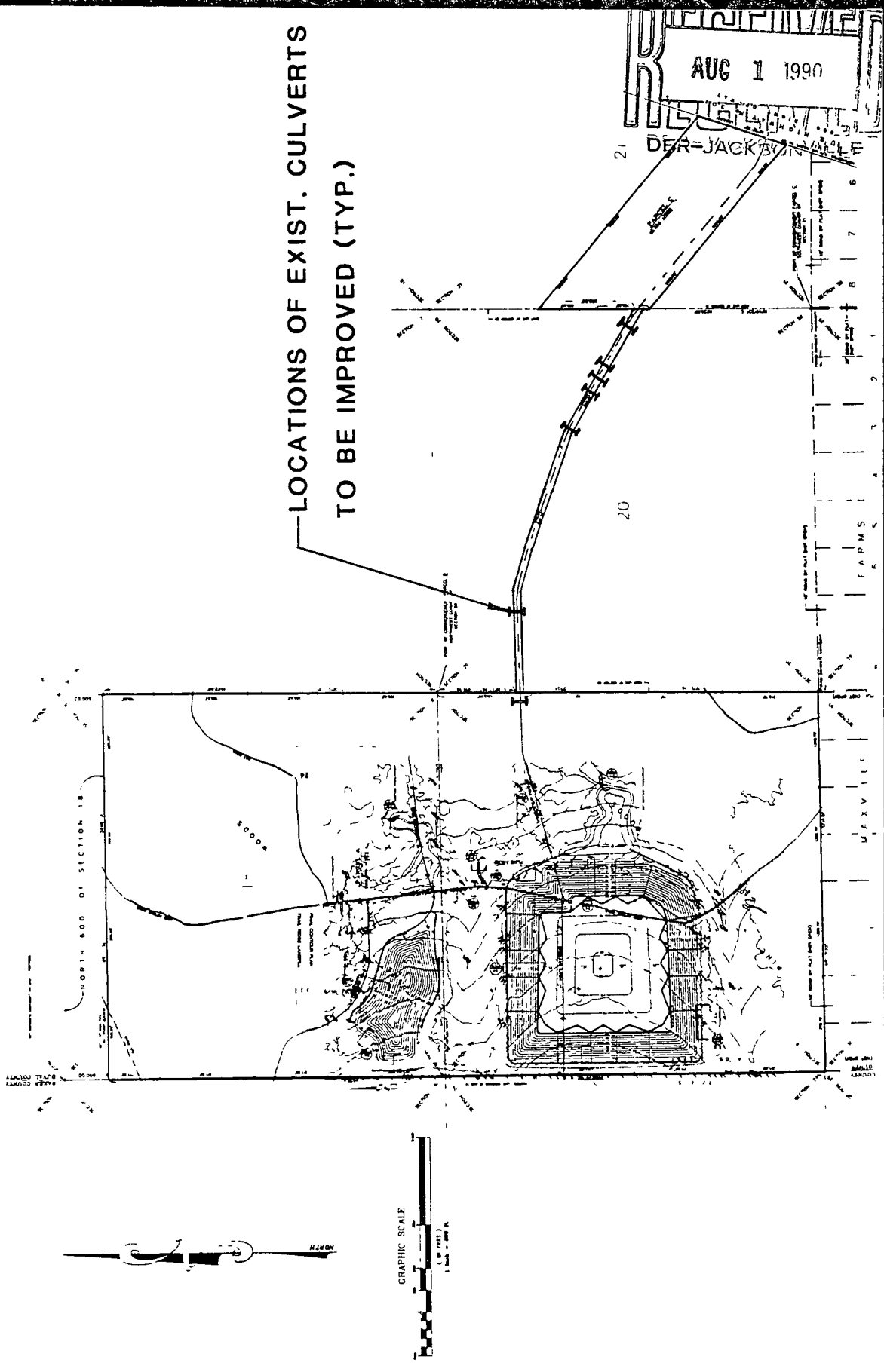
LOCATION MAP

PROJ. NO. E89-113

DATE

SCALE 1" 2000'

DRAWING NO



LOCATIONS OF EXIST. CULVERTS
TO BE IMPROVED (TYP.)

AUG 1 1990

DER-JACKSONVILLE

PROJ. NO.	89-113
DATE	
SCALE	1"=2000'
DRAWING NO.	

PLAN VIEW

TRAIL RIDGE LANDFILL

**England-Thims
& Miller, Inc.**

Consulting & Design Engineers
3331 St. Johns Bluff Rd. SE Jacksonville FL 32216

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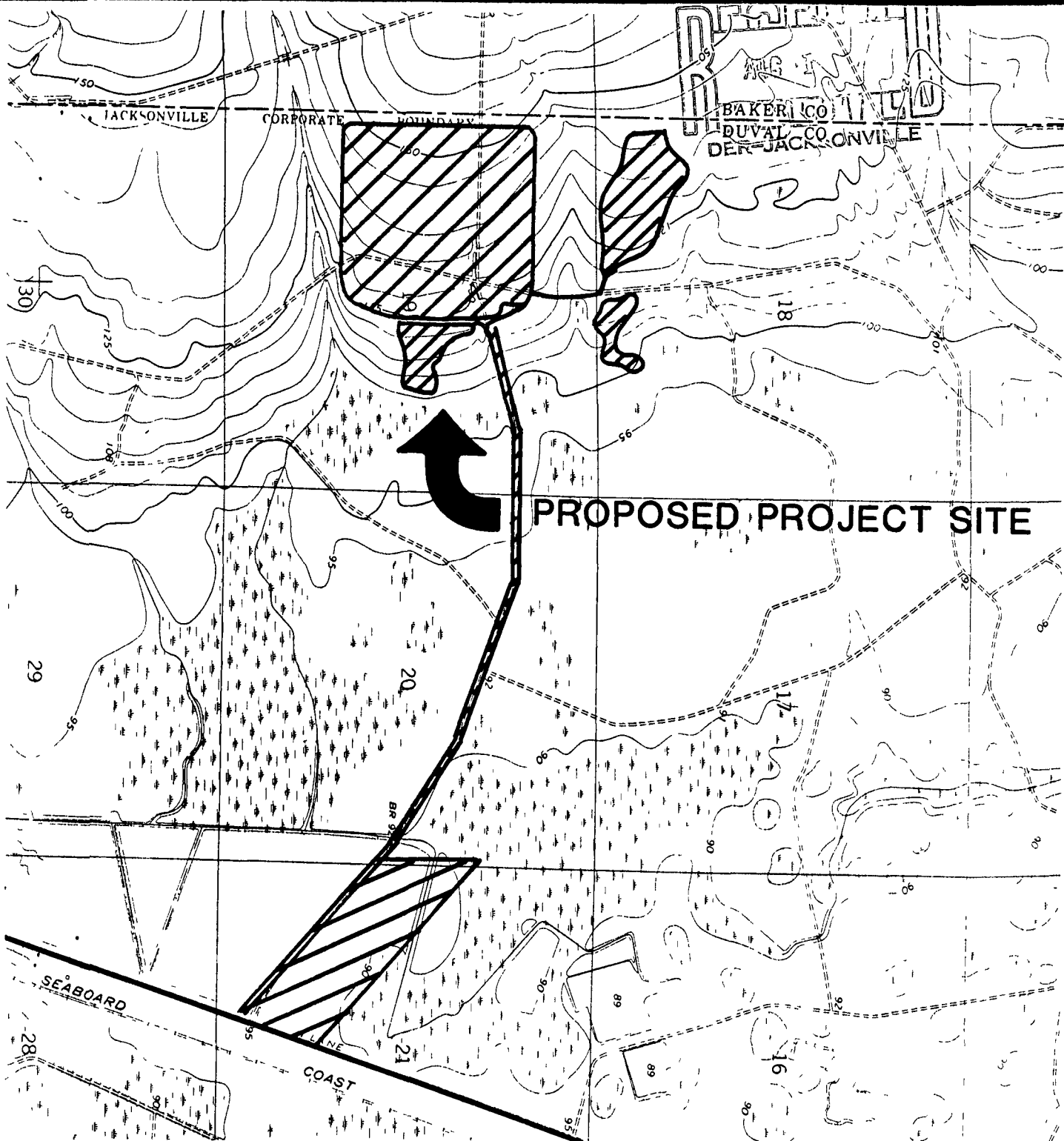
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QUADRANGLE MAP
OF MAXVILLE, FL.

SECTIONS 18, 19, 20, & 21

T-3-S, R-23-E



TRAIL RIDGE LANDFILL

LOCATION MAP

PROJ. NO. E89-113

DATE

SCALE 1" 2000'

DRAWING NO.

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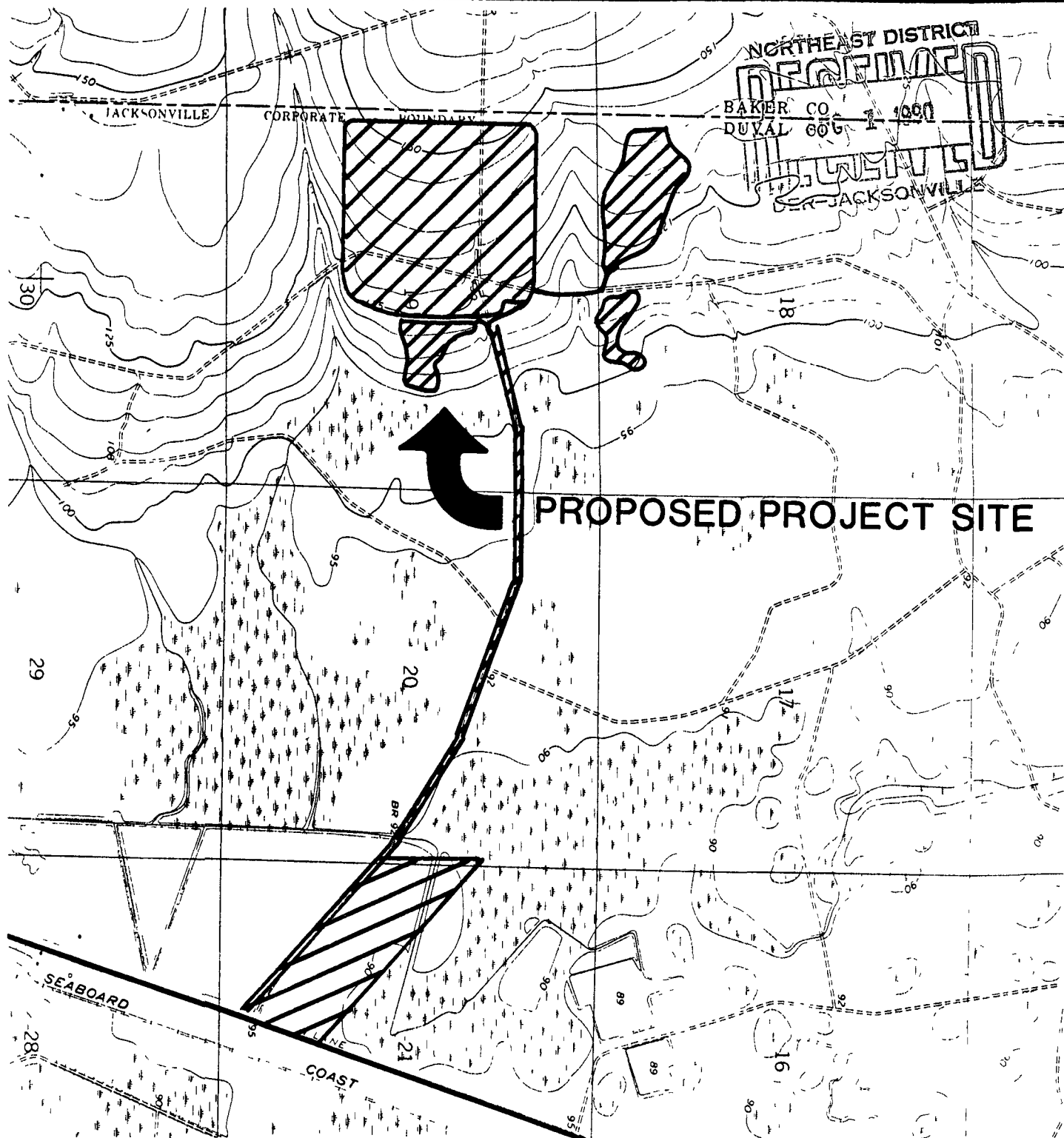
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the volume of water to be contained on site: 30± (acre ft.)
the use to be made of the water and any other limitation thereon: groundwater recharge and wetland irrigation.
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QUADRANGLE MAP
OF MAXVILLE, FL.

SECTIONS 18, 19, 20, & 21

T-3-S, R-23-E



England, Thims
& Miller, Inc.
Consulting & Design Engineers

TRAIL RIDGE LANDFILL

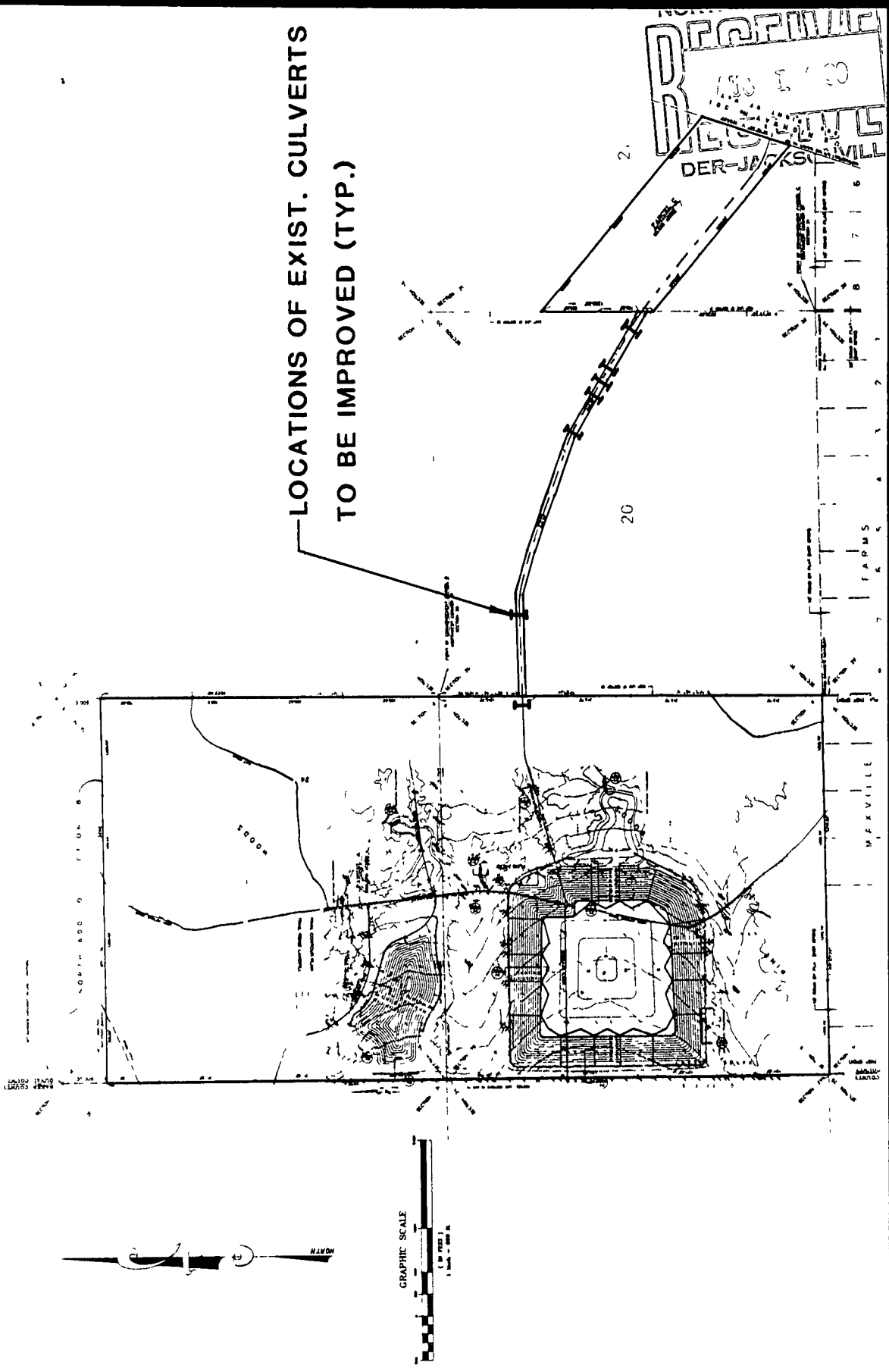
LOCATION MAP

PROJ. NO. E89-113

DATE

SCALE 1" 2000'

DRAWING NO



PROJ. NO.	89-113
DATE	
SCALE	1"=2000'
DRAWING NO.	

PLAN VIEW

TRAIL RIDGE LANDFILL

England-Thims & Miller, Inc.
 Consulting & Design Engineers
 3131 St. Johns Bluff Rd. So., Jacksonville, FL 32216

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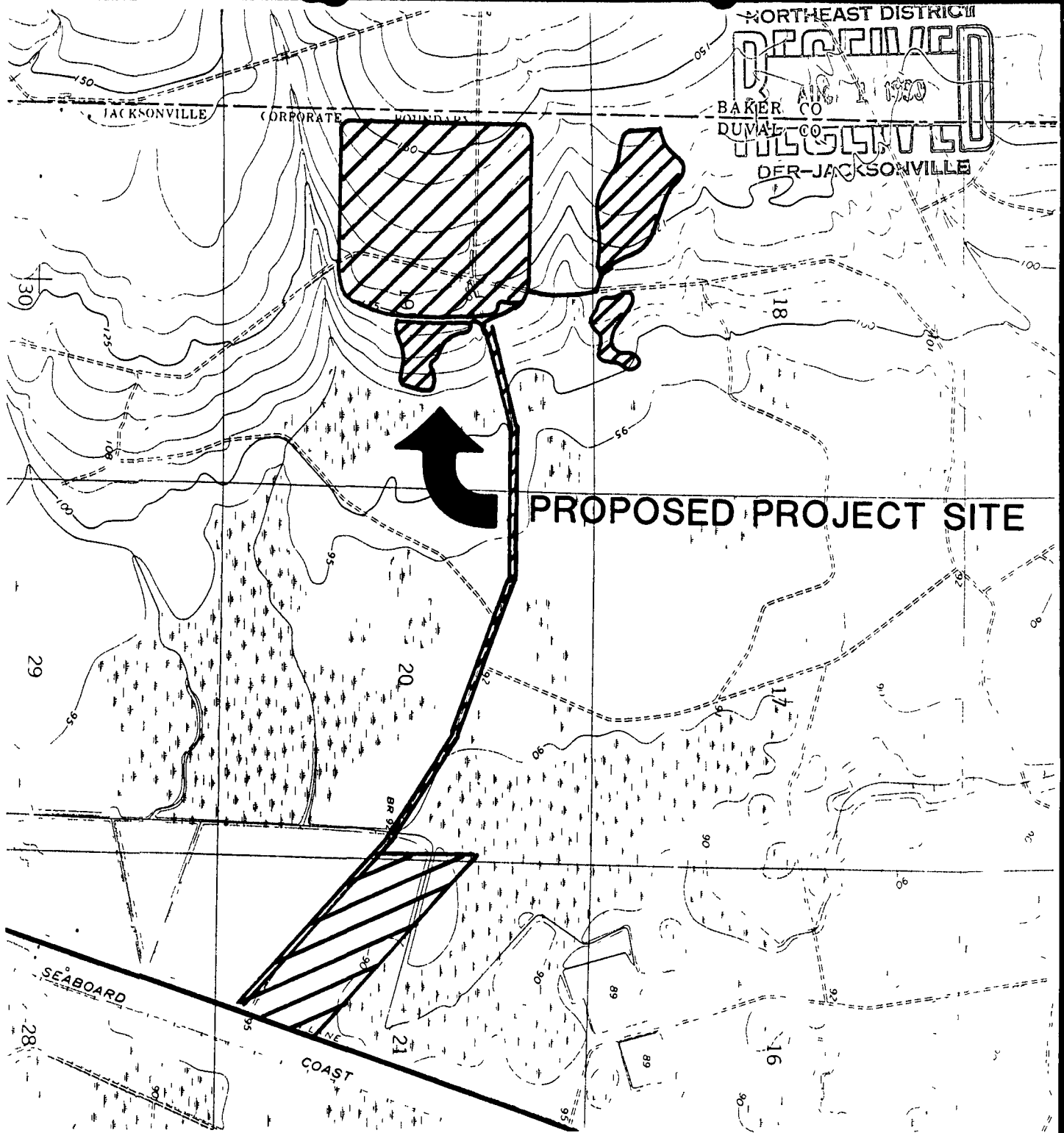
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QUADRANGLE MAP
OF MAXVILLE, FL.

SECTIONS 18, 19, 20, & 21

T-3-S, R-23-E



England-Thimby
& Millar, Inc.
Consulting & Design Engineers

TRAIL RIDGE LANDFILL

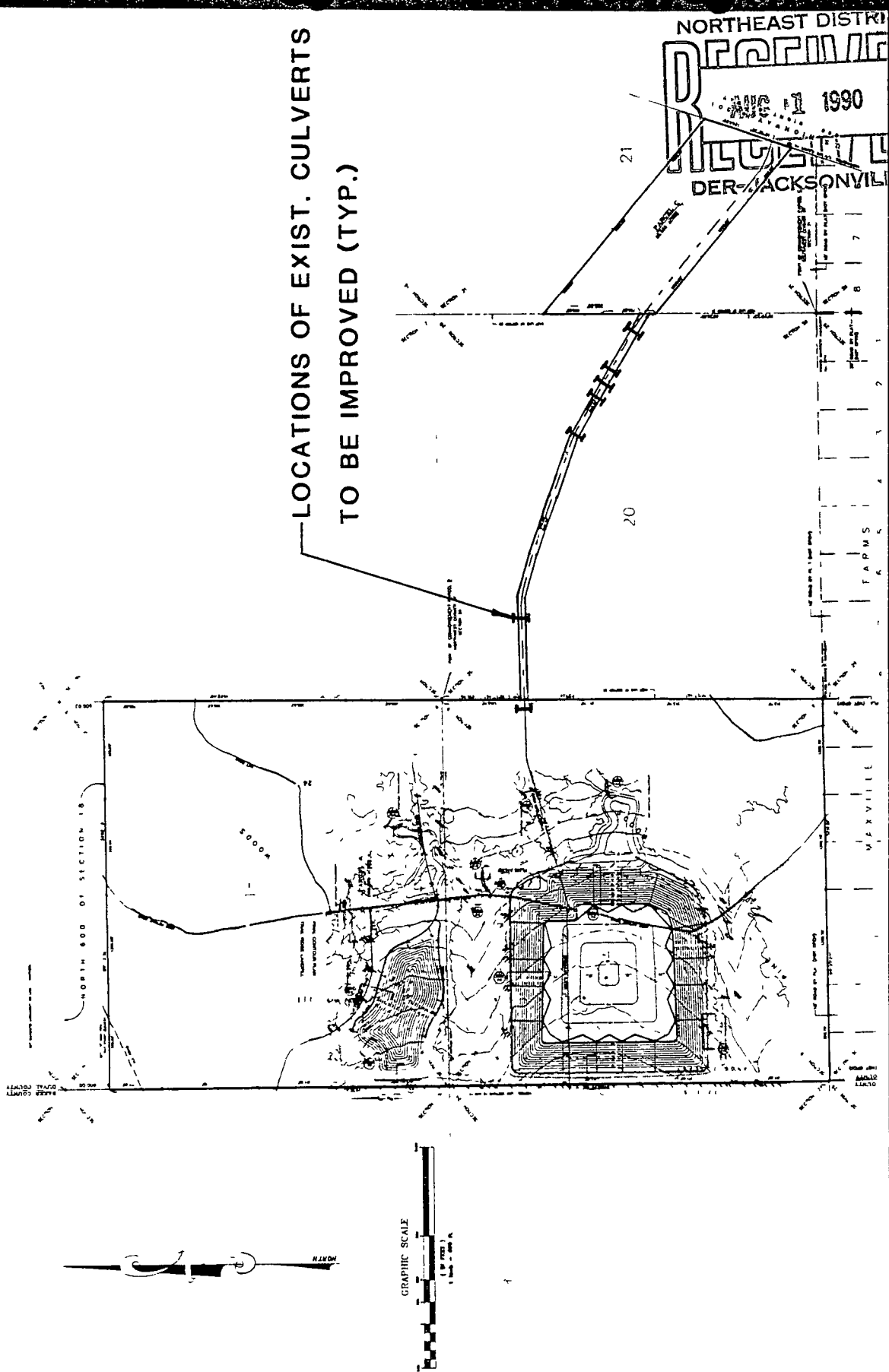
LOCATION MAP

PROJ. NO. E89-113

DATE

SCALE 1" = 2000'

DRAWING NO



PROJ. NO.	89-113
DATE	
SCALE	1" = 2000'
DRAWING NO.	

PLAN VIEW
TRAIL RIDGE LANDFILL

England-Thims & Miller, Inc.
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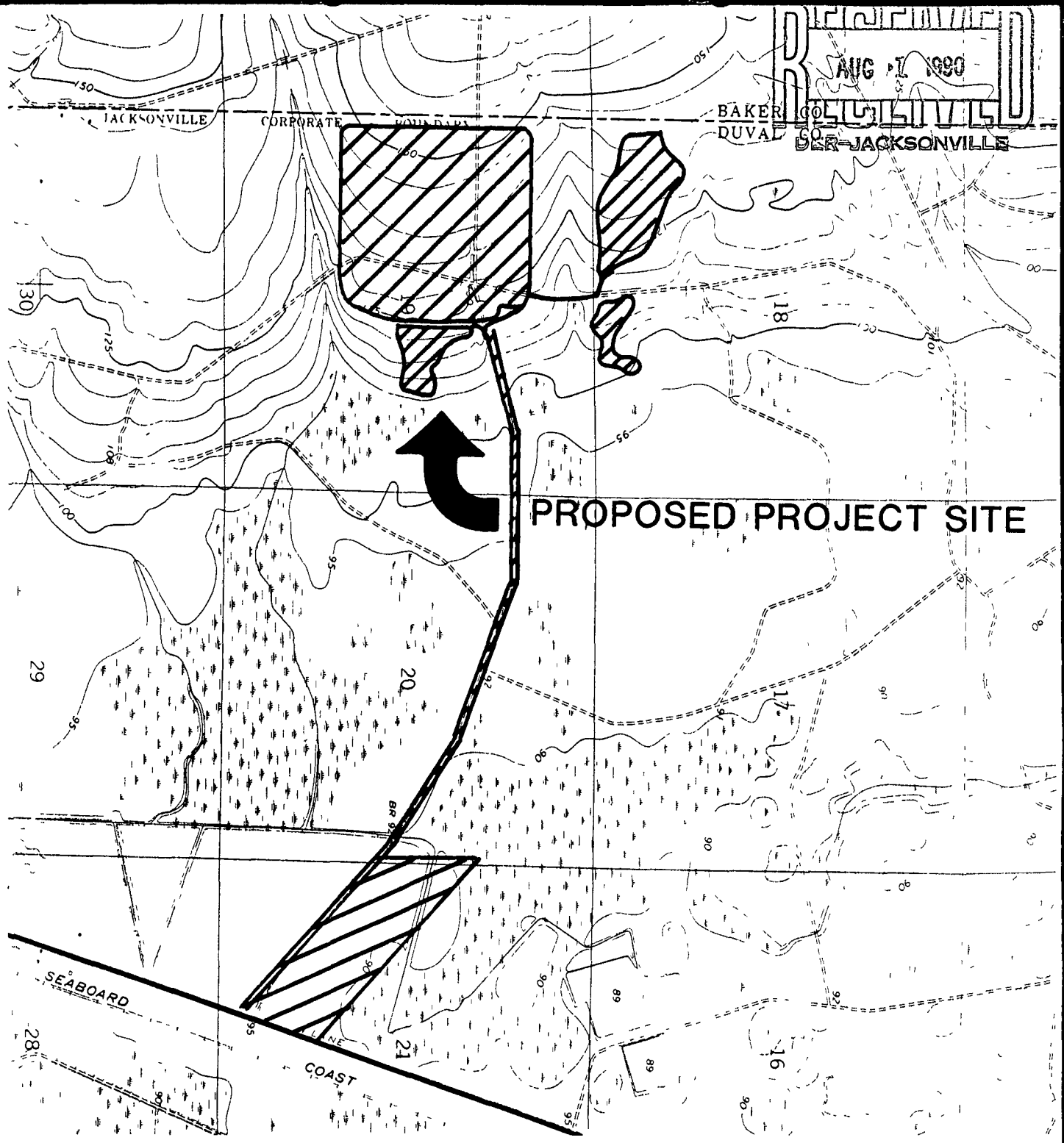
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QUADRANGLE MAP
OF MAXVILLE, FL.

SECTIONS 18, 19, 20, & 21

T-3-S, R-23-E

England-Thimby
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Consulting & Design Engineers

TRAIL RIDGE LANDFILL

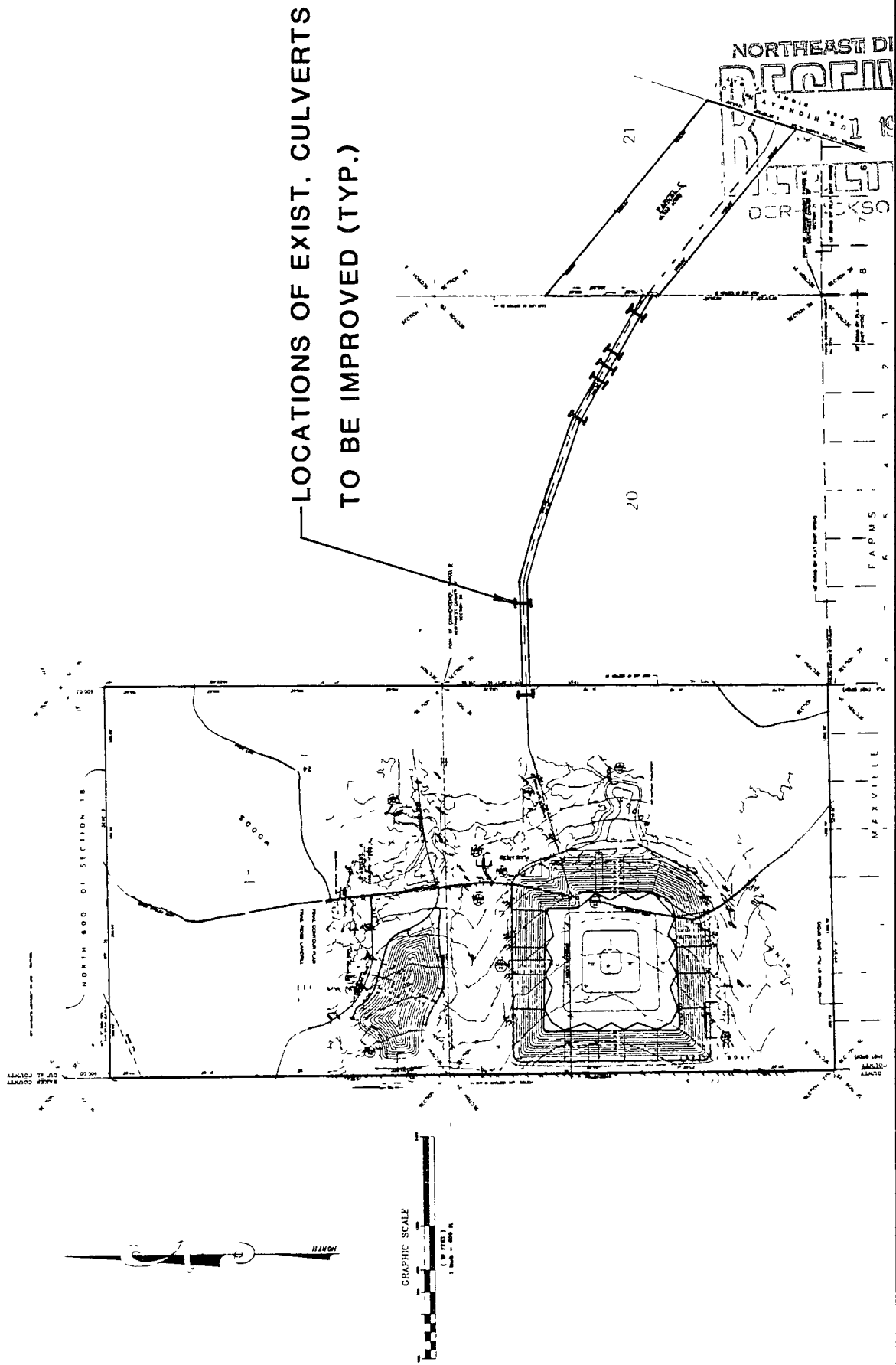
LOCATION MAP

PROJ. NO. E89-113

DATE

SCALE 1" 2000'

DRAWING NO



**England-Thims
& Miller, Inc.**
Consulting & Design Engineers
3131 St. Johns Bluff Rd. SE, Jacksonville, FL 32216

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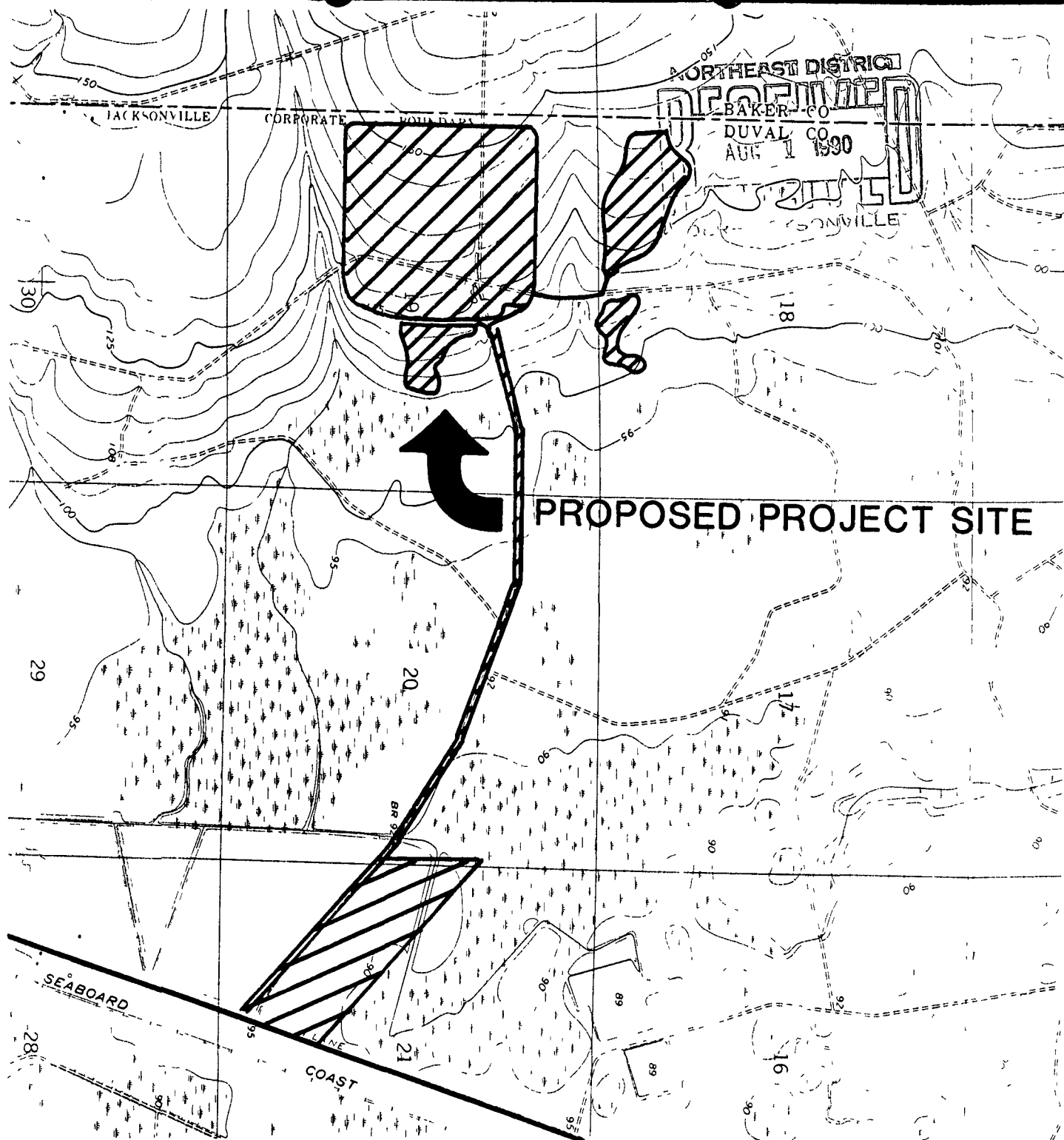
Earliest possible date for agency action: _____

Date to be posted: _____ Date to be removed: _____

Written objections must be filed by: _____

- -----
1. Attach a location map, showing the boundary of the proposed activity and its relationship to any other portions of the project. Map size must be no larger than 11" by 17" referenced to Section, Township, and Range. Map scale must be 1" = 2000' (plot on USGS quad maps). Attach multiple sheets, if necessary.
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 4. Provide a brief statement describing any wetland mitigation proposed to be undertaken (attach additional sheets if necessary): The conversion of 4.76 ac of upland into high quality wetlands is proposed to offset the wetland impacts. This will provide a ratio of wetlands created/wetlands impacted of C.O.E. - 1.07; S.J.R.W.M.D. - 1.50; D.E.R. - 2.80:1
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 6. Indicate the source of any water to be contained on site: stormwater runoff, the volume of water to be contained on site: 30± (acre-feet), the use to be made of the water and any other limitation thereon groundwater recharge and wetland irrigation.
- -----

Persons interested in the above described application should contact the St. Johns River Water Management District at P. O. Box 1429, Palatka, Florida 32178-1429, or in person at its office on State Highway 100 West, Palatka, Florida, 904/328-8321. Written objections to the application may be made no later than the date specified above. Written objections should identify the objector by name and address, and fully describe the nature of the objection to the application. All timely filed written objections will be presented to the Board for consideration prior to the Board taking action on the application. Filing a written objection does not entitle one to a Chapter 120, Florida Statutes, administrative hearing. Only those persons whose substantial interests are affected by the application and who file a petition meeting the District's requirements after receipt of notice of intended action or final action may obtain an administrative hearing (see section 40C-1.511, F.A.C.). The requirements relating to timing and content of such petitions are set forth in Chapter 40C-1, F.A.C., Parts I and V.



QUADRANGLE MAP
OF MAXVILLE, FL.

SECTIONS 18, 19, 20, & 21

T-3-S, R-23-E



TRAIL RIDGE LANDFILL

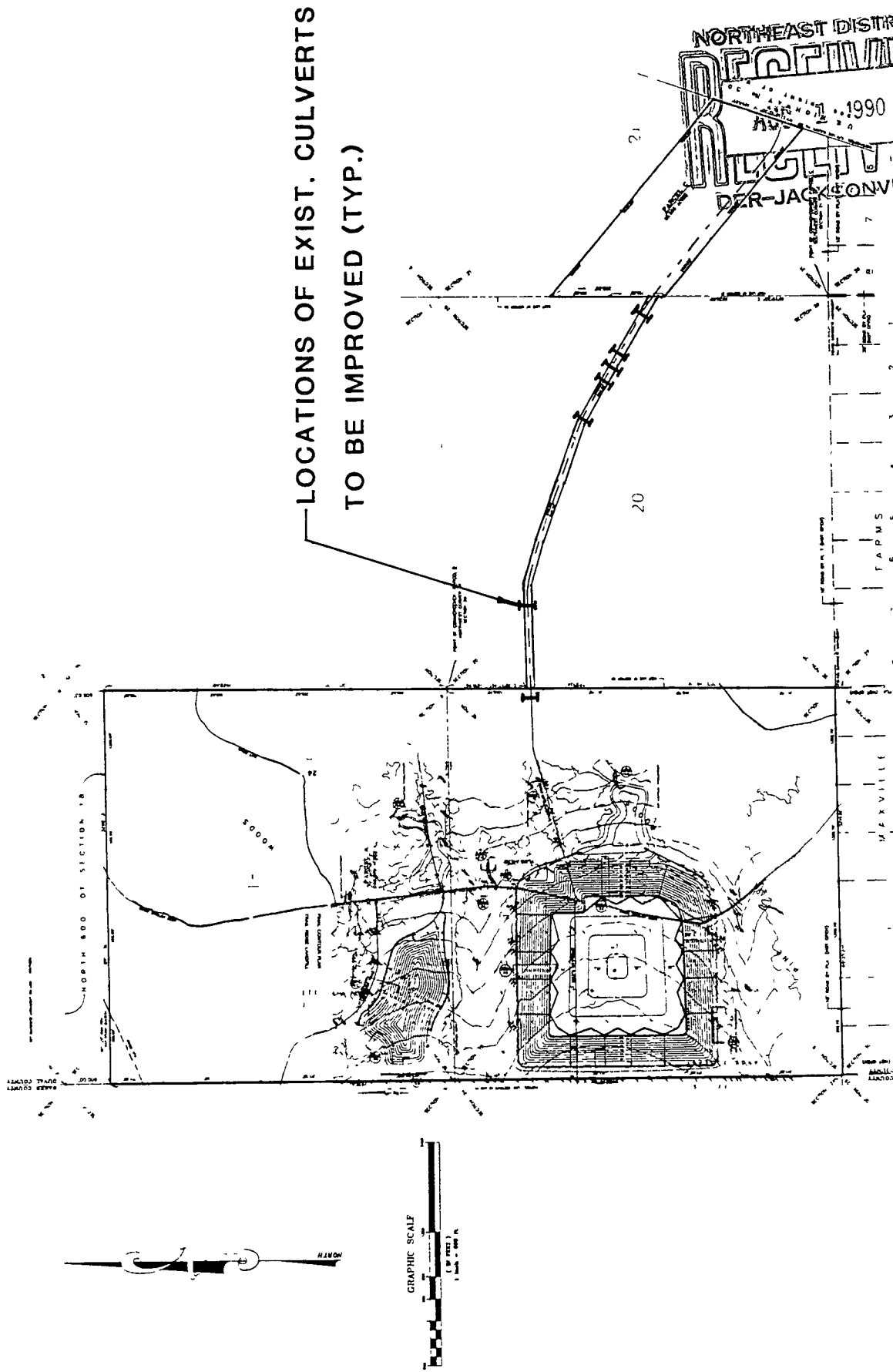
LOCATION MAP

PROJ. NO. E89-113

DATE

SCALE 1" = 2000'

DRAWING NO



NOTICE OF RECEIPT OF APPLICATION

Pursuant to Section 373.413, Florida Statutes, and Chapter 40C-4, Florida Administrative Code, the applicant is required to provide the following information for the purpose of public notice. Failure to provide all information will result in an incomplete application. This information is in addition to that required in other portions of the application form

Five copies of this form and all attachments must be submitted.

This section will be completed by the District

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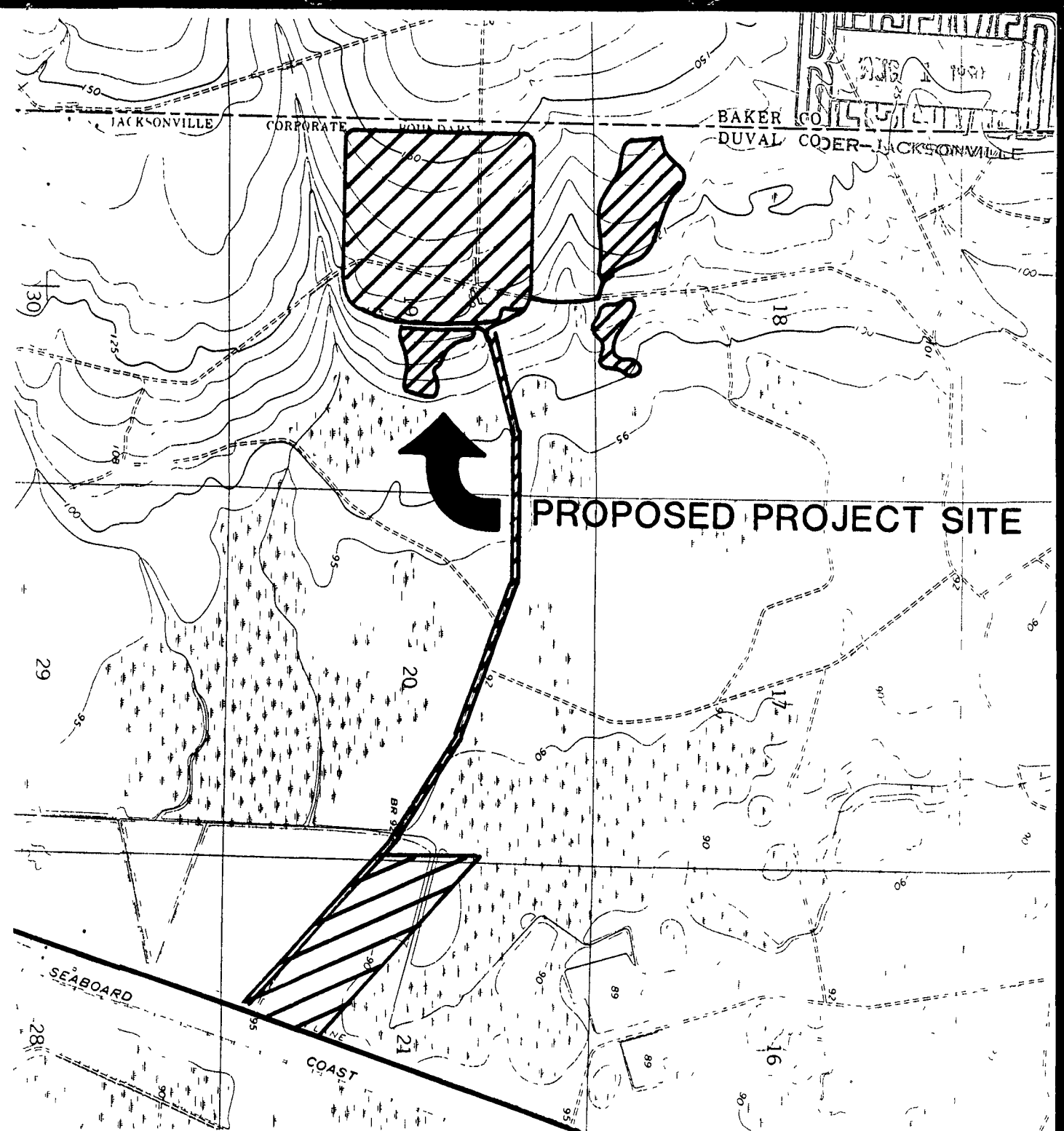
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- 5 Provide the names of all streams, lakes, wetlands, or other watercourses that are proposed to be impounded, diverted, drained, discharged into (either directly or indirectly), or otherwise impacted by the proposed activity. Discharge into headwaters of Deep Creek.
- 6 Indicate the source of any water to be contained on site: stormwater runoff. the volume of water to be contained on site: 30± (acre ft). the use to be made of the water and any other limitation thereon: groundwater recharge and wetland irrigation.

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QUADRANGLE MAP
OF MAXVILLE, FL.

SECTIONS 18, 19, 20, & 21
T-3-S, R-23-E



TRAIL RIDGE LANDFILL
LOCATION MAP

PROJ. NO. E89-113
DATE
SCALE 1" 2000'
DRAWING NO.

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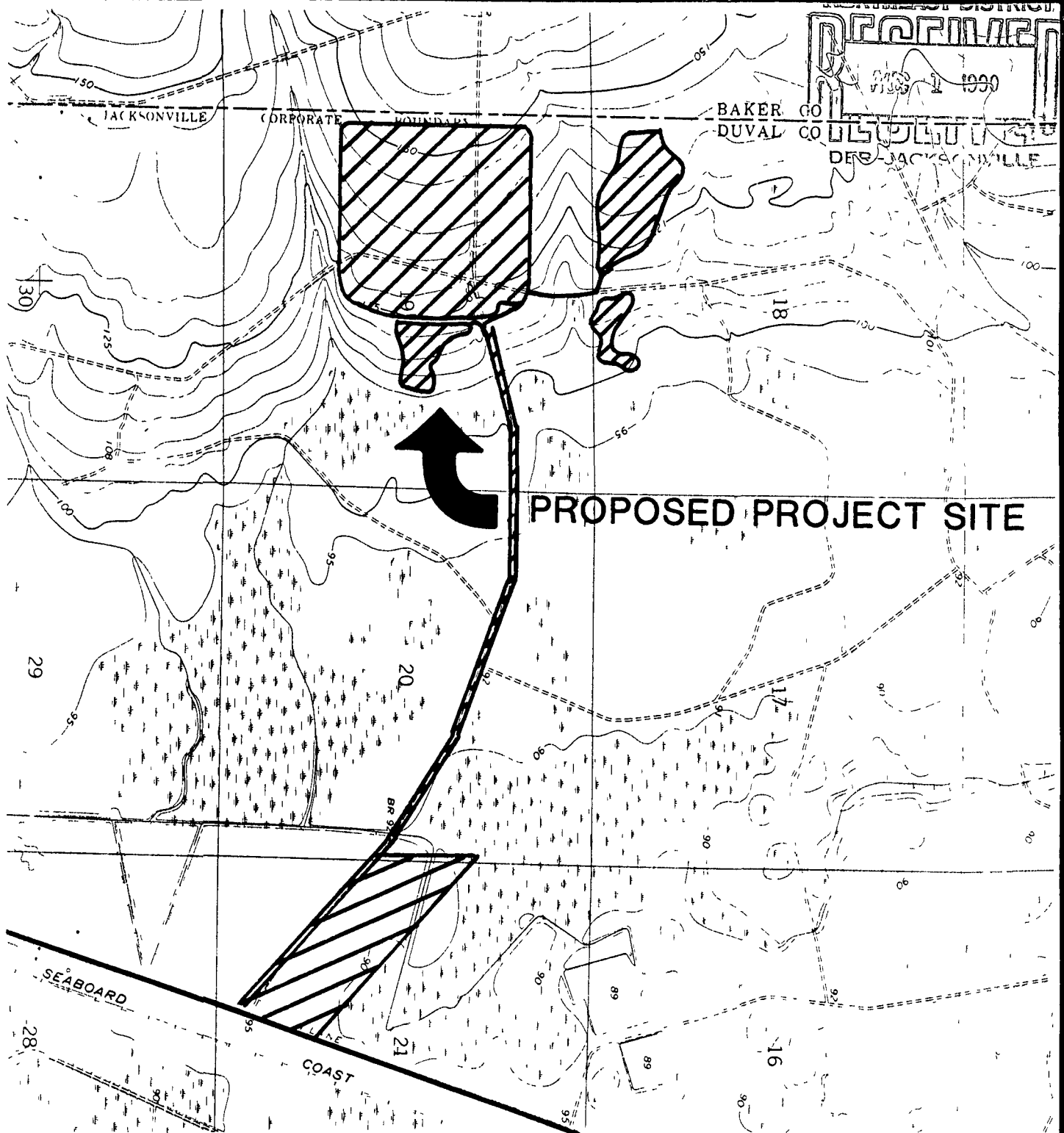
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QUADRANGLE MAP
OF MAXVILLE, FL.

SECTIONS 18, 19, 20, & 21

T-3-S, R-23-E

England, Thimby
& Miller, Inc.
Consulting & Design Engineers

TRAIL RIDGE LANDFILL

LOCATION MAP

PROJ. NO. E89-113

DATE

SCALE 1" = 2000'

DRAWING NO

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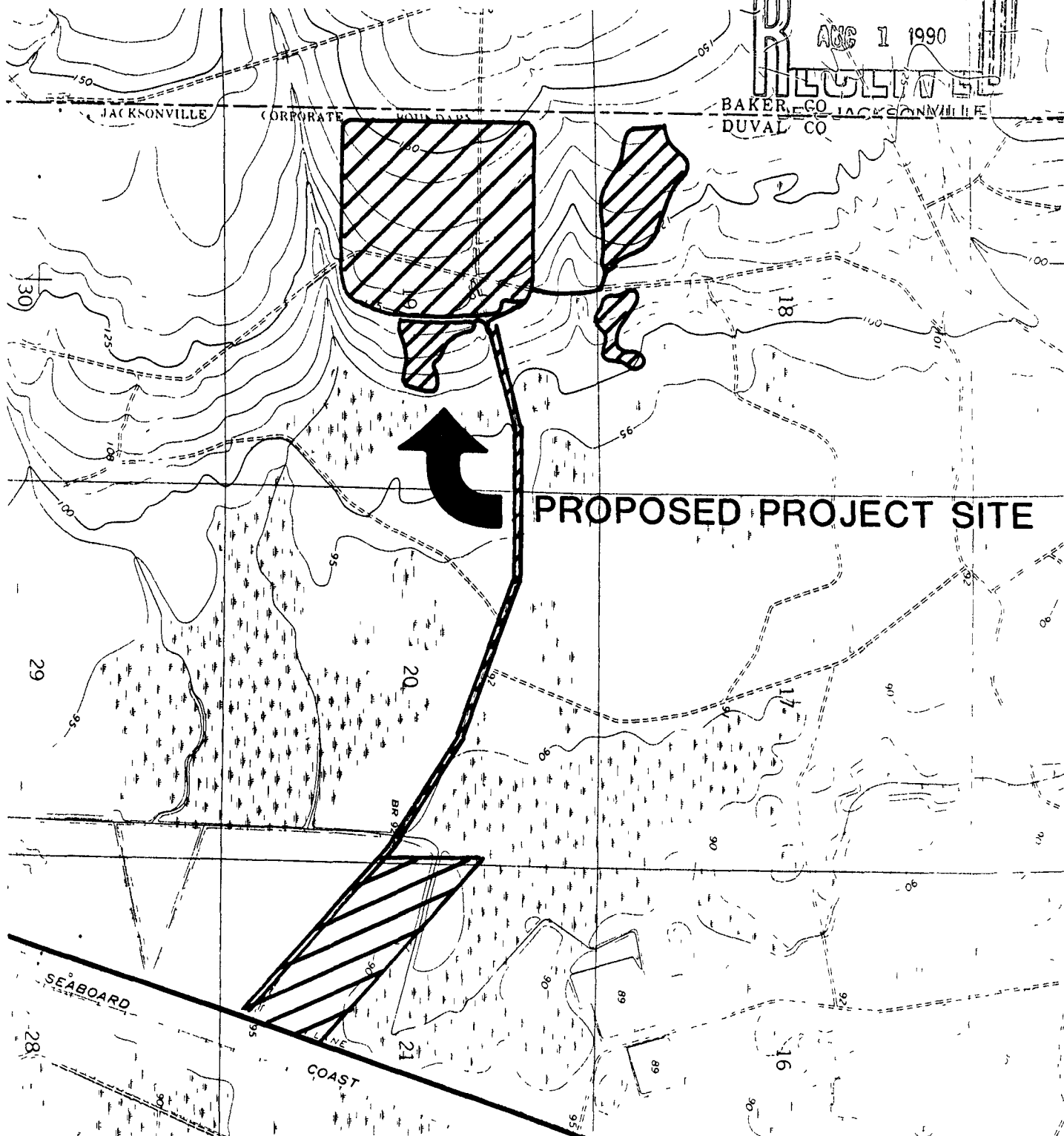
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AUG 1 1990

BAKER CO JACKSONVILLE
DUVAL CO JACKSONVILLE



QUADRANGLE MAP
OF MAXVILLE, FL.

SECTIONS 18, 19, 20, & 21

T-3-S, R-23-E



England, Thims
& Miller, Inc.
Consulting & Design Engineers

TRAIL RIDGE LANDFILL

LOCATION MAP

PROJ. NO. E89-113

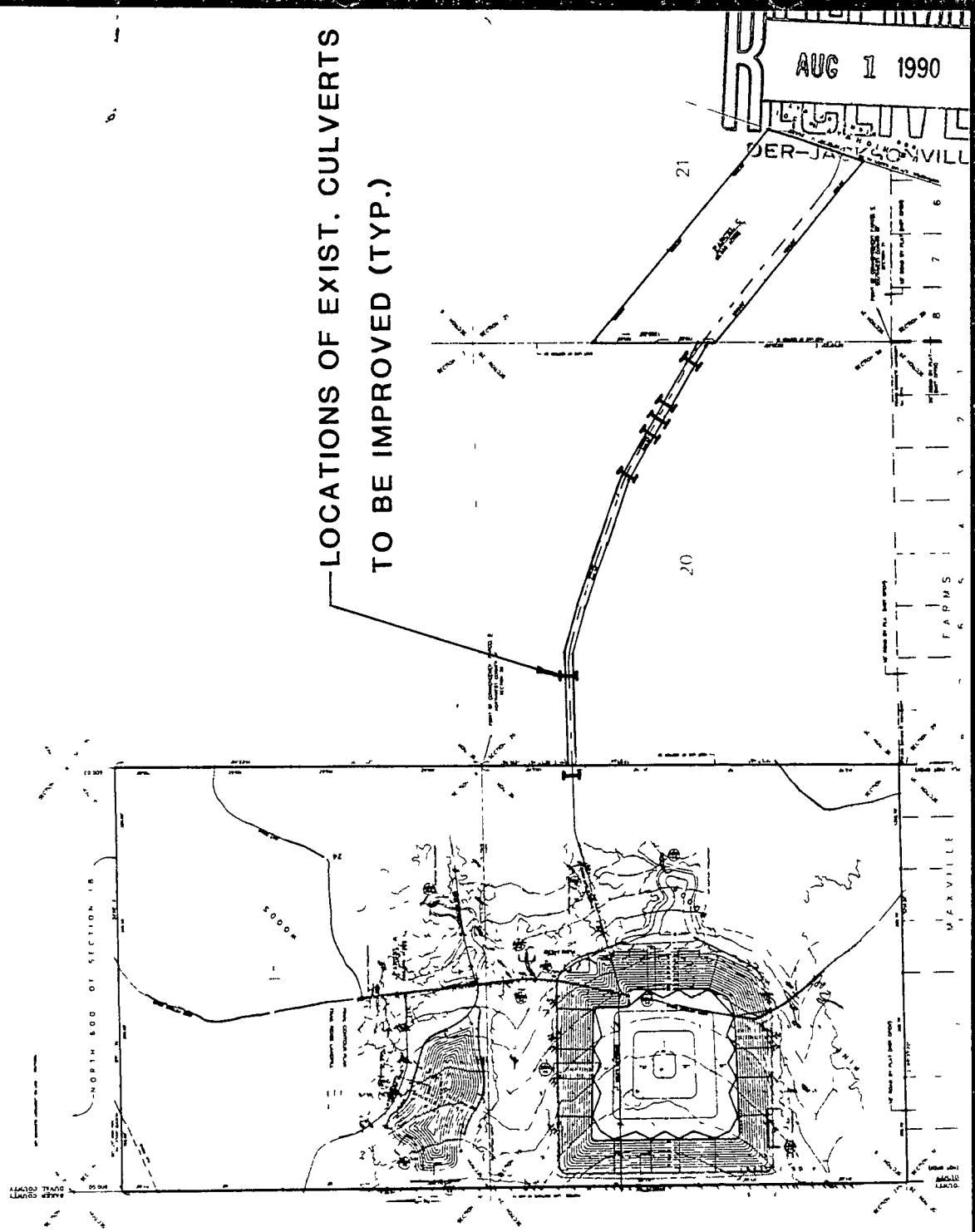
DATE

SCALE 1" = 2000'

DRAWING NO

AUG 1 1990

LOCATIONS OF EXIST. CULVERTS
TO BE IMPROVED (TYP.)



PROJ. NO.	89-113
DATE	
SCALE	1" = 2000'
DRAWING NO.	

PLAN VIEW

TRAIL RIDGE LANDFILL

**England-Thims
& Miller, Inc.**
Consulting & Design Engineers
3131 St. Johns Bluff Rd. SE, Jacksonville, FL 32216