NORTH BROWARD RESOURCE RECOVERY FACILITY
ASH PROCESSING ADDITION

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es#/520/ocr

NORTH BROWARD RESOURCE RECOVERY FACILITY
ASH PROCESSING ADDITION

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es#5/506/ocr

INTRODUCTION

Wheelabrator North Broward Inc. (WNB) seeks agency approval for a modification of site certification No. PA86-22.

The refuse fueled boilers at the North Broward County Resource Recovery Facility (RRF) convert Municipal Solid Waste (MSW) into electrical energy and reduce the volume of MSW by 90% through the combustion process. The remaining residue consists of two streams. Bottom Ash is the material remaining on the grates after combustion is complete. Fly Ash is the ash component in the flue gas and is collected in a scrubber/baghouse system. The bottom ash and fly ash are currently combined for disposal into the adjacent ash monofill.

The purpose of this modification is to construct appropriate equipment to sufficiently process the ash residue for beneficial reuse either as landfill daily cover or substitute aggregate material for construction applications. The Department of Environmental Protection has authorized such reuse application for Wheelabrator's McKay Bay Facility as indicated in Appendix C and is currently reviewing Wheelabrator's data submittal seeking a recovered materials determination for WNB.

PROCESS DESCRIPTION

The ash reuse process was developed for the purpose of manufacturing both landfill cover or a marketable aggregate product from the ash residue remaining from the combustion of municipal solid waste. The modification will allow for the processing of ash residue into recovered materials. These materials meet the criteria for landfill daily cover as described in F.A.C.17-701 and also qualify as a recycled material pursuant to F.A.C.17-702.

The process begins when the ash residue exits the facility. While the refuse processing in the Resource Recovery Facility is a continuous 24 hours per day operation, the ash reuse process is designed as a single shift operation. Therefore, the bottom ash which discharges from the combustion grates is conveyed to a storage bunker prior to processing.

The process is divided into four phases: initial ferrous recovery and processing; initial size gradation, reagent introduction and curing; final sizing; and shipping. A description of each phase of the process is provided below and is shown in Figure 1 and 2.

Ferrous Recovery

Recovery of ferrous metal from the ash residue stream is important for three reasons. Ferrous metal recovery avoids consumption of ash monofill volume and therefore extends its useful life. Recovered ferrous scrap is a valuable scrap metal product which enhances recycling efforts and is easily reused. Thirdly, removal of the ferrous metal, which varies in size from large bulky objects to small nails, screws, etc., enhances the ability to produce a homogeneous product.

The ash residue is conveyed to a finger screen where the stream is divided into plus 4" and minus 4" fractions. The plus 4" material is primarily ferrous metal and is conveyed to a bunker where it is stored prior to shipping.

Initial Size Gradation

The minus 4" fraction from the finger screen is conveyed to a sizing screen. The ferrous metal in this fraction is magnetically removed from the screen oversize stream. The screen undersize stream is then, through the following steps, either shipped as landfill daily cover or processed into a construction aggregate.

Reagent Introduction

The production of construction aggregate requires the addition of a portland cement based reagent blend to the remaining ash stream after ferrous metal recovery.

The discharge from the ash storage silo is weighed and reagents are proportioned into a mixer. After mixing is complete, the blend is discharged into an interim curing bunker.

Final Sizing and Shipping

After the curing period, the blend is removed from the interim storage bunker by a front end loader and introduced to another sizing screen. A final cleanup magnet removes any remaining ferrous metal. The cured aggregate product discharges into a truck and is shipped to the purchaser. The oversize material is crushed and returned to the final screen.

Process Results

The system is designed with the capability of processing all of the ash residue generated at the Wheelabrator North Broward Facility. Approximately 80% of the ash will be processed, while approximately 10% of the initial ash residue will be recovered as marketable ferrous metal. The processed aggregate will be sold as landfill cover or construction aggregate. Approximately 10% of the initial ash is expected to be process reject material and will be disposed of in accordance with F.A.C. 17-702.

This fully enclosed ash reuse process building will measure 125' x 350', and will be located adjacent to the existing ash residue handling and loading area. The equipment utilized in this process will be conveyors, loaders, screens, and mixers which are not unlike equipment already utilized at the Resource Recovery Facility.

The ash reuse processing building will be designed and constructed at an estimated cost of seven million dollars, and may require additional employees to operate and maintain the new facility.

IMPACTS

Site impacts for the North Broward Resource Recovery Facility were discussed in detail in the original siting application and in subsequent modifications. The addition of the ash reuse process building, whether producing landfill cover or construction aggregate, has little additional resource impact. Pertinent issues with regards to these impacts are as follows.

Air

The modification includes two new air emission points, all of which control particulate emissions generated by the production of recovered materials or the delivery of bulk reagents.

Two dust collectors will be mounted on the roof of the ash processing building. The dust collectors have several "pick up" points throughout the process. This dust collection system is designed to properly ventilate work areas and eliminate the possibility of fugitive dusting. Potential emissions from all points total less than 15 tons per year and actual emissions will be much lower. Emission estimates and air flow diagrams are included in Appendix B.

Water

The Ash Reuse Process Facility will generate approximately 1800 gallons of wastewater derived from washdown activities per day. This water will be supplied from the existing North Broward Resource Recovery Facility process water stream. The wastewater will enter the sump inside the ash reuse process building and will be pumped to the water storage tank at the Resource Recovery Plant for reuse on site.

Storm water shown in the cross hatched area in Drawing No. 5 will enter one of the sumps through a surface U-drain system. The runoff, will be pumped to the onsite contact water recycle tank. Manhole 7A will be capped to keep this runoff from entering the detention pond. The area from the new ash processing facility is presently an impervious area and construction of the proposed facility will not increase runoff volume from the area, as demonstrated in the storm water calculations provided in Appendix A.

Potable water will be used inside the building for working personnel and visitors. The sanitary sewers serving the new restroom facility within the ash reuse processing building will flow to the Facility's lift station which flow to the North Broward Waste Water Treatment Plant. The estimated daily usage of potable water is approximately 225 gallons.

Traffic

The ash reuse process will generate approximately 4500 tons per week of landfill daily cover or construction aggregate product. The product will be shipped six days per week and will be distributed as close to the production facility as possible.

The production of the ash reuse facility will be consumed at the adjacent landfill or other nearby markets as daily cover. The material will be transported via an existing internal road linking the resource recovery facility with the landfill. Since the processed ash products can be used in the landfill as daily cover, it will displace truck loads of purchased cover material that currently travels to the landfill from Powerline Road.

The balance of the processed aggregate will be utilized as a road construction aggregate. Markets are the three asphalt batch plants in the vicinity of 48th Street and Powerline Road. Trucks will exit the production facility and travel less than one mile to the consumers. The processed aggregate is a 100% substitute for natural aggregates; therefore, the batch plants in the vicinity will avoid delivery of aggregate that is currently delivered through the Sample Road and Powerline Road corridor. The processed aggregate will be delivered in covered trucks in accordance with Department of Transportation requirements.

The ash processing facility will require deliveries of reagents and supplies estimated to be 2-3 trucks per day in addition to existing normal deliveries to the project site. The ash reuse process will not impact normal refuse deliveries to the facility. We anticipate minimal impact to the facility staffing requirements.

In summary, the ash reuse process will result in a net reduction of vehicle traffic in the congested Sample Road and Powerline Road area. Truck deliveries of processed aggregate to local asphalt plants and the adjacent landfill will have a one for one offset of existing aggregate deliveries.

Noise

The North Broward Ash Processing Facility will be designed, procured, constructed and operated to meet all applicable noise ordinances (Sec 27-231-27) Broward County Ordinances.

The Facility will be designed to operate during the day shift with occasional second shift work when necessary due to equipment maintenance and plant outages.

Various noise abatement measures will be required and incorporated into the Ash Reuse Processing Facility design to reduce noise impact due to operation of the facility. Different forms of noise control measures include equipment enclosures, attenuating materials, barriers, mufflers, lagging, vibration damping and insulation.

CONSTRUCTION ENVIRONMENTAL CONTROL PLAN

The total duration of construction is expected to be 120 days from ground breaking to completion.

Piling will be required for support of various building and foundation loads. Pile driving activities will be restricted to the hours of 7:00 am to 7:00 pm and are anticipated to be completed within a two week time frame.

There is sufficient impervious surface on site to serve as a laydown area.

An environmental control program shall be established under the supervision of a qualified individual to assure that all construction activities conform to applicable environmental regulations and the applicable conditions of certification.

If harmful effects or irreversible environmental damage not anticipated by the application are detected during construction, the the Southeast District Office shall be notified.

APPENDIX A

REVISED STORM WATER DRAINAGE CALCULATIONS

RUST ENGINEERING COMPANY

RUST AND QUALITY–A Company and a Commitment sm

100 Corporate Parkway 35242
Post Office Box 101
Birmingham, Alabama 35201
Tel. (205) 995-7878

April 6, 1994

Mr. Paul Claerbout, Plant Manager
WHEELABRATOR NORTH BROWARD, Inc.
2600 N. W. 48th Street
Pompano Beach, FL 33073

SUBJECT: RUST Contract No. 21-4527L
Proposed Ash Processing Recycling Facility and
Required Revision to
STORM DRAINAGE CALCULATIONS
for the NORTH BROWARD COUNTY
RESOURCE RECOVERY FACILITY
Broward County, Florida

Dear Mr. Claerbout:

Reference is made to the following report entitled: STORM DRAINAGE CALCULATIONS FOR THE NORTH BROWARD COUNTY RESOURCE RECOVERY FACILITY, BROWARD COUNTY, FLORIDA;

Prepared by: RUST INTERNATIONAL CORPORATION
Birmingham, Alabama
Contract 21-3457
October 4, 1989

Also, reference power plant siting Certification No. PA86-22. The current project being proposed for this site consists of a 350 ft. long by 126 ft. wide Ash Processing Building to be constructed on the site in an area just south of the eastern Storm Water Detention Pond. This area is now mostly paved except for the eastern end which has the Ash Loadout Facility and a portion of the Conveyor Gallery. An area along the south side of the proposed building of approximately 235 ft. by 65 ft. will be paved to provide truck access to the doors of the proposed building along its south side. This proposed paved area is now pervious as considered in the referenced storm drainage calculations.

The attached calculations determine the impact on the existing storm drainage and Detention Ponds resulting from the construction of the proposed Ash Processing Facility. These calculations demonstrate that the stormwater management requirements of the South Florida Water Management District are still being met.

The new calculations sheets presented here represent only those sheets of the original referenced report that are revised because of the proposed project. These calculations show that only minor changes will occur in the storm drainage runoff and the stage storage capacity of the two detention ponds. Drainage Areas 5, 7, and 7A will be impacted. The proposed Ash Processing Building is to be constructed within Drainage Area 7A and its roofed area will replace an area that is presently paved. The existing catch basin at 7A is to be covered over to exclude any surface storm drainage. The surface water coming from the existing and proposed paved areas is considered to have been in contact with ash. The storm drainage from this paved portion of Drainage Area 7A will be directed by a swale toward the east into an existing U-drain and sump system from which it will be pumped to the on site contact water recycle system. The storm drainage from the roof of the proposed Ash Processing Building will be directed to downspouts located along the north side of the new building which drain to the detention ponds. This will be achieved by having a relatively flat roof that slopes down from the south side to the north side of the building. An area of approximately 72 ft. by 45 ft. located just north of the stack will be transferred from drainage area 7A to drainage area 5. An area of new pavement approximately 70 ft. by 60 ft. is to be added inside drainage area 7. Also, the construction of the proposed building and the new paved area will reduce the available site stage storage above El. 18.0 by 0.30 Ac-Ft. This loss of site stage storage does not cause the results to fall outside of the requirements.

If additional information is required, please contact this office.

Sincerely,

Jack Franks

Jack Franks
RUST Engineering Company
Civil Engineer
Florida PE NO. 45496

JF/er

Attachments: Revised pages of Referenced
STORM DRAINAGE CALCULATIONS

STORM DRAINAGE CALCULATIONS

for the

NORTH BROWARD COUNTY
RESOURCE RECOVERY FACILITY
Broward County, Florida

Prepared by

RUST INTERNATIONAL CORPORATION
Birmingham, Alabama

Contract 21-3457
October 4, 1989
Revised February 14, 1994
for Contract 21-4527L

Jack Frankl

FL. P.E. No. 45496
3-24-94

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I. DETENTION CALCULATIONS

REVISED PAGES FOR CONTRACT 21-4527L
February 14, 1994

NORTH BROWARD WATER MANAGEMENT DISTRICT
STORM DRAINAGE CALCULATIONS
NORTH BROWARD RESOURCE RECOVER FACILITY
REVISED CALCULATIONS - FEBRUARY 14, 1994

INPUT

ACREAGES (AC)		
* TOTAL AREA (AC)		22.72 AC
- LESS AREA OUT TO WASTE TREATMENT		1.31 AC
- NET SITE AREA		21.41 AC
* IMPERVIOUS (AC)		
- BUILDING (ROOF)		3.84 AC
- ROAD AND PARKING		6.64 AC
* WATER OR POND AREA		2.60 AC
* PERVIOUS AREA		8.33 AC
MINIMUM ELEVATIONS (FT-NGVD)		
* ROADS AND PARKING		16.80 FT
* FLOORS		19.00 FT
SITE STORAGE ELEVATIONS USED (FT-NGVD)		
* BEGIN SITE STORAGE AT ELEV.		15.80
* MAX. SITE STORAGE ELEVATION		19.00
ZONING		INDUSTRIAL
ALLOWABLE DISCHARGE-CSM		69.20 CSM
WATER LEVELS (FT-NGVD)		
* WET SEASON W. TABLE		10.00 FT
DESIGN STORM RAINFALL AMOUNTS (IN)		
* ROADS (10YR-24HR)		10.90 IN
* POND DESIGN (25YR-72HR)		18.10 IN
* FLOORS (100YR-72HR)		24.70 IN
PRETREATMENT? (YES=1, NO=0)		1.00

COMPUTATIONS

DETENTION REQUIREMENTS (AC FT)		
* STORAGE FOR FIRST 1" RUNOFF (AC-FT)	1*21.41/12	1.78 AC-FT
* STORAGE FOR 2.5" * IMPERV.		
- WATER + ROOF AREA	2.60 + 3.84	6.44 AC
- SITE AREA FOR W Q	21.41 - 6.44	14.97 AC
- IMPERV AREA FOR W Q	14.97 - 8.33	6.64 AC
- % IMPERVIOUS FOR W Q	$\frac{6.64}{14.97}$ * 100	44.36%
- 2.5 * % IMPERVIOUS	2.5 * 0.4436	1.11 IN

NORTH BROWARD WATER MANAGEMENT DISTRICT
STORM DRAINAGE CALCULATIONS
NORTH BROWARD RESOURCE RECOVERY FACILITY
REVISED CALCULATIONS - FEBRUARY 14, 1994

VOL REQ'D FOR WATER QUALITY DETENTION REQUIRED (AC-FT)	1.11* (21.41-2.60)/12=	1.74 AC-FT
* CONTROLLING DETENTION REQUIRED (AC-FT)	1.78 vs. 1.74	1.78 AC-FT
* 1/2" PRETREATMENT REQUIRED (INCL.ROOF AREA)	.5* (21.41-2.60)/12	0.78 AC-FT
* REQUIRED LAKE VOL. (AC-FT) (Assumes dry det, no separate pre-trtmt system)	0.75*1.78	1.34 AC-FT

Lake Bottom Elevation = 11.00, 3:1 side slopes
Assume all storage above elevation 17.00 as vertical

STAGE-STORAGE TABLE

STAGE (FT)	LAKE (AC-FT)	SITE (AC-FT)	PROJECT (AC-FT)
10.0	0.00	0.00	0.00
11.0	0.00	0.00	0.00
11.2	0.36	0.00	0.36
11.4	0.73	0.00	0.73
11.6	1.10	0.00	1.10
11.8	1.48	0.00	1.48
12.0	1.87	0.00	1.87
12.5	2.85	0.00	2.85
13.0	3.87	0.00	3.87
14.0	6.00	0.00	6.00
15.0	8.27	0.00	8.27
15.5	9.45	0.00	9.45
16.0	10.67	0.08	10.75
16.5	11.92	0.95	12.87
17.0	13.20	2.80	16.00
18.0	15.80	9.42	25.22
19.0	18.40	19.63	38.03

CONTROL STRUCTURE DETENTION DISCHARGE WEIR (BLEEDER)

MIN CONTROL ELEVATION (DWT)	10.00	FT
MIN CONTROL ELEVATION (ROAD EL. - 2)	14.80	FT
CONTROL ELEVATION USED (FT-NGVD)	10.00	FT
MIN EL WEIR CREST (FT-NGVD) FOR WATER QUALITY DETENTION	11.74	FT
WEIR CREST ELEVATION USED (FT-NGVD)	12.00	FT
MAX DAILY DISCHARGE VOLUME (AC-FT) @ 1/2" PER DAY	0.81	AC-FT
OR	0.41	CFS

NORTH BROWARD WATER MANAGEMENT DISTRICT
STORM DRAINAGE CALCULATIONS
NORTH BROWARD RESOURCE RECOVERY FACILITY
REVISED CALCULATIONS - FEBRUARY 14, 1994

SIZE CONTROL STRUCTURE DETENTION DISCHARGE WEIR

USE COMBINATION 3" DIA. HOLE (INVERT AT CONTROL ELEVATION. 10.00) AND V-NOTCH OPENING (NOTCH ELEV. 11.40) FOR BLEEDER STRUCTURE:

V-NOTCH ANGLE USED (DEGREES)	40.64	DEG
WEIR LENGTH (FT) (12.00-11.40)*2*TAN(40.64/2)	0.44	FT

SIZE ALLOWABLE PEAK DISCHARGE WEIR

ALLOW PEAK DISCH. FOR THIS PROJ 69.20*21.41/640	2.32	CFS

SOIL STORAGE:

* IMPERVIOUS (AC) 3.84 + 6.64 + 2.60	13.08	
* PERVIOUS (AC) 21.41 - 13.08	8.33	AC
* AVERAGE PERV. AREA ELEVATION (NGVD)	18.00	
* DEPTH TO WATER TABLE (FT) 18.00 - 10.00	8.00	FT
* SOIL (COMPACTED) MOIST. STOR. AVAIL. (IN.)	8.18	IN
* COMPOS SOIL MOIST. STOR. (S) 8.33/21.41*8.18	3.18	IN

MAX 25YR-72HR ZERO DISCHARGE STAGE:

* TOTAL RAINFALL (P)	18.10	IN
* TOTAL RUNOFF (Q) (IN) ((P-.2S)^2)/(P+.8S)	14.77	IN
* TOTAL RUNOFF VOLUME (AC-FT) 14.77*21.41/12	26.35	AC-FT
* ZERO DISCHARGE STAGE ELEV. (FROM STA-STO TABLE)	18.10	FT
* DISCH. AT STAGE 18.10 (FROM STA-STO DISCH TABLE)	2.27	CFS

PEAK DISCHARGE WEIR DIMENSIONS

FOR RECTANGULAR: (PLACE "1" HERE TO CALCULATE PEAK DISCHARGE USING RECT. WEIR) ---> 0

*
*
*

* FOR V-NOTCH: (A "1" HERE INDICATES PEAK DISCHARGE USES THE BLEEDER WEIR) ---> 1

DRY DETENTION STARTS AT STAGE	11.00	FT
- TOTAL WET DETENTION	0.00	AC-FT
- 25YR-72HR DRY DETENTION	26.35	AC-FT

NORTH BROWARD WATER MANAGEMENT DISTRICT
STORM DRAINAGE CALCULATIONS
NORTH BROWARD RESOURCE RECOVERY FACILITY
REVISED CALCULATIONS - FEBRUARY 14, 1994

STAGE-STORAGE-DISCHARGE TABLE

STAGE (FT)	STORAGE (AC-FT)	3" DIA. ORIFICE	V-NOTCH	TOTAL
10.0	0.00	0.00	0.00	0.00
11.0	0.00	0.22	0.00	0.22
11.2	0.36	0.25	0.00	0.25
11.4	0.73	0.27	0.00	0.27
11.6	1.10	0.29	0.02	0.31
11.8	1.48	0.31	0.09	0.40
12.0	1.87	0.32	0.29	0.61
12.5	2.85	0.36	0.54	0.90
13.0	3.87	0.40	0.70	1.10
14.0	6.00	0.47	0.95	1.42
15.0	8.27	0.52	1.14	1.66
15.5	9.45	0.55	1.23	1.78
16.0	10.75	0.57	1.31	1.88
16.5	12.87	0.60	1.39	1.99
17.0	16.00	0.62	1.46	2.08
18.0	25.22	0.66	1.59	2.25
19.0	38.03	0.70	1.72	2.42

CHECK PROPOSED MIN BUILDING FLOOR ELEV

MAX 100YR-72HR ZERO DISCHARGE STAGE
TOTAL RAINFALL (P) 24.70 IN
TOTAL RUNOFF (Q) (IN) ((P-.2S)^2)/(P+.8S) 21.26 IN
TOTAL RUNOFF VOLUME (AC-FT) 21.26*21.41/12 37.93 AC-FT

ZERO DISCHARGE STAGE ELEV
(FROM STA-STO TABLE) 19.00 FT,OK
BUILDING FINISHED FLOORS EL. 19.00 ARE OK

CHECK PROPOSED MIN ROAD ELEV

MAX 10YR-24HR ZERO DISCHARGE STAGE
TOTAL RAINFALL (P) 10.90 IN
TOTAL RUNOFF (Q) (IN) ((P-.2S)^2)/(P+.8S) 7.84 IN
TOTAL RUNOFF VOLUME (AC-FT) 7.84*21.41/12 13.99AC-FT

ZERO DISCHARGE STAGE ELEV (FROM STA-STO TABLE) 16.68 FT,OK
ROAD CENTERLINE EL. 16.80 IS OK

S C S P R O G R A M

PROJECT NAME . . . . : NORTH BROWARD RRF (REV. 2-14-94)
REVIEWER . . . . . : L. E. CRIGLER
PROJECT AREA . . . . : 21.45 ACRES
GROUND STORAGE . . . : 8.18 INCHES
TERMINATION DISCHARGE : 1.00 CFS
DISTRIBUTION TYPE . . : SFWMD
RETURN FREQUENCY . . : 10.00 YEARS
RAINFALL DURATION . . : 1-DAY
24-HOUR RAINFALL . . : 10.90 INCHES
REPORTING SEQUENCE . : STANDARDIZED

STAGE (FT)	STORAGE (AF)	DISCHARGE (CFS)
10.00	.00	.00
11.00	.00	.22
11.20	.36	.25
11.40	.73	.27
11.60	1.10	.31
11.80	1.48	.40
12.00	1.87	.61
12.50	2.85	.90
13.00	3.87	1.10
14.00	6.00	1.42
15.00	8.27	1.66
15.50	9.45	1.78
16.00	10.75	1.88
16.50	12.87	1.99
17.00	16.00	2.08
18.00	25.22	2.25
19.00	38.03	2.42

					- - - - - - R E S E R V O I R - - - - - -				
TIME (HR)	RAIN FALL (IN)	ACCUM. RUNOFF (IN)	BASIN DISCHGE (CFS)	ACCUM. INFLOW (AF)	VOLUME (AF)	ACCUM. OUTFLOW (AF)	INSTANT DISCHGE (CFS)	AVERAGE DISCHGE (CFS)	STAGE (FT)
.00	.00	.00	.0	.0	.0	.0	.0	.0	10.00
4.00	.49	.00	.0	.0	.0	.0	.0	.0	10.00
8.00	1.49	.00	.0	.0	.0	.0	.0	.0	10.00
10.00	2.32	.05	1.4	.1	.1	.0	.2	.1	11.03
11.00	2.93	.18	3.6	.3	.3	.0	.2	.2	11.13
11.50	3.48	.34	7.4	.6	.6	.0	.3	.2	11.26
11.75	5.11	1.04	60.4	1.9	1.8	.1	.3	.3	11.64
12.00	7.15	2.22	102.4	4.0	3.9	.1	.9	.6	12.49
12.50	7.95	2.75	23.1	4.9	4.8	.1	1.2	1.1	13.32
13.00	8.36	3.03	12.4	5.4	5.3	.1	1.3	1.2	13.59
14.00	8.92	3.43	7.8	6.1	5.8	.3	1.4	1.3	13.83

					RESERVOIR				
TIME (HR)	RAIN FALL (IN)	ACCUM. RUNOFF (IN)	BASIN DISCHGE (CFS)	ACCUM. INFLOW (AF)	VOLUME (AF)	ACCUM. OUTFLOW (AF)	INSTANT DISCHGE (CFS)	AVERAGE DISCHGE (CFS)	STAGE (FT)
6.00	3.69	3.32	5.2	7.0	6.6	.5	1.5	1.4	14.19
9.00	10.33	4.52	3.2	8.1	7.1	1.0	1.5	1.5	14.45
24.00	10.90	4.92	2.2	8.6	7.3	1.6	1.6	1.6	14.55
30.00	10.90	4.92	.0	8.8	6.5	2.3	1.5	1.5	14.23
36.00	10.90	4.92	.0	8.8	5.8	3.0	1.4	1.4	13.91
42.00	10.90	4.92	.0	8.8	5.1	3.7	1.3	1.3	13.60
48.00	10.90	4.92	.0	8.8	4.5	4.3	1.2	1.2	13.31
54.00	10.90	4.92	.0	8.8	4.0	4.8	1.1	1.2	13.04
60.00	10.90	4.92	.0	8.8	3.4	5.4	1.0	1.1	12.78
61.00	10.90	4.92	.0	8.8	3.3	5.5	1.0	1.0	12.74

SUMMARY INFORMATION

MAXIMUM STAGE WAS 14.55 FEET AT 24.00 HOURS
MAXIMUM DISCHARGE WAS 1.6 CFS AT 24.00 HOURS

S C S P R O G R A M

2-14-94

PROJECT NAME . . . . . : N. BROWARD RPP (REV. [illegible])
REVIEWER . . . . . : L. E. CRIGLER
PROJECT AREA . . . . . : 21.46 ACRES
GROUND STORAGE . . . . : 8.18 INCHES
TERMINATION DISCHARGE : 1.00 CFS
DISTRIBUTION TYPE . . : SFWMD
RETURN FREQUENCY . . . : 25.00 YEARS
RAINFALL DURATION . . : 1-DAY
24-HOUR RAINFALL . . . : 13.32 INCHES
REPORTING SEQUENCE . : STANDARDIZED

STAGE (FT)	STORAGE (AF)	DISCHARGE (CFS)
10.00	.00	.00
11.00	.00	.22
11.20	.36	.25
11.40	.73	.27
11.60	1.10	.31
11.80	1.48	.40
12.00	1.87	.61
12.50	2.85	.90
13.00	3.87	1.10
14.00	6.00	1.42
15.00	8.27	1.66
15.50	9.45	1.78
16.00	10.75	1.88
16.50	12.87	1.99
17.00	16.00	2.08
18.00	25.22	2.25
19.00	38.03	2.42

TIME (HR)	RAIN FALL (IN)	ACCUM. RUNOFF (IN)	BASIN DISCHGE (CFS)	ACCUM. INFLOW (AF)	- - - - - - R E S E R V O I R - - - - - - VOLUME (AF)	ACCUM. OUTFLOW (AF)	INSTANT DISCHGE (CFS)	AVERAGE DISCHGE (CFS)	STAGE (FT)
.00	.00	.00	.0	.0	.0	.0	.0	.0	10.00
4.00	.32	.00	.0	.0	.0	.0	.0	.0	10.00
8.00	.65	.00	.0	.0	.0	.0	.0	.0	10.00
12.00	.97	.00	.0	.0	.0	.0	.0	.0	10.00
16.00	1.30	.00	.0	.0	.0	.0	.0	.0	10.00
20.00	1.62	.00	.0	.0	.0	.0	.0	.0	10.00
24.00	1.94	.01	.1	.0	.0	.0	.1	.1	10.55
28.00	2.42	.07	.4	.1	.0	.1	.2	.2	11.02
32.00	2.89	.17	.6	.3	.1	.2	.2	.2	11.07
36.00	3.36	.30	.8	.5	.3	.2	.2	.2	11.16
40.00	3.84	.47	1.0	.8	.5	.3	.3	.3	11.27

TIME (HR)	RAIN FALL (IN)	ACCUM. RUNOFF (IN)	BASIN DISCHGE (CFS)	ACCUM. INFLOW (AF)	RESERVOIR VOLUME (AF)	RESERVOIR ACCUM. OUTFLOW (AF)	RESERVOIR INSTANT DISCHGE (CFS)	RESERVOIR AVERAGE DISCHGE (CFS)	STAGE (FT)
4.00	4.31	.66	1.1	1.2	.8	.4	.3	.3	11.41
8.00	4.78	.87	1.2	1.6	1.1	.5	.3	.3	11.57
52.00	5.38	1.18	2.1	2.1	1.5	.6	.4	.3	11.79
56.00	6.61	1.86	5.3	3.4	2.5	.9	.8	.6	12.31
58.00	7.62	2.53	8.4	4.6	3.6	.9	1.0	.9	12.80
59.00	8.36	3.04	12.6	5.4	4.4	1.0	1.2	1.1	13.17
59.50	9.03	3.51	20.7	6.2	5.2	1.1	1.3	1.2	13.51
59.75	11.02	5.02	130.8	9.0	7.8	1.2	1.5	1.4	14.23
60.00	13.52	7.04	174.6	12.6	11.4	1.2	1.6	1.6	15.56
60.50	14.49	7.96	35.6	14.0	12.8	1.2	2.0	1.9	16.40
61.00	15.00	8.29	18.7	14.8	13.5	1.3	2.0	2.0	16.67
62.00	15.68	8.87	11.4	15.9	14.4	1.5	2.0	2.0	16.72
64.00	16.50	9.69	7.5	17.1	15.3	1.8	2.1	2.0	16.88
68.00	17.46	10.43	4.6	18.7	16.1	2.6	2.1	2.1	17.01
72.00	18.10	11.00	3.1	19.7	16.5	3.2	2.1	2.1	17.05
80.00	18.10	11.00	.0	19.7	15.1	4.6	2.1	2.1	16.85
88.00	18.10	11.00	.0	19.7	13.7	6.0	2.0	2.0	16.64
96.00	18.10	11.00	.0	19.7	12.4	7.3	2.0	2.0	16.39
104.00	18.10	11.00	.0	19.7	11.1	8.6	1.9	1.9	16.09
112.00	18.10	11.00	.0	19.7	9.9	9.8	1.8	1.9	15.68
120.00	18.10	11.00	.0	19.7	8.7	11.0	1.7	1.8	15.20
128.00	18.10	11.00	.0	19.7	7.7	12.0	1.6	1.7	14.78
136.00	18.10	11.00	.0	19.7	6.6	13.1	1.5	1.6	14.38
144.00	18.10	11.00	.0	19.7	5.7	14.0	1.4	1.4	13.95
152.00	18.10	11.00	.0	19.7	4.8	14.9	1.2	1.3	13.45
160.00	18.10	11.00	.0	19.7	4.0	15.7	1.1	1.2	13.08
167.75	18.10	11.00	.0	19.7	3.4	16.3	1.0	1.1	12.75

SUMMARY INFORMATION

MAXIMUM STAGE WAS 17.05 FEET AT 72.00 HOURS
MAXIMUM DISCHARGE WAS 2.1 CFS AT 72.00 HOURS

S C S P R O G R A M

2-14-94

PROJECT NAME . . . . . : N. BROWARD RRF (REV ~~1-27-94~~)
REVIEWER . . . . . : L. E. CRIGLER
PROJECT AREA . . . . . : 21.45 ACRES
GROUND STORAGE . . . . : 8.18 INCHES
TERMINATION DISCHARGE : 1.00 CFS
DISTRIBUTION TYPE . . : SFWMD
RETURN FREQUENCY . . . : 100.00 YEARS
RAINFALL DURATION . . : 3-DAY
24-HOUR RAINFALL . . . : 16.16 INCHES
REPORTING SEQUENCE . : STANDARDIZED

STAGE (FT)	STORAGE (AF)	DISCHARGE (CFS)
10.00	.00	.00
11.00	.00	.22
11.20	.36	.25
11.40	.73	.27
11.60	1.10	.31
11.80	1.48	.40
12.00	1.87	.61
12.50	2.85	.90
13.00	3.87	1.10
14.00	6.00	1.42
15.00	8.27	1.66
15.50	9.45	1.78
16.00	10.75	1.88
16.50	12.87	1.99
17.00	16.00	2.08
18.00	25.22	2.25
19.00	38.03	2.42

					- - - - - - R E S E R V O I R - - - - - -				
TIME (HR)	RAIN FALL (IN)	ACCUM. RUNOFF (IN)	BASIN DISCHGE (CFS)	ACCUM. INFLOW (AF)	VOLUME (AF)	ACCUM. OUTFLOW (AF)	INSTANT DISCHGE (CFS)	AVERAGE DISCHGE (CFS)	STAGE (FT)
.00	.00	.00	.0	.0	.0	.0	.0	.0	10.00
4.00	.44	.00	.0	.0	.0	.0	.0	.0	10.00
8.00	.88	.00	.0	.0	.0	.0	.0	.0	10.00
12.00	1.33	.00	.0	.0	.0	.0	.0	.0	10.00
16.00	1.77	.00	.1	.0	.0	.0	.1	.0	10.31
20.00	2.21	.04	.3	.1	.0	.1	.2	.2	11.00
24.00	2.65	.11	.5	.2	.1	.1	.2	.2	11.03
28.00	3.30	.28	1.1	.5	.3	.2	.2	.2	11.16
32.00	3.95	.51	1.4	.9	.6	.3	.3	.3	11.33
36.00	4.59	.78	1.6	1.4	1.0	.4	.3	.3	11.55
40.00	5.24	1.10	1.8	2.0	1.5	.5	.4	.3	11.73

TIME (HR)	RAIN FALL (IN)	ACCUM. RUNOFF (IN)	BASIN DISCHGE (CFS)	ACCUM. INFLOW (AF)	RESERVOIR VOLUME (AF)	ACCUM. OUTFLOW (AF)	INSTANT DISCHGE (CFS)	AVERAGE DISCHGE (CFS)	STAGE (FT)
4.00	6.88	1.45	2.0	2.6	1.9	.7	.6	.6	12.02
5.00	6.53	1.83	2.1	3.3	2.4	.9	.6	.7	12.05
52.00	7.34	2.35	3.6	4.2	3.0	1.3	.9	.8	12.37
56.00	9.02	3.50	8.5	6.3	4.7	1.6	1.2	1.1	13.37
58.00	10.40	4.53	13.2	8.1	6.4	1.7	1.4	1.3	14.10
59.00	11.42	5.33	19.9	9.5	7.7	1.8	1.6	1.5	14.64
59.50	12.33	6.06	31.7	10.8	8.9	1.9	1.7	1.8	15.13
59.75	15.06	8.34	197.1	14.9	12.9	2.0	1.9	1.8	16.03
60.00	18.45	11.31	257.7	20.2	18.2	2.0	2.1	2.0	16.93
60.50	19.78	12.51	51.7	22.4	20.3	2.1	2.1	2.1	17.40
61.00	20.47	13.13	27.1	23.5	21.3	2.2	2.2	2.2	17.64
62.00	21.40	13.98	16.5	25.0	22.6	2.4	2.3	2.2	17.70
64.00	22.53	15.01	10.9	26.6	24.1	2.7	2.2	2.2	17.67
68.00	23.83	16.22	6.6	29.0	25.5	3.6	2.3	2.2	18.02
72.00	24.71	17.03	4.4	30.4	26.2	4.2	2.3	2.3	18.07
80.00	24.71	17.03	.0	30.4	24.7	5.7	2.2	2.3	17.95
88.00	24.71	17.03	.0	30.4	23.3	7.1	2.2	2.2	17.79
96.00	24.71	17.03	.0	30.4	21.8	8.6	2.2	2.2	17.63
104.00	24.71	17.03	.0	30.4	20.4	10.0	2.2	2.2	17.47
112.00	24.71	17.03	.0	30.4	19.0	11.4	2.1	2.1	17.32
120.00	24.71	17.03	.0	30.4	17.5	12.9	2.1	2.1	17.17
128.00	24.71	17.03	.0	30.4	16.2	14.2	2.1	2.1	17.02
136.00	24.71	17.03	.0	30.4	14.8	15.6	2.0	2.1	16.87
144.00	24.71	17.03	.0	30.4	13.5	16.9	2.0	2.0	16.69
152.00	24.71	17.03	.0	30.4	12.1	18.3	2.0	2.0	16.33
160.00	24.71	17.03	.0	30.4	10.9	19.5	1.9	1.9	16.03
168.00	24.71	17.03	.0	30.4	9.7	20.7	1.8	1.8	15.58
176.00	24.71	17.03	.0	30.4	8.5	21.9	1.7	1.7	15.10
184.00	24.71	17.03	.0	30.4	7.4	23.0	1.6	1.6	14.63
192.00	24.71	17.03	.0	30.4	6.4	24.0	1.5	1.6	14.19
200.00	24.71	17.03	.0	30.4	5.5	24.9	1.3	1.4	13.76
208.00	24.71	17.03	.0	30.4	4.7	25.7	1.2	1.3	13.37
216.00	24.71	17.03	.0	30.4	3.9	26.5	1.1	1.2	13.01
222.25	24.71	17.03	.0	30.4	3.3	27.1	1.0	1.0	12.74

SUMMARY INFORMATION

MAXIMUM STAGE WAS 18.07 FEET AT 72.00 HOURS
MAXIMUM DISCHARGE WAS 2.3 CFS AT 72.00 HOURS

Form E-11

RUST. BIRMINGHAM, ALABAMA

PROPOSAL OR JOB NO. 21-3457

FOR NORTH BROWARD RESOURCE RECOVERY FACILITY

AT NORTH BROWARD COUNTY, FLORIDA

DESCRIPTION DETENTION POND OUTLET CONTROL STRUCTURE

DATE 10-2-89

BY WJC CKD.

DWG.

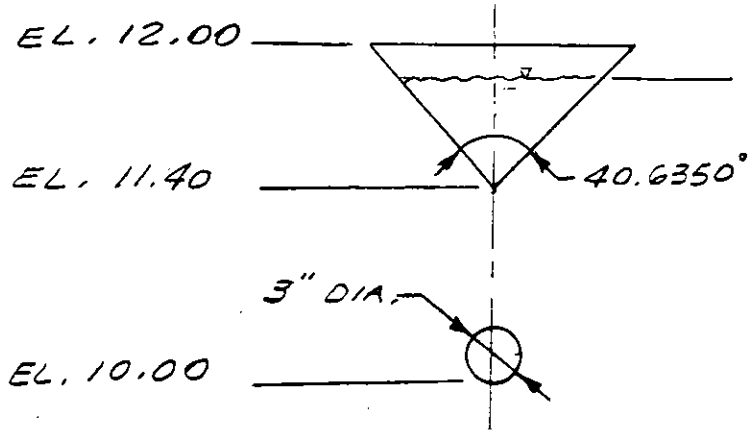
REVISED 02-14-94
BY: JACK FRANKS
FOR CONTRACT 21-4527L

NORTH BROWARD RRF DETENTION POND OUTLET CONTROL STRUCTURE

EL. 18.10 —— ZERO DISCHARGE STAGE FOR 25-YR., 3-DAY STORM DISCHARGE AT THIS STAGE IS < ALLOWABLE PEAK DISCHARGE FOR THIS SITE (2.27 < 2.32)

EL. 17.25 —— TOP OF DIKE

EL. 17.10 —— TOP OF STRUCTURE



EL. 11.74, STAGE @ REQUIRED 1.37 AC-FT. OF DETENTION (VOLUME UP TO THIS STAGE CAN BE DISCHARGED NO FASTER THAN 0.81 AC-FT./DAY, OR 0.41 CFS, WHICH IS ½" OF SITE RUNOFF). ACTUAL DISCHARGE IS 0.37 CFS.

(ROUTED)
ACTUAL 25-YR., 3-DAY STAGE IS
→ 17.05 FEET WITH 2.1 CFS DISCHARGE (< 2.32, O.K.)
(ROUTED)
ACTUAL 100-YR., 3-DAY STAGE IS
→ 18.07 FEET WITH 2.3 CFS DISCHARGE (< 2.32, STILL O.K.) 100-YR., 3-DAY ZERO DISCHARGE STAGE = 19.00 (BLDG FLOORS) O.K.

10-YR., 1-DAY ZERO DISCHARGE STAGE IS
→ 16.68 FEET, FROM CALCULATED 13.99 AC-FT. STORAGE.

→ 16.68 < 16.80 (ROAD ELEV.) O.K.

II. STORM DRAINAGE CALCULATIONS

REVISED PAGES FOR CONTRACT 21-4527L
February 14, 1994

Form E-11A

RUST. BIRMINGHAM, ALABAMA

PROPOSAL OR JOB NO. 21-3457

FOR NORTH BROWARD RRF

AT NORTH BROWARD COUNTY, FLORIDA

DESCRIPTION STORM SEWER SYSTEM CALCULATIONS - MAIN SYSTEM

DATE 9-28-89 REV. WJC 10-4-89

BY WJC CKD.

DWG. REV. 2-14-94 BY: JACK FRANKS

ORIGINAL CALCULATIONS 9-28-89 & 10-4-89

INLET LOCATION N	INLET LOCATION E	INLET STRUCT. NO.	OUTLET STRUCT. NO.	AREA, ACRES PAVED C=0.95	AREA, ACRES GRAVEL C=0.50	AREA, ACRES YARD C=0.40	AREA, ACRES	ΣCA INCREMENT	ΣCA CUMULATIVE	TIME CONC. T_c, MIN.	INTENS. i, IN/HR.	FLOW Q, CFS	VELOCITY V, FPS	FLOW TIME t, MIN.	PIPE LENGTH L, FT.	PIPE DIA. D, IN.	SLOPE S, %	ELEVATION INLET FT.	ELEVATION OUTLET FT.	NOTES:
3385.78	2211.33	1B	1A	0.26				0.25	0.25	5	9.1	2.3	2.6	—	24.66	15	0.25	16.40	16.34	
3429.44	2211.33	1A	1	0.20				0.19	0.44	5	9.1	4.0	3.7	—	9.31	15	0.5	16.34	16.29	ACTUAL TIME OF CONC. @ M.H. NO. 1 = 3.36 MIN.
3429.00	2211.33	1	2	1.06	0.37			2.2	2.64	5	9.1	24.0	5.0	0.39	116.08	30	0.4	15.62	15.16	
3429.00	2090.00	2	3A	0.07		0.19		0.14	2.78	5	9.1	25.3	5.4	0.38	123.43	30	0.45	15.16	14.60	
3429.00	1961.32	3A	3					—	2.78	5	9.1	25.3	5.4	0.29	94.70	30	0.45	14.60	14.17	
3528.95	1961.32	3	4	0.18		0.53		0.38	3.16	4.92 5	9.1	28.8	6.4	0.26	100.25	30	0.6	14.17	13.57	
3611.16	2024.03	4	5	0.23		0.45		0.40	3.56	4.68 5	9.1	32.4	7.1	0.18	78.23	30	0.75	13.57	12.98	
3693.39	1892.07	6A	6	0.32		1.0		0.70	0.70	5	9.1	6.4	4.2	—	77.63	18	0.5	14.15	13.76	
3693.39	1971.03	6	5	0.19		0.14		0.24	0.94	5	9.1	8.6	5.2	—	49.67	18	0.8	13.76	13.36	
3693.39	2024.03	5	7A	0.36		0.36		0.49	4.99	4.86 5	9.1	45.4	6.8	0.46	183.81	36	0.55	12.64	11.63	
3880.00	1971.03	7	7A	0.19		0.14		0.24	0.24	5	9.1	2.2	3.3	—	70.64	18	0.5	12.70	12.35	
3880.00	2045.00	7A	POND	0.66		0.40		0.79	6.02	5.3	9.0	54.2	8.3	—	203.58	36	0.8	11.63	10.00	
4085.58	2045.00	POND																		

REVISED 2-14-94
BY JACK FRANKS
FOR CONTRACT NO. 21-4527L

3693.39	2024.03	5	7A	0.36		0.43		0.51	5.01	5	9.1	45.6	6.82	0.45	183.81	36	0.55	12.64	11.63	
3880.00	1971.03	7	7A	0.26		0.07		0.28	0.28	5	9.1	2.55	3.41	0.31	70.64	18	0.5	12.70	12.35	
3880.00	2045.00	7A	POND	—	—	—	—	—	5.29	5	9.1	48.15	8.31	0.41	203.58	36	0.8	11.63	10.00	REVISED DRAINAGE AREA 7A NOW DRAINS TO AN EXISTING SUMP AND PUMP STATION FROM WHICH IT IS PUMPED TO THE WASTE WATER TREATMENT SYSTEM.

CIRCULAR CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

February 14, 1994
NORTH BROWARD RESOURCE RECOVERY FACILITY
21-4527L
STORM SEWER SEGMENT NO.5 - 7A

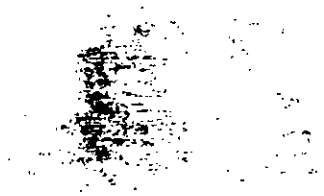
PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Flow Rate (cubic feet per second)	45.6
Channel Bottom Slope (feet per foot)	0.0055
Manning's Roughness Coefficient (n-value)	0.015C
Channel Diameter (feet)	3.00

PROGRAM RESULTS:

DESCRIPTION	VALUE
Normal Depth (feet)	2.69
Flow Velocity (feet per second)	6.82
Froude Number (Flow is Sub-Critical)	0.629
Velocity Head (feet)	0.72
Energy Head (feet)	3.41
Cross-Sectional Area of Flow (square feet)	6.68
Top Width of Flow (feet)	1.83

CIRCULAR CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.5 (c) 1986
Dodson & Associates, Inc., 7015 W. Tidwell, #107, Houston, TX 77092
(713) 895-8322. A complete program manual is available.



CIRCULAR CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

February 14, 1994
NORTH BROWARD RESOURCE RECOVERY FACILITY
21-4527L
STORM SEWER SEGMENT NO.7 - 7A

PROGRAM INPUT DATA:

DESCRIPTION	VALUE
Flow Rate (cubic feet per second)	2.5
Channel Bottom Slope (feet per foot)	0.005(
Manning's Roughness Coefficient (n-value)	0.015(
Channel Diameter (feet)	1.50

PROGRAM RESULTS:

DESCRIPTION	VALUE
Normal Depth (feet)	0.65
Flow Velocity (feet per second)	3.41
Froude Number (Flow is Sub-Critical)	0.855
Velocity Head (feet)	0.18
Energy Head (feet)	0.83
Cross-Sectional Area of Flow (square feet)	0.73
Top Width of Flow (feet)	1.49

CIRCULAR CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.5 (c) 1986
Dodson & Associates, Inc., 7015 W. Tidwell, #107, Houston, TX 7709
(713) 895-8322. A complete program manual is available.

CIRCULAR CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

February 14, 1994
NORTH BROWARD RESOURCE RECOVERY FACILITY
21-4527L
STORM SEWER SEGMENT NO 7A - POND

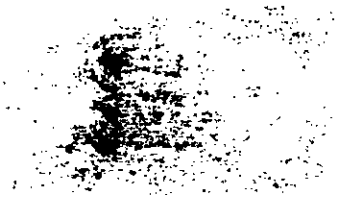
PROGRAM INPUT DATA:

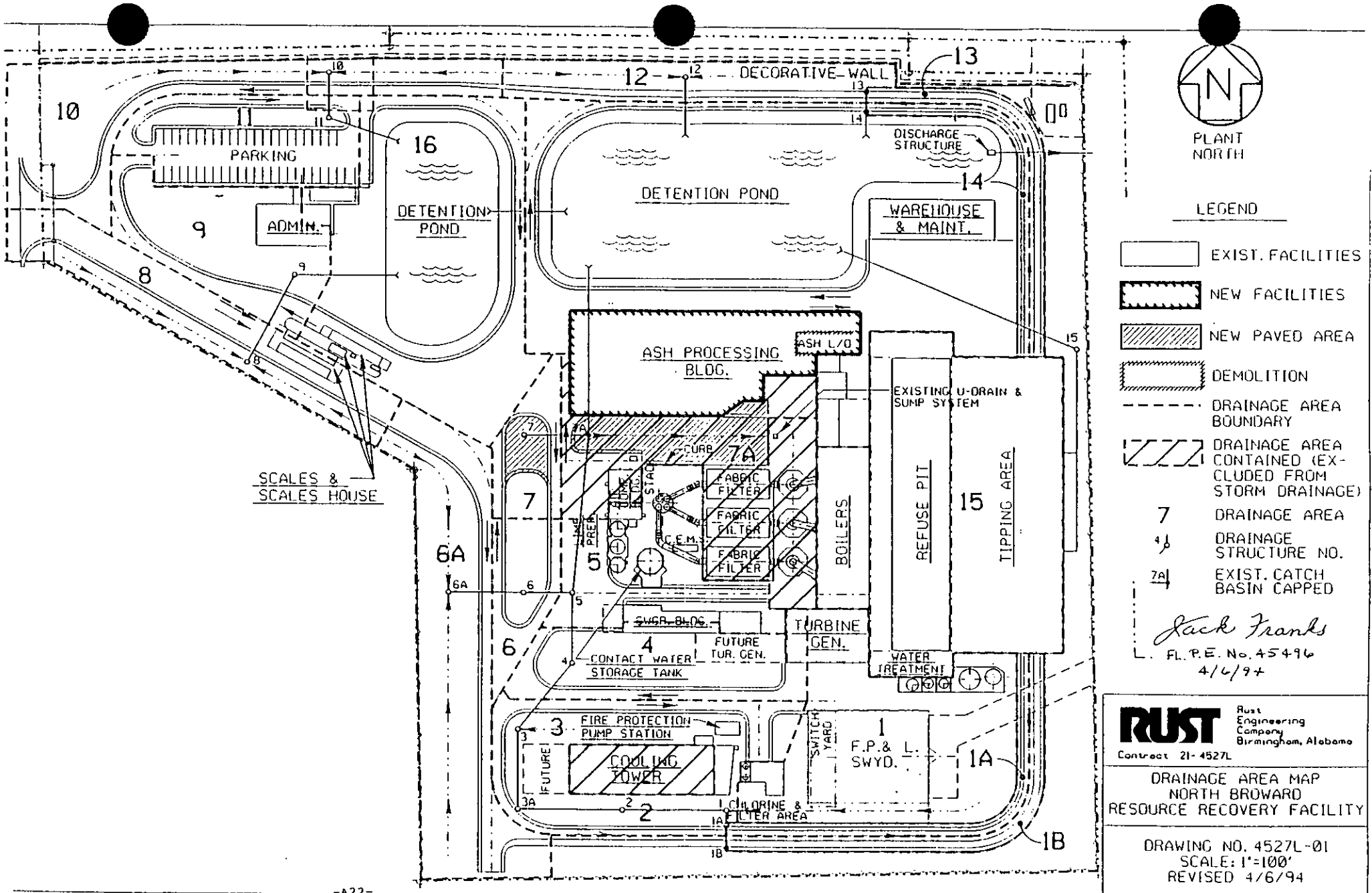
DESCRIPTION	VALUE
Flow Rate (cubic feet per second)	48.1
Channel Bottom Slope (feet per foot)	0.0080
Manning's Roughness Coefficient (n-value)	0.0150
Channel Diameter (feet)	3.00

PROGRAM RESULTS:

DESCRIPTION	VALUE
Normal Depth (feet)	2.29
Flow Velocity (feet per second)	8.31
Froude Number (Flow is Sub-Critical)	0.973
Velocity Head (feet)	1.07
Energy Head (feet)	3.36
Cross-Sectional Area of Flow (square feet)	5.78
Top Width of Flow (feet)	2.55

CIRCULAR CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.5 (c) 1986
Dodson & Associates, Inc., 7015 W. Tidwell, #107, Houston, TX 77092
(713) 895-8322. A complete program manual is available.




PLANT NORTH
DECORATIVE WALL
PARKING
ADMIN.
DETENTION POND
DETENTION POND
DISCHARGE STRUCTURE
WAREHOUSE & MAINT.
ASH PROCESSING BLDG.
ASH L/O
EXISTING U-DRAIN & SUMP SYSTEM
SCALES & SCALES HOUSE
CURB
FABRIC FILTER
FABRIC FILTER
FABRIC FILTER
ID FAN
STACK
LIME PREP
ACT. C.
BOILERS
REFUSE PIT
TIPPING AREA
SWGR. BLDG.
FUTURE TUR. GEN.
TURBINE GEN.
CONTACT WATER STORAGE TANK
WATER TREATMENT
FIRE PROTECTION PUMP STATION
FUTURE
COOLING TOWER
SWITCH YARD
F.P.& L. SWYD.
CHLORINE & FILTER AREA
LEGEND
EXIST. FACILITIES
NEW FACILITIES
NEW PAVED AREA
DEMOLITION
DRAINAGE AREA BOUNDARY
DRAINAGE AREA CONTAINED (EXCLUDED FROM STORM DRAINAGE)
DRAINAGE AREA
DRAINAGE STRUCTURE NO.
EXIST. CATCH BASIN CAPPED
Jack Franks
FL. P.E. No. 45496
4/6/94
RUST
Rust Engineering Company Birmingham, Alabama
Contract 21-4527L
DRAINAGE AREA MAP
NORTH BROWARD
RESOURCE RECOVERY FACILITY
DRAWING NO. 4527L-01
SCALE: 1"=100'
REVISED 4/6/94
DRAWING No. 5

APPENDIX B

POTENTIAL EMISSIONS ANALYSIS/EXISTING MINOR AIR SOURCE PERMITS

3-24-94

WHEELABRATOR NORTH BROWARD INC.
ASH RECYCLING PROCESSING FACILITY
PROJECT DESCRIPTION

An ash recycling processing facility is proposed to be installed to combine bottom ash, from the refuse fired boilers, with cement and water to produce a product to be used as landfill cover and/or construction aggregate. The process equipment will be installed in a totally enclosed building. There will be several particulate control pick-up points in the building (see attached Ash Recycling Processing Facility Flow Diagram). The air from the pick-up points will be routed to a baghouse dust collector. The vents from the ash storage silo and the cement silo will also be routed to the baghouse dust collector. The baghouse dust collector will be designed for a minimum particulate removal efficiency of 99.9%.

4-12-94

ASH RECYCLING PROCESSING FACILITY
PROCESS RATE AND EMISSION CALCULATIONS

1. Total Process Input Rate and Product Rate

   a. Raw Materials

      1) Ash
      190 tons/hr X 2000 lb/ton = 380,000 lb/hr

      includes ~90000 lb/hr metals
      ∴ 260,000 lb/hr ash
      30,000 lb/hr misc non-magn
      290,000
      + 90,000
      380,000

      2) Portland Cement Based Reagent Blend
      6.5 tons/hr X 2000 lb/ton = 13,000 lb/hr

      3) Water - normally none,
      added as needed for dust control

      Total Process Input Rate = 393,000 lb/hr (Maximum)

   b. Product Weight

      Sum of inputs to mixer:

      1) Ash Product 260,000 lb/hr

      2) Portland Cement Based Reagent Blend 13,000 lb/hr

      Product Rate 273,000 lb/hr

2. Air Emission Calculations

   a. Control Device Efficiency

      Inlet Grain Loading to Baghouse 3.0 grains/act.ft^3

      Outlet Grain Loading from Baghouse 0.004 grains/act.ft^3

      (3.0 grains/act.ft^3 - 0.004 grains/act.ft^3)/(3.0 grains/act.ft^3) X 100

      = 99.9%

COMPARE INLET GRAIN LOADING TO AP42 (8.8-3): FLY ASH CRUSHING, SCREENING, SINTERING, & FOUNDRY

$110 \frac{lb\ PM}{ton\ mat'l} \times \frac{260{,}000\ lb/hr\ mat'l}{2000} = 14{,}300 \frac{lb\ PM}{hr}$

$14{,}300 \times 0.001 = 14.3 \frac{lb}{hr}$

$14.3 \times \frac{6000}{2000} = 42.9\ Tons/yr$ -B2-

b. Airborne Contaminants Emitted

1) Potential Uncontrolled Particulate Emissions

3.0 grains/act.ft^3 X lb/7000 grains X 114,000 act.ft^3/min X 60 min/hr

= 2,931 lb/hr

Tons/year

2,931 lb/hr X 6000 hr/yr X ton/2000lb = 8,793 tons/yr

2) Particulate Emissions After Control Device

Maximum lb/hr

0.004 grains/act.ft^3 X lb/7000 grains X 114,000 act.ft^3/min X 60 min/hr

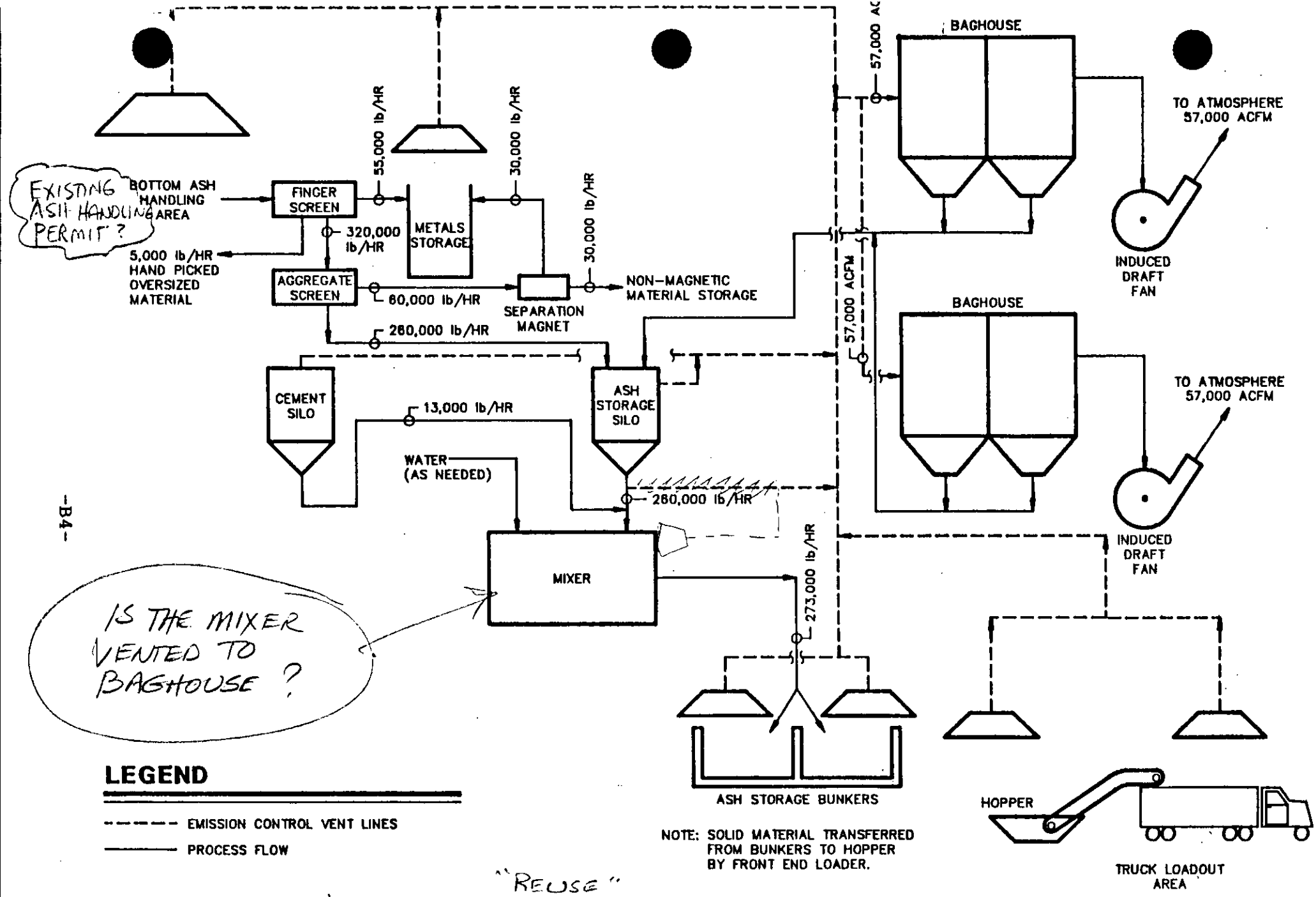
= 3.91 lb/hr

Tons/year

3.91 lb/hr X 6000 hr/yr X ton/2000lb = 11.7 tons/yr

3.021

14.72



-B4-

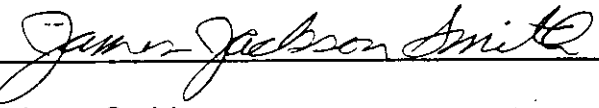
NEW ASH ~~RECYCLING~~ "REUSE" PROCESSING FACILITY

FLOW DIAGRAM

NO SCALE

PROFESSIONAL ENGINEER REGISTERED IN FLORIDA

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in this document. There is reasonable assurance, in my professional judgment, that the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable rules and regulations of the Florida Department of Environmental Protection.

Signed 

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