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THE OPERATION OF THE DRAINAGE SYSTEM  
IN THE BLACK RIVER UPPER MORASS PROJECT

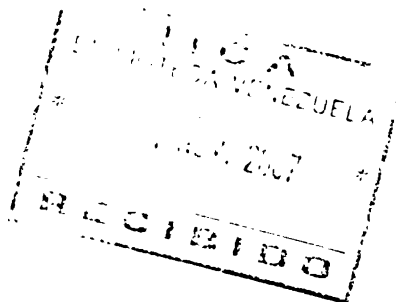
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**THE OPERATION OF THE DRAINAGE SYSTEM IN THE BLACK RIVER  
UPPER MORASS PROJECT**

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by

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November 1981

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## THE OPERATION OF THE DRAINAGE SYSTEM IN THE BLACK RIVER UPPER MORASS PROJECT

### 1. Introduction

From the hydrological point of view there are two types of soil in the area: the mineral soil made up of ~~ely~~ sandy clay and sandy clay loam with a low infiltration rate and consequently a high runoff potential and the peat soil with a high water absorption potential and a low run off potential.

A set of open drains and three (3) pump stations are to be established in the Project to remove the excess of overland flow during the rainy season and to evacuate the subsurface water from internal drainage and blue holes during the dry period.

The objective of the management of water resources of the area should be to provide the most suitable water relations for optimum agricultural production within the framework of a soil and water conservation policy. The water level in the drains should permit the maintenance of the depth of the water table required by the crop planted in a particular field.

Every drain should be provided at its outlet with a check drain having sluice gates to control the water surface level in the drain.

When there is much surface flow the gates should permit water to flow to the Black River, but in the dry season the gates should stop the flow and raise the water level high enough to facilitate subsurface flow into the fields.

In the soil, water flows from a point of high potential to a point of low potential. If the potential in the drain is higher than the potential in the field, water will flow from the drain into the field. If the potential in the soil is higher than in the drain,

UNITED STATES DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

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water will flow into the drain. At the present time the latter situation is taking place in the Project area and the peat soil is losing water.

## 2. Evaluation of the Capacity of Drains

According to the typical drain cross section Figure 1, and using the Manning's Formula for the steady state flow in open channels the drain hydraulic characteristics have been computed and they are presented in the tables in Appendix 1.

The following expressions have been used:

Manning's Formula:

$$Q = \frac{1}{N} Ah R^{2/3} S^{1/2} \quad (\text{International System})$$

$$Q = \frac{1.486}{N} Ah R^{2/3} S^{1/2} \quad (\text{English System})$$

Where:

Q = Water discharge (cubic feet per second CFS or cubic meter per second M<sup>3</sup>/S)

N = Roughness coefficient, for a clay soil, uniform channel

N = 0.030, because drains should be kept without vegetation to take care of heavy flood during rainy season.

Ah = Hydraulic section (square feet (Ft<sup>2</sup>) or square meters (M<sup>2</sup>))

bh = Hydraulic bottom width (feet)(ft) or meters (m)

dh = Hydraulic depth (feet) (ft) or meters (m)

m = Side slope of the drain; m = 2 for every drain

R = Hydraulic radius (Feet) (ft) or meters (m)

$$R = \frac{Ah}{Ph}$$

Ph = Hydraulic Perimeter (Feet) (ft) or meters (m)

$$P_h = b_h + 2 d_n (1 + m^2)^{0.5}$$

1 = Longitudinal slope of the drain

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The values of  $b_h$ ,  $d_h$  and I are given for the different stations of every drain and its capacity computed accordingly. Beside the hydraulic data and based on Figure I the top width and the area taken by every drain have been computed too, in order to know the acreage taken by the drainage system.

The following expressions have been used:

Where:

ba = bottom width (Feet) (Ft)

da = Depth of the drain (Feet) (Ft)

Area lost = (Top width) (Length of drain)

Table I shows that the drainage system has taken 184 acres (74 Ha) or 1.6% of the intensive study area and the maximum capacity at the Grass River Pumping Station is 6054 cfs. The 16 pumps working simultaneously take away only 1600 cfs. This means that the drain is four times oversized.

### 3. Drainage Organisation

To accomplish the objectives of the drainage system, Figure 2, the latter could be subdivided in three (3) sectors (A, B and C), each sector under the management of a drainage operator.

#### Drainage Sector A

Drains: AD; AD-2; AD-2A; AD-2B; AD-1; AD-3;  
ID; ID-1; ID-2; ID-3; ID-2A; ID-2B

#### Drainage Sector B

Drains: 2D; 2D-1; 2D-1D, 2D-1B; 2D-1B1; 2D-1A; 2D-1A1; 2D-1A2

#### Drainage Sector C

Drains: 2D-2; 2D-3; 2D-4; BD; BD1

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TABLE 1 Characteristics of Drains in BRUMDEC Project

Drain	Length Maximum			Capacity M <sup>3</sup> /s	Area Acres	Lost Has
	Feet	Meters	CFS			
AD	3700	1128	6054	171.5	15.03	6.0864
AD-2	4291.2	1308.29	191	5.41	5.24	2.1207
AD-2A	4760	1451.22	49	1.40	3.19	1.2916
AD-2B	4774	1455.49	159	4.50	3.70	1.4994
AD-1	950.5	289.79	26	0.73	0.61	0.2473
AD-3	1317.6	401.71	60	1.71	0.96	0.3905
ID	19352	5900	1910	54.10	29.32	11.8682
ID-1	5975	1821.65	113	3.21	4.59	1.8567
ID-2	2680	817	97	2.76	1.97	0.7970
ID-3	5525.5	1684.6	137	3.87	4.37	1.7677
ID-2A	2000	610	74	2.09	1.47	0.5948
ID-2B	18423	542	74	2.09	1.33	0.5390
2D	8841.3	2695.52	1483	42.01	16.74	6.7759
2D-1	16400	5000	801	22.68	23.16	9.3752
2D-ID	4515	1376.5	84	2.43	3.42	1.3847
2D-IB	10354.1	3156.74	273	7.74	8.23	3.3315
2D-IBI	6762.8	2061.83	51	1.45	4.40	1.7804
2D-IA	6093.4	1857.7	165	4.68	4.92	1.9933
2D-IAI	6166.8	1880.12	75	2.11	4.69	1.8978
2D-IA2	5000.0	1524.39	73	2.08	3.45	1.3981
2D-2	10940.9	3335.64	227	6.43	11.72	4.7567
2D-3	10970	3344.51	65	1.84	7.86	3.1811
2D-4	7123	2171.68	46	1.29	4.86	1.9680
BD	13294	4053	461	13.05	13.01	5.2675
BD-1	7842.5	2391	34	0.95	5.65	2.2879
<b>Total</b>					<b>183.89</b>	<b>74.4574</b>



3-1 Specific Duties of a Drainage Operator

- to keep the water level in the drains at a given depth in conjunction with the required ground water level for the established crop in the type of soil. To do this, he has to keep records of the relationship between the drain water surface and the water levels in the observation wells:
- to control the flow towards the pump station.
- to keep the drains working at full capacity; to do this he has to keep records of the siltation in the drains, and arrange for mineral and vegetable material to be removed from the drains as often as necessary.
- to keep the culverts working at full capacity
- to prepare the programme and the budget for the maintenance of the drains of his sector

The programme of the maintenance should include the length of drains to be redressed, the type of machine needed, the cost per hour, the number of working hours needed, the specifications of the cross-section of the drain at every station, the volume of earth to be taken out.

- to supervise the maintenance work in drains and related structures.
- to work very closely with the Agronomists and follow the drainage requirements of the crop pattern for every season.
- to work very closely with the pump station supervisors to know the pump stations working conditions

The Drainage Operator works directly under the Superintendent of Irrigation - Drainage and Roads.

For carrying out the physical work in the drainage sector, the drainage operator should have labourers working with him.

- to identify the areas in the mineral soil where internal drainage is needed.

The first thing I noticed when I stepped out of the plane was the fresh air. It felt like a warm blanket after a long flight. The ground below was a mix of green fields and small towns, each with its own unique charm. I had heard that the weather was perfect, and indeed it was. The sun was shining brightly, and the breeze was just what I needed to relax after a long journey.

As I walked through the airport, I noticed how busy everyone was. People were carrying luggage, talking on mobile phones, and rushing to their respective gates. It was a chaotic scene, but I managed to find my way through it. I had a small bag with me, and I was looking forward to exploring the city I had just arrived in. The excitement was palpable, and I couldn't wait to see what the future held for me here.

The first night in the city was a bit of a challenge. I had heard that the streets were safe, but I still felt a bit nervous. I stayed in a small hotel, and the room was simple but comfortable. I had a good night's sleep, and in the morning, I was ready to start my adventure. The city was beautiful, and I was excited to see what I could discover. I had heard that the food was amazing, and I was looking forward to trying it all.

Over the next few days, I explored every corner of the city. I visited museums, parks, and historical sites. I met some interesting people, and I learned a lot about the culture and history of the place. I had heard that the people were friendly, and indeed they were. I was welcomed with open arms, and I felt like I had found a new home. The city was a mix of old and new, and I was enjoying every minute of it. I had heard that the nightlife was great, and I was looking forward to trying it all.

As the days went by, I started to feel more at home. I had found a place where I could relax and enjoy life. I had heard that the people were friendly, and indeed they were. I was welcomed with open arms, and I felt like I had found a new home. The city was a mix of old and new, and I was enjoying every minute of it. I had heard that the nightlife was great, and I was looking forward to trying it all.

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#### 4 Maintenance of the Drainage System

At the present time the drains are covered with vegetation that needs to be removed to give the drains the capacity of carrying the excess of water during the rainy season. The resistance of vegetation to flow will increase the Manning's roughness coefficient, reduce the velocity of water flow and increase the water depth. At the beginning of the rainy season the drains should be free of vegetation which could be removed mechanically or by hand labour or by placing sea cows in the drains.

As far as silting is concerned there is no problem of maintenance initially because the drains have been designed with an additional depth of 0.304m (1.0 ft) in the main drains and 0.152m (0.5 ft) in the secondary drains.

When the water management in drains will take place, siltation will increase, records of siltation should be kept to programme the frequency of cleaning and reshaping the cross-section of drains. Culverts should receive maintenance as often as necessary and their working conditions should be observed frequently.

#### 5 The Pump Stations

The excess of water is taken out to the sea through the Black River by three (3) pump stations at Grass River, Island River and New River. In the Grass River Station there are sixteen (16) pumps each having a capacity of 2.83 m<sup>3</sup>/s 100 cubic feet per second (100 cfs).

In the Island River there will be eight (8) pumps with a capacity of 100 cfs each and in the New River there will be 4 pumps, 2 with a capacity of 2.83 m<sup>3</sup>/s (100 cfs) and 2 with a capacity of 1.42 m<sup>3</sup>/s (50 cfs).

The water resources management should be such that pumping hours are minimized to reduce the cost of operation, but the pumps and engines should always be in good working conditions to avoid the damage of flooding.

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For the operation and maintenance of the engines and pumps a well equipped workshop, a specialized mechanic and a stock of spare parts are required. Pumps and engines should be serviced according to manufacture's recommendations.

RECOMMENDATIONS FOR THE OPERATION AND MAINTENANCE OF  
THE DRAINAGE SYSTEM IN BRUMDEC'S PROJECT

- 1 The Irrigation - Drainage and Roads Engineer should be employed by BRUMDEC before the end of the construction of the drains, roads and dykes, because he should work with the Supervisors from the Consultants. (Harza Overseas Engineering Company and Hue Lyew Chin) and from the National Development Agency (NDA) to follow the construction modifications, the material used, the verification of the specifications, the hourly yield of the heavy equipment (draglines, back-hoes, scrapers, tractors etc) the fuel and oil consumption of the equipment, pumps and engines. He will need to be familiar with the equipment used to verify the specifications and the performance of machines. He will need to be familiar with the soil (mineral and organic), with the water resources and with the general environment of the area in order to plan a rational optimum programme of water resources usage in the Project.
- 2 Employ the three (3) drainage operators and train them in the basic principles of irrigation, drainage, soil-water-plant relationship, precipitation, surface runoff, water table position, flow through media, survey and water control. Then show them their field responsibilities and the water level management in the drainage sector.
- 3 To avoid water desorption from the peat soil, the water level in the drains should be kept at least at the design water surface. (The capillarity height could take care of the 1.5 feet freebord).
- 4 At the end of April and at the end of September the drains should be kept free of vegetation to give them the design capacity to carry away the surface water excess.

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- 5 Records of water levels, of drains water surface levels, of volume of water pumped, of hours of work of every pump in each pump station and of silting in the canals, should be kept to have the basic information to plan the management of the water resources for the Project.
- 6 For the time being silting is not a problem in the drains because the original design has given them 0.304 (1 ft.) and 0.152 m (0.5 ft). Allowance for silting for the main and for the secondary drains, respectively. Besides that as it is shown in Table 1 the drains have been overdesigned.
- 7 A period of observation under the influence of growing crops is necessary before installing internal drains in the mineral soils. At the present time the mineral soils under sugar cane have a very low infiltration rate and a very bad internal drainage.
8. Check dams should be installed close to the outlet of the drains to control the water level in the drains and consequently the water table in the ground.
- 9 Pumps should be maintained according to the manufacture's recommendations to get the 25 year lifetime under operation.

The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that proper record-keeping is essential for the integrity of the financial system and for the ability to detect and prevent fraud. The text also mentions the need for regular audits and the role of independent auditors in ensuring the reliability of financial statements.

The second part of the document focuses on the role of the accounting profession. It highlights the need for accountants to adhere to high standards of ethical conduct and to maintain their professional competence through continuous education. The text also discusses the importance of transparency and accountability in the financial reporting process.

The final part of the document provides a summary of the key points discussed and offers recommendations for improving the financial reporting process. It concludes by emphasizing the need for ongoing collaboration and communication between all stakeholders involved in the financial system.

APPENDIX I (1)

SECTION CHARACTERISTICS OF MAIN 10 (S=0.030; Length = 1374 ft. to 4031 ft. Side Slope=2)

Station	W	H	B	D	E	Slope	Velocity	Flow	Perchard	Slit Base	Top Width	Area Feet					
2+00	36	7.33	28	1.52	3.8	1.77	6.3	1.82	219	20.27	32	13.81	1.2	3.25	0.00331	2.76	0.19
2+00	37	7.33	27	6.1	3.0	1.52	2.5	1.68	169	15.87	15	13.52	2.6	1.10	0.00231	2.07	0.63
2+00	38	7.33	27	3.66	1.9	1.22	3.5	1.37	88	8.13	22	2.72	2.6	0.65	0.00227	1.33	0.93
2+00	39	7.33	27	3.04	1.2	0.94	3.7	1.13	59	4.47	26	8.09	2.2	0.68	0.00214	2.16	3.15
2+00	40	7.33	27	1.22	1.9	0.92	3.5	1.07	36	3.35	19	2.52	1.9	0.37	0.0021	2.37	0.72
2+00	41	7.33	27	1.22	1.3	0.72	3.3	1.07	16	1.75	18	1.22	1.9	0.37	0.00207	1.68	0.50

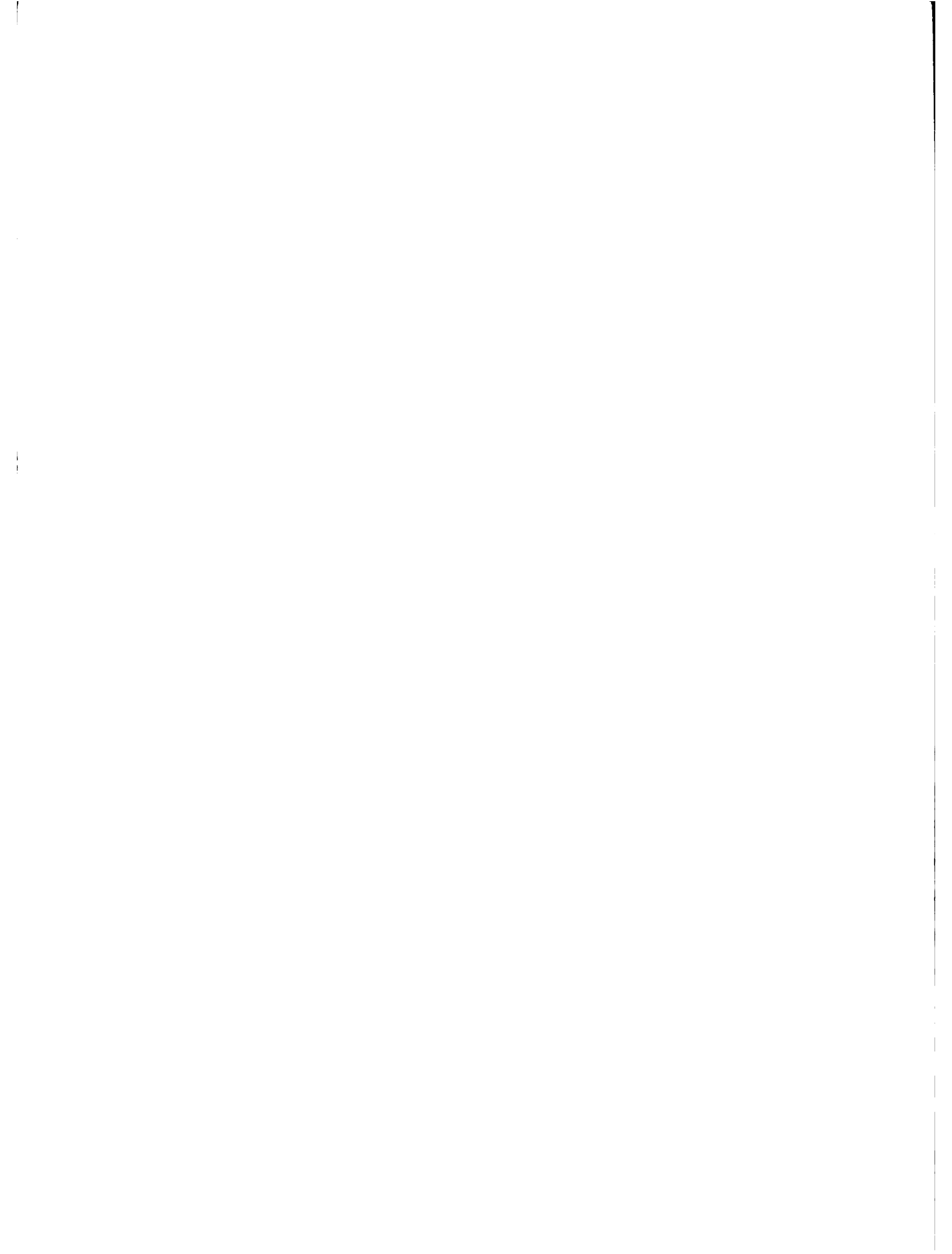
Area Cont. = 5774.31 ft<sup>2</sup> = 53.765 Acres = 5.536 Acs.

SECTION CHARACTERISTICS OF MAIN 10-1 (S=0.030; Length = 783.5 ft. to 2391 ft. Side Slope=2)

2+00	6	1.63	1	1.72	1	2.72	3.5	1.07	36	3.35	19	2.52	1.86	0.37	0.00205	1.18	0.36
2+00	7	1.22	2	0.51	2.2	0.47	2.7	0.82	18	1.72	15	1.72	1.25	0.13	0.00132	2.20	0.67
2+00	8	1.22	2	0.51	1.5	0.19	2.1	0.65	22	1.07	13	1.69	1.03	0.13	0.00132	1.67	0.51

Area Cont. = 5774.31 ft<sup>2</sup> = 53.765 Acres = 2.2731 Acs.

Hydraulic bottom width  
 Hydraulic width  
 Hydraulic depth  
 Hydraulic Perimeter  
 Hydraulic Radius









**APPENDIX I (C)**  
**BASIC CHARACTERISTICS OF TRAILS ID -1 (S=0.030; Length = 3975 Ft. = 1207.65 M; Side Slope = 4)**

Station	Elev.			Dist.			Slope			Velocity			Flow			Freeboard			Bilt Data			Top Width			Area Lost				
	Pt.	Ft.	M	Pt.	Ft.	M	Pt.	Ft.	M	Pt.	Ft.	M	Pt.	Ft.	M	Pt.	Ft.	M	Pt.	Ft.	M	Pt.	Ft.	M	Pt.	Ft.	M	Pt.	Ft.
0+0	1.72	2	0.51	1.8	1.16	0.35	1.31	11.08	3.10	20.99	6.10	2.10	0.64	0.031	0.158	113.21	3.21	1.5	0.16	0.5	0.152	31.2	10.73	32860	2478.55				
0+5	1.72	2	0.51	1.8	1.15	0.34	1.31	11.08	3.10	20.99	6.10	2.10	0.64	0.030821	0.60	36.34	2.16	1.5	0.16	0.5	0.152	31.2	10.73	32860	2478.55				
0+10	1.72	2	0.51	1.8	0.92	0.27	1.31	11.28	2.09	18.31	3.08	1.88	0.55	0.030411	0.433	2.95	1.67	1.5	0.16	0.5	0.152	30.4	10.00	32860	2478.55				
0+15	1.72	2	0.51	1.8	0.73	0.22	0.98	11.12	1.96	14.73	1.19	1.11	0.11	0.030483	0.16	3.17	0.90	1.5	0.16	0.5	0.152	29.6	9.07	32860	2478.55				

Area Lost = 17760 Ft.-sq. = 1.8961 Ha

**BASIC CHARACTERISTICS OF TRAILS ID -2 (S=0.030; Length = 6680 Ft.=2037 M; Side Slope=4)**

0+0	1.72	2	0.51	1.8	0.955	0.27	1.31	11.116	3.31	1.72	0.52	0.030213	3.27	0.99	37.13	2.16	1.5	0.16	0.5	0.152	32	9.76	37160	3100.79
0+5	1.72	2	0.51	1.8	0.955	0.27	1.31	11.116	3.31	1.72	0.52	0.030213	3.27	0.99	37.13	2.16	1.5	0.16	0.5	0.152	32	9.76	37160	3100.79

Area Lost = 87160 Ft.-sq. = 1.9710 Ha



APPENDIX I (1)

DESIGN CHARACTERISTICS OF DRAIN 10-1 (S=0.039; Length = 5425.5 Ft=1652.6 M Side Slope = 2)

Station	Station		Station		Station		Station		Station		Station		Station		Station		Station		Area Sect							
	Pt	M	Pt	M	Pt	M	Pt	M	Pt	M	Pt	M	Pt	M	Pt	M	Pt	M								
0+0	1.22	2	0.61	1.2	1.23	1.7	1.53	32.08	1.51	22.70	6.93	2.32	0.70	0.0052	2.62	0.82	136.6	1.51	1.5	0.16	0.5	0.152	31.6	9.63	75205.1	71.5.29
1+052.5	1.22	2	0.61	1.2	1.23	1.7	1.53	32.08	1.51	22.70	6.93	2.32	0.70	0.0052	2.62	0.82	136.6	1.51	1.5	0.16	0.5	0.152	31.6	9.63	75205.1	71.5.29
2+0	1.22	2	0.61	1.2	1.23	1.7	1.53	32.08	1.51	22.70	6.93	2.32	0.70	0.0052	2.62	0.82	136.6	1.51	1.5	0.16	0.5	0.152	31.6	9.63	75205.1	71.5.29
3+052.5	1.22	2	0.61	1.2	1.23	1.7	1.53	32.08	1.51	22.70	6.93	2.32	0.70	0.0052	2.62	0.82	136.6	1.51	1.5	0.16	0.5	0.152	31.6	9.63	75205.1	71.5.29

Area Sect = 17225.5 Ft<sup>2</sup> = 1.7677 Ha

DESIGN CHARACTERISTICS OF DRAIN 10-1 (S=0.039; Length = 5425.5 Ft=1652.6 M Side Slope = 2)

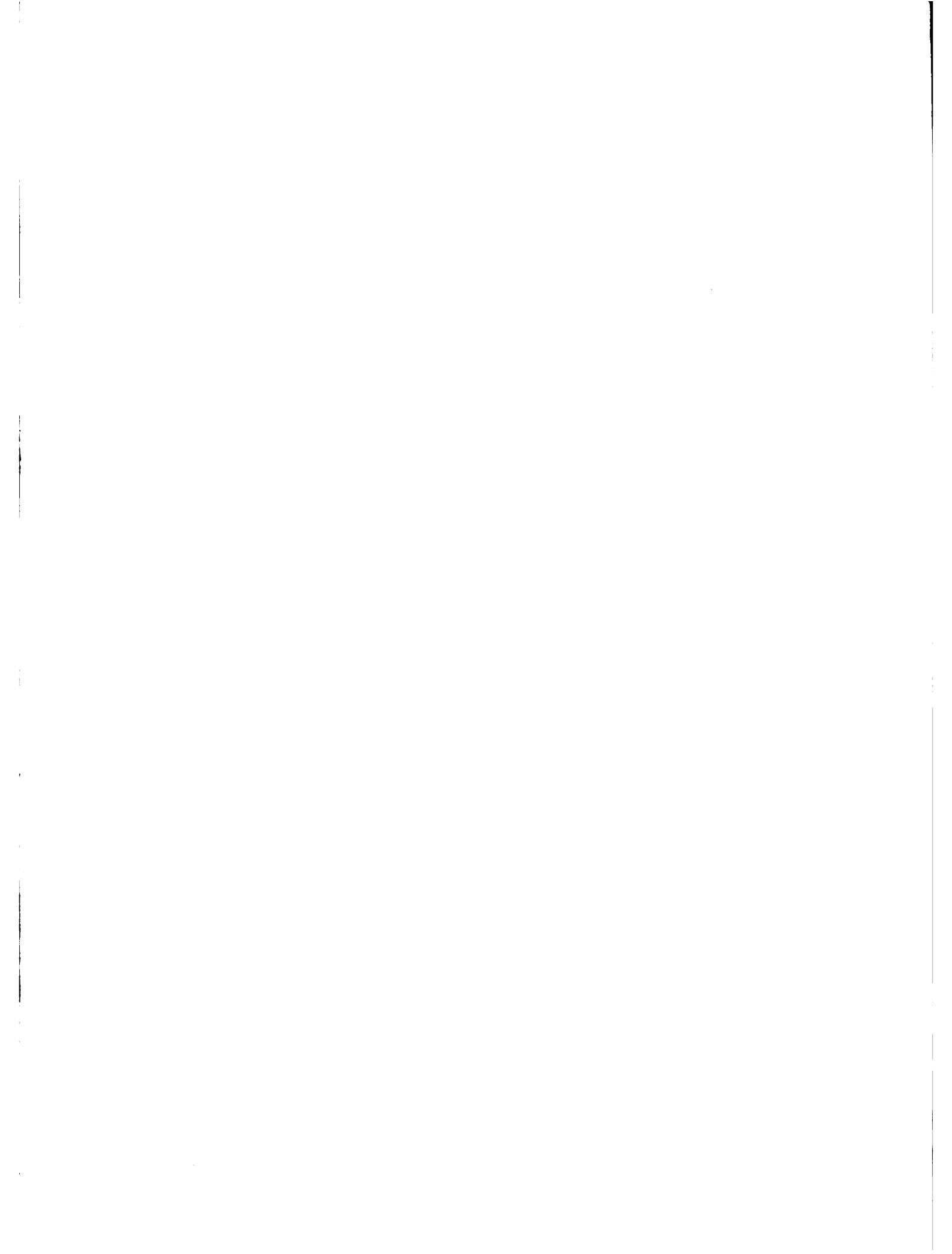
1	1.22	2	0.61	1.2	1.23	1.7	1.53	32.08	1.51	22.70	6.93	2.32	0.70	0.0052	2.62	0.82	136.6	1.51	1.5	0.16	0.5	0.152	31.6	9.63	75205.1	71.5.29
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Area Sect = 2661.4 Ft<sup>2</sup> = 0.61 Acres = 2.2473 Ha

DESIGN CHARACTERISTICS OF DRAIN 10-1 (S=0.039; Length = 5425.5 Ft=1652.6 M Side Slope = 2)

5	1.22	2	0.61	1.2	1.23	1.7	1.53	32.08	1.51	22.70	6.93	2.32	0.70	0.0052	2.62	0.82	136.6	1.51	1.5	0.16	0.5	0.152	31.6	9.63	75205.1	71.5.29
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Area Sect = 17225.5 Ft<sup>2</sup> = 1.7677 Ha



APPENDIX I (5)

DESIGN CHARACTERISTICS OF DRAIN 10-2A (S=0.030; Length = 2000 Ft.; Side Slope = 2)

Station	Elevation		Area		Perimeter		Silt Zone		Top Width		Area Lost													
	ft.	in.	sq. ft.	sq. in.	ft.	in.	ft.	in.	ft.	in.	sq. ft.	sq. in.												
1+00	1.22	2	0.61	3	1.067	30	2.79	17.116	5.31	1.72	0.52	0.0012	2.16	0.73	11.78	2.09	3.5	0.16	0.5	0.152	32	0.76	0.000	0.000
1+50	1.22	2	0.61	3	1.067	30	2.79	17.116	5.31	1.72	0.52	0.0012	2.16	0.73	11.78	2.09	3.5	0.16	0.5	0.152	32	0.76	0.000	0.000

Area lost = 6.000 sq. ft. = 0.136 acres

DESIGN CHARACTERISTICS OF DRAIN 10-2B (S=0.030; Length = 1812.3+562 Ft.; Side Slope = 2)

Station	Elevation		Area		Perimeter		Silt Zone		Top Width		Area Lost													
	ft.	in.	sq. ft.	sq. in.	ft.	in.	ft.	in.	ft.	in.	sq. ft.	sq. in.												
1+00	1.22	2	0.61	3	1.067	30	2.79	17.116	5.31	1.72	0.52	0.0012	2.16	0.73	11.78	2.09	3.5	0.16	0.5	0.152	32	0.76	0.000	0.000
1+50	1.22	2	0.61	3	1.067	30	2.79	17.116	5.31	1.72	0.52	0.0012	2.16	0.73	11.78	2.09	3.5	0.16	0.5	0.152	32	0.76	0.000	0.000

Area lost = 31775 sq. ft. = 0.7300 acres

Hydraulic section  
 Hydraulic perimeter  
 Hydraulic radius

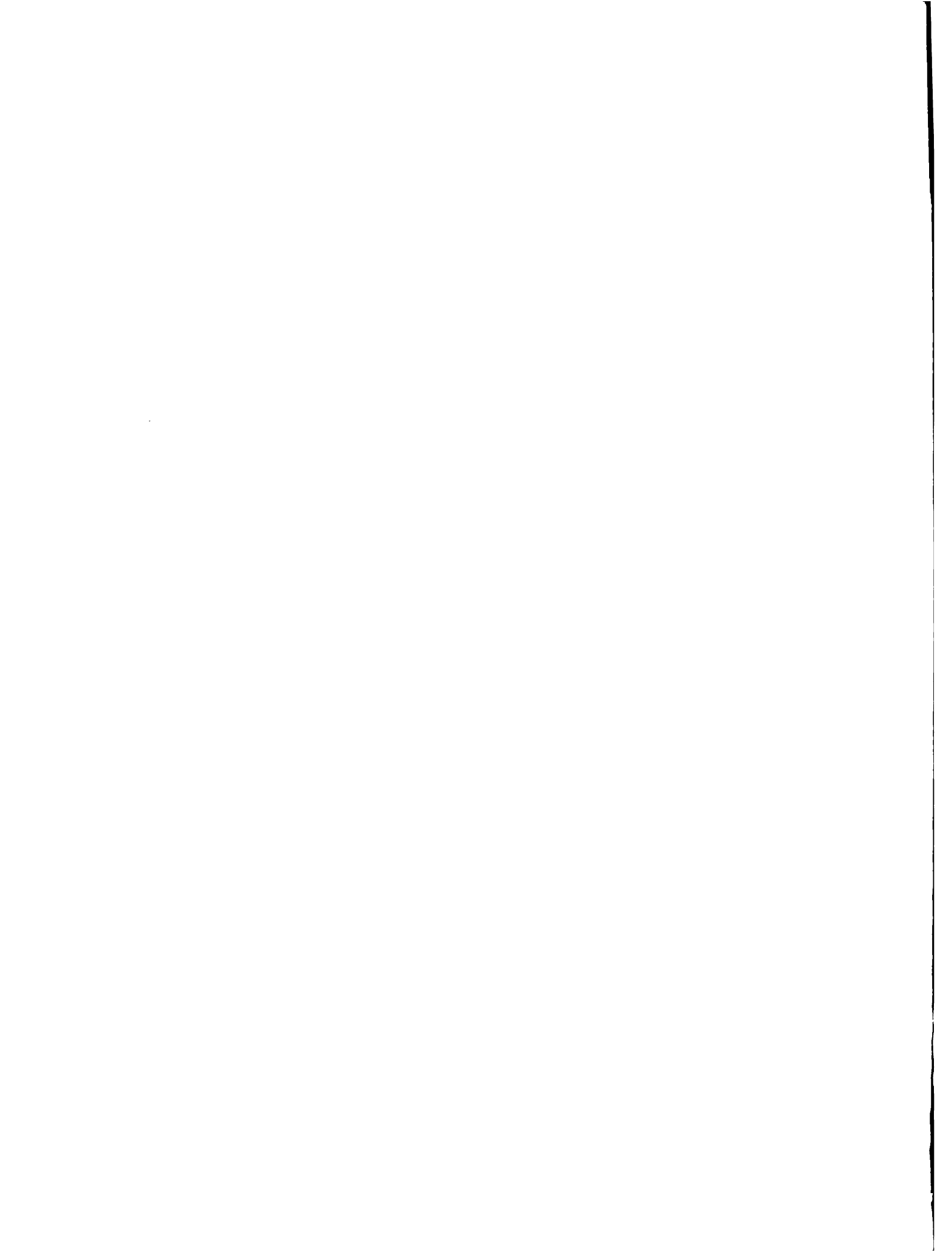


APPENDIX I (6)

BESTIAL CHARACTERISTICS OF GRAIN 20 (Follows Elm River; 2-0-0-0-0; Length 451.3; P. = 2698.52 m; side slope = 2)

No.	Elev			Dist			Area			Perimeter			Silt			Top Width			Area Left			
	P.	N.	E.	P.	N.	E.	P.	N.	E.	P.	N.	E.	P.	N.	E.	P.	N.	E.				
194	72.11	11.59	36.23	7.3	2.561	104.42	95.13	158.09	13.29	6.34	1.595	0.0000053	1.134	0.137	0.16	1.0	0.225	149.5	11.10	24,593.8	12,217	
195	28.79	16	27.17	6.0	1.829	7.0	2.136	572	41.30	156.83	10.31	3.165	1.513	0.707	0.18	0.16	1.0	0.305	127	14.52	25,000.0	22,111
196	10.67	29	8.24	4.0	1.524	172	15.99	52.89	16.12	3.25	0.992	0.00381	2.122	0.67	0.16	1.0	0.353	65	10.82	27,000.0	14,252	
197	6.71	18	3.19	3.2	0.59	1.72	1.780	99.89	8.15	16.31	11.07	2.353	0.161	0.00121	0.16	1.0	0.274	30.8	15.19	16,776	14,004	

Area Left = 72009.8 P. = 16.74 Acres = 6.1719 Ha.





APPENDIX 1 (7)

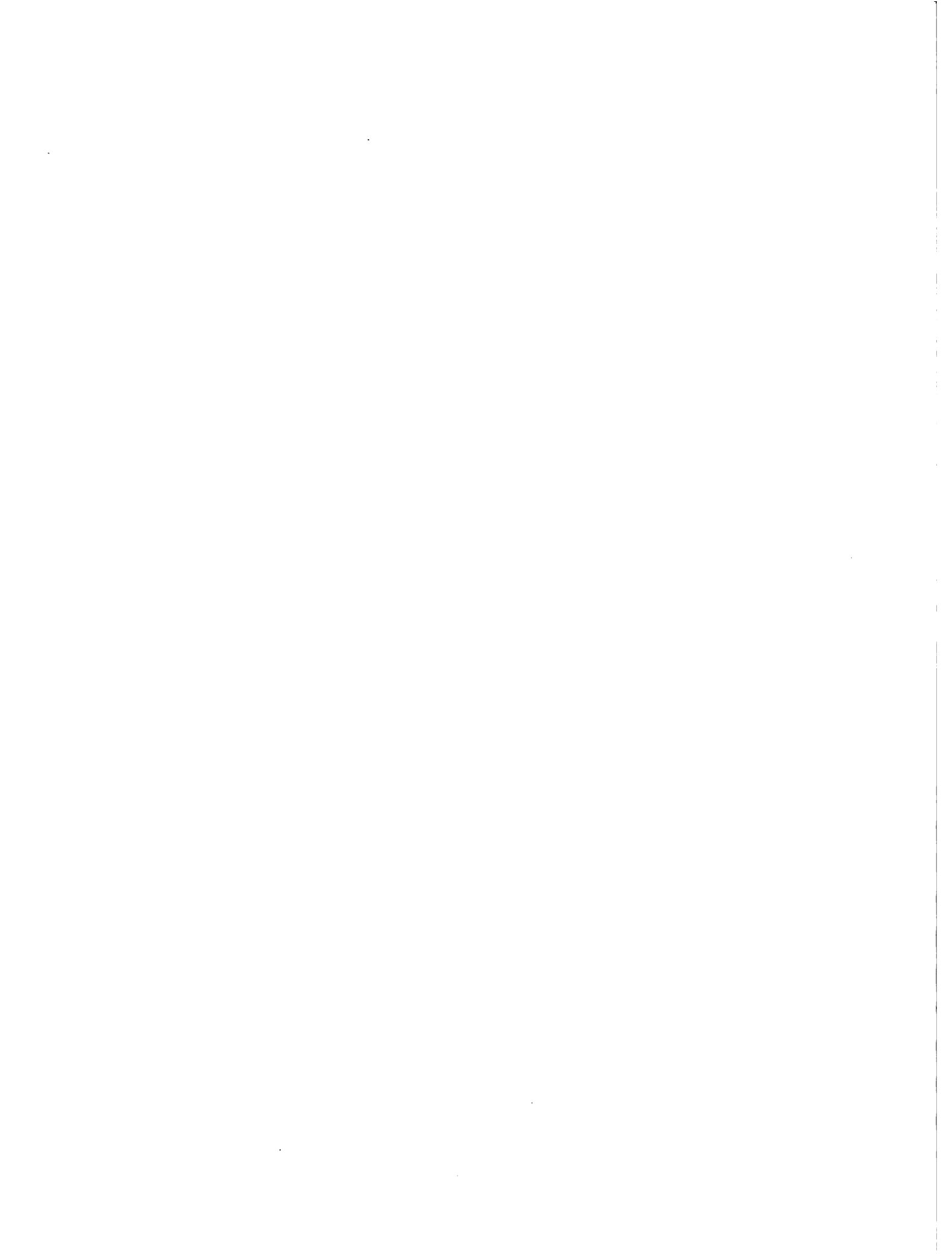
DESIGN CHARACTERISTICS OF DRAIN 20-1 (S=0.030; Length = 1000 Ft; Area = 5000 Sq Ft; side slope = 2:1)

Station	Station		Station		Station		Station		Station		Station		Station		Station		Station		Station		Station		Station	
	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37		
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	

DESIGN CHARACTERISTICS OF DRAIN 20-2 (S=0.030; Length = 1100 Ft; Area = 5100 Sq Ft; side slope = 2:1)

Station	Station		Station		Station		Station		Station		Station		Station		Station		Station		Station		Station		Station	
	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	
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	

Hydraulic Section 1  
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 Hydraulic Section 3  
 Hydraulic Section 4  
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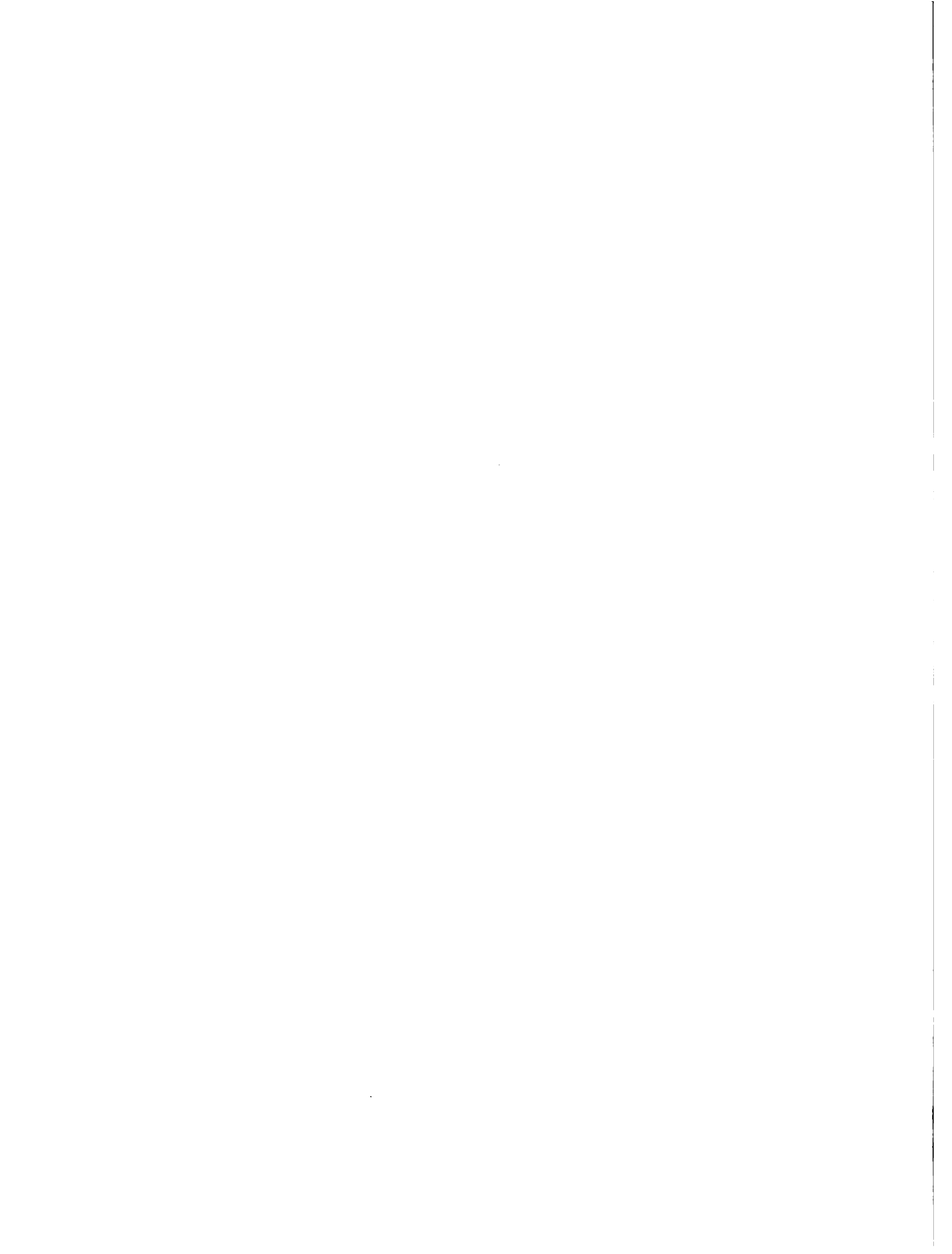


APPENDIX I (C)

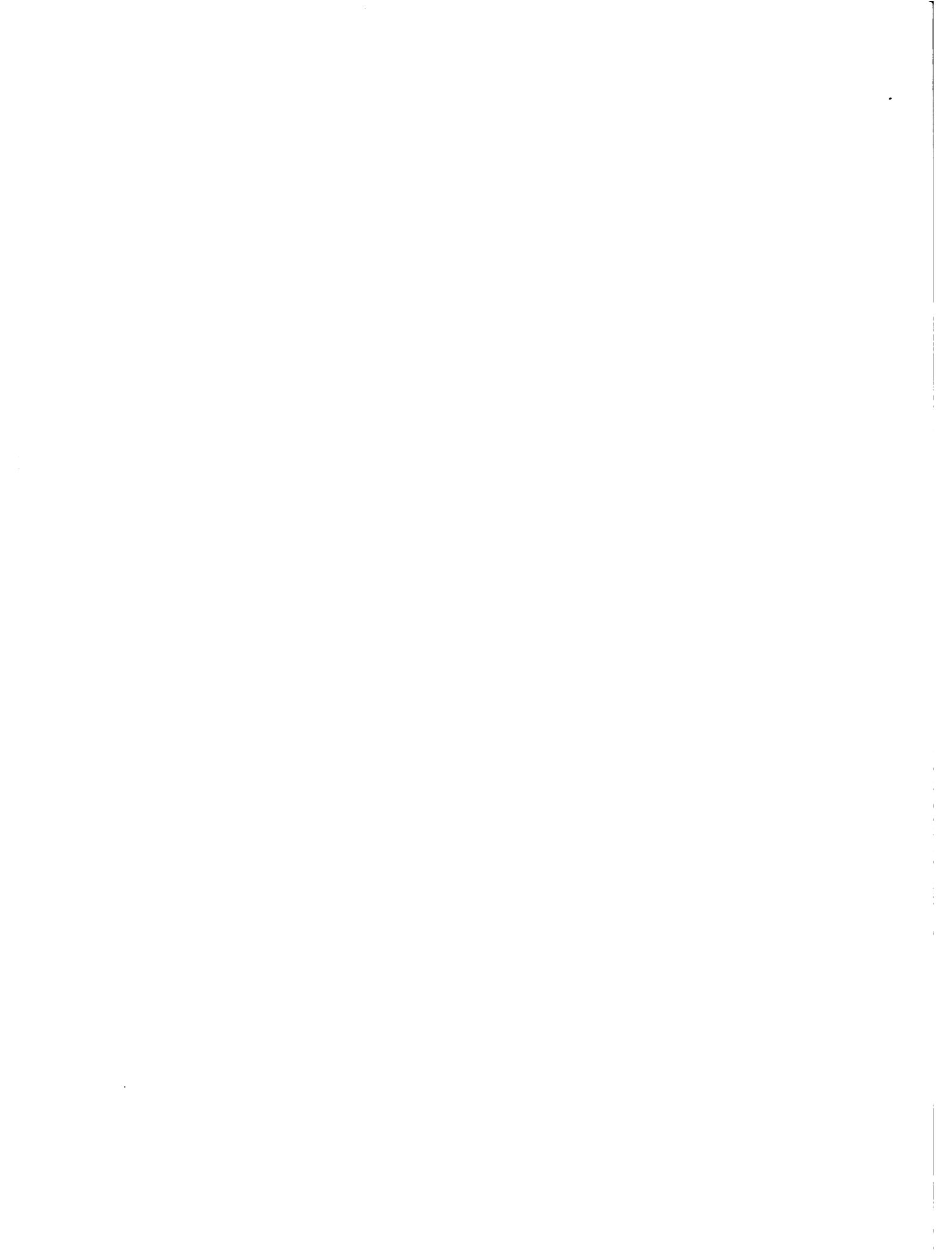
SECTION CHARACTERISTICS OF BRAD AD-2 (S=0.030; Length = 1291.2 Ft. = 1308.29 Ft.; 84.60 Slope=2)

Station	Bottom width		Top width		Slope		Area		Perimeter		Wetted perimeter		Hydraulic radius	Hydraulic section	Hydraulic perimeter	Area lost										
	B	T	S	T	S	T	A	P	W	P	W	P														
1+00	6.22	16	1.48	3.1	1.65	3.9	1.60	166.22	33.16	14.35	33.16	1.72	3.15	0.60529	3.15	0.39	101	5.31	1.5	0.16	0.5	2.152	32.6	16.95	176.60	72.8.20
1+10	5.11	15	1.37	3.0	1.52	3.5	1.68	130	33.71	12.26	32.70	1.65	3.05	0.60529	3.05	0.31	151	4.29	1.5	0.16	0.5	2.152	32	15.84	150.85	1072.8
Area lost = 261.27 Ft. <sup>2</sup> = 5.16 Acres = 2.1271 A.																										
SECTION CHARACTERISTICS OF BRAD AD-2A (S=0.030; Length = 1369 Ft. = 1351.22 Ft.; 84.60 Slope=2)																										
1+00	1.72	2	2.61	2.6	0.79	3.1	0.95	21.12	2.15	15.53	1.77	1.58	0.15	0.2011	2.13	0.45	19	1.40	1.5	0.16	0.5	2.152	20.8	0.27	72.00	6.70.15
1+10	1.72	2	2.61	2.0	0.61	2.5	0.76	16	1.49	12.74	1.95	1.75	0.18	0.20111	1.90	0.38	27	0.66	1.5	0.16	0.5	0.152	20	0.45	66.70	6.56.72
Area lost = 1.19 Acres = 0.2916 A.																										
SECTION CHARACTERISTICS OF BRAD AD-2B (S=0.030; Length = 1174 Ft. = 1155.19 Ft.; 84.60 Slope=2)																										
1+00	1.51	1	1.22	1.2	1.28	1.7	1.43	60.18	5.62	25.78	1.55	2.43	0.15	0.0085	2.49	0.80	159	0.5	1.5	0.16	0.5	2.152	19.8	11.91	140.7	
1+10	1.72	2	0.61	1.1	1.06	1.9	1.19	36.12	3.11	19.29	1.55	1.90	0.18	0.0085	2.27	0.68	52	2.32	1.5	0.16	0.5	-	-	-	-	-
1+20	1.72	2	0.61	1.0	0.91	1.5	1.07	30	2.79	17.19	1.53	1.76	0.21	0.0085	2.19	0.65	51	1.79	1.5	0.16	0.5	-	-	-	-	-
Area lost = 163.39 Ft. <sup>2</sup> = 3.70 Acres = 1.4794 A.																										

Bottom width      Top width      Slope      Area      Perimeter      Wetted perimeter      Hydraulic radius      Hydraulic section      Hydraulic perimeter      Area lost







APPENDIX I (10)

DESIGN CHARACTERISTICS OF DRAIN 2D-131 (D=0.030); Length = 6792.8 Ft=2061.83 M; Side Slope = 2

0-0	4	1.22	2	0.61	2.4	0.75	2.9	0.88	21.12	1.96	14.75	0.49	1.44	0.40	0.00148	2.43	0.74	51	1.45	1.5	0.46	0.5	0.132	29.6	9.02	79115	7152.48
25+72.8																											
01+60	4	1.22	2	0.41	2.0	0.61	2.5	0.76	18	1.49	12.94	1.95	1.25	0.38	0.00289	2.98	0.91	48	1.36	1.5	0.46	0.5	0.132	23	8.54	42282	3922.58
07+42.8	4	1.22	2	0.61	1.8	0.55	2.3	0.70	11.46	1.08	12.05	3.47	0.95	0.29	0.00289	2.49	0.76	29	0.82	1.5	0.46	0.5	0.132	27.2	8.29	70232	6529.01

Area Lost = 191569 Ft<sup>2</sup>=4.40 Acres = 1.7804 Ha





**APPENDIX I (11)**  
**STATISTICAL CHARACTERISTICS OF DRAIN 20-10 (S=0.030; Length = 1315 Ft=1376.5 M; Side Slope = 2)**

Station	Area			Perimeter			Wetted Perimeter			Hydraulic Radius			Velocity			Area		
	sq ft	sq m	ft	ft	m	ft	ft	m	ft	ft	m	ft	ft	m	sq ft			
1+00.0	1.27	0.12	3	0.91	3.5	3.67	30	2.70	17.4	5.3	1.75	0.51	0.00132	2.55	2.87	35	30.76	3505.12

Area lost = 21.116 sq ft = 1.9533 m

**STATISTICAL CHARACTERISTICS OF DRAIN 20-11A (S=0.030; Length = 693.4 Ft=187.7 M; Side Slope = 2)**

1+00.0	1.27	0.12	3	0.91	3.5	3.67	30	2.70	17.4	5.3	1.75	0.51	0.00132	2.55	2.87	35	30.76	3505.12
--------	------	------	---	------	-----	------	----	------	------	-----	------	------	---------	------	------	----	-------	---------

Area lost = 21.116 sq ft = 1.9533 m

**STATISTICAL CHARACTERISTICS OF DRAIN 20-111 (S=0.030; Length = 666.0 Ft=180.12 M; Side Slope = 2)**

1+00.0	1.27	0.12	3	0.91	3.5	3.67	30	2.70	17.4	5.3	1.75	0.51	0.00132	2.55	2.87	35	30.76	3505.12
--------	------	------	---	------	-----	------	----	------	------	-----	------	------	---------	------	------	----	-------	---------

Area lost = 21.116 sq ft = 1.9533 m



SECTION I (17)  
 DESIGN CHARACTERISTICS OF DATA 2D-2 (S=0.030; Length = 1070.9 Ft=313.6M; Side Slope=2)

Station	ELEVATION			DISTANCE			SLOPE			VELOCITY			WATER DEPTH			WATER VELOCITY							
	FT	M	IN	FT	M	IN	FT	M	IN	FT	M	IN	FT	M	IN	FT	M	IN					
11	1.27	1.9	3.66	1.1	1.74	3.5	1.59	100.32	30.92	33.68	10.27	2.28	0.71	0.7259	2.76	0.84	2.16	0.65	0.152	17.6	5.31	104.779	31.787
12	1.56	1.9	3.25	1.8	1.86	3.3	1.52	101.65	31.05	33.47	10.20	3.12	0.75	0.7740	2.10	0.64	2.16	0.65	0.152	17.2	5.23	102.823	31.053
13	1.53	1.9	2.44	1.1	1.51	3.9	1.59	82.72	25.69	29.05	2.79	0.85	0.8710	1.87	0.58	2.68	0.81	0.152	13.6	4.12	75.053	22.611	

Area Cont 5113-3  $P^2 = 22.72$  Acres = 1.7567 Ha.

DESIGN CHARACTERISTICS OF DATA 2D-3 (S=0.030; Length = 1070 Ft=313.6M; Side Slope=2)

11	1.22	1.9	2.65	1.0	1.67	3.0	1.07	30	2.70	31.52	2.31	1.75	0.53	0.5325	2.16	0.66	2.5	0.76	0.152	32	9.76	177.500	54.256
12	1.22	1.9	2.65	1.0	1.67	3.0	0.95	23.92	2.22	15.63	1.77	1.54	0.17	0.0795	1.43	0.43	25.3	1.02	0.152	30.4	9.27	167.245	51.5478

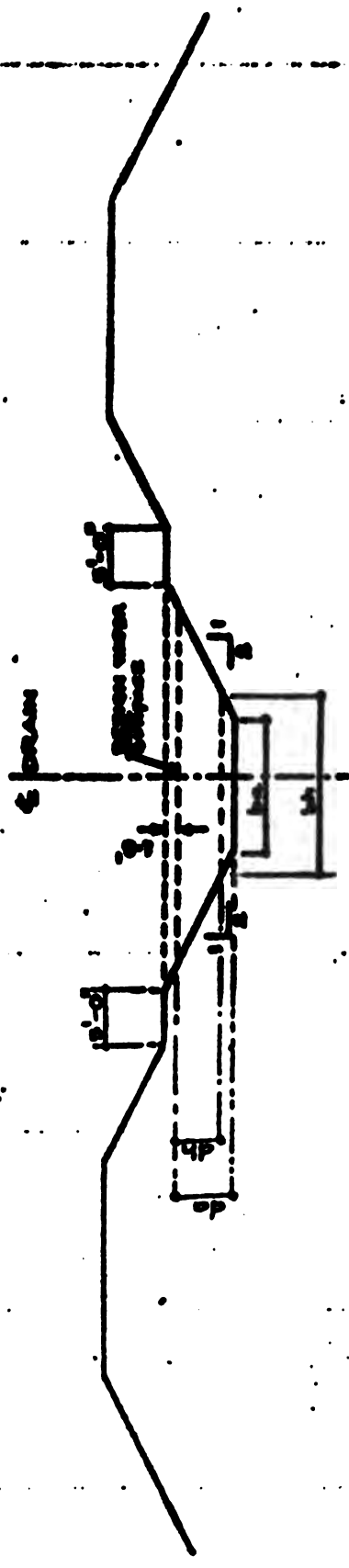
Area Cont 2222  $P^2 = 7.56$  Acres = 1.0111 Ha.

DESIGN CHARACTERISTICS OF DATA 2D-4 (S=0.030; Length = 7123.1 Ft=2171.6M; Side Slope=2)

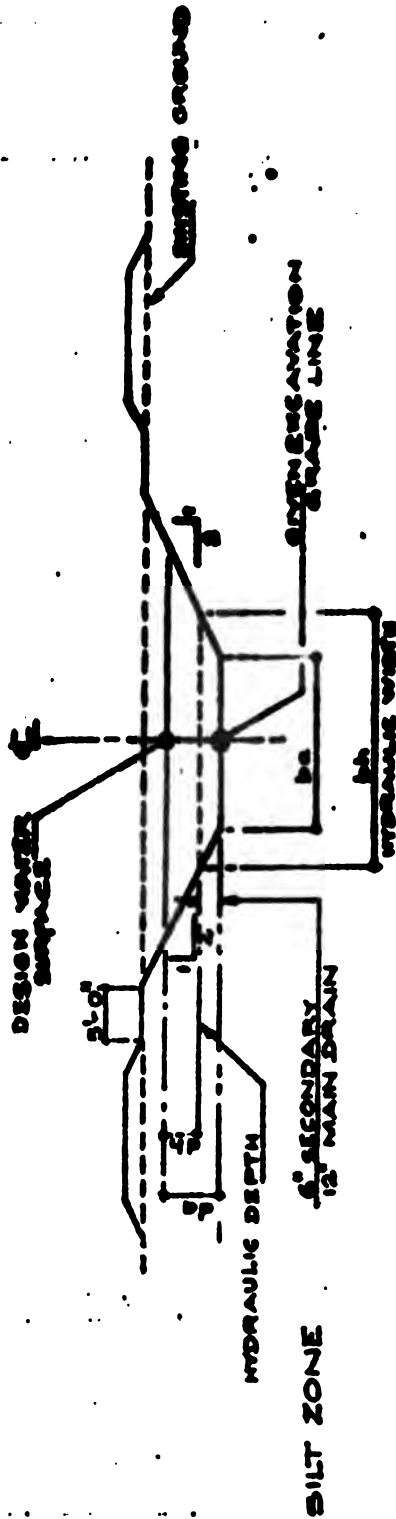
11	1.22	1.9	2.65	1.0	1.67	3.0	1.57	22.1	2.68	16.59	3.04	1.75	0.41	0.5715	2.03	0.62	15.24	1.29	0.152	31.2	9.41		
12	1.22	1.9	2.65	1.0	1.67	3.0	0.52	9.32	0.88	12.26	3.16	0.92	0.75	1.0147	2.32	0.70	23	0.70	0.152	29.65	8.69		

Area Cont 21131  $P^2 = 1.86$  Acres = 1.6600 Ha.





DRAIN IN LOCATION OF NATURAL DRAIN

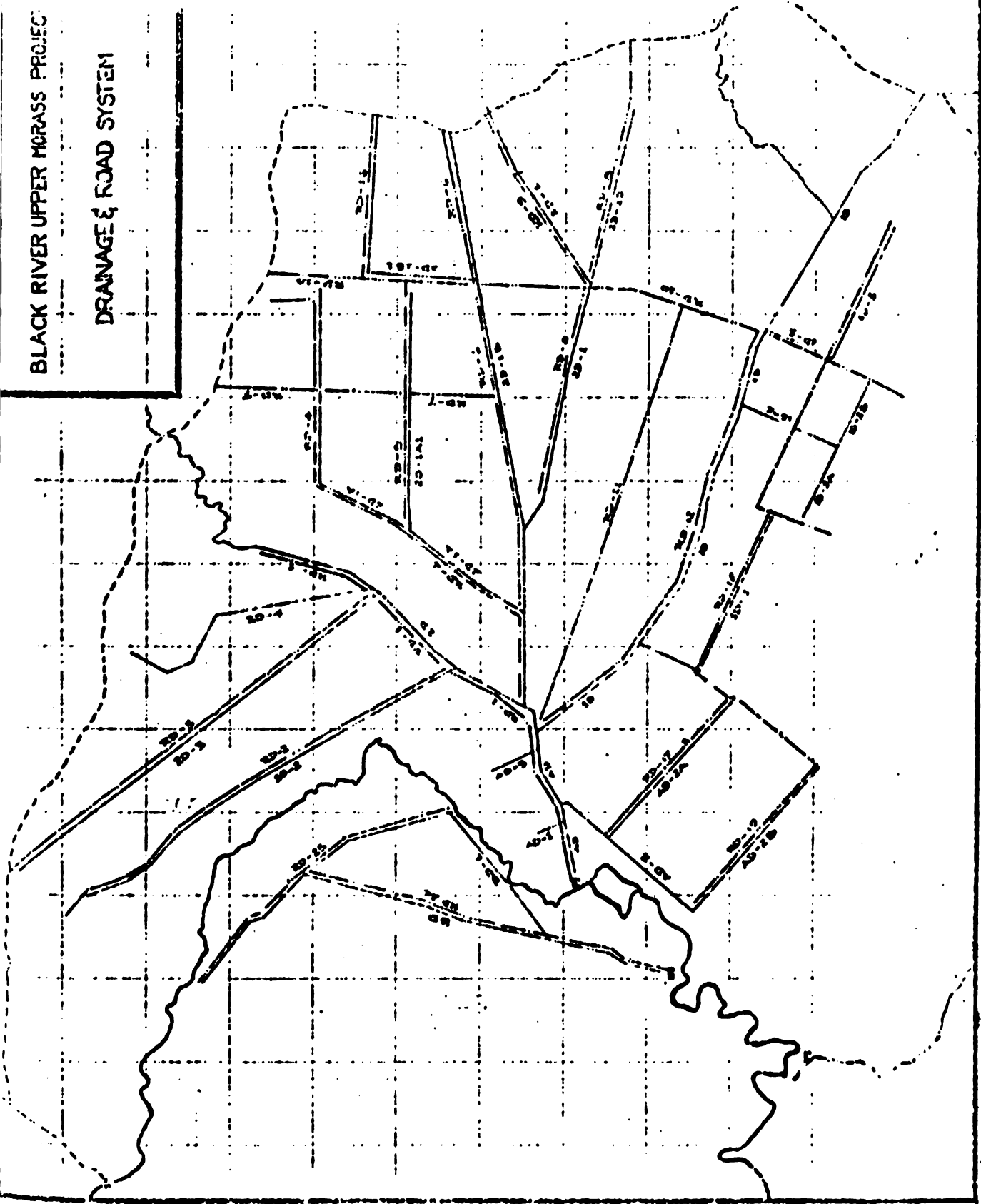


TYPICAL DRAIN SECTION

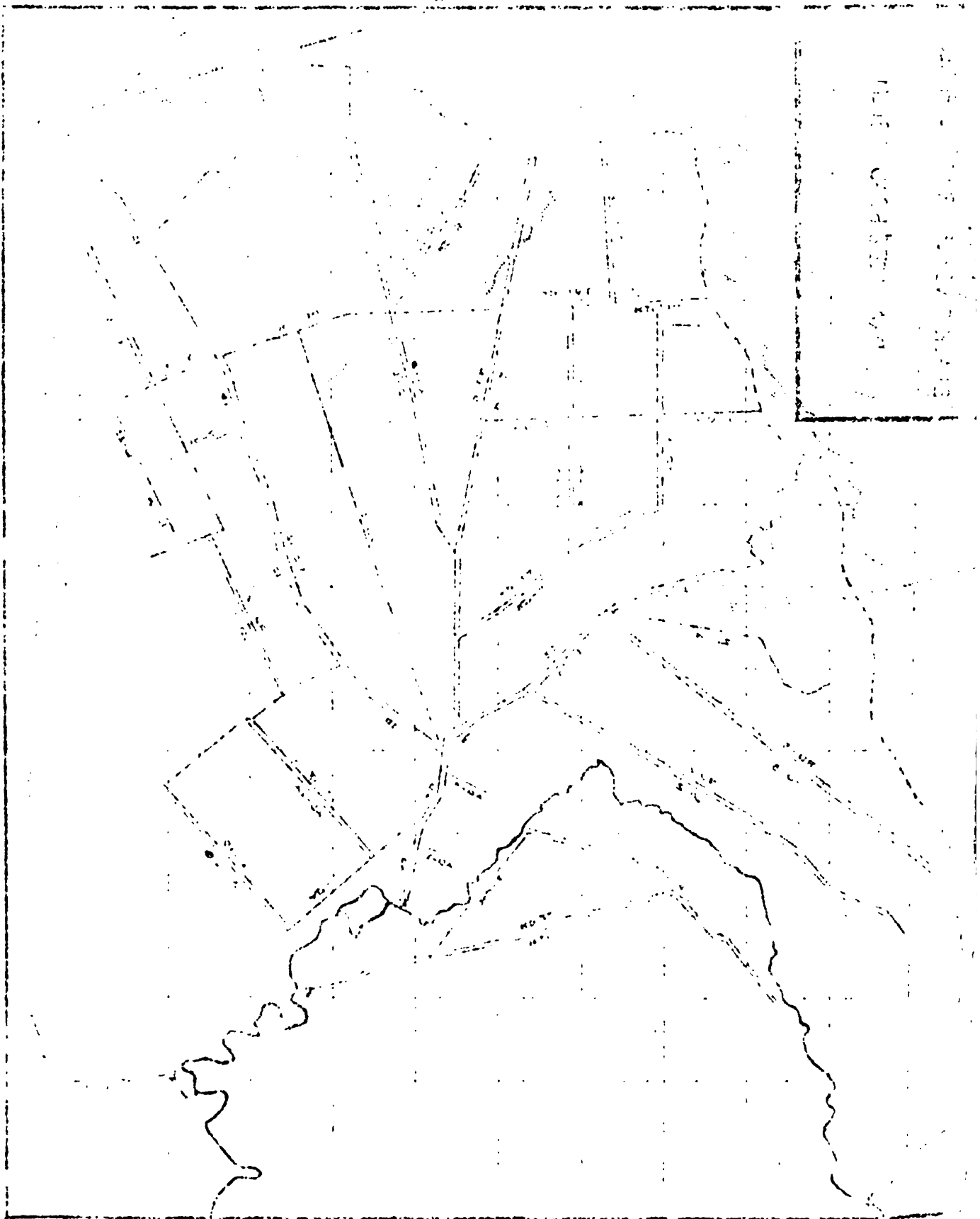
SOURCE: HARZA OVERSEAS ENGINEERING COMPANY AND MSU LVERING, 1977. BLACK RIVER UPPER REACH  
 FEASIBILITY REPORT, 3 VOL. 5.



BLACK RIVER UPPER MCRASS PROJECT  
DRAINAGE & ROAD SYSTEM



SCALE: 1" = 100' (AS SHOWN ON MAP) DATE: 10/15/77 DRAWN BY: J. W. HARRIS CHECKED BY: R. J. HARRIS





APPENDIX II

RECOMMENDED DEPTH OF THE WATER TABLE FOR MAXIMUM YIELD  
OF CROPS GROWING IN PEAT SOILS

Crop	Depth of Water Table	
	Feet	Meter
Beans	1.5 - 2	0.45 - 0.61
Cabbage	1.5 - 2	0.45 - 0.61
Carrots	2	0.61
Corn (sweet)	2.0 - 2.5	0.61 - 0.75
Lettuce	2.5 - 3.0	0.75 - 0.90
Onions	2.0 - 2.5	0.61 - 0.75
Peas	1.5 - 2.0	0.45 - 0.61
Potatoes	1.5 - 2.0	0.45 - 0.61
Tomatoes	1.5 - 2.0	0.45 - 0.61

APPENDIX III

RECOMMENDED PARTS FOR THE ENGINE (30" PUMP)

- 2 sets of fan belts
- 1 set of radiator hoses, clamps and tubing
- 1 box of 15 amp fuses
- 1 fuel solenoid
- 1 safety relay
- 3 starter solenoids
- 4 voltage ammeter
- 4 water temperature gauge
- 4 oil pressure gauge
- 12 fuel filters
- 12 oil filters
- 6 air filters

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that this is crucial for ensuring transparency and accountability in the organization's operations.

2. The second part of the document outlines the various methods and tools used to collect and analyze data. It highlights the need for a systematic approach to data collection and the importance of using reliable and valid measurement instruments.

3. The third part of the document discusses the ethical considerations that must be taken into account when conducting research. It stresses the importance of obtaining informed consent from participants and ensuring that their privacy and confidentiality are protected throughout the study.

4. The fourth part of the document describes the various types of research designs that can be used to investigate different research questions. It compares and contrasts experimental, quasi-experimental, and non-experimental designs, highlighting their strengths and limitations.

5. The fifth part of the document discusses the importance of data analysis and interpretation. It outlines the various statistical techniques that can be used to analyze data and interpret the results of the study. It also emphasizes the need to report findings in a clear and concise manner.

6. The sixth part of the document discusses the importance of disseminating research findings and the role of the researcher in promoting the use of research to inform practice. It highlights the various channels through which research findings can be shared and the importance of engaging with stakeholders in the process.

7. The seventh part of the document discusses the importance of ongoing evaluation and improvement of research practices. It emphasizes the need for researchers to regularly assess the quality of their work and seek feedback from colleagues and supervisors to ensure that they are using the most effective and efficient methods.

8. The eighth part of the document discusses the importance of staying current in the field of research. It highlights the various resources available to researchers, such as journals, books, and online databases, and the importance of regularly reviewing the literature to stay up-to-date on the latest findings and developments in the field.

APPENDIX III (cont'd)

RECOMMENDED PARTS FOR THE ENGINE (42" PUMPS)

- 3 sets of radiator hoses, clamps and tubing
- 4 sets of fan belts
- 3 boxes 15 amp fuses
- 3 fuel solenoids
- 3 safety relays
- 2 starter solenoid
- 1 starter
- 3 voltage amp meters
- 3 oil pressure ammeters
- 3 oil pressure gauges
- 36 water temperature gauges
- 36 oil filters
- 36 fuel filters
- 18 air filters

RECOMMENDED PARTS LIST - MAJOR (42" PUMP SIZE)

1. 1 coupling element for coupling connecting engine to hydraulic pump
2. Hydraulic pump
3. 1 relief valve
4. Intake to hydraulic pump (suction) hose and clamps
5. Hose assembly L.P. for relief valve return with push-loc swivel on one end, and push-loc straight fitting on other end
6.  $\frac{1}{4}$ " hose assembly H.P. 2' H.P. hose fitting with reusable swivel end. 2' H.P. hose fitting with reusable straight end.
7. Miscellaneous  $\frac{1}{4}$ " H.P. fitting  $\frac{1}{4}$ " x  $\frac{1}{8}$ " adaptor fitting male and female from check valve to  $\frac{1}{4}$ " control valve
8. 2 each quick coupling, 5100 for return line
9. 2 each 5100 quick coupling for supply line
10. 1 each needle valve

# Section 1

## Section 1.1: Introduction

This section introduces the basic concepts of the course.

The first part of the course will focus on the

fundamental principles of the subject.

It will cover the following topics:

1. The history of the subject.

2. The basic concepts and terminology.

3. The main results of the subject.

4. The applications of the subject.

5. The current research in the field.

6. The future of the subject.

7. The role of the subject in society.

8. The importance of the subject.

9. The challenges of the subject.

10. The opportunities of the subject.

## Section 1.2: The History of the Subject

The history of the subject is a long and interesting one.

It

dates back to the ancient Greeks.

They were the first to study the

subject in a systematic way.

They discovered many of the basic principles of the

subject and laid the foundation for the modern theory.

The subject has since then developed rapidly and has become

one of the most important branches of science.

The subject has a rich history and a bright future.

It is a subject that is constantly evolving and

bringing new discoveries to light.

The subject is a subject that is full of

challenges and opportunities.

APPENDIX III (cont'd)

11. 1 each 0-3000 P.S.I. pressure gauge
12. 1 each vacuum gauge
13. 1 float for hyd. tank safety
14. 1 each 40' H.P. supply hose with male pipe fitting ends and quick couplings
15. 1 each 40' L.P. return hose with male pipe fitting ends and quick couplings
16. 1 each S/S teflon oil feeder line for pump
17. 1 hydraulic motor
18. 1 propeller
19. 1 each S/S wear ring
20. 1 bottom seal plate
21. 1 Crane seal
22. 6 return line filters
23. 1 box 2 $\frac{1}{4}$ "x 5/8 bolts and nuts (contains 50)
24. 2 discharge pipe gaskets
25. set pump bowl bearings

RECOMMENDED PARTS LIST - MAJOR (30" PUMP SIZE)

26. 1 coupling element for coupling connecting engine to hyd. pump.
27. Hyd. pump
28. 1 relief valve
29. Intake to hyd. pump (suction) hose and clamps
30. Hose assembly L.P. for relief valve return with push-loc swivel on one end and push-loc straight fitting on other end
31.  $\frac{1}{4}$ " hose assembly H.P., 2'H.P. hose fitting with reusable straight end
32. Miscellaneous  $\frac{1}{4}$ " H.P. Fitting  $\frac{1}{4}$ x $\frac{1}{8}$  adaptor fitting male and female, from check valve to  $\frac{1}{4}$ " control valve
33. 2 each 5100 quick coupling for supply
34. 2 each quick coupling, 5100 for return line
35. 1 each needle valve
36. 1 each 0-3000 P.S.I. pressure gauge
37. 1 each vacuum gauge
38. 1 float for hyd tank safety

## 1. Introduction

The following table provides a summary of the key findings from the study. It details the performance metrics for various models under different conditions, highlighting the most effective configurations.

Model	Configuration	Accuracy (%)	Precision (%)	Recall (%)
Model A	Baseline	85.2	88.1	82.3
	Optimized	92.5	94.0	90.8
Model B	Baseline	78.9	80.5	76.4
	Optimized	88.3	90.1	86.5
Model C	Baseline	81.5	83.2	79.8
	Optimized	89.7	91.5	87.9

These results indicate that the optimized configurations consistently outperform the baseline models across all metrics, with Model A showing the highest overall accuracy.

## 2. Methodology

The methodology employed in this study involves a comprehensive analysis of the data, followed by the implementation and evaluation of various models. The key steps include data preprocessing, model selection, and performance evaluation.

The data was preprocessed to ensure consistency and accuracy, with missing values imputed and outliers removed. The models were then trained on the prepared data, and their performance was evaluated using standard metrics such as accuracy, precision, and recall.

The results show that the optimized models achieved significantly higher performance compared to the baseline models, demonstrating the effectiveness of the proposed methodology.

APPENDIX III (cont'd)

39. 1 each 40' H.P. supply hose with male pipe fitting ends and quick couplings
40. 1 each 40' L.P. return hose with male pipe fitting ends and quick couplings
41. 1 each S/S teflon oil feeder line for pump
42. 1 hydraulic motor
43. 1 propeller
44. 1 each S/S wear ring
45. 1 bottom seal plate
46. 1 crane seal
47. 6 return line filters
48. 1 box 2"x $\frac{1}{2}$ " bolts and nuts (contains 50)
49. 2 discharge pipe gaskets
50. set pump bowl bearings

# Introduction

The purpose of this document is to provide a comprehensive overview of the project's objectives, scope, and the methodology used to achieve the results. This document is intended for the project's stakeholders and serves as a reference for the project's progress and outcomes.

The project was initiated in response to the need for a more efficient and effective way to manage the company's resources. The primary goal was to identify the key areas of the business that required improvement and to develop a plan to address these needs. The project was completed in a timely manner and the results have been highly positive.

The project was managed using a combination of traditional and agile methodologies. This approach allowed for greater flexibility and adaptability in response to changing requirements. The project team worked closely with the stakeholders to ensure that the project remained aligned with the company's strategic goals. The results of the project have been significant and have led to a number of improvements in the company's operations.



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- No. I - 10 Jose Emilio Araujo, "The Theory Behind the Community Enterprise - Seminar in Jamaica", March 1978
- No. I - 11 Marie Strachan, "A National Programme for the Development of Hillside Farming in Jamaica", April 1978
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(ii)

- No. I - 14 R. C. E. McDonald, A. H. Wahab, "Fertility Assessment of Newly Terraced Hillside Soils Using the Microplot Technique - the Allsides Case Study", 1978
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- No. III - 4 IICA Jamaica Staff, "Agro-Socio-Economic Sample Survey of Allsides - Trellenny, Jamaica", September 1979

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2. The second part of the document outlines the various methods used to collect and analyze data. It describes how this information is used to identify trends, assess risks, and make informed decisions about the organization's future.

3. The third part of the document focuses on the implementation of internal controls. It details the specific measures taken to prevent fraud, reduce errors, and ensure the integrity of the organization's financial reporting.

4. The fourth part of the document discusses the role of the audit committee. It explains how this body is responsible for overseeing the organization's financial reporting process and for ensuring that the external auditors are given the necessary access to information.

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8. The eighth part of the document discusses the role of the external auditors. It explains how these professionals are responsible for providing an independent opinion on the organization's financial statements and for identifying any areas of concern.

9. The ninth part of the document discusses the role of the regulatory authorities. It explains how these bodies are responsible for enforcing the laws and regulations that govern the organization's financial reporting and for taking action against any organizations that fail to comply.

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- No. IV - 5 Glenys H. Barker, "Bibliography of Literature relating to Research and Development in the Agricultural Sector of Jamaica 1959 - 1979", March 1980
- No. IV - 6 Milton R. Wedderburn, "Hillside Farmers' Pre-Cooperative A Socio-Economic Assessment", March 1980
- No. IV - 7 Adele J. Wint, "The Role of Women in the Development Process", April 1980
- No. IV - 8 Milton R. Wedderburn, "The Co-operative Input in the Development of the Pilot Hillside Agricultural Project (PHILAGRIP)", April 1980
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- No. IV - 10 Henry Lancelot, "Traditional Systems in Hillside Farming, Upper Trelawny, Jamaica", June 1980

Year	Month	Day	Event	Location	Notes
1910	Jan	15	...	...	...
1910	Feb	20	...	...	...
1910	Mar	10	...	...	...
1910	Apr	25	...	...	...
1910	May	15	...	...	...
1910	Jun	30	...	...	...
1910	Jul	10	...	...	...
1910	Aug	25	...	...	...
1910	Sep	15	...	...	...
1910	Oct	30	...	...	...
1910	Nov	10	...	...	...
1910	Dec	25	...	...	...
1911	Jan	15	...	...	...
1911	Feb	20	...	...	...
1911	Mar	10	...	...	...
1911	Apr	25	...	...	...
1911	May	15	...	...	...
1911	Jun	30	...	...	...
1911	Jul	10	...	...	...
1911	Aug	25	...	...	...
1911	Sep	15	...	...	...
1911	Oct	30	...	...	...
1911	Nov	10	...	...	...
1911	Dec	25	...	...	...

- No. IV - 11 IICA/Jamaica, "Pilot Hillside Agricultural Project", (PHILAGRIP), Project Document. Vols. I, II and III, June 1980
- No. IV - 12 A. Wahab, I. Johnson, P. Aitken, H. Murray and H. Stennett, "Highlights of the Pilot Hillside Agricultural Project at Allsides", July 1980
- No. IV - 13 I. Johnson, A. Wahab, P. Aitken, H. Payne, "Benchmark for a Project Profile for Developing a Peanut Industry in Jamaica", July 1980
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- No. IV - 15 Norma Munguia, Percy Aitken, Abdul Wahab, Irving Johnson, "Salt Extraction by Solar Energy", A Mini-project, September 1980
- No. IV - 16 Abdul H. Wahab, Percy Aitken-Soux, Irving E. Johnson and Howard Murray, "The Allsides Project in Jamaica - Developmental Potentials of Hillside Agriculture", September 1980
- No. IV - 17 P. Aitken, A. Wahab, I. Johnson, A. Sahney and N. Munguia, "Rural Women Survey", Vols. I, II and III, October 1980
- No. IV - 18 P. Aitken, I. E. Johnson, A. Wahab, "Assessment of Employment Among Small Hillside Farmers of Jamaica", November 1980
- No. IV - 19 IICA/Jamaica "Pilot Hillside Agricultural Project", (PHILAGRIP), Final Project Document. October 1980.
- No. IV - 20 P. Aitken, A. Wahab, I. E. Johnson, Bo-Myeong Woo, "IICA Evaluation of the First Phase FSB Allsides Project", (Internal Document of Work), November 1980
- No. IV - 21 MINAC/IICA/CARDI - "Seminar on Multiple Cropping", December 1980
- 1981
- No. V - 1 N. Munguia, P. Aitken, A. Wahab, I. Johnson, "Smoke Curing of Fish (as a household industry in Rural Jamaica)", January 1981

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2. The second part of the document outlines the specific procedures for recording transactions. It details the steps from identifying a transaction to entering it into the accounting system, ensuring that all necessary details are captured.

3. The third part of the document discusses the importance of regular reconciliation. It explains how this process helps to identify and correct errors, ensuring that the company's books are always balanced and accurate.

4. The fourth part of the document addresses the role of internal controls in the accounting process. It describes how these controls help to prevent fraud and ensure the integrity of the financial data.

5. The fifth part of the document discusses the importance of maintaining proper documentation. It explains how this helps to provide a clear audit trail and supports the accuracy of the financial statements.

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- No. V - 5 P. Aitken-Soux, A. H. Wahab, I. E. Johnson, "Country Level Action Plan (CLAP)", May 1981
- No. V - 6 P. Aitken-Soux, A. H. Wahab, I. E. Johnson, "Overview of Agricultural Development in Jamaica", May 1981
- No. V - 7 Samuel Thompson, I. E. Johnson, P. Aitken-Soux, Abdul Wahab, "The Land Development & Utilization Act 1966", July 1981
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- No. V - 9 Dave Hutton, Abdul Wahab, Howard Murray, "Yield Response of Yellow Yam (Dioscorea Cayenensis) After Disinfesting Planting Material of Pratylenchus Coffeae", July 1981
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- No. V - 13 Bo-Myeong Woo, Abdul H. Wahab, Joseph Dehaney, "Crop Production on Hillsides using non-Bench Terracing Alternative Measures for Soil Conservation (first year's results of the Clive River Soil Conservation studies)", September 1981
- No. V - 14 Abdul H. Wahab, Percy Aitken-Soux, Irving E. Johnson, Bo-Myeong Woo, Howard Murray and Joseph Dehaney, "Agricultural Production on Hillsides - the Allsides Project Case Study", September 1981

The first part of the document discusses the general principles of the law of contract, which are based on the freedom of contract and the sanctity of contracts. It is essential to understand these principles as they form the foundation of the entire legal system.

In the second part, we explore the formation of a contract, which requires an offer and an acceptance. The offer must be clear, definite, and communicated to the offeree. The acceptance must be made in a timely manner and without any conditions.

The third part of the document deals with the performance of a contract. Once a contract is formed, the parties are bound to fulfill their obligations. Failure to do so may result in a breach of contract, which can be remedied through various legal means.

The fourth part discusses the discharge of a contract. A contract can be discharged through various means, such as agreement, frustration, or operation of law. It is important to understand the conditions under which a contract can be discharged.

The fifth part of the document deals with the remedies available for a breach of contract. The primary remedy is damages, which are intended to put the injured party in the position they would have been in had the contract been performed. Other remedies include specific performance and injunction.

The sixth part of the document discusses the law of agency. An agent is a person who is authorized to act on behalf of another person, known as the principal. The law of agency governs the relationship between the principal and the agent.

The seventh part of the document deals with the law of tort. A tort is a civil wrong that causes harm to another person. The law of tort provides a legal remedy for such wrongs, typically in the form of damages.

The eighth part of the document discusses the law of property. Property is a legal right that a person has in a thing. The law of property governs the acquisition, transfer, and protection of property.

The ninth part of the document deals with the law of succession. Succession is the process by which a person's property is transferred to another person upon their death. The law of succession governs the rights of the heirs and the executor of the estate.

The tenth and final part of the document discusses the law of evidence. Evidence is the material that is used to prove or disprove a fact in a legal proceeding. The law of evidence governs the rules of evidence and the burden of proof.

- No. V - 15 D. G. Hutton, A. H. Wahab, and J. Dehaney, "Investigating Critical Levels of Dry Rotting of Yellow Yam (*Dioscorea Cayenensis*) Planting Material, the Benefits of Disinfesting the Heads of *Pratylenchus Coffeae* and of After-Planting Nematicide Treatments", September 1981
- No. V - 16 D. G. Hutton, A. H. Wahab, H. Murray and J. Dehaney, "Critical Levels of Dry Rotting of Yellow Yam (*Dioscorea Cayenensis*) Planting Material and Yield Responses After Disinfesting Heads of *Pratylenchus Coffeae* and After Post-Plant Nematicide Applications", September 1981
- No. V - 17 E. Ayer and J. Reyes, "Seminar on Mediterranean Fruit Fly", September 30, 1981
- No. V - 18 Bo-Myeong Woo, "Erosion Control Works in Korea", October 1981
- No. V - 19 Irving E. Johnson and Percy Aitken-Soux, "Country Level Action Plan (CLAP)" (Third Revision - Internal Document of Work), October 1981
- No. V - 20 Humberto Pizarro, "Programme of Work to Establish Guidelines for the Effective Administration, Operation and Maintenance of the Irrigation and Drainage District in the BRUMDEC Project", November 1981
- No. V - 21 Humberto Pizarro, "The Operation of the Drainage System in the Black River Upper Morass Project", November 1981



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Drainage System in the Black River

Título Upper Morass Project.

Fecha Devolución

24 JUL 1984

Nombre del solicitante

J. Mann



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