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HAND BOOK

CHANNEL DESIGN, WITH TABLES, FOR VARYING
SIZE QUARTERNARY CANALS
SPECIFIC TO CONDITIONS AT

LAM NAM OON

SAKON NAKHON

ACCOMPANIES TECHNICAL NOTE 1
"GUIDELINES FOR TERTIARY IRRIGATION
SYSTEM DEVELOPMENT - LAM NAM OON"

AUGUST 1980

paper copy

LOUIS BERGER INTERNATIONAL, INC.

6th FLOOR, NO. 5, PATPONG 2 ROAD
P.O. BOX 11-1369, BANGKOK 11, THAILAND

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CHANNEL DESIGN, WITH TABLES, FOR VARYING SIZE QUARTERNARY CANALS

- LAM NAM OON -

SAKON NAKHON, THAILAND

AUGUST, 1980

ISSUED BY

CENTER FOR RURAL DEVELOPMENT
LOUIS BERGER INTERNATIONAL, INC. U.S.A.
UNDER CONTRACT WITH MINISTRY OF
AGRICULTURE AND COOPERATIVES OF THE
KINGDOM OF THAILAND

WORK PERFORMED BY

WILLIAM C. BELL
ERROLL D. COLES
and
MICHAEL STERN

PART I FOREWORD AND INTRODUCTION

PART II EXPLANATION

PART III TABLES

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TABLE 2 SIDE SLOPE = 1:1.5

TABLE 3 SIDE SLOPE = 1:2

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AUTHORS

FOREWORD

The Center For Rural Development, which is a Division of the Berger Group of companies, assists clients in planning and implementing programs and projects aimed to expand economic opportunities and improve the well-being of rural populations in many parts of the world.

Currently, in 1980, the Center supports eight major rural development projects which are funded by the World Bank, the U.S. Agency For International Development, The Aisan Development Bank, and other international agencies in Asia, Africa, the Middle East, and Latin America.

As a part of its services to clients and the professional community of those engaged in rural development work, the Center releases technical notes on various aspects of individual projects.

For those interested, additional copies may be obtained from the Center For Rural Development, c/o Louis Berger International, Inc., 100 Halsted Street, East Orange, New Jersey 07019, U.S.A.

INTRODUCTION

The Lam Nam Oon Integrated Rural Development Project is located in amphoes* Phang Khone, Pannanikom, and Muang, Changwat Sakon Nakhon, Thailand. It comprises a dam, reservoir, and main-secondary canal system that will provide irrigation water to approximately 220,000 rai of small farm holdings. About 10,000 farmers reside in the area.

Begun thirteen years ago, the infrastructure parts of the project are now almost completed. In order to develop efficient on-farm water delivery systems and water/farm management practices in the area, The Royal Thai Government has programmed US$43,800,000 for special work in the area during a five-year interval.

Of this amount, US$4,500,000 comprises funds borrowed from the United States of America in order to finance technical assistance, equipment, and local development costs.

Starting October 12, 1979 the American consulting firm, Louis Berger International, Inc. was employed under contract to provide technical advisory services for the project. These advisory services are for the cooperating agencies comprising: The Ministry of Agriculture And Cooperatives; Royal Irrigation Department (R.I.D.), Community Development Department (C.D), Department Agriculture (D.A.) and Department of Agricultural Extension (D.O.A.E).

The contractor is tasked with responsibility for designing and testing on-farm water delivery systems in the Lam Nam Oon (LNO) area. In relation to this, when contractor engineering specialists arrived at Lam Nam Oon in November 1979, the Royal Irrigation Department (R.I.D) had already installed a Land Consolidation-related on-farm water delivery system in pilot areas 1 and 3. Nothing had been done about designing and testing a system related to Ditch-Dyke modes of distributing water to farm units.

This situation caused the Louis Berger consultants to push for selection of a pilot area 2 location as rapidly as possible. A selection of area was made in April, 1980; and Mr. Erroll Coles, as Water Management, Operations and Maintenance Engineer was asked to develop the technical guidelines for the design of three sytems for pilot area 2. Technical Note No. 1, (to which this hand book is a supplement) is the result. Mr. William C. Bell has developed the tables within this Hand Book, with the assistance of Mr. Stern, who did the programming using a Hewlett-Packard computer.

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* Administrative Sub-Districts of a Changwat (Province)

* Rai = 0.16 Hectare (0.40 Acre)

PART II EXPLANATION

CHANNEL DESIGN

Stable Channels

In order that small unlined tertiary and quarternary canals remain stable and require a minimum of maintenance the design should be based of the principle of limitting velocities in relation to the soils in which the canals are excavated. This can be achieved by the use of two principles (1) Critical Tractive Force and (2) Froude Number.

Critical Tractive Force

A stable channel is one that may aggrade or degrade at a very slow rate and this degredation or scouring may take place up to a certain shear force. Above this shear force or critical tractive force, the channel degrades rapidly. The permissible tractive force is determined by the grain size diameter of the bed material. In channels with uniform flow the tractive force equals the components of gravity forces acting on the water prism in the direction of flow, expressed by the equation

$$T = r\,S\,\rho$$

where
T = tractive force kg/m^2
r = hydraulic radius m
S = slope of channel m/m
ρ = unit weight of water kg/m^3

To arrive at a value for critical tractive force use of the Lane Diagram is made Figure 1. This relates the plasticity index (PI) of a soil to maximum critical tractive force (CTF). Figure 2,3. The PI can be measured in a lab. Also a good relationship between total inon exchange capacity and PI has been established and this may be used to obtain a value for PI.

The CTF value taken from the Lane Diagram has to be corrected to take into account the distribution of the tractive forces along the sides and bottom of the channel. The included table gives the correction factors for different b/d ratios and sideslope. The larger of the values (for bottom) is used since this gives a depth that corresponds to the least velocity at which erosion will begin.

Figure 1.

Lane Diagram.

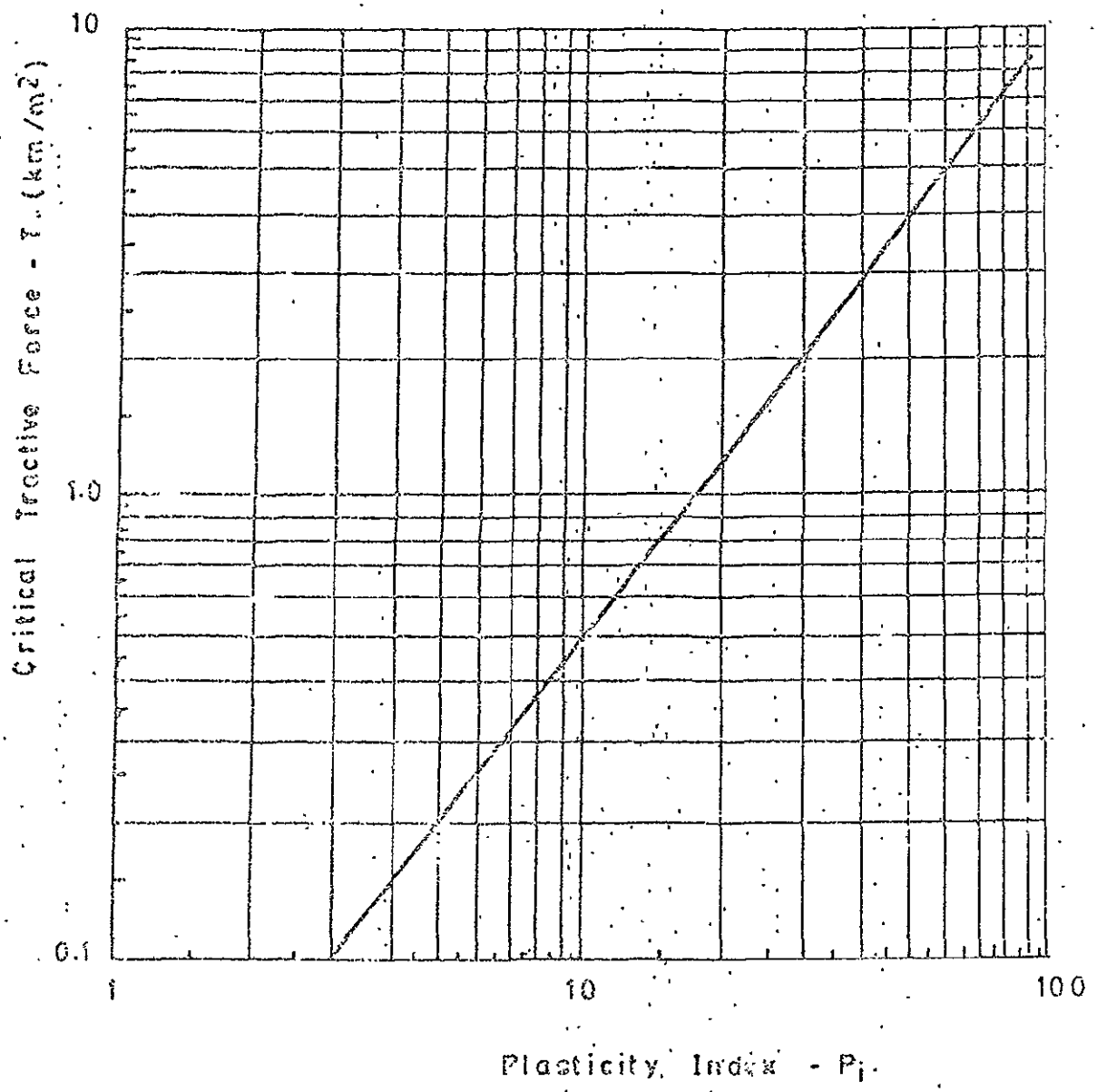


FIGURE 2

Classification of the Cohesiveness of Soils

Class	Clay Fraction (<2M)	Plasticity Index
Cohesionless (loamy sand)	0-2	< 1
Slightly cohesive (Sandy loam)	2-10	1-10
Medium cohesive (loam to loamy clay)	10-20	10-20
Cohesive (Clay loam to medium clay)	20-30	20-30
Very cohesive (clays to heavy clay)	30-100	> 30

FIGURE 3

C.T.F. Correction Factors

b/d	Channel Side Slopes Z					
	Channel Sides			Channel bed		
	1	1.5	2	1	1 5	2
1	.70	.70	.74	.80	.80	.80
1.25	.72	.72	.75	.84	.84	.84
1.50	.73	.73	.75	.86	.86	.86
1.75	.73	.73	.75	.88	.88	.88
2.0	.74	.74	.76	.90	.90	.90
3.0	.75	.75	.77	.95	.95	.95
4.0	.76	.75	.78	.95	.96	.96
5.0	.76	.76	.78	.975	.975	.975
>9	-	-	-	1.00	1.00	1.00

Froude Number

The Froude Number is a dimensionless number the defines the nature of free flow conditions. In the case of unlined channels it is desirable to maintain the flow regime as close as possible to tranquil flow. This is expressed by the equation

$$Fr = \frac{V}{\sqrt{g\ D}\ \cos \frac{s}{\alpha}}$$

where Fr = Froude Number
V = velocity m/sec
g = 9.80665 m/sec^2
$D = \frac{A}{T}$ (for trapozeidal channels) m
s = slope of channel m/m
α = energy coefficient

The value of Cos s/α may be neglected for small values of slope and flow. Error introduced by this omission is very small. By maintaining velocities at Froude Numbers between 0.1 and 0.3 for noncohesive soils assures tranquil flow.

Channel Dimensions

The dimensions are usually obtained by using the Manning equation

$$V = \frac{1}{N} r^{\frac{2}{3}} S^{\frac{1}{2}}$$

V = velocity m/sec
N = value based on expected condition of channel
r = hydraulic radius m
S = slope of channel m/m

The value for N can be taken as 0.025 to 0.029 for small straight aligned channels.

The ideal ratio of bottom width (b) to depth (d) is expressed by

$$b = 2\ d \tan \frac{z}{2}$$

This relationship is not always convenient for construction purposes and other ratios of b/d are used. An acceptable range for small channels is from 1.0 to 1.25.

Channel side slopes vary with the kind of material in which the channel is excavated. The usual ranges of values are from 1:1 to 2.5:1 for unlined channels.

Design

In designing small channels usually only two values are normally given, the required capacity (Q) and the b/d ratio. The other values must be calculated using a particular roughness coefficient (n), Froude Number, critical tractive force and side slope for local conditions.

In applying this method of design the depth of flow (d) is determined from the critical tractive force and the Froude Number. For the conditions given, this fixes a maximum and minimum depth of flow. From these, maximum and minimum values of velocity, slope and bottom width are obtained. Therefore any value between these will meet the criteria for designing a stable channel.

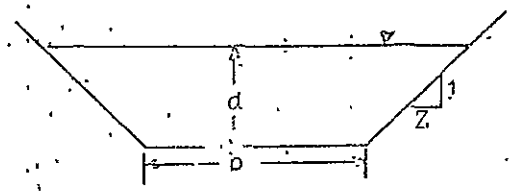
Equations

The following pages show the derivation of the equations for use in this method of channel design.

Design of Quartenary Canals

Based on Critical Tractive Force

The general equations for Trapazoidal Channel



The Manning equation: (metric)

$$V = \frac{1}{N} r^{2/3} S^{1/2}$$

$$\& \; Q = A \frac{1}{N} r^{2/3} S^{1/2}$$

Area $(A) = (Z + \frac{b}{d})\, d^2$ $\qquad \frac{b}{d} = X$

(1) $\quad A = N' \, d^2$ $\qquad X + Z = N'$

Top width $(T) = (\frac{b}{d} + 2Z)\, d$

(2) $\quad T = (X + 2Z)\, d$

Velocity $(V) = \frac{Q}{A}$

(3) $\quad V = \frac{Q}{N' \, d^2 \, (1000)}$ $\qquad$ (for Q in l/sec divide by 1000)

Wetted perimeter $(P) = \left[\frac{b}{d} + 2(Z^2 + 1)^{\frac{1}{2}}\right] d$

(4) $\quad P = (X + L)\, d$ $\qquad 2(Z^2 + 1)^{\frac{1}{2}} = L$

Hydraulic Radius $(r) = \frac{A}{P} = \frac{N' \, d^2}{(X + L)\, d}$

(5) $\quad r = \frac{N' \, d}{X + L}$

$$\text{Slope (S)} = \left[\frac{Q}{A \frac{1}{N} r^{2/3}}\right]^2 \qquad \text{(for Q in l/sec divide by 1000)}$$

$$= \left\{\frac{Q}{1000\ N'\ d^2 \frac{1}{N} \left[\frac{N'\ d}{X + L}\right]^{2/3}}\right\}^2 \qquad \text{factor out d}$$

$$(6) \qquad S = \left\{\frac{Q}{1000\ N' \frac{1}{N} \left[\frac{N'}{X + L}\right]^{2/3}}\right\}^2 \left[\frac{1}{d^{10/3}}\right]$$

bottom width (b) = d X

$$(7) \qquad b = d\ X$$

Equation for Froude Number (Fr)

$$(8) \qquad Fr = \frac{V}{\sqrt{g \frac{A}{T}}} \qquad g = 9.80665\ m/sec^2$$

$$\sqrt{g} = 3.13156\ m/\ sec^2$$

$$= \frac{\frac{Q}{N' d^2}}{\sqrt{g \left[\frac{X + Z}{X + 2Z}\right] d}} \qquad \frac{X + Z}{X + 2Z} = M$$

$$= \frac{Q}{N'\ d^2\ 3.13156\ M^{\frac{1}{2}}\ d^{\frac{1}{2}}}$$

$$(9) \qquad Fr = \frac{Q}{N'\ M^{\frac{1}{2}}\ 3.13156\ d^{5/2}} \qquad \text{and}$$

$$(10) \qquad d = \left[\frac{Q}{1000\ Fr\ 3.13156\ M^{\frac{1}{2}}\ N'}\right]^{2/5} \qquad \text{(for Q in l/sec divide by 1000)}$$

This gives maximum depth.

Equation for Tractive Force (T)

(11) $T = CF^{*}\, r\, S\, \rho \qquad \rho = 1000\ kg/m^3$

$$= CF\ 1000\left[\frac{N'\ d}{X + L}\right]\left\{\frac{Q}{N'\ d^2\ \frac{1}{N}\left[\frac{N'\ d}{X + L}\right]^{2/3}}\right\}^2 \qquad \text{factor out d}$$

$$= CF\ 1000\left[\frac{N'}{X + L}\right]\left\{\frac{Q}{N'\ \frac{1}{N}\left[\frac{N'}{X + L}\right]^{2/3}}\right\}^2 \left[\frac{1}{d^{13/3}}\right] \qquad \text{(for Q in l/sec divide by 1000)}$$

$$\text{let } C = CF\ 1000\left[\frac{N'}{X + L}\right]\left\{\frac{Q}{1000\ N'\ \frac{1}{N}\left[\frac{N'}{X + L}\right]^{2/3}}\right\}^2 \qquad \text{and}$$

(12) $T = C\ \frac{1}{d^{13/3}}$ and

(13) $d = \left[\frac{C}{T}\right]^{3/13}$

This gives minimum depth.

* CF is a reduction factor for τ that depends on the b/d ratio and side slope.

With the maximum and minimum values of "d" determined from the Froude number and Critical Tractive Force, the corresponding values of b,A,V and S are calculated.

The following equations are used for these calculations:

(1) $$b = X\,d$$

(2) $$V = \frac{Q}{1000\,N'\,d^2}$$

(3) $$S = \left\{\frac{Q}{1000\,N'\,\frac{1}{N}\left[\frac{N'}{X + L}\right]^{2/3}}\right\}^2 \frac{1}{d^{7\frac{1}{2}/3}}$$

(4) $$A = N'\,d^2$$

This set of tables for design of small unlined channels is based on the following:

- Value of the Froude Number is 0.1 this assures tranquil flow.
- A Critical Tractive Force of 0.2, determined for the soils at Lam Nam Oon.
- A b/d ratio of 1.25.
- Reduction value for CTF of 0.84.
- Roughness coefficient (N) of 0.025.

The tables are arranged as follows:

- Table 1 S:S = 1:1
- Table 2 S:S = 1:1.5
- Table 3 S:S = 1:2.0
- Table 4 S:S = 1:2.5
- Values of Q are from 20 l/sec to 300 l/sec in increments of 10.
- First row of calculations give minimum values of b,d,and A, maximum values of S and V.
- Last row of calculations give maximum values of b,d, and A, minimum values of S and V.
- Between these b is incremented by 0.01 for intermediate values of d,V,S, and A.

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC.

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
30.0	0.2229	0.1783	0.4194	0.002420	0.072
30.0	0.2300	0.1840	0.3938	0.002047	0.076
30.0	0.2400	0.1920	0.3617	0.001631	0.083
30.0	0.2500	0.2000	0.3333	0.001312	0.090
30.0	0.2600	0.2080	0.3082	0.001065	0.097
30.0	0.2700	0.2160	0.2858	0.000870	0.105
30.0	0.2800	0.2240	0.2657	0.000717	0.113
30.0	0.2900	0.2320	0.2477	0.000595	0.121
30.0	0.3000	0.2400	0.2315	0.000496	0.130
30.0	0.3100	0.2480	0.2168	0.000417	0.138
30.0	0.3200	0.2560	0.2035	0.000352	0.147
30.0	0.3300	0.2640	0.1913	0.000299	0.157
30.0	0.3400	0.2720	0.1802	0.000255	0.166
30.0	0.3500	0.2800	0.1701	0.000218	0.176
30.0	0.3600	0.2880	0.1608	0.000188	0.187
30.0	0.3700	0.2960	0.1522	0.000162	0.197
30.0	0.3800	0.3040	0.1443	0.000141	0.208
30.0	0.3806	0.3045	0.1438	0.000139	0.209

LAM NAM DON
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LOUIS BERGER INTERNATIONAL INC.

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

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30.0	0.2600	0.2080	0.3082	0.001065	0.097
30.0	0.2700	0.2160	0.2858	0.000870	0.105
30.0	0.2800	0.2240	0.2657	0.000717	0.113
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30.0	0.3000	0.2400	0.2315	0.000496	0.130
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30.0	0.3200	0.2560	0.2035	0.000352	0.147
30.0	0.3300	0.2640	0.1913	0.000299	0.157
30.0	0.3400	0.2720	0.1802	0.000255	0.166
30.0	0.3500	0.2800	0.1701	0.000218	0.176
30.0	0.3600	0.2880	0.1608	0.000188	0.187
30.0	0.3700	0.2960	0.1522	0.000162	0.197
30.0	0.3800	0.3040	0.1443	0.000141	0.208
30.0	0.3806	0.3045	0.1438	0.000139	0.209

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INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
50.0	0.2822	0.2257	0.4362	0.001912	0.115
50.0	0.2900	0.2320	0.4129	0.001652	0.121
50.0	0.3000	0.2400	0.3858	0.001379	0.130
50.0	0.3100	0.2480	0.3613	0.001157	0.138
50.0	0.3200	0.2560	0.3391	0.000977	0.147
50.0	0.3300	0.2640	0.3188	0.000829	0.157
50.0	0.3400	0.2720	0.3004	0.000707	0.166
50.0	0.3500	0.2800	0.2834	0.000606	0.176
50.0	0.3600	0.2880	0.2679	0.000521	0.187
50.0	0.3700	0.2960	0.2536	0.000450	0.197
50.0	0.3800	0.3040	0.2405	0.000391	0.208
50.0	0.3900	0.3120	0.2283	0.000340	0.219
50.0	0.4000	0.3200	0.2170	0.000297	0.230
50.0	0.4100	0.3280	0.2066	0.000261	0.242
50.0	0.4200	0.3360	0.1968	0.000229	0.254
50.0	0.4300	0.3440	0.1878	0.000202	0.266
50.0	0.4400	0.3520	0.1794	0.000179	0.279
50.0	0.4500	0.3600	0.1715	0.000159	0.292
50.0	0.4600	0.3680	0.1641	0.000141	0.305
50.0	0.4669	0.3736	0.1593	0.000130	0.314

LAM NAM OON
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DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

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Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
60.0	0.3069	0.2455	0.4423	0.001758	0.136
60.0	0.3200	0.2560	0.4069	0.001407	0.147
60.0	0.3300	0.2640	0.3826	0.001194	0.157
60.0	0.3400	0.2720	0.3604	0.001018	0.166
60.0	0.3500	0.2800	0.3401	0.000872	0.176
60.0	0.3600	0.2880	0.3215	0.000751	0.187
60.0	0.3700	0.2960	0.3044	0.000649	0.197
60.0	0.3800	0.3040	0.2886	0.000563	0.208
60.0	0.3900	0.3120	0.2739	0.000490	0.219
60.0	0.4000	0.3200	0.2604	0.000428	0.230
60.0	0.4100	0.3280	0.2479	0.000375	0.242
60.0	0.4200	0.3360	0.2362	0.000330	0.254
60.0	0.4300	0.3440	0.2253	0.000291	0.266
60.0	0.4400	0.3520	0.2152	0.000257	0.279
60.0	0.4500	0.3600	0.2058	0.000229	0.292
60.0	0.4600	0.3680	0.1969	0.000203	0.305
60.0	0.4700	0.3760	0.1886	0.000181	0.318
60.0	0.4800	0.3840	0.1808	0.000162	0.332
60.0	0.4900	0.3920	0.1735	0.000145	0.346
60.0	0.5000	0.4000	0.1667	0.000130	0.360
60.0	0.5023	0.4018	0.1652	0.000127	0.363

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
70.0	0.3296	0.2636	0.4476	0.001637	0.156
70.0	0.3400	0.2720	0.4205	0.001386	0.166
70.0	0.3500	0.2800	0.3968	0.001187	0.176
70.0	0.3600	0.2880	0.3751	0.001022	0.187
70.0	0.3700	0.2960	0.3551	0.000883	0.197
70.0	0.3800	0.3040	0.3366	0.000766	0.208
70.0	0.3900	0.3120	0.3196	0.000672	0.219
70.0	0.4000	0.3200	0.3038	0.000583	0.230
70.0	0.4100	0.3280	0.2892	0.000511	0.242
70.0	0.4200	0.3360	0.2756	0.000449	0.254
70.0	0.4300	0.3440	0.2629	0.000396	0.266
70.0	0.4400	0.3520	0.2511	0.000350	0.279
70.0	0.4500	0.3600	0.2401	0.000311	0.292
70.0	0.4600	0.3680	0.2297	0.000276	0.305
70.0	0.4700	0.3760	0.2201	0.000246	0.318
70.0	0.4800	0.3840	0.2110	0.000220	0.332
70.0	0.4900	0.3920	0.2025	0.000197	0.346
70.0	0.5000	0.4000	0.1944	0.000177	0.360
70.0	0.5100	0.4080	0.1869	0.000159	0.375
70.0	0.5200	0.4160	0.1798	0.000144	0.389
70.0	0.5300	0.4240	0.1731	0.000130	0.404
70.0	0.5342	0.4274	0.1703	0.000125	0.411

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC.

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.800
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
80.0	0.3500	0.2800	0.4522	0.001539	0.177
80.0	0.3600	0.2880	0.4287	0.001335	0.187
80.0	0.3700	0.2960	0.4058	0.001153	0.197
80.0	0.3800	0.3040	0.3847	0.001000	0.208
80.0	0.3900	0.3120	0.3653	0.000871	0.219
80.0	0.4000	0.3200	0.3472	0.000761	0.230
80.0	0.4100	0.3280	0.3305	0.000667	0.242
80.0	0.4200	0.3360	0.3149	0.000587	0.254
80.0	0.4300	0.3440	0.3005	0.000517	0.266
80.0	0.4400	0.3520	0.2870	0.000458	0.279
80.0	0.4500	0.3600	0.2743	0.000406	0.292
80.0	0.4600	0.3680	0.2625	0.000361	0.305
80.0	0.4700	0.3760	0.2515	0.000322	0.318
80.0	0.4800	0.3840	0.2411	0.000280	0.332
80.0	0.4900	0.3920	0.2314	0.000253	0.346
80.0	0.5000	0.4000	0.2222	0.000231	0.360
80.0	0.5100	0.4080	0.2136	0.000208	0.375
80.0	0.5200	0.4160	0.2055	0.000188	0.389
80.0	0.5300	0.4240	0.1978	0.000170	0.404
80.0	0.5400	0.4320	0.1905	0.000154	0.420
80.0	0.5500	0.4400	0.1837	0.000139	0.436
80.0	0.5600	0.4480	0.1772	0.000126	0.452
80.0	0.5635	0.4500	0.1749	0.000122	0.457

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
90.0	0.3701	0.2961	0.4563	0.001458	0.197
90.0	0.3800	0.3040	0.4328	0.001266	0.208
90.0	0.3900	0.3120	0.4109	0.001102	0.219
90.0	0.4000	0.3200	0.3906	0.000963	0.230
90.0	0.4100	0.3280	0.3718	0.000844	0.242
90.0	0.4200	0.3360	0.3543	0.000742	0.254
90.0	0.4300	0.3440	0.3380	0.000655	0.266
90.0	0.4400	0.3520	0.3228	0.000579	0.279
90.0	0.4500	0.3600	0.3086	0.000514	0.292
90.0	0.4600	0.3680	0.2954	0.000457	0.305
90.0	0.4700	0.3760	0.2829	0.000407	0.318
90.0	0.4800	0.3840	0.2713	0.000364	0.332
90.0	0.4900	0.3920	0.2603	0.00032	0.346
90.0	0.5000	0.4000	0.2500	0.000293	0.360
90.0	0.5100	0.4080	0.2403	0.000264	0.375
90.0	0.5200	0.4160	0.2311	0.000233	0.389
90.0	0.5300	0.4240	0.2225	0.000215	0.404
90.0	0.540	0.4320	0.2143	0.000194	0.420
90.0	0.5500	0.4400	0.2066	0.000176	0.436
90.0	0.5600	0.4480	0.1993	0.000160	0.452
90.0	0.5700	0.4560	0.1924	0.000146	0.468
90.0	0.5800	0.4640	0.1858	0.000133	0.484
90.0	0.5900	0.4720	0.1795	0.000121	0.501
90.0	0.5907	0.4726	0.1791	0.000120	0.502

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
100.0	0.3875	0.3108	0.4600	0.001389	0.217
100.0	0.4000	0.3200	0.4340	0.001189	0.230
100.0	0.4100	0.3280	0.4131	0.001042	0.242
100.0	0.4200	0.3360	0.3937	0.000916	0.254
100.0	0.4300	0.3440	0.3756	0.000808	0.266
100.0	0.4400	0.3520	0.3587	0.000715	0.27[illegible]
100.0	0.4500	0.3600	0.3429	0.000634	0.292
100.0	0.4600	0.3680	0.3282	0.000564	0.305
100.0	0.4700	0.3760	0.3144	0.000503	0.318
100.0	0.4800	0.3840	0.3014	0.000450	0.332
100.0	0.4900	0.3920	0.2892	0.000403	0.346
100.0	0.5000	0.4000	0.2778	0.000362	0.360
100.0	0.5100	0.4080	0.2670	0.000325	0.375
100.0	0.5200	0.4160	0.2568	0.000293	0.389
100.0	0.5300	0.4240	0.2472	0.000265	0.404
100.0	0.5400	0.4320	0.2381	0.000240	0.4[illegible]
100.0	0.5500	0.4400	0.2296	0.000218	0.4[illegible]
100.0	0.5600	0.4480	0.2214	0.000198	0.452
100.0	0.5700	0.4560	0.2[illegible]	0.000180	0.468
100.0	0.5800	0.4640	0.2064	0.000164	0.484
100.0	0.5900	0.4720	0.1995	0.000150	0.501
100.0	0.6000	0.4800	0.1929	0.000137	0.518
100.0	0.6100	0.4880	0.1866	0.000125	0.53[illegible]
100.0	0.6161	0.4929	0.1829	0.000119	0.547

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS - BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (CF) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
110.0	0.4060	0.3248	0.4634	0.001329	0.237
110.0	0.4200	0.3360	0.4330	0.001109	0.254
110.0	0.4300	0.3440	0.4131	0.000978	0.266
110.0	0.4400	0.3520	0.3946	0.000865	0.279
110.0	0.4500	0.3600	0.3772	0.000768	0.292
110.0	0.4600	0.3680	0.3610	0.000683	0.305
110.0	0.4700	0.3760	0.3458	0.000609	0.318
110.0	0.4800	0.3840	0.3315	0.000544	0.332
110.0	0.4900	0.3920	0.3182	0.000487	0.346
110.0	0.5000	0.4000	0.3056	0.000438	0.360
110.0	0.5100	0.4080	0.2937	0.000394	0.375
110.0	0.5200	0.4160	0.2825	0.000355	0.389
110.0	0.5300	0.4240	0.2719	0.000321	0.404
110.0	0.5400	0.4320	0.2620	0.000290	0.420
110.0	0.5500	0.4400	0.2525	0.000263	0.436
110.0	0.5600	0.4480	0.2436	0.000239	0.452
110.0	0.5700	0.4560	0.2351	0.000218	0.468
110.0	0.5800	0.4640	0.2271	0.000198	0.484
110.0	0.5900	0.4720	0.2194	0.000181	0.501
110.0	0.6000	0.4800	0.2122	0.000165	0.518
110.0	0.6100	0.4880	0.2053	0.000152	0.536
110.0	0.6200	0.4960	0.1987	0.000139	0.554
110.0	0.6300	0.5040	0.1925	0.000126	0.572
110.0	0.6400	0.5120	0.1865	0.000117	0.591
110.0	0.6401	0.5121	0.1865	0.000117	0.590

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
130.0	0.4385	0.3508	0.4694	0.001230	0.277
130.0	0.4500	0.3600	0.4458	0.001072	0.292
130.0	0.4600	0.3680	0.4266	0.000953	0.305
130.0	0.4700	0.3760	0.4087	0.000850	0.318
130.0	0.4800	0.3840	0.3918	0.000760	0.332
130.0	0.4900	0.3920	0.3760	0.000681	0.346
130.0	0.5000	0.4000	0.3611	0.000611	0.360
130.0	0.5100	0.4080	0.3471	0.000550	0.375
130.0	0.5200	0.4160	0.3339	0.000496	0.389
130.0	0.5300	0.4240	0.3214	0.000448	0.404
130.0	0.5400	0.4320	0.3096	0.000405	0.42[illegible]
130.0	0.5500	0.4400	0.2984	0.000368	0.43[illegible]
130.0	0.5600	0.4480	0.2879	0.000334	0.452
130.0	0.5700	0.4560	0.2779	0.000304	0.468
130.0	0.5800	0.464[illegible]	0.2684	0.000277	0.484
130.0	0.5900	0.472	0.2593	0.000253	0.501
130.0	0.6000	0.4800	0.2508	0.000231	0.519
130.0	0.6100	0.4880	0.2426	0.000212	0.536
130.0	0.6200	0.4960	0.2349	0.000194	0.554
130.0	0.6300	0.5040	0.2275	0.000178	0.572
130.0	0.6400	0.5120	0.2204	0.000164	0.590
130.0	0.6500	0.5200	0.2137	0.000151	0.609
130.0	0.6600	0.5280	0.2072	0.000139	0.[illegible]
130.0	0.6700	0.5360	0.2011	0.000128	0.[illegible]
130.0	0.6800	0.5440	0.1952	0.000119	0.666
130.0	0.6943	0.5474	0.1928	0.000115	0.674

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
130.0	0.4385	0.3508	0.4694	0.001230	0.277
130.0	0.4500	0.3600	0.4458	0.001072	0.292
130.0	0.4600	0.3680	0.4266	0.000953	0.305
130.0	0.4700	0.3760	0.4087	0.000850	0.319
130.0	0.4800	0.3840	0.3918	0.000760	0.332
130.0	0.4900	0.3920	0.3760	0.000681	0.346
130.0	0.5000	0.4000	0.3611	0.000611	0.361
130.0	0.5100	0.4080	0.3471	0.000550	0.375
130.0	0.5200	0.4160	0.3339	0.000496	0.389
130.0	0.5300	0.4240	0.3214	0.000448	0.404
130.0	0.5400	0.4320	0.3096	0.000405	0.42
130.0	0.5500	0.4400	0.2984	0.000368	0.436
130.0	0.5600	0.4480	0.2879	0.000334	0.452
130.0	0.5700	0.4560	0.2779	0.000304	0.468
130.0	0.5800	0.4640	0.2684	0.000277	0.484
130.0	0.5900	0.472	0.2593	0.000253	0.501
130.0	0.6000	0.4800	0.2508	0.000231	0.518
130.0	0.6100	0.4880	0.2426	0.000212	0.536
130.0	0.6200	0.4960	0.2349	0.000194	0.554
130.0	0.6300	0.5040	0.2275	0.000178	0.572
130.0	0.6400	0.5120	0.2204	0.000164	0.590
130.0	0.6500	0.5200	0.2137	0.000151	0.609
130.0	0.6600	0.5280	0.2072	0.000139	0.627
130.0	0.6700	0.5360	0.2011	0.000128	0.646
130.0	0.6800	0.5440	0.1952	0.000119	0.665
130.0	0.6843	0.5474	0.1928	0.000115	0.674

LAM NAM QON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
150.0	0.4625	0.3748	0.4746	0.001152	0.316
150.0	0.4800	0.3840	0.4521	0.001012	0.332
150.0	0.4900	0.3920	0.4338	0.000906	0.346
150.0	0.5000	0.4000	0.4167	0.000814	0.360
150.0	0.5100	0.4080	0.4005	0.000732	0.375
150.0	0.5200	0.4160	0.3852	0.000660	0.389
150.0	0.5300	0.4240	0.3708	0.000596	0.404
150.0	0.5400	0.4320	0.3572	0.000540	0.420
150.0	0.5500	0.4400	0.3444	0.000489	0.436
150.0	0.5600	0.4480	0.3322	0.000445	0.452
150.0	0.5700	0.4560	0.3206	0.000405	0.468
150.0	0.5800	0.4640	0.3097	0.000369	0.484
150.0	0.5900	0.4720	0.2992	0.000337	0.501
150.0	0.6000	0.4800	0.2894	0.000308	0.518
150.0	0.6100	0.4880	0.2799	0.000282	0.536
150.0	0.6200	0.4960	0.2710	0.000258	0.554
150.0	0.6300	0.5040	0.2625	0.000237	0.572
150.0	0.6400	0.5120	0.2543	0.000218	0.590
150.0	0.6500	0.5200	0.2465	0.000201	0.608
150.0	0.6600	0.5280	0.2391	0.000185	0.627
150.0	0.6700	0.5360	0.2320	0.000171	0.646
150.0	0.6800	0.5440	0.2253	0.000158	0.666
150.0	0.6900	0.5520	0.2188	0.000146	0.686
150.0	0.7000	0.5600	0.2126	0.000135	0.706
150.0	0.7100	0.5680	0.2066	0.000125	0.726
150.0	0.7200	0.5760	0.2009	0.000116	0.746
150.0	0.7300	0.5797	0.1953	0.000112	0.756

LAM NAM CUN
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.040
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
160.0	0.4826	0.3861	0.4770	0.000410	0.335
160.0	0.4900	0.3920	0.4628	0.000931	0.346
160.0	0.5000	0.4000	0.4444	0.000926	0.360
160.0	0.5100	0.4080	0.4272	0.000833	0.375
160.0	0.5200	0.4160	0.4109	0.000751	0.389
160.0	0.5300	0.4240	0.3956	0.000679	0.404
160.0	0.5400	0.4320	0.3810	0.000614	0.420
160.0	0.5500	0.4400	0.3673	0.000557	0.436
160.0	0.5600	0.4480	0.3543	0.000506	0.452
160.0	0.5700	0.4560	0.3420	0.000460	0.468
160.0	0.5800	0.4640	0.3303	0.000420	0.484
160.0	0.5900	0.4720	0.3192	0.000383	0.501
160.0	0.6000	0.4800	0.3086	0.000350	0.518
160.0	0.6100	0.4880	0.2986	0.000321	0.536
160.0	0.6200	0.4960	0.2891	0.000294	0.554
160.0	0.6300	0.5040	0.2799	0.000270	0.572
160.0	0.6400	0.5120	0.2713	0.000248	0.590
160.0	0.6500	0.5200	0.2630	0.000228	0.608
160.0	0.6600	0.5280	0.2551	0.000211	0.627
160.0	0.6700	0.5360	0.2475	0.000194	0.646
160.0	0.6800	0.5440	0.2403	0.000180	0.666
160.0	0.6900	0.5520	0.2334	0.000166	0.686
160.0	0.7000	0.5600	0.2268	0.000154	0.706
160.0	0.7100	0.5680	0.2204	0.000143	0.726
160.0	0.7200	0.5760	0.2143	0.000132	[illegible]
160.0	0.7300	0.5840	0.2085	0.000123	0.767
160.0	0.7400	0.5920	0.2029	0.000114	0.788
160.0	0.7436	0.5949	0.2010	0.000112	0.795

LAM NAM CON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
160.0	0.4826	0.3861	0.4770	0.0[illegible]10	0.335
160.0	0.4900	0.3920	0.4628	0.00[illegible]31	0.346
160.0	0.5000	0.4000	0.4444	0.000926	0.360
160.0	0.5100	0.4080	0.4272	0.000833	0.375
160.0	0.5200	0.4160	0.4109	0.000751	0.389
160.0	0.5300	0.4240	0.3956	0.000679	0.404
160.0	0.5400	0.4320	0.3810	0.000614	0.420
160.0	0.5500	0.4400	0.3673	0.000557	0.436
160.0	0.5600	0.4480	0.3543	0.000506	0.452
160.0	0.5700	0.4560	0.3420	0.0[illegible]460	0.468
160.0	0.5800	0.4640	0.3303	0.0[illegible]420	0.484
160.0	0.5900	0.4720	0.3192	0.000383	0.501
160.0	0.6000	0.4800	0.3086	0.000350	0.518
160.0	0.6100	0.4880	0.2986	0.000321	0.536
160.0	0.6200	0.4960	0.2891	0.000294	0.554
160.0	0.6300	0.5040	0.2[illegible]	0.000270	0.572
160.0	0.6400	0.5120	0.2713	0.000248	0.590
160.0	0.[illegible]00	0.5200	0.2630	0.000228	0.608
160.0	0.[illegible]	0.5280	0.2551	0.000211	0.627
160.0	0.6700	0.5360	0.2475	0.000194	0.646
160.0	0.6800	0.5440	0.2403	0.000180	0.664
160.0	0.6900	0.5520	0.2334	0.000166	0.686
160.0	0.7000	0.5600	0.2268	0.000154	0.706
160.0	0.7100	0.5680	0.2204	0.000143	0.726
160.0	0.7200	0.5760	0.2143	0.000132	[illegible]
160.0	0.7300	0.5840	0.2085	0.000123	0.7[illegible]
160.0	0.7400	0.5920	0.2029	0.000114	0.7[illegible]
160.0	0.7436	0.5949	0.2010	0.000112	0.7[illegible]

LAM NAM CON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
180.0	0.5000	0.4000	0.4813	0.001059	0.374
180.0	0.5200	0.4160	0.4623	0.000931	0.392
180.0	0.5300	0.4240	0.4450	0.000859	0.4[illegible]
180.0	0.5400	0.4320	0.4287	0.000777	0.420
180.0	0.5500	0.4400	0.4132	0.000705	0.436
180.0	0.5600	0.4480	0.3986	0.000640	0.452
180.0	0.5700	0.4560	0.3847	0.000583	0.468
180.0	0.5800	0.4640	0.3716	0.000531	0.484
180.0	0.5900	0.4720	0.3591	0.000485	0.501
180.0	0.6000	0.4800	0.3472	0.000443	0.518
180.0	0.6100	0.4880	0.3359	0.000406	0.536
180.0	0.6200	0.4960	0.3252	0.000372	0.554
180.0	0.6300	0.5040	0.3149	0.000342	0.572
180.0	0.6400	0.5120	0.3052	0.000314	0.590
180.0	0.6500	0.5200	0.2959	0.000287	0.608
180.0	0.6600	0.5280	0.2870	0.000267	0.627
180.0	0.6700	0.5360	0.2785	0.000246	0.645
180.0	0.6800	0.5440	0.2703	0.000227	0.666
180.0	0.6900	0.5520	0.2625	0.000210	0.686
180.0	0.7000	0.5600	0.2551	0.000195	0.706
180.0	0.7100	0.5680	0.2480	0.000181	0.726
180.0	0.7200	0.5760	0.2411	0.000168	0.746
180.0	0.7300	0.5840	0.2344	0.000156	0.767
180.0	0.7400	0.5920	0.2281	0.000145	0.789
180.0	0.7500	0.6000	0.2222	0.000135	0.810
180.0	0.7600	0.6080	0.2164	0.000126	0.832
180.0	0.7700	0.6160	0.2108	0.000117	0.854
180.0	0.7794	0.6236	0.2058	0.000110	0.875

LAM NAM CON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d) =1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
180.0	0.5000	0.4000	0.4813	0.001059	0.374
180.0	0.5200	0.4160	0.4623	0.000951	0.39[illegible]
180.0	0.5300	0.4240	0.4450	0.000859	0.4[illegible]
180.0	0.5400	0.4320	0.4287	0.000777	0.420
180.0	0.5500	0.4400	0.4132	0.000705	0.434
180.0	0.5600	0.4480	0.3986	0.000640	0.45[illegible]
180.0	0.5700	0.4560	0.3847	0.000583	0.46[illegible]
180.0	0.5800	0.4640	0.3716	0.000531	0.484
180.0	0.5900	0.4720	0.3591	0.000485	0.501
180.0	0.6000	0.4800	0.3472	0.000443	0.51[illegible]
180.0	0.6100	0.4880	0.3359	0.000406	0.53[illegible]
180.0	0.6200	0.4960	0.3252	0.000372	0.554
180.0	0.6300	0.5040	0.3149	0.000342	0.572
180.0	0.6400	0.5120	0.3052	0.000314	0.590
180.0	0.6500	0.5200	0.2959	0.000289	0.608
180.0	0.6600	0.5280	0.2870	0.000267	0.[illegible]
180.0	0.6700	0.5360	0.2785	0.000246	0.66[illegible]
180.0	0.6800	0.5440	0.2703	0.000227	0.666
180.0	0.6900	0.5520	0.2625	0.000210	0.686
180.0	0.7000	0.5600	0.2551	0.000195	0.706
180.0	0.7100	0.5680	0.2480	0.000181	0.726
180.0	0.7200	0.5760	0.2411	0.000168	0.746
180.0	0.7300	0.5840	0.2346	0.000156	0.767
180.0	0.7400	0.5920	0.2282	0.000145	0.789
180.0	0.7500	0.6000	0.2222	0.000135	0.8[illegible]
180.0	0.7600	0.6080	0.2164	0.000126	0.832
180.0	0.7700	0.6160	0.2108	0.000117	0.854
180.0	0.7794	0.6236	0.2058	0.000110	0.875

LAM NAM LON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.209
Correction Factor (CF) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
200.0	0.5350	0.4280	0.4852	0.001008	0.412
200.0	0.5500	0.4400	0.4591	0.000870	0.436
200.0	0.5600	0.4480	0.4429	0.000790	0.452
200.0	0.5700	0.4560	0.4275	0.000717	0.468
200.0	0.5800	0.4640	0.4129	0.000655	0.484
200.0	0.5900	0.4720	0.3990	0.000598	0.501
200.0	0.6000	0.4800	0.3858	0.000547	0.518
200.0	0.6100	0.4880	0.3733	0.000501	0.536
200.0	0.6200	0.4960	0.3613	0.000459	0.554
200.0	0.6300	0.5040	0.3499	0.000422	0.572
200.0	0.6400	0.5120	0.3391	0.000388	0.590
200.0	0.6500	0.5200	0.3287	0.000357	0.608
200.0	0.6600	0.5280	0.3188	0.000329	0.627
200.0	0.6700	0.5360	0.3094	0.000304	0.646
200.0	0.6800	0.5440	0.3004	0.000281	0.666
200.0	0.6900	0.5520	0.2917	0.000260	0.686
200.0	0.7000	0.5600	0.2834	0.000240	0.706
200.0	0.7100	0.5680	0.2755	0.000223	0.726
200.0	0.7200	0.5760	0.2679	0.000207	0.746
200.0	0.7300	0.5840	0.2606	0.000192	0.767
200.0	0.7400	0.5920	0.2536	0.000179	0.789
200.0	0.7500	0.6000	0.2469	0.000166	0.810
200.0	0.7600	0.6080	0.2405	0.000155	0.832
200.0	0.7700	0.6160	0.2343	0.000145	0.854
200.0	0.7800	0.6240	0.2283	0.000135	0.876
200.0	0.7900	0.6320	0.2225	0.000126	0.899
200.0	0.8000	0.6400	0.2170	0.000118	0.922
200.0	0.8100	0.6480	0.2117	0.000110	0.945
200.0	0.8130	0.6504	0.2101	0.000108	0.952

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.040
Roughness Coefficient (n) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
210.0	0.5472	0.4377	0.4871	0.000986	0.431
210.0	0.5560	0.4480	0.4650	0.000871	0.452
210.0	0.5700	0.4560	0.4489	0.000793	0.470
210.0	0.5800	0.4640	0.4335	0.000723	0.484
210.0	0.5900	0.4720	0.4189	0.000660	0.501
210.0	0.6000	0.4800	0.4051	0.000603	0.518
210.0	0.6100	0.4880	0.3912	0.000552	0.536
210.0	0.6200	0.4960	0.3794	0.000506	0.554
210.0	0.6300	0.5040	0.3674	0.000465	0.572
210.0	0.6400	0.5120	0.3560	0.000427	0.590
210.0	0.6500	0.5200	0.3452	0.000394	0.608
210.0	0.6600	0.5280	0.3348	0.000363	0.627
210.0	0.6700	0.5360	0.3249	0.000335	0.646
210.0	0.6800	0.5440	0.3154	0.000309	0.[illegible]
210.0	0.69[illegible]	0.5520	0.3063	0.000286	0.686
210.0	0.7000	0.5600	0.2976	0.000265	0.706
210.0	0.7100	0.5680	0.2893	0.000246	0.7[illegible]
210.0	0.7200	0.5760	0.2813	0.000228	0.7[illegible]
210.0	0.7300	0.5840	0.2737	0.000212	0.7[illegible]
210.0	0.7400	0.5920	0.2663	0.000197	0.7[illegible]
210.0	0.7500	0.6000	0.2593	0.000183	0.8[illegible]
210.0	0.7600	0.6080	0.2525	0.000171	0.837
210.0	0.7700	0.6160	0.2[illegible]	0.000159	0.8[illegible]
210.0	0.7800	0.6240	0.2[illegible]97	0.000147	0.8[illegible]
210.0	0.7900	0.6320	0.2337	0.000139	0.899
210.0	0.8000	0.6400	0.2279	0.000130	0.922
210.0	0.8100	0.6480	0.2223	0.000122	0.945
210.0	0.8200	0.6560	0.2169	0.000114	0.968
210.0	0.8290	0.6632	0.2122	0.000108	0.990

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC.

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1.

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (CF) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
220.0	0.5591	0.4472	0.4888	0.000965	0.450
220.0	0.5700	0.4560	0.4702	0.000870	0.468
220.0	0.5800	0.4640	0.4542	0.000793	0.484
220.0	0.5900	0.4720	0.4389	0.000724	0.501
220.0	0.6000	0.4800	0.4244	0.000662	0.518
220.0	0.6100	0.4880	0.4106	0.000606	0.5[illegible]
220.0	0.6200	0.4960	0.3974	0.000556	0.554
220.0	0.6300	0.5040	0.3849	0.000510	0.572
220.0	0.6400	0.5120	0.3730	0.000469	0.590
220.0	0.6500	0.5200	0.3616	0.000432	0.6[illegible]
220.0	0.6600	0.5280	0.3507	0.000399	0.6[illegible]
220.0	0.6700	0.5340	0.3403	0.000372	0.646
220.0	0.6800	0.5440	0.3304	0.000340	0.666
220.0	0.6900	0.5520	0.3209	0.000314	0.686
220.0	0.7000	0.5600	0.3118	0.000291	0.706
220.0	0.7100	0.5680	0.3031	0.000270	0.726
220.0	0.7200	0.5760	0.2947	0.000250	0.746
220.0	0.7300	0.5840	0.2867	0.000233	0.767
220.0	0.7400	0.5920	0.2790	0.000216	0.769
220.0	0.7500	0.6000	0.2716	0.000201	0.810
220.0	0.7600	0.6080	0.2645	0.000188	0.832
220.0	0.7700	0.6160	0.2577	0.000175	0.854
220.0	0.7[illegible]	0.6240	0.2511	0.000163	0.876
220.0	0.7[illegible]	0.6320	0.2448	0.000153	0.899
220.0	0.[illegible]	0.6400	0.2387	0.000143	0.922
220.0	0.8[illegible]	0.6480	0.2329	0.000134	0.945
220.0	0.8[illegible]	0.6560	0.2272	0.000125	0.96[illegible]
220.0	0.8300	0.6640	0.2218	0.000117	0.99[illegible]
220.0	0.8400	0.6720	0.2165	0.000110	1.016
220.0	0.8446	0.6757	0.2142	0.000107	1.027

LAM NAM CON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
230.0	0.5700	0.4565	0.4905	0.000945	0.469
230.0	0.5800	0.4640	0.4748	0.000867	0.484
230.0	0.5900	0.4720	0.4588	0.000791	0.501
230.0	0.6000	0.4800	0.4437	0.000723	0.518
230.0	0.6100	0.4880	0.4292	0.000662	0.536
230.0	0.6200	0.4960	0.4155	0.000607	0.554
230.0	0.6300	0.5040	0.4026	0.000558	0.572
230.0	0.6400	0.5120	0.3899	0.000513	0.590
230.0	0.6500	0.5200	0.3780	0.000472	0.608
230.0	0.6600	0.5280	0.3667	0.000435	[illegible]
230.0	0.6700	0.5360	0.3558	0.000402	[illegible]
230.0	0.6800	0.5440	0.3454	0.000371	[illegible]
230.0	0.6900	0.5520	0.3355	0.000343	0.686
230.0	0.7000	0.5600	0.3260	0.000316	0.706
230.0	0.7100	0.5680	0.3168	0.000295	0.726
230.0	0.7200	0.5760	0.3081	0.000274	0.746
230.0	0.7300	0.5840	0.2997	0.000254	0.767
230.0	0.7400	0.5920	0.2917	0.000236	0.789
230.0	0.7500	0.6000	0.2840	0.000220	[illegible]
230.0	0.7600	0.6080	0.2765	0.000205	[illegible]
230.0	0.7700	0.6160	0.2694	0.000191	[illegible]
230.0	0.7800	0.6240	0.2625	0.000178	[illegible]
230.0	0.7900	0.6320	0.2559	0.000167	0.899
230.0	0.8000	0.6400	0.2496	0.000156	0.922
230.0	0.8100	0.6480	0.2434	0.000146	[illegible]
230.0	[illegible]	0.6560	0.2375	0.000137	[illegible]
230.0	[illegible]	0.6640	0.2319	0.000128	[illegible]
230.0	0.8300	0.6720	0.2264	0.000120	[illegible]
230.0	0.8500	0.6800	0.2211	0.000113	[illegible]
230.0	0.8597	0.6878	0.2161	0.000106	1.064

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
240.0	0.5820	0.4656	0.4921	0.000927	0.488
240.0	0.5900	0.4720	0.4753	0.000862	0.504
240.0	0.6000	0.4800	0.4600	0.000788	0.518
240.0	0.6100	0.4880	0.4479	0.000721	0.536
240.0	0.6200	0.4960	0.4336	0.000661	0.554
240.0	0.6300	0.5040	0.4199	0.000607	0.572
240.0	0.6400	0.5120	0.4069	0.000558	0.590
240.0	0.6500	0.5200	0.3945	0.000514	0.610
240.0	0.6600	0.5280	0.3826	0.000474	0.627
240.0	0.6700	0.5360	0.3713	0.000437	0.646
240.0	0.6800	0.5440	0.3604	0.000404	0.666
240.0	0.6900	0.5520	0.3501	0.000374	0.686
240.0	0.7000	0.5600	0.3401	0.000346	0.706
240.0	0.7100	0.5680	0.3306	0.000321	0.726
240.0	0.7200	0.5760	0.3215	0.000298	0.746
240.0	0.7300	0.5840	0.3128	0.000277	0.767
240.0	0.7400	0.5920	0.3044	0.000257	0.789
240.0	0.7500	0.6000	0.2963	0.000240	0.810
240.0	0.7600	0.6080	0.2886	0.000223	0.832
240.0	0.7700	0.6160	0.2811	0.000208	0.854
240.0	0.7800	0.6240	0.2739	0.000194	0.876
240.0	0.7900	0.6320	0.2671	0.000182	0.899
240.0	0.8000	0.6400	0.2604	0.000170	0.922
240.0	0.8100	0.6480	0.2540	0.000159	0.945
240.0	0.8200	0.6560	0.2479	0.000149	0.968
240.0	0.8300	0.6640	0.2419	0.000140	0.992
240.0	0.8400	0.6720	0.2362	0.000131	1.016
240.0	0.8500	0.6800	0.2307	0.000123	1.040
240.0	0.8600	0.6880	0.2253	0.000115	1.065
240.0	0.8700	0.6960	0.2202	0.000109	1.090
240.0	0.8745	0.6996	0.2179	0.000106	1.101

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
250.0	0.5930	0.4744	0.4936	0.000910	0.506
250.0	0.6000	0.4800	0.4823	0.000855	0.518
250.0	0.6100	0.4880	0.4666	0.000783	0.536
250.0	0.6200	0.4960	0.4516	0.000718	0.554
250.0	0.6300	0.5040	0.4374	0.000659	0.572
250.0	0.6400	0.5120	0.4239	0.000606	0.590
250.0	0.6500	0.5200	0.4109	0.000558	0.608
250.0	0.6600	0.5280	0.3986	0.000514	0.627
250.0	0.6700	0.5360	0.3867	0.000475	0.646
250.0	0.6800	0.5440	0.3755	0.000438	0.666
250.0	0.6900	0.5520	0.3647	0.000406	0.686
250.0	0.7000	0.5600	0.3543	0.000376	0.706
250.0	0.7100	0.5680	0.3444	0.000348	0.726
250.0	0.7200	0.5760	0.3349	0.000323	0.746
250.0	0.7300	0.5840	0.3258	0.000300	0.767
250.0	0.7400	0.5920	0.3170	0.000279	0.789
250.0	0.7500	0.6000	0.3086	0.000260	0.810
250.0	0.7600	0.6080	0.3006	0.000242	0.832
250.0	0.7700	0.6160	0.2928	0.000226	0.854
250.0	0.7800	0.6240	0.2854	0.000211	0.876
250.0	0.7900	0.6320	0.2782	0.000197	0.899
250.0	0.8000	0.6400	0.2713	0.000184	0.922
250.0	0.8100	0.6480	0.2646	0.000172	0.945
250.0	0.8200	0.6560	0.2582	0.000162	0.968
250.0	0.8300	0.6640	0.2520	0.000151	0.992
250.0	0.8400	0.6720	0.2460	0.000142	1.016
250.0	0.8500	0.6800	0.2403	0.000133	1.040
250.0	0.8600	0.6880	0.2347	0.000125	1.065
250.0	0.8700	0.6960	0.2294	0.000118	1.090
250.0	0.8800	0.7040	0.2242	0.000111	1.115
250.0	0.8889	0.7111	0.2197	0.000105	1.139

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth - (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
260.0	0.6039	0.4831	0.4951	0.000893	0.525
260.0	0.6100	0.4880	0.4852	0.000847	0.536
260.0	0.6200	0.4960	0.4697	0.000776	0.554
260.0	0.6300	0.5040	0.4549	0.000713	0.572
260.0	0.6400	0.5120	0.4408	0.000655	0.590
260.0	0.6500	0.5200	0.4274	0.000603	0.608
260.0	0.6600	0.5280	0.4145	0.000556	0.627
260.0	0.6700	0.5360	0.4022	0.000513	0.646
260.0	0.6800	0.5440	0.3905	0.000474	0.666
260.0	0.6900	0.5520	0.3792	0.000439	0.686
260.0	0.7000	0.5600	0.3685	0.000406	0.706
260.0	0.7100	0.5680	0.3582	0.000377	0.726
260.0	0.7200	0.5760	0.3483	0.000350	0.746
260.0	0.7300	0.5840	0.3388	0.000325	0.767
260.0	0.7400	0.5920	0.3297	0.000302	0.789
260.0	0.7500	0.6000	0.3210	0.000281	0.810
260.0	0.7600	0.6080	0.3126	0.000262	0.832
260.0	0.7700	0.6160	0.3045	0.000244	0.854
260.0	0.7800	0.6240	0.2968	0.000228	0.876
260.0	0.7900	0.6320	0.2893	0.000213	0.899
260.0	0.8000	0.6400	0.2821	0.000199	0.922
260.0	0.8100	0.6480	0.2752	0.000187	0.945
260.0	0.8200	0.6560	0.2685	0.000175	0.968
260.0	0.8300	0.6640	0.2621	0.000164	0.992
260.0	0.8400	0.6720	0.2559	0.000154	1.016
260.0	0.8500	0.6800	0.2499	0.000144	1.040
260.0	0.8600	0.6880	0.2441	0.000136	1.065
260.0	0.8700	0.6960	0.2385	0.000127	1.090
260.0	0.8800	0.7040	0.2332	0.000120	1.115
260.0	0.8900	0.7120	0.2279	0.000113	1.141
260.0	0.9000	0.7200	0.2229	0.000106	1.166
260.0	0.9029	0.7224	0.2215	0.000105	1.174

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (CF) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
270.0	0.6145	0.4916	0.4966	0.000878	0.544
270.0	0.6200	0.4960	0.4878	0.000837	0.554
270.0	0.6300	0.5040	0.4724	0.000769	0.572
270.0	0.6400	0.5120	0.4578	0.000707	0.590
270.0	0.6500	0.5200	0.4438	0.000651	0.608
270.0	0.6600	0.5280	0.4304	0.000600	0.627
270.0	0.6700	0.5360	0.4177	0.000553	0.646
270.0	0.6800	0.5440	0.4055	0.000511	0.666
270.0	0.6900	0.5520	0.3938	0.000473	0.686
270.0	0.7000	0.5600	0.3827	0.000438	0.706
270.0	0.7100	0.5680	0.3720	0.000406	0.726
270.0	0.7200	0.5760	0.3617	0.000377	0.746
270.0	0.7300	0.5840	0.3518	0.000350	0.767
270.0	0.7400	0.5920	0.3424	0.000326	0.789
270.0	0.7500	0.6000	0.3333	0.000303	0.810
270.0	0.7600	0.6080	0.3246	0.000283	0.832
270.0	0.7700	0.6160	0.3162	0.000264	0.854
270.0	0.7800	0.6240	0.3082	0.000246	0.876
270.0	0.7900	0.6320	0.3004	0.000230	0.899
270.0	0.8000	0.6400	0.2930	0.000215	0.922
270.0	0.8100	0.6480	0.2858	0.000201	0.945
270.0	0.8200	0.6560	0.2789	0.000188	0.968
270.0	0.8300	0.6640	0.2722	0.000177	0.992
270.0	0.8400	0.6720	0.2657	0.000166	1.016
270.0	0.8500	0.6800	0.2595	0.000156	1.040
270.0	0.8600	0.6880	0.2535	0.000146	1.065
270.0	0.8700	0.6960	0.2477	0.000137	1.090
270.0	0.8800	0.7040	0.2421	0.000129	1.115
270.0	0.8900	0.7120	0.2367	0.000122	1.141
270.0	0.9000	0.7200	0.2315	0.000115	1.166
270.0	0.9100	0.7280	0.2264	0.000108	1.192
270.0	0.9167	0.7333	0.2231	0.000104	1.210

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
280.0	0.6249	0.4999	0.4980	0.000863	0.562
280.0	0.6300	0.5040	0.4899	0.000827	0.572
280.0	0.6400	0.5120	0.4747	0.000760	0.590
280.0	0.6500	0.5200	0.4602	0.000700	0.608
280.0	0.6600	0.5280	0.4464	0.000645	0.627
280.0	0.6700	0.5360	0.4332	0.000595	0.646
280.0	0.6800	0.5440	0.4205	0.000550	0.666
280.0	0.6900	0.5520	0.4084	0.000509	0.686
280.0	0.7000	0.5600	0.3968	0.000471	0.706
280.0	0.7100	0.5680	0.3857	0.000437	0.726
280.0	0.7200	0.5760	0.3751	0.000406	0.746
280.0	0.7300	0.5840	0.3649	0.000377	0.767
280.0	0.7400	0.5920	0.3551	0.000350	0.789
280.0	0.7500	0.6000	0.3457	0.000326	0.810
280.0	0.7600	0.6080	0.3366	0.000304	0.832
280.0	0.7700	0.6160	0.3280	0.000283	0.854
280.0	0.7800	0.6240	0.3196	0.000265	0.876
280.0	0.7900	0.6320	0.3116	0.000247	0.899
280.0	0.8000	0.6400	0.3038	0.000231	0.922
280.0	0.8100	0.6480	0.2964	0.000216	0.945
280.0	0.8200	0.6560	0.2892	0.000203	0.968
280.0	0.8300	0.6640	0.2823	0.000190	0.992
280.0	0.8400	0.6720	0.2756	0.000178	1.016
280.0	0.8500	0.6800	0.2691	0.000167	1.040
280.0	0.8600	0.6880	0.2629	0.000157	1.065
280.0	0.8700	0.6960	0.2569	0.000148	1.090
280.0	0.8800	0.7040	0.2511	0.000139	1.115
280.0	0.8900	0.7120	0.2455	0.000131	1.141
280.0	0.9000	0.7200	0.2401	0.000123	1.166
280.0	0.9100	0.7280	0.2348	0.000116	1.192
280.0	0.9200	0.7360	0.2297	0.000110	1.219
280.0	0.9300	0.7440	0.2248	0.000104	1.245
280.0	0.9301	0.7441	0.2248	0.000103	1.246

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
290.0	0.6351	0.5081	0.4993	0.000849	0.581
290.0	0.6500	0.5200	0.4767	0.000751	0.608
290.0	0.6600	0.5280	0.4623	0.000692	0.627
290.0	0.6700	0.5360	0.4496	0.000639	0.646
290.0	0.6800	0.5440	0.4355	0.000590	0.666
290.0	0.6900	0.5520	0.4230	0.000546	0.686
290.0	0.7000	0.5600	0.4110	0.000506	0.706
290.0	0.7100	0.5680	0.3995	0.000469	0.726
290.0	0.7200	0.5760	0.3885	0.000435	0.746
290.0	0.7300	0.5840	0.3779	0.000404	0.767
290.0	0.7400	0.5920	0.3678	0.000376	0.789
290.0	0.7500	0.6000	0.3580	0.000350	0.810
290.0	0.7600	0.6080	0.3487	0.000326	0.832
290.0	0.7700	0.6160	0.3397	0.000304	0.854
290.0	0.7800	0.6240	0.3310	0.000284	0.876
290.0	0.7900	0.6320	0.3227	0.000265	0.899
290.0	0.8000	0.6400	0.3147	0.000248	0.922
290.0	0.8100	0.6480	0.3069	0.000232	0.945
290.0	0.8200	0.6560	0.2995	0.000217	0.968
290.0	0.8300	0.6640	0.2923	0.000204	0.992
290.0	0.8400	0.6720	0.2854	0.000191	1.016
290.0	0.8500	0.6800	0.2787	0.000179	1.040
290.0	0.8600	0.6880	0.2723	0.000169	1.065
290.0	0.8700	0.6960	0.2661	0.000159	1.090
290.0	0.8800	0.7040	0.2601	0.000149	1.115
290.0	0.8900	0.7120	0.2542	0.000140	1.141
290.0	0.9000	0.7200	0.2486	0.000132	1.166
290.0	0.9100	0.7280	0.2432	0.000125	1.192
290.0	0.9200	0.7360	0.2379	0.000118	1.219
290.0	0.9300	0.7440	0.2328	0.000111	1.245
290.0	0.9400	0.7520	0.2279	0.000105	1.272
290.0	0.9433	0.7546	0.2263	0.000103	1.281

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY LANALS
Based on Critical Tractive Force

TABLE 1 SIDE SLOPE = 1 : 1

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
300.0	0.6451	0.5161	0.5006	0.000836	0.599
300.0	0.6600	0.5280	0.4783	0.000740	0.627
300.0	0.6700	0.5360	0.4641	0.000683	0.646
300.0	0.6800	0.5440	0.4505	0.000631	0.666
300.0	0.6900	0.5520	0.4376	0.000584	0.686
300.0	0.7000	0.5600	0.4252	0.000541	0.706
300.0	0.7100	0.5680	0.4133	0.000502	0.726
300.0	0.7200	0.5760	0.4019	0.000465	0.746
300.0	0.7300	0.5840	0.3909	0.000432	0.767
300.0	0.7400	0.5920	0.3804	0.000402	0.789
300.0	0.7500	0.6000	0.3704	0.000374	0.810
300.0	0.7600	0.6080	0.3607	0.000349	0.832
300.0	0.7700	0.6160	0.3514	0.000325	0.854
300.0	0.7800	0.6240	0.3424	0.000304	0.876
300.0	0.7900	0.6320	0.3338	0.000284	0.899
300.0	0.8000	0.6400	0.3255	0.000265	0.922
300.0	0.8100	0.6480	0.3175	0.000248	0.945
300.0	0.8200	0.6560	0.3098	0.000233	0.968
300.0	0.8300	0.6640	0.3024	0.000218	0.992
300.0	0.8400	0.6720	0.2953	0.000205	1.016
300.0	0.8500	0.6800	0.2884	0.000192	1.040
300.0	0.8600	0.6880	0.2817	0.000180	1.065
300.0	0.8700	0.6960	0.2752	0.000170	1.090
300.0	0.8800	0.7040	0.2690	0.000160	1.115
300.0	0.8900	0.7120	0.2630	0.000150	1.141
300.0	0.9000	0.7200	0.2572	0.000142	1.166
300.0	0.9100	0.7280	0.2516	0.000133	1.192
300.0	0.9200	0.7360	0.2461	0.000126	1.219
300.0	0.9300	0.7440	0.2409	0.000119	1.245
300.0	0.9400	0.7520	0.2358	0.000112	1.272
300.0	0.9500	0.7600	0.2308	0.000106	1.300
300.0	0.9561	0.7649	0.2279	0.000103	1.316

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
20.0	0.1682	0.1345	0.4019	0.003125	0.050
20.0	0.1800	0.1440	0.3507	0.002174	0.057
20.0	0.1900	0.1520	0.3148	0.001629	0.064
20.0	0.2000	0.1600	0.2841	0.001239	0.070
20.0	0.2100	0.1680	0.2577	0.000955	0.078
20.0	0.2200	0.1760	0.2348	0.000745	0.085
20.0	0.2300	0.1840	0.2148	0.000588	0.093
20.0	0.2400	0.1920	0.1973	0.000469	0.101
20.0	0.2500	0.2000	0.1818	0.000377	0.110
20.0	0.2600	0.2080	0.1681	0.000306	0.119
20.0	0.2700	0.2160	0.1559	0.000250	0.128
20.0	0.2800	0.2240	0.1449	0.000206	0.138
20.0	0.2900	0.2320	0.1351	0.000171	0.148
20.0	0.3000	0.2400	0.1263	0.000143	0.158
20.0	0.3028	0.2422	0.1240	0.000136	0.161

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
30.0	0.2028	0.1622	0.4146	0.002592	0.072
30.0	0.2100	0.1680	0.3865	0.002150	0.078
30.0	0.2200	0.1760	0.3522	0.001677	0.085
30.0	0.2300	0.1840	0.3222	0.001323	0.093
30.0	0.2400	0.1920	0.2959	0.001055	0.101
30.0	0.2500	0.2000	0.2727	0.000848	0.110
30.0	0.2600	0.2080	0.2522	0.000688	0.119
30.0	0.2700	0.2160	0.2338	0.000563	0.128
30.0	0.2800	0.2240	0.2174	0.000463	0.138
30.0	0.2900	0.2320	0.2027	0.000384	0.148
30.0	0.3000	0.2400	0.1894	0.000321	0.158
30.0	0.3100	0.2480	0.1774	0.000269	0.169
30.0	0.3200	0.2560	0.1665	0.000227	0.180
30.0	0.3300	0.2640	0.1565	0.000193	0.192
30.0	0.3400	0.2720	0.1475	0.000165	0.203
30.0	0.3500	0.2800	0.1391	0.000141	0.216
30.0	0.3561	0.2849	0.1344	0.000129	0.223

LAM NAM CON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
40.0	0.2316	0.1852	0.4239	0.002269	0.094
40.0	0.2400	0.1920	0.3946	0.001875	0.101
40.0	0.2500	0.2000	0.3636	0.001508	0.110
40.0	0.2600	0.2080	0.3362	0.001223	0.119
40.0	0.2700	0.2160	0.3118	0.001000	0.128
40.0	0.2800	0.2240	0.2899	0.000824	0.138
40.0	0.2900	0.2320	0.2702	0.000683	0.148
40.0	0.3000	0.2400	0.2525	0.000570	0.158
40.0	0.3100	0.2480	0.2365	0.000479	0.169
40.0	0.3200	0.2560	0.2219	0.000404	0.180
40.0	0.3300	0.2640	0.2087	0.000343	0.192
40.0	0.3400	0.2720	0.1966	0.000293	0.203
40.0	0.3500	0.2800	0.1855	0.000251	0.216
40.0	0.3600	0.2880	0.1754	0.000216	0.228
40.0	0.3700	0.2960	0.1660	0.000186	0.241
40.0	0.3800	0.3040	0.1574	0.000162	0.254
40.0	0.3900	0.3120	0.1494	0.000141	0.268
40.0	0.3995	0.3196	0.1424	0.000124	0.281

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
50.0	0.2567	0.2053	0.4312	0.002047	0.116
50.0	0.2700	0.2160	0.3897	0.001563	0.128
50.0	0.2800	0.2240	0.3624	0.001287	0.138
50.0	0.2900	0.2320	0.3378	0.001068	0.148
50.0	0.3000	0.2400	0.3157	0.000891	0.158
50.0	0.3100	0.2480	0.2956	0.000748	0.169
50.0	0.3200	0.2560	0.2774	0.000632	0.180
50.0	0.3300	0.2640	0.2609	0.000536	0.192
50.0	0.3400	0.2720	0.2458	0.000457	0.203
50.0	0.3500	0.2800	0.2319	0.000392	0.216
50.0	0.3600	0.2880	0.2192	0.000337	0.228
50.0	0.3700	0.2960	0.2075	0.000291	0.241
50.0	0.3800	0.3040	0.1967	0.000253	0.254
50.0	0.3900	0.3120	0.1868	0.000220	0.268
50.0	0.4000	0.3200	0.1776	0.000192	0.282
50.0	0.4100	0.3280	0.1690	0.000168	0.296
50.0	0.4200	0.3360	0.1610	0.000148	0.310
50.0	0.4300	0.3440	0.1536	0.000131	0.325
50.0	0.4368	0.3494	0.1489	0.000120	0.336

LAM NAM CON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS.
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
60.0	0.2792	0.2234	0.4373	0.001882	0.137
60.0	0.2900	0.2320	0.4054	0.001537	0.148
60.0	0.3000	0.2400	0.3788	0.001283	0.158
60.0	0.3100	0.2480	0.3547	0.001077	0.169
60.0	0.3200	0.2560	0.3329	0.000909	0.180
60.0	0.3300	0.2640	0.3130	0.000772	0.192
60.0	0.3400	0.2720	0.2949	0.000658	0.203
60.0	0.3500	0.2800	0.2783	0.000564	0.216
60.0	0.3600	0.2880	0.2630	0.000485	0.228
60.0	0.3700	0.2960	0.2490	0.000419	0.241
60.0	0.3800	0.3040	0.2361	0.000364	0.254
60.0	0.3900	0.3120	0.2241	0.000317	0.268
60.0	0.4000	0.3200	0.2131	0.000277	0.282
60.0	0.4100	0.3280	0.2028	0.000243	0.296
60.0	0.4200	0.3360	0.1933	0.000213	0.310
60.0	0.4300	0.3440	0.1844	0.000188	0.325
60.0	0.4400	0.3520	0.1761	0.000166	0.341
60.0	0.4500	0.3600	0.1684	0.000148	0.356
60.0	0.4600	0.3680	0.1611	0.000131	0.372
60.0	0.4698	0.3759	0.1544	0.000117	0.389

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
70.0	0.2998	0.2398	0.4425	0.001753	0.158
70.0	0.3100	0.2480	0.4139	0.001466	0.169
70.0	0.3200	0.2560	0.3884	0.001238	0.180
70.0	0.3300	0.2640	0.3652	0.001051	0.192
70.0	0.3400	0.2720	0.3441	0.000896	0.203
70.0	0.3500	0.2800	0.3247	0.000768	0.216
70.0	0.3600	0.2880	0.3069	0.000660	0.228
70.0	0.3700	0.2960	0.2905	0.000571	0.241
70.0	0.3800	0.3040	0.2754	0.000495	0.254
70.0	0.3900	0.3120	0.2615	0.000431	0.268
70.0	0.4000	0.3200	0.2486	0.000377	0.282
70.0	0.4100	0.3280	0.2366	0.000330	0.296
70.0	0.4200	0.3360	0.2255	0.000290	0.310
70.0	0.4300	0.3440	0.2151	0.000256	0.325
70.0	0.4400	0.3520	0.2054	0.000226	0.341
70.0	0.4500	0.3600	0.1964	0.000201	0.356
70.0	0.4600	0.3680	0.1880	0.000179	0.372
70.0	0.4700	0.3760	0.1800	0.000159	0.389
70.0	0.4800	0.3840	0.1726	0.000142	0.406
70.0	0.4900	0.3920	0.1657	0.000128	0.423
70.0	0.4997	0.3998	0.1593	0.000115	0.439

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC.

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
80.0	0.3189	0.2551	0.4471	0.001648	0.179
80.0	0.3300	0.2640	0.4174	0.001372	0.192
80.0	0.3400	0.2720	0.3932	0.001170	0.203
80.0	0.3500	0.2800	0.3711	0.001003	0.216
80.0	0.3600	0.2880	0.3507	0.000863	0.228
80.0	0.3700	0.2960	0.3320	0.000745	0.241
80.0	0.3800	0.3040	0.3148	0.000647	0.254
80.0	0.3900	0.3120	0.2988	0.000563	0.268
80.0	0.4000	0.3200	0.2841	0.000492	0.282
80.0	0.4100	0.3280	0.2704	0.000431	0.296
80.0	0.4200	0.3360	0.2577	0.000379	0.310
80.0	0.4300	0.3440	0.2458	0.000334	0.325
80.0	0.4400	0.3520	0.2348	0.000296	0.341
80.0	0.4500	0.3600	0.2245	0.000262	0.356
80.0	0.4600	0.3680	0.2148	0.000233	0.372
80.0	0.4700	0.3760	0.2058	0.000208	0.389
80.0	0.4800	0.3840	0.1973	0.000186	0.406
80.0	0.4900	0.3920	0.1893	0.000167	0.423
80.0	0.5000	0.4000	0.1818	0.000150	0.440
80.0	0.5100	0.4080	0.1748	0.000135	0.458
80.0	0.5200	0.4160	0.1681	0.000121	0.476
80.0	0.5271	0.4217	0.1636	0.000113	0.489

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
90.0	0.3367	0.2693	0.4512	0.001561	0.199
90.0	0.3500	0.2800	0.4174	0.001269	0.216
90.0	0.3600	0.2880	0.3946	0.001092	0.228
90.0	0.3700	0.2960	0.3735	0.000943	0.241
90.0	0.3800	0.3040	0.3541	0.000818	0.254
90.0	0.3900	0.3120	0.3362	0.000712	0.268
90.0	0.4000	0.3200	0.3196	0.000622	0.282
90.0	0.4100	0.3280	0.3042	0.000546	0.296
90.0	0.4200	0.3360	0.2899	0.000480	0.310
90.0	0.4300	0.3440	0.2766	0.000423	0.325
90.0	0.4400	0.3520	0.2641	0.000374	0.341
90.0	0.4500	0.3600	0.2525	0.000332	0.356
90.0	0.4600	0.3680	0.2417	0.000295	0.372
90.0	0.4700	0.3760	0.2315	0.000263	0.389
90.0	0.4800	0.3840	0.2219	0.000235	0.406
90.0	0.4900	0.3920	0.2130	0.000211	0.423
90.0	0.5000	0.4000	0.2045	0.000189	0.440
90.0	0.5100	0.4080	0.1966	0.000170	0.458
90.0	0.5200	0.4160	0.1891	0.000154	0.476
90.0	0.5300	0.4240	0.1820	0.000139	0.494
90.0	0.5400	0.4320	0.1754	0.000126	0.513
90.0	0.5500	0.4400	0.1690	0.000114	0.532
90.0	0.5526	0.4420	0.1675	0.000111	0.537

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
100.0	0.3534	0.2828	0.4548	0.001487	0.220
100.0	0.3600	0.2880	0.4384	0.001348	0.228
100.0	0.3700	0.2960	0.4150	0.001165	0.241
100.0	0.3800	0.3040	0.3935	0.001010	0.254
100.0	0.3900	0.3120	0.3736	0.000880	0.268
100.0	0.4000	0.3200	0.3551	0.000768	0.282
100.0	0.4100	0.3280	0.3380	0.000674	0.296
100.0	0.4200	0.3360	0.3221	0.000592	0.310
100.0	0.4300	0.3440	0.3073	0.000523	0.325
100.0	0.4400	0.3520	0.2935	0.000462	0.341
100.0	0.4500	0.3600	0.2806	0.000410	0.356
100.0	0.4600	0.3680	0.2685	0.000365	0.372
100.0	0.4700	0.3760	0.2572	0.000325	0.389
100.0	0.4800	0.3840	0.2466	0.000291	0.406
100.0	0.4900	0.3920	0.2366	0.000260	0.423
100.0	0.5000	0.4000	0.2273	0.000234	0.440
100.0	0.5100	0.4080	0.2184	0.000210	0.458
100.0	0.5200	0.4160	0.2101	0.000190	0.476
100.0	0.5300	0.4240	0.2023	0.000171	0.494
100.0	0.5400	0.4320	0.1948	0.000155	0.513
100.0	0.5500	0.4400	0.1878	0.000141	0.532
100.0	0.5600	0.4480	0.1812	0.000128	0.552
100.0	0.5700	0.4560	0.1749	0.000116	0.572
100.0	0.5763	0.4611	0.1710	0.000110	0.585

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
110.0	0.3693	0.2955	0.4582	0.001423	0.240
110.0	0.3800	0.3040	0.4328	0.001222	0.254
110.0	0.3900	0.3120	0.4109	0.001064	0.268
110.0	0.4000	0.3200	0.3906	0.000930	0.282
110.0	0.4100	0.3280	0.3718	0.000815	0.296
110.0	0.4200	0.3360	0.3543	0.000717	0.310
110.0	0.4300	0.3440	0.3380	0.000632	0.325
110.0	0.4400	0.3520	0.3228	0.000559	0.341
110.0	0.4500	0.3600	0.3086	0.000496	0.356
110.0	0.4600	0.3680	0.2954	0.000441	0.372
110.0	0.4700	0.3760	0.2829	0.000393	0.389
110.0	0.4800	0.3840	0.2713	0.000352	0.406
110.0	0.4900	0.3920	0.2603	0.000315	0.423
110.0	0.5000	0.4000	0.2500	0.000283	0.440
110.0	0.5100	0.4080	0.2403	0.000254	0.458
110.0	0.5200	0.4160	0.2311	0.000229	0.476
110.0	0.5300	0.4240	0.2225	0.000207	0.494
110.0	0.5400	0.4320	0.2143	0.000188	0.513
110.0	0.5500	0.4400	0.2066	0.000170	0.532
110.0	0.5600	0.4480	0.1993	0.000155	0.552
110.0	0.5700	0.4560	0.1924	0.000141	0.572
110.0	0.5800	0.4640	0.1858	0.000128	0.592
110.0	0.5900	0.4720	0.1795	0.000117	0.613
110.0	0.5987	0.4790	0.1743	0.000108	0.631

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (CF) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
120.0	0.3845	0.3076	0.4613	0.001367	0.260
120.0	0.3900	0.3120	0.4483	0.001267	0.268
120.0	0.4000	0.3200	0.4261	0.001107	0.282
120.0	0.4100	0.3280	0.4056	0.000970	0.296
120.0	0.4200	0.3360	0.3865	0.000853	0.310
120.0	0.4300	0.3440	0.3687	0.000752	0.325
120.0	0.4400	0.3520	0.3522	0.000666	0.341
120.0	0.4500	0.3600	0.3367	0.000590	0.356
120.0	0.4600	0.3680	0.3222	0.000525	0.372
120.0	0.4700	0.3760	0.3087	0.000468	0.389
120.0	0.4800	0.3840	0.2959	0.000418	0.406
120.0	0.4900	0.3920	0.2840	0.000375	0.423
120.0	0.5000	0.4000	0.2727	0.000337	0.440
120.0	0.5100	0.4080	0.2621	0.000303	0.458
120.0	0.5200	0.4160	0.2522	0.000273	0.476
120.0	0.5300	0.4240	0.2427	0.000247	0.494
120.0	0.5400	0.4320	0.2338	0.000223	0.513
120.0	0.5500	0.4400	0.2254	0.000202	0.532
120.0	0.5600	0.4480	0.2174	0.000184	0.552
120.0	0.5700	0.4560	0.2099	0.000167	0.572
120.0	0.5800	0.4640	0.2027	0.000153	0.592
120.0	0.5900	0.4720	0.1959	0.000139	0.613
120.0	0.6000	0.4800	0.1894	0.000127	0.634
120.0	0.6100	0.4880	0.1832	0.000117	0.655
120.0	0.6199	0.4960	0.1774	0.000107	0.676

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
130.0	0.3989	0.3192	0.4641	0.001317	0.280
130.0	0.4100	0.3280	0.4394	0.001138	0.296
130.0	0.4200	0.3360	0.4187	0.001001	0.310
130.0	0.4300	0.3440	0.3995	0.000883	0.325
130.0	0.4400	0.3520	0.3815	0.000781	0.341
130.0	0.4500	0.3600	0.3648	0.000693	0.356
130.0	0.4600	0.3680	0.3491	0.000616	0.372
130.0	0.4700	0.3760	0.3344	0.000550	0.389
130.0	0.4800	0.3840	0.3206	0.000491	0.406
130.0	0.4900	0.3920	0.3076	0.000440	0.423
130.0	0.5000	0.4000	0.2955	0.000395	0.440
130.0	0.5100	0.4080	0.2840	0.000355	0.458
130.0	0.5200	0.4160	0.2732	0.000320	0.476
130.0	0.5300	0.4240	0.2630	0.000290	0.494
130.0	0.5400	0.4320	0.2533	0.000262	0.513
130.0	0.5500	0.4400	0.2442	0.000238	0.532
130.0	0.5600	0.4480	0.2355	0.000216	0.552
130.0	0.5700	0.4560	0.2273	0.000196	0.572
130.0	0.5800	0.4640	0.2196	0.000179	0.592
130.0	0.5900	0.4720	0.2122	0.000163	0.613
130.0	0.6000	0.4800	0.2052	0.000149	0.634
130.0	0.6100	0.4880	0.1985	0.000137	0.655
130.0	0.6200	0.4960	0.1922	0.000125	0.677
130.0	0.6300	0.5040	0.1861	0.000115	0.699
130.0	0.6400	0.5120	0.1803	0.000106	0.721
130.0	0.6401	0.5121	0.1803	0.000106	0.721

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (K) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
140.0	0.4128	0.3303	0.4[illegible]8	0.001273	0.300
140.0	0.4200	0.3360	0.45[illegible]9	0.001161	0.310
140.0	0.4300	0.3440	0.4302	0.001024	0.325
140.0	0.4400	0.3520	0.4109	0.000906	0.341
140.0	0.4500	0.3600	0.3928	0.000804	0.356
140.0	0.4600	0.3680	0.3759	0.000715	0.372
140.0	0.4700	0.3760	0.3601	0.000637	0.389
140.0	0.4800	0.3840	0.3452	0.000570	0.406
140.0	0.4900	0.3920	0.3313	0.000510	0.423
140.0	0.5000	0.4000	0.3182	0.000458	0.440
140.0	0.5100	0.4080	0.3058	0.000412	0.458
140.0	0.5200	0.4160	0.2942	0.000372	0.476
140.0	0.5300	0.4240	0.2832	0.000336	0.494
140.0	0.5400	0.4320	0.2728	0.000304	0.513
140.0	0.550	0.4400	0.2630	0.000276	0.532
140.0	0.5600	0.4480	0.2537	0.000250	0.552
140.0	0.5700	0.4560	0.2448	0.000228	0.572
140.0	0.5800	0.4640	0.2365	0.000208	0.[illegible]92
140.0	0.5900	0.4720	0.2285	0.000190	0.613
140.0	0.6000	0.4800	0.2210	0.000173	0.634
140.0	0.6100	0.4880	0.2138	0.000159	0.655
140.0	0.6200	0.4960	0.2069	0.000145	0.677
140.0	0.6300	0.5040	0.2004	0.000134	0.699
140.0	0.6400	0.5120	0.1942	0.000123	0.721
140.0	0.6500	0.5200	0.1883	0.000113	0.744
140.0	0.6594	0.5275	0.1830	0.000105	0.765

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
160.0	0.4391	0.3513	0.4716	0.001197	0.339
160.0	0.4500	0.3600	0.4489	0.001050	0.356
160.0	0.4600	0.3680	0.4296	0.000934	0.372
160.0	0.4700	0.3760	0.4115	0.000832	0.389
160.0	0.4800	0.3840	0.3946	0.000744	0.406
160.0	0.4900	0.3920	0.3786	0.000667	0.423
160.0	0.5000	0.4000	0.3636	0.000598	0.440
160.0	0.5100	0.4080	0.3495	0.000538	0.458
160.0	0.5200	0.4160	0.3362	0.000485	0.476
160.0	0.5300	0.4240	0.3236	0.000439	0.494
160.0	0.5400	0.4320	0.3118	0.000397	0.513
160.0	0.5500	0.4400	0.3005	0.000360	0.532
160.0	0.5600	0.4480	0.2899	0.000327	0.552
160.0	0.5700	0.4560	0.2798	0.000298	0.572
160.0	0.5800	0.4640	0.2702	0.000271	0.592
160.0	0.5900	0.4720	0.2612	0.000248	0.613
160.0	0.6000	0.4800	0.2525	0.000226	0.634
160.0	0.6100	0.4880	0.2443	0.000207	0.655
160.0	0.6200	0.4960	0.2365	0.000190	0.677
160.0	0.6300	0.5040	0.2290	0.000174	0.699
160.0	0.6400	0.5120	0.2219	0.000160	0.721
160.0	0.6500	0.5200	0.2152	0.000148	0.744
160.0	0.6600	0.5280	0.2087	0.000136	0.767
160.0	0.6700	0.5360	0.2025	0.000126	0.790
160.0	0.6800	0.5440	0.1966	0.000116	0.814
160.0	0.6900	0.5520	0.1909	0.000107	0.838
160.0	0.6956	0.5564	0.1879	0.000103	0.851

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
170.0	0.4515	0.3612	0.4738	0.001164	0.359
170.0	0.4600	0.3680	0.4565	0.001054	0.372
170.0	0.4700	0.3760	0.4373	0.000940	0.389
170.0	0.4800	0.3840	0.4192	0.000840	0.406
170.0	0.4900	0.3920	0.4023	0.000752	0.423
170.0	0.5000	0.4000	0.3864	0.000676	0.440
170.0	0.5100	0.4080	0.3714	0.000608	0.458
170.0	0.5200	0.4160	0.3572	0.000548	0.476
170.0	0.5300	0.4240	0.3439	0.000495	0.494
170.0	0.5400	0.4320	0.3312	0.000448	0.513
170.0	0.5500	0.4400	0.3193	0.000406	0.532
170.0	0.5600	0.4480	0.3080	0.000369	0.552
170.0	0.5700	0.4560	0.2973	0.000336	0.572
170.0	0.5800	0.4640	0.2871	0.000306	0.592
170.0	0.5900	0.4720	0.2775	0.000279	0.613
170.0	0.6000	0.4800	0.2683	0.000255	0.634
170.0	0.6100	0.4880	0.2596	0.000234	0.655
170.0	0.6200	0.4960	0.2513	0.000214	0.677
170.0	0.6300	0.5040	0.2434	0.000197	0.699
170.0	0.6400	0.5120	0.2358	0.000181	0.721
170.0	0.6500	0.5200	0.2286	0.000167	0.743
170.0	0.6600	0.5280	0.2217	0.000154	0.767
170.0	0.6700	0.5360	0.2152	0.000142	0.790
170.0	0.6800	0.5440	0.2089	0.000131	0.814
170.0	0.6900	0.5520	0.2029	0.000121	0.838
170.0	0.7000	0.5600	0.1971	0.000112	0.862
170.0	0.7100	0.5680	0.1916	0.000104	0.887
170.0	0.7176	0.5741	0.1902	0.000102	0.894

LAM NAM CON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.842
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
180.0	0.4636	0.3709	0.4759	0.001134	0.378
180.0	0.4700	0.3760	0.4630	0.001053	0.389
180.0	0.4800	0.3840	0.4439	0.000942	0.406
180.0	0.4900	0.3920	0.4260	0.000844	0.423
180.0	0.5000	0.4000	0.4091	0.000757	0.440
180.0	0.5100	0.4080	0.3932	0.000681	0.458
180.0	0.5200	0.4160	0.3782	0.000614	0.476
180.0	0.5300	0.4240	0.3641	0.000555	0.494
180.0	0.5400	0.4320	0.3507	0.000502	0.513
180.0	0.5500	0.4400	0.3381	0.000456	0.532
180.0	0.5600	0.4480	0.3261	0.000414	0.552
180.0	0.5700	0.4560	0.3148	0.000377	0.572
180.0	0.5800	0.4640	0.3040	0.000343	0.592
180.0	0.5900	0.4720	0.2938	0.000313	0.613
180.0	0.6000	0.4800	0.2841	0.000286	0.634
180.0	0.6100	0.4880	0.2749	0.000262	0.655
180.0	0.6200	0.4960	0.2661	0.000240	0.677
180.0	0.6300	0.5040	0.2577	0.000221	0.699
180.0	0.6400	0.5120	0.2497	0.000203	0.721
180.0	0.6500	0.5200	0.2421	0.000187	0.744
180.0	0.6600	0.5280	0.2348	0.000172	0.767
180.0	0.6700	0.5360	0.2278	0.000159	0.790
180.0	0.6800	0.5440	0.2212	0.000147	0.814
180.0	0.6900	0.5520	0.2148	0.000136	0.838
180.0	0.7000	0.5600	0.2087	0.000126	0.862
180.0	0.7100	0.5680	0.2029	0.000117	0.887
180.0	0.7200	0.5760	0.1973	0.000108	0.912
180.0	0.7291	0.5833	0.1924	0.000101	0.936

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
190.0	0.4753	0.3800	0.4779	0.001106	0.398
190.0	0.4900	0.3920	0.4496	0.000940	0.423
190.0	0.5000	0.4000	0.4318	0.000844	0.440
190.0	0.5100	0.4080	0.4151	0.000759	0.458
190.0	0.5200	0.4160	0.3992	0.000685	0.476
190.0	0.5300	0.4240	0.3843	0.000618	0.494
190.0	0.5400	0.4320	0.3702	0.000560	0.513
190.0	0.5500	0.4400	0.3569	0.000508	0.532
190.0	0.5600	0.4480	0.3442	0.000461	0.552
190.0	0.5700	0.4560	0.3323	0.000420	0.572
190.0	0.5800	0.4640	0.3209	0.000382	0.592
190.0	0.5900	0.4720	0.3101	0.000349	0.613
190.0	0.6000	0.4800	0.2999	0.000319	0.634
190.0	0.6100	0.4880	0.2901	0.000292	0.655
190.0	0.6200	0.4960	0.2808	0.000268	0.677
190.0	0.6300	0.5040	0.2720	0.000246	0.699
190.0	0.6400	0.5120	0.2636	0.000226	0.721
190.0	0.6500	0.5200	0.2555	0.000208	0.744
190.0	0.6600	0.5280	0.2478	0.000192	0.767
190.0	0.6700	0.5360	0.2405	0.000177	0.790
190.0	0.6800	0.5440	0.2335	0.000164	0.814
190.0	0.6900	0.5520	0.2267	0.000151	0.838
190.0	0.7000	0.5600	0.2203	0.000140	0.862
190.0	0.7100	0.5680	0.2142	0.000130	0.887
190.0	0.7200	0.5760	0.2082	0.000121	0.912
190.0	0.7300	0.5840	0.2026	0.000112	0.938
190.0	0.7400	0.5920	0.1971	0.000104	0.964
190.0	0.7450	0.5960	0.1945	0.000101	0.977

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
200.0	0.4867	0.3894	0.4797	0.001080	0.417
200.0	0.5000	0.4000	0.4545	0.000935	0.440
200.0	0.5100	0.4080	0.4369	0.000841	0.458
200.0	0.5200	0.4160	0.4203	0.000759	0.476
200.0	0.5300	0.4240	0.4045	0.000685	0.494
200.0	0.5400	0.4320	0.3897	0.000620	0.513
200.0	0.5500	0.4400	0.3757	0.000562	0.532
200.0	0.5600	0.4480	0.3624	0.000511	0.552
200.0	0.5700	0.4560	0.3498	0.000465	0.572
200.0	0.5800	0.4640	0.3378	0.000424	0.592
200.0	0.5900	0.4720	0.3264	0.000387	0.613
200.0	0.6000	0.4800	0.3157	0.000354	0.634
200.0	0.6100	0.4880	0.3054	0.000324	0.655
200.0	0.6200	0.4960	0.2956	0.000297	0.677
200.0	0.6300	0.5040	0.2863	0.000273	0.699
200.0	0.6400	0.5120	0.2774	0.000251	0.721
200.0	0.6500	0.5200	0.2690	0.000231	0.744
200.0	0.6600	0.5280	0.2609	0.000213	0.767
200.0	0.6700	0.5360	0.2531	0.000196	0.790
200.0	0.6800	0.5440	0.2458	0.000181	0.814
200.0	0.6900	0.5520	0.2387	0.000168	0.838
200.0	0.7000	0.5600	0.2319	0.000155	0.862
200.0	0.7100	0.5680	0.2254	0.000144	0.887
200.0	0.7200	0.5760	0.2192	0.000134	0.912
200.0	0.7300	0.5840	0.2132	0.000124	0.938
200.0	0.7400	0.5920	0.2075	0.000116	0.964
200.0	0.7500	0.6000	0.2020	0.000108	0.990
200.0	0.7600	0.6080	0.1967	0.000100	1.017
200.0	0.7605	0.6084	0.1965	0.000100	1.018

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
210.0	0.4978	0.3982	0.4815	0.001056	0.436
210.0	0.5100	0.4080	0.4587	0.000928	0.458
210.0	0.5200	0.4160	0.4413	0.000836	0.476
210.0	0.5300	0.4240	0.4248	0.000756	0.494
210.0	0.5400	0.4320	0.4092	0.000684	0.513
210.0	0.5500	0.4400	0.3944	0.000620	0.532
210.0	0.5600	0.4480	0.3805	0.000563	0.552
210.0	0.5700	0.4560	0.3672	0.000513	0.572
210.0	0.5800	0.4640	0.3547	0.000467	0.592
210.0	0.5900	0.4720	0.3428	0.000426	0.613
210.0	0.6000	0.4800	0.3314	0.000390	0.634
210.0	0.6100	0.4880	0.3207	0.000357	0.655
210.0	0.6200	0.4960	0.3104	0.000327	0.677
210.0	0.6300	0.5040	0.3006	0.000301	0.699
210.0	0.6400	0.5120	0.2913	0.000276	0.721
210.0	0.6500	0.5200	0.2824	0.000254	0.744
210.0	0.6600	0.5280	0.2739	0.000235	0.767
210.0	0.6700	0.5360	0.2658	0.000216	0.790
210.0	0.6800	0.5440	0.2580	0.000200	0.814
210.0	0.6900	0.5520	0.2506	0.000185	0.838
210.0	0.7000	0.5600	0.2435	0.000171	0.862
210.0	0.7100	0.5680	0.2367	0.000159	0.887
210.0	0.7200	0.5760	0.2302	0.000147	0.912
210.0	0.7300	0.5840	0.2239	0.000137	0.938
210.0	0.7400	0.5920	0.2179	0.000127	0.964
210.0	0.7500	0.6000	0.2121	0.000119	0.990
210.0	0.7600	0.6080	0.2066	0.000111	1.017
210.0	0.7700	0.6160	0.2012	0.000103	1.044
210.0	0.7755	0.6204	0.1984	0.000099	1.058

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2

SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
220.0	0.5086	0.4069	0.4833	0.001033	0.455
220.0	0.5200	0.4160	0.4623	0.000918	0.476
220.0	0.5300	0.4240	0.4450	0.000829	0.494
220.0	0.5400	0.4320	0.4287	0.000751	0.513
220.0	0.5500	0.4400	0.4132	0.000681	0.532
220.0	0.5600	0.4480	0.3986	0.000618	0.552
220.0	0.5700	0.4560	0.3847	0.000562	0.572
220.0	0.5800	0.4640	0.3716	0.000513	0.592
220.0	0.5900	0.4720	0.3591	0.000466	0.613
220.0	0.6000	0.4800	0.3472	0.000428	0.634
220.0	0.6100	0.4880	0.3359	0.000392	0.655
220.0	0.6200	0.4960	0.3252	0.000359	0.677
220.0	0.6300	0.5040	0.3149	0.000330	0.699
220.0	0.6400	0.5120	0.3052	0.000303	0.721
220.0	0.6500	0.5200	0.2959	0.000279	0.744
220.0	0.6600	0.5280	0.2870	0.000257	0.767
220.0	0.6700	0.5360	0.2785	0.000238	0.790
220.0	0.6800	0.5440	0.2703	0.000219	0.814
220.0	0.6900	0.5520	0.2625	0.000203	0.838
220.0	0.7000	0.5600	0.2551	0.000188	0.862
220.0	0.7100	0.5680	0.2480	0.000174	0.887
220.0	0.7200	0.5760	0.2411	0.000162	0.912
220.0	0.7300	0.5840	0.2346	0.000150	0.938
220.0	0.7400	0.5920	0.2283	0.000140	0.964
220.0	0.7500	0.6000	0.2222	0.000130	0.990
220.0	0.7600	0.6080	0.2164	0.000121	1.017
220.0	0.7700	0.6160	0.2108	0.000113	1.044
220.0	0.7800	0.6240	0.2055	0.000106	1.071
220.0	0.7900	0.6320	0.2003	0.000099	1.098
220.0	0.7900	0.6320	0.2003	0.000099	1.099

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
230.0	0.5191	0.4153	0.4849	0.001012	0.474
230.0	0.5300	0.4240	0.4652	0.000906	0.494
230.0	0.5400	0.4320	0.4482	0.000820	0.513
230.0	0.5500	0.4400	0.4320	0.000744	0.532
230.0	0.5600	0.4480	0.4167	0.000676	0.552
230.0	0.5700	0.4560	0.4022	0.000615	0.572
230.0	0.5800	0.4640	0.3885	0.000560	0.592
230.0	0.5900	0.4720	0.3754	0.000512	0.613
230.0	0.6000	0.4800	0.3630	0.000468	0.634
230.0	0.6100	0.4880	0.3512	0.000428	0.655
230.0	0.6200	0.4960	0.3400	0.000393	0.677
230.0	0.6300	0.5040	0.3293	0.000361	0.699
230.0	0.6400	0.5120	0.3190	0.000331	0.721
230.0	0.6500	0.5200	0.3093	0.000305	0.744
230.0	0.6600	0.5280	0.3000	0.000281	0.767
230.0	0.6700	0.5360	0.2911	0.000260	0.790
230.0	0.6800	0.5440	0.2826	0.000240	0.814
230.0	0.6900	0.5520	0.2745	0.000222	0.838
230.0	0.7000	0.5600	0.2667	0.000206	0.862
230.0	0.7100	0.5680	0.2592	0.000191	0.887
230.0	0.7200	0.5760	0.2521	0.000177	0.912
230.0	0.7300	0.5840	0.2452	0.000164	0.938
230.0	0.7400	0.5920	0.2386	0.000153	0.964
230.0	0.7500	0.6000	0.2323	0.000142	0.990
230.0	0.7600	0.6080	0.2262	0.000133	1.017
230.0	0.7700	0.6160	0.2204	0.000124	1.044
230.0	0.7800	0.6240	0.2148	0.000115	1.071
230.0	0.7900	0.6320	0.2094	0.000108	1.098
230.0	0.8000	0.6400	0.2042	0.000101	1.126
230.0	0.8042	0.6434	0.2021	0.000098	1.138

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
240.0	0.5294	0.4235	0.4865	0.000993	0.493
240.0	0.5300	0.4320	0.4676	0.000893	0.513
240.0	0.5500	0.4400	0.4508	0.000810	0.532
240.0	0.5600	0.4480	0.4348	0.000736	0.552
240.0	0.5700	0.4560	0.4197	0.000669	0.572
240.0	0.5800	0.4640	0.4054	0.000610	0.592
240.0	0.5900	0.4720	0.3917	0.000557	0.613
240.0	0.6000	0.4800	0.3788	0.000509	0.634
240.0	0.6100	0.4880	0.3665	0.000466	0.655
240.0	0.6200	0.4960	0.3547	0.000428	0.677
240.0	0.6300	0.5040	0.3436	0.000393	0.699
240.0	0.6400	0.5120	0.3329	0.000361	0.721
240.0	0.6500	0.5200	0.3228	0.000332	0.744
240.0	0.6600	0.5280	0.3130	0.000306	0.767
240.0	0.6700	0.5360	0.3038	0.000283	0.790
240.0	0.6800	0.5440	0.2949	0.000261	0.814
240.0	0.6900	0.5520	0.2864	0.000242	0.838
240.0	0.7000	0.5600	0.2783	0.000224	0.862
240.0	0.7100	0.5680	0.2705	0.000207	0.887
240.0	0.7200	0.5760	0.2630	0.000193	0.912
240.0	0.7300	0.5840	0.2559	0.000179	0.938
240.0	0.7400	0.5920	0.2490	0.000166	0.964
240.0	0.7500	0.6000	0.2424	0.000155	0.990
240.0	0.7600	0.6080	0.2361	0.000144	1.017
240.0	0.7700	0.6160	0.2300	0.000135	1.044
240.0	0.7800	0.6240	0.2241	0.000126	1.071
240.0	0.7900	0.6320	0.2185	0.000117	1.098
240.0	0.8000	0.6400	0.2131	0.000110	1.126
240.0	0.8100	0.6480	0.2078	0.000103	1.155
240.0	0.8180	0.6544	0.2038	0.000097	1.178

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
250.0	0.5395	0.4316	0.4880	0.000974	0.512
250.0	0.5500	0.4400	0.4696	0.000879	0.532
250.0	0.5600	0.4480	0.4530	0.000798	0.552
250.0	0.5700	0.4560	0.4372	0.000726	0.572
250.0	0.5800	0.4640	0.4223	0.000662	0.592
250.0	0.5900	0.4720	0.4081	0.000604	0.613
250.0	0.6000	0.4800	0.3946	0.000553	0.634
250.0	0.6100	0.4880	0.3817	0.000506	0.655
250.0	0.6200	0.4960	0.3695	0.000464	0.677
250.0	0.6300	0.5040	0.3579	0.000426	0.699
250.0	0.6400	0.5120	0.3468	0.000392	0.721
250.0	0.6500	0.5200	0.3362	0.000361	0.744
250.0	0.6600	0.5280	0.3261	0.000332	0.767
250.0	0.6700	0.5360	0.3164	0.000307	0.790
250.0	0.6800	0.5440	0.3072	0.000283	0.814
250.0	0.6900	0.5520	0.2984	0.000262	0.838
250.0	0.7000	0.5600	0.2899	0.000243	0.862
250.0	0.7100	0.5680	0.2818	0.000225	0.887
250.0	0.7200	0.5760	0.2740	0.000209	0.912
250.0	0.7300	0.5840	0.2666	0.000194	0.938
250.0	0.7400	0.5920	0.2594	0.000181	0.964
250.0	0.7500	0.6000	0.2525	0.000168	0.990
250.0	0.7600	0.6080	0.2459	0.000157	1.017
250.0	0.7700	0.6160	0.2396	0.000146	1.044
250.0	0.7800	0.6240	0.2335	0.000136	1.071
250.0	0.7900	0.6320	0.2276	0.000127	1.098
250.0	0.8000	0.6400	0.2219	0.000119	1.126
250.0	0.8100	0.6480	0.2165	0.000111	1.155
250.0	0.8200	0.6560	0.2113	0.000104	1.183
250.0	0.8300	0.6640	0.2062	0.000098	1.212
250.0	0.8315	0.6652	0.2055	0.000097	1.217

LAM NAM CON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2. SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
260.0	0.5493	0.4395	0.4895	0.000957	0.531
260.0	0.5600	0.4480	0.4711	0.000863	0.552
260.0	0.5700	0.4560	0.4547	0.000786	0.572
260.0	0.5800	0.4640	0.4391	0.000716	0.592
260.0	0.5900	0.4720	0.4244	0.000654	0.613
260.0	0.6000	0.4800	0.4104	0.000598	0.634
260.0	0.6100	0.4880	0.3970	0.000547	0.655
260.0	0.6200	0.4960	0.3843	0.000502	0.677
260.0	0.6300	0.5040	0.3722	0.000461	0.699
260.0	0.6400	0.5120	0.3607	0.000424	0.721
260.0	0.6500	0.5200	0.3497	0.000390	0.744
260.0	0.6600	0.5280	0.3391	0.000359	0.767
260.0	0.6700	0.5360	0.3291	0.000332	0.790
260.0	0.6800	0.5440	0.3195	0.000307	0.814
260.0	0.6900	0.5520	0.3103	0.000284	0.838
260.0	0.7000	0.5600	0.3015	0.000263	0.862
260.0	0.7100	0.5680	0.2931	0.000244	0.887
260.0	0.7200	0.5760	0.2850	0.000226	0.912
260.0	0.7300	0.5840	0.2772	0.000210	0.938
260.0	0.7400	0.5920	0.2698	0.000195	0.964
260.0	0.7500	0.6000	0.2626	0.000182	0.990
260.0	0.7600	0.6080	0.2558	0.000169	1.017
260.0	0.7700	0.6160	0.2492	0.000158	1.044
260.0	0.7800	0.6240	0.2428	0.000147	1.071
260.0	0.7900	0.6320	0.2367	0.000138	1.098
260.0	0.8000	0.6400	0.2308	0.000129	1.126
260.0	0.8100	0.6480	0.2252	0.000121	1.155
260.0	0.8200	0.6560	0.2197	0.000113	1.183
260.0	0.8300	0.6640	0.2144	0.000106	1.212
260.0	0.8400	0.6720	0.2094	0.000099	1.242
260.0	0.8446	0.6757	0.2071	0.000096	1.256

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
270.0	0.5590	0.4472	0.4909	0.000940	0.550
270.0	0.5700	0.4560	0.4722	0.000847	0.572
270.0	0.5800	0.4640	0.4560	0.000772	0.592
270.0	0.5900	0.4720	0.4407	0.000705	0.613
270.0	0.6000	0.4800	0.4261	0.000644	0.634
270.0	0.6100	0.4880	0.4123	0.000590	0.655
270.0	0.6200	0.4960	0.3991	0.000541	0.677
270.0	0.6300	0.5040	0.3865	0.000497	0.699
270.0	0.6400	0.5120	0.3745	0.000457	0.721
270.0	0.6500	0.5200	0.3631	0.000421	0.744
270.0	0.6600	0.5280	0.3522	0.000388	0.767
270.0	0.6700	0.5360	0.3417	0.000358	0.790
270.0	0.6800	0.5440	0.3318	0.000331	0.814
270.0	0.6900	0.5520	0.3222	0.000306	0.838
270.0	0.7000	0.5600	0.3131	0.000283	0.863
270.0	0.7100	0.5680	0.3043	0.000263	0.887
270.0	0.7200	0.5760	0.2959	0.000244	0.912
270.0	0.7300	0.5840	0.2879	0.000226	0.938
270.0	0.7400	0.5920	0.2801	0.000211	0.964
270.0	0.7500	0.6000	0.2727	0.000196	0.990
270.0	0.7600	0.6080	0.2656	0.000183	1.017
270.0	0.7700	0.6160	0.2587	0.000170	1.044
270.0	0.7800	0.6240	0.2522	0.000159	1.071
270.0	0.7900	0.6320	0.2458	0.000149	1.098
270.0	0.8000	0.6400	0.2397	0.000139	1.126
270.0	0.8100	0.6480	0.2338	0.000130	1.155
270.0	0.8200	0.6560	0.2282	0.000122	1.183
270.0	0.8300	0.6640	0.2227	0.000114	1.212
270.0	0.8400	0.6720	0.2174	0.000107	1.242
270.0	0.8500	0.6800	0.2123	0.000101	1.272
270.0	0.8575	0.6860	0.2086	0.000096	1.294

LAM NAM GON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC.

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
280.0	0.5685	0.4548	0.4923	0.000924	0.569
280.0	0.5800	0.4640	0.4729	0.000830	0.592
280.0	0.5900	0.4720	0.4570	0.000758	0.613
280.0	0.6000	0.4800	0.4419	0.000693	0.634
280.0	0.6100	0.4880	0.4275	0.000635	0.655
280.0	0.6200	0.4960	0.4139	0.000582	0.677
280.0	0.6300	0.5040	0.4008	0.000534	0.699
280.0	0.6400	0.5120	0.3884	0.000491	0.721
280.0	0.6500	0.5200	0.3765	0.000452	0.744
280.0	0.6600	0.5280	0.3652	0.000417	0.767
280.0	0.6700	0.5360	0.3544	0.000385	0.790
280.0	0.6800	0.5440	0.3441	0.000356	0.814
280.0	0.6900	0.5520	0.3342	0.000329	0.838
280.0	0.7000	0.5600	0.3247	0.000305	0.862
280.0	0.7100	0.5680	0.3156	0.000282	0.887
280.0	0.7200	0.5760	0.3069	0.000262	0.912
280.0	0.7300	0.5840	0.2985	0.000244	0.938
280.0	0.7400	0.5920	0.2905	0.000226	0.964
280.0	0.7500	0.6000	0.2828	0.000211	0.990
280.0	0.7600	0.6080	0.2754	0.000196	1.017
280.0	0.7700	0.6160	0.2683	0.000183	1.044
280.0	0.7800	0.6240	0.2615	0.000171	1.071
280.0	0.7900	0.6320	0.2549	0.000160	1.098
280.0	0.8000	0.6400	0.2486	0.000149	1.126
280.0	0.8100	0.6480	0.2425	0.000140	1.155
280.0	0.8200	0.6560	0.2366	0.000131	1.183
280.0	0.8300	0.6640	0.2309	0.000123	1.212
280.0	0.8400	0.6720	0.2255	0.000115	1.242
280.0	0.8500	0.6800	0.2202	0.000108	1.272
280.0	0.8600	0.6880	0.2151	0.000102	1.302
280.0	0.8700	0.6960	0.2102	0.000096	1.332
280.0	0.8701	0.6960	0.2102	0.000096	1.332

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
290.0	0.5777	0.4622	0.4937	0.000910	0.587
290.0	0.5900	0.4720	0.4733	0.000813	0.613
290.0	0.6000	0.4800	0.4577	0.000743	0.634
290.0	0.6100	0.4880	0.4420	0.000681	0.655
290.0	0.6200	0.4960	0.4286	0.000624	0.677
290.0	0.6300	0.5040	0.4151	0.000573	0.699
290.0	0.6400	0.5120	0.4023	0.000527	0.721
290.0	0.6500	0.5200	0.3900	0.000485	0.744
290.0	0.6600	0.5280	0.3783	0.000447	0.767
290.0	0.6700	0.5360	0.3671	0.000413	0.790
290.0	0.6800	0.5440	0.3563	0.000381	0.814
290.0	0.6900	0.5520	0.3461	0.000353	0.838
290.0	0.7000	0.5600	0.3363	0.000327	0.862
290.0	0.7100	0.5680	0.3269	0.000303	0.887
290.0	0.7200	0.5760	0.3178	0.000281	0.912
290.0	0.7300	0.5840	0.3092	0.000261	0.938
290.0	0.7400	0.5920	0.3009	0.000243	0.964
290.0	0.7500	0.6000	0.2929	0.000226	0.990
290.0	0.7600	0.6080	0.2853	0.000211	1.017
290.0	0.7700	0.6160	0.2779	0.000197	1.044
290.0	0.7800	0.6240	0.2708	0.000183	1.071
290.0	0.7900	0.6320	0.2640	0.000171	1.098
290.0	0.8000	0.6400	0.2575	0.000160	1.126
290.0	0.8100	0.6480	0.2511	0.000150	1.155
290.0	0.8200	0.6560	0.2451	0.000141	1.183
290.0	0.8300	0.6640	0.2392	0.000132	1.212
290.0	0.8400	0.6720	0.2335	0.000124	1.242
290.0	0.8500	0.6800	0.2281	0.000116	1.272
290.0	0.8600	0.6880	0.2228	0.000109	1.302
290.0	0.8700	0.6960	0.2177	0.000102	1.332
290.0	0.8800	0.7040	0.2128	0.000096	1.363
290.0	0.8824	0.7059	0.2116	0.000095	1.370

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 2 SIDE SLOPE = 1 : 1.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
300.0	0.5869	0.4695	0.4949	0.000895	0.606
300.0	0.6000	0.4800	0.4735	0.000796	0.634
300.0	0.6100	0.4880	0.4581	0.000728	0.655
300.0	0.6200	0.4960	0.4434	0.000668	0.677
300.0	0.6300	0.5040	0.4295	0.000613	0.699
300.0	0.6400	0.5120	0.4161	0.000564	0.721
300.0	0.6500	0.5200	0.4034	0.000519	0.744
300.0	0.6600	0.5280	0.3913	0.000479	0.767
300.0	0.6700	0.5360	0.3797	0.000442	0.790
300.0	0.6800	0.5440	0.3686	0.000408	0.814
300.0	0.6900	0.5520	0.3580	0.000378	0.838
300.0	0.7000	0.5600	0.3479	0.000350	0.862
300.0	0.7100	0.5680	0.3381	0.000324	0.887
300.0	0.7200	0.5760	0.3288	0.000301	0.912
300.0	0.7300	0.5840	0.3199	0.000280	0.938
300.0	0.7400	0.5920	0.3113	0.000260	0.964
300.0	0.7500	0.6000	0.3030	0.000242	0.990
300.0	0.7600	0.6080	0.2951	0.000226	1.017
300.0	0.7700	0.6160	0.2875	0.000210	1.044
300.0	0.7800	0.6240	0.2802	0.000196	1.071
300.0	0.7900	0.6320	0.2731	0.000183	1.098
300.0	0.8000	0.6400	0.2663	0.000172	1.126
300.0	0.8100	0.6480	0.2598	0.000161	1.155
300.0	0.8200	0.6560	0.2535	0.000150	1.183
300.0	0.8300	0.6640	0.2474	0.000141	1.212
300.0	0.8400	0.6720	0.2416	0.000132	1.242
300.0	0.8500	0.6800	0.2359	0.000124	1.272
300.0	0.8600	0.6880	0.2305	0.000117	1.302
300.0	0.8700	0.6960	0.2252	0.000110	1.332
300.0	0.8800	0.7040	0.2201	0.000103	1.363
300.0	0.8900	0.7120	0.2152	0.000097	1.394
300.0	0.8944	0.7155	0.2131	0.000095	1.408

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.040
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
20.0	0.1556	0.1245	0.3969	0.003367	0.050
20.0	0.1700	0.1360	0.3327	0.002103	0.060
20.0	0.1800	0.1440	0.2968	0.001551	0.067
20.0	0.1900	0.1520	0.2664	0.001162	0.075
20.0	0.2000	0.1600	0.2404	0.000884	0.083
20.0	0.2100	0.1680	0.2180	0.000681	0.092
20.0	0.2200	0.1760	0.1987	0.000532	0.101
20.0	0.2300	0.1840	0.1818	0.000419	0.110
20.0	0.2400	0.1920	0.1669	0.000334	0.120
20.0	0.2500	0.2000	0.1538	0.000269	0.130
20.0	0.2600	0.2080	0.1422	0.000218	0.141
20.0	0.2700	0.2160	0.1319	0.000178	0.152
20.0	0.2800	0.2240	0.1226	0.000147	0.163
20.0	0.2857	0.2286	0.1178	0.000132	0.170

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC.

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
30.0	0.1877	0.1501	0.4095	0.002792	0.073
30.0	0.2000	0.1600	0.3686	0.001989	0.083
30.0	0.2100	0.1680	0.3271	0.001533	0.092
30.0	0.2200	0.1760	0.2980	0.001196	0.101
30.0	0.2300	0.1840	0.2726	0.000944	0.110
30.0	0.2400	0.1920	0.2504	0.000752	0.120
30.0	0.2500	0.2000	0.2308	0.000605	0.130
30.0	0.2600	0.2080	0.2134	0.000491	0.141
30.0	0.2700	0.2160	0.1978	0.000401	0.152
30.0	0.2800	0.2240	0.1840	0.000331	0.163
30.0	0.2900	0.2320	0.171[illegible]	0.000274	0.175
30.0	0.3000	0.2400	0.1603	0.000229	0.187
30.0	0.3100	0.2480	0.1501	0.000192	0.200
30.0	0.3200	0.2560	0.1409	0.000162	0.213
30.0	0.3300	0.2640	0.1324	0.000138	0.227
30.0	0.3360	0.2688	0.1277	0.000125	0.235

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
40.0	0.2143	0.1715	0.4196	0.002445	0.096
40.0	0.2200	0.1760	0.3973	0.002127	0.101
40.0	0.2300	0.1840	0.3635	0.001678	0.110
40.0	0.2400	0.1920	0.3339	0.001337	0.120
40.0	0.2500	0.2000	0.3077	0.001076	0.130
40.0	0.2600	0.2080	0.2845	0.000873	0.141
40.0	0.2700	0.2160	0.2638	0.000713	0.152
40.0	0.2800	0.2240	0.2453	0.000588	0.163
40.0	0.2900	0.2320	0.2287	0.000487	0.175
40.0	0.3000	0.2400	0.2137	0.000407	0.187
40.0	0.3100	0.2480	0.2001	0.000342	0.200
40.0	0.3200	0.2560	0.1878	0.000288	0.213
40.0	0.3300	0.2640	0.1766	0.000245	0.227
40.0	0.3400	0.2720	0.1664	0.000209	0.240
40.0	0.3500	0.2800	0.1570	0.000179	0.255
40.0	0.3600	0.2880	0.1484	0.000154	0.270
40.0	0.3700	0.2960	0.1405	0.000133	0.285
40.0	0.3770	0.3016	0.1353	0.000120	0.296

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
50.0	0.2376	0.1901	0.4259	0.002206	0.117
50.0	0.2500	0.2000	0.3846	0.001681	0.130
50.0	0.2600	0.2080	0.3556	0.001363	0.141
50.0	0.2700	0.2160	0.3297	0.001115	0.152
50.0	0.2800	0.2240	0.3066	0.000918	0.163
50.0	0.2900	0.2320	0.2858	0.000762	0.175
50.0	0.3000	0.2400	0.2671	0.000636	0.187
50.0	0.3100	0.2480	0.2501	0.000534	0.200
50.0	0.3200	0.2560	0.2348	0.000450	0.213
50.0	0.3300	0.2640	0.2207	0.000382	0.227
50.0	0.3400	0.2720	0.2079	0.000326	0.240
50.0	0.3500	0.2800	0.1962	0.000279	0.255
50.0	0.3600	0.2880	0.1855	0.000240	0.270
50.0	0.3700	0.2960	0.1756	0.000200	0.285
50.0	0.3800	0.3040	0.1665	0.000180	0.300
50.0	0.3900	0.3120	0.1580	0.000157	0.316
50.0	0.4000	0.3200	0.1502	0.000137	0.333
50.0	0.4100	0.3280	0.1430	0.000120	0.350
50.0	0.4122	0.3298	0.1415	0.000117	0.353

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
60.0	0.2584	0.2067	0.4319	0.002028	0.139
60.0	0.2700	0.2160	0.3957	0.001605	0.152
60.0	0.2800	0.2240	0.3679	0.001322	0.163
60.0	0.2900	0.2320	0.3430	0.001097	0.175
60.0	0.3000	0.2400	0.3205	0.000915	0.187
60.0	0.3100	0.2480	0.3002	0.000768	0.200
60.0	0.3200	0.2560	0.2817	0.000649	0.213
60.0	0.3300	0.2640	0.2649	0.000551	0.227
60.0	0.3400	0.2720	0.2495	0.000469	0.240
60.0	0.3500	0.2800	0.2355	0.000402	0.255
60.0	0.3600	0.2880	0.2226	0.000346	0.270
60.0	0.3700	0.2960	0.2107	0.000299	0.285
60.0	0.3800	0.3040	0.1998	0.000259	0.300
60.0	0.3900	0.3120	0.1897	0.000226	0.316
60.0	0.4000	0.3200	0.1803	0.000197	0.333
60.0	0.4100	0.3280	0.1716	0.000173	0.350
60.0	0.4200	0.3360	0.1635	0.000152	0.367
60.0	0.4300	0.3440	0.1560	0.000134	0.385
60.0	0.4400	0.3520	0.1490	0.000119	0.403
60.0	0.4434	0.3547	0.1467	0.000114	0.409

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
70.0	0.2775	0.2220	0.4371	0.001188	0.160
70.0	0.2900	0.2320	0.4002	0.001493	0.175
70.0	0.3000	0.2400	0.3739	0.001246	0.187
70.0	0.3100	0.2480	0.3502	0.001046	0.200
70.0	0.3200	0.2560	0.3287	0.000883	0.213
70.0	0.3300	0.2640	0.3090	0.000749	0.227
70.0	0.3400	0.2720	0.2911	0.000639	0.240
70.0	0.3500	0.2800	0.2747	0.000547	0.255
70.0	0.3600	0.2880	0.2597	0.000471	0.270
70.0	0.3700	0.2960	0.2458	0.000407	0.285
70.0	0.3800	0.3040	0.2331	0.000353	0.300
70.0	0.3900	0.3120	0.2213	0.000307	0.316
70.0	0.4000	0.3200	0.2103	0.000269	0.333
70.0	0.4100	0.3280	0.2002	0.000235	0.350
70.0	0.4200	0.3360	0.1908	0.000207	0.367
70.0	0.4300	0.3440	0.1820	0.000183	0.385
70.0	0.4400	0.3520	0.1738	0.000162	0.403
70.0	0.4500	0.3600	0.1662	0.000143	0.421
70.0	0.4600	0.3680	0.1590	0.000127	0.440
70.0	0.4700	0.3760	0.1523	0.000114	0.459
70.0	0.4716	0.3773	0.1513	0.000112	0.463

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
80.0	0.2951	0.2361	0.4416	0.001776	0.181
80.0	0.3100	0.2480	0.4042	0.001366	0.200
80.0	0.3200	0.2560	0.3756	0.001153	0.213
80.0	0.3300	0.2640	0.3532	0.000979	0.227
80.0	0.3400	0.2720	0.3327	0.000835	0.240
80.0	0.3500	0.2800	0.3140	0.000715	0.255
80.0	0.3600	0.2880	0.2968	0.000615	0.270
80.0	0.3700	0.2960	0.2809	0.000532	0.285
80.0	0.3800	0.3040	0.2664	0.000461	0.300
80.0	0.3900	0.3120	0.2529	0.000402	0.316
80.0	0.4000	0.3200	0.2404	0.000351	0.333
80.0	0.4100	0.3280	0.2288	0.000308	0.350
80.0	0.4200	0.3360	0.2180	0.000270	0.367
80.0	0.4300	0.3440	0.2080	0.000239	0.385
80.0	0.4400	0.3520	0.1987	0.000211	0.403
80.0	0.4500	0.3600	0.1899	0.000187	0.421
80.0	0.4600	0.3680	0.1818	0.000166	0.440
80.0	0.4700	0.3760	0.1741	0.000148	0.459
80.0	0.4800	0.3840	0.1669	0.000133	0.479
80.0	0.4900	0.3920	0.1602	0.000119	0.499
80.0	0.4974	0.3980	0.1554	0.000110	0.515

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.259
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
80.0	0.2951	0.2361	0.4416	0.001776	0.181
80.0	0.3100	0.2480	0.4002	0.001366	0.200
80.0	0.3200	0.2560	0.3756	0.001153	0.213
80.0	0.3300	0.2640	0.3532	0.000979	0.227
80.0	0.3400	0.2720	0.3327	0.000835	0.240
80.0	0.3500	0.2800	0.3140	0.000715	0.255
80.0	0.3600	0.2880	0.2968	0.000615	0.270
80.0	0.3700	0.2960	0.2809	0.000532	0.285
80.0	0.3800	0.3040	0.2664	0.000461	0.300
80.0	0.3900	0.3120	0.2529	0.000402	0.316
80.0	0.4000	0.3200	0.2404	0.000351	0.333
80.0	0.4100	0.3280	0.2288	0.000308	0.350
80.0	0.4200	0.3360	0.2180	0.000270	0.367
80.0	0.4300	0.3440	0.2080	0.000239	0.385
80.0	0.4400	0.3520	0.1987	0.000211	0.403
80.0	0.4500	0.3600	0.1899	0.000187	0.421
80.0	0.4600	0.3680	0.1818	0.000166	0.440
80.0	0.4700	0.3760	0.1741	0.000148	0.459
80.0	0.4800	0.3840	0.1669	0.000133	0.479
80.0	0.4900	0.3920	0.1602	0.000119	0.499
80.0	0.4974	0.3980	0.1554	0.000110	0.515

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
100.0	0.3271	0.2617	0.4492	0.001602	0.223
100.0	0.3400	0.2720	0.4159	0.001304	0.240
100.0	0.3500	0.2800	0.3925	0.001117	0.255
100.0	0.3600	0.2880	0.3710	0.000961	0.270
100.0	0.3700	0.2960	0.3512	0.000831	0.285
100.0	0.3800	0.3040	0.3329	0.000721	0.300
100.0	0.3900	0.3120	0.3161	0.000627	0.316
100.0	0.4000	0.3200	0.3005	0.000548	0.333
100.0	0.4100	0.3280	0.2860	0.000480	0.350
100.0	0.4200	0.3360	0.2725	0.000423	0.367
100.0	0.4300	0.3440	0.2600	0.000373	0.385
100.0	0.4400	0.3520	0.2483	0.000330	0.403
100.0	0.4500	0.3600	0.2374	0.000292	0.421
100.0	0.4600	0.3680	0.2272	0.000260	0.440
100.0	0.4700	0.3760	0.2176	0.000232	0.459
100.0	0.4800	0.3840	0.2087	0.000207	0.479
100.0	0.4900	0.3920	0.2002	0.000186	0.499
100.0	0.5000	0.4000	0.1923	0.000167	0.520
100.0	0.5100	0.4080	0.1848	0.000150	0.541
100.0	0.5200	0.4160	0.1778	0.000135	0.562
100.0	0.5300	0.4240	0.1712	0.000122	0.584
100.0	0.5400	0.4320	0.1649	0.000111	0.607
100.0	0.5439	0.4351	0.1625	0.000106	0.615

LAM NAM DON
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LOUIS BERGER INTERNATIONAL INC.

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
110.0	0.3419	0.2735	0.4525	0.001533	0.243
110.0	0.3500	0.2800	0.4317	0.001352	0.255
110.0	0.3600	0.2880	0.4081	0.001163	0.270
110.0	0.3700	0.2960	0.3863	0.001005	0.285
110.0	0.3800	0.3040	0.3662	0.000872	0.300
110.0	0.3900	0.3120	0.3477	0.000759	0.316
110.0	0.4000	0.3200	0.3305	0.000663	0.333
110.0	0.4100	0.3280	0.3146	0.000581	0.350
110.0	0.4200	0.3360	0.2998	0.000511	0.367
110.0	0.4300	0.3440	0.2860	0.000451	0.385
110.0	0.4400	0.3520	0.2732	0.000399	0.403
110.0	0.4500	0.3600	0.2612	0.000354	0.421
110.0	0.4600	0.3680	0.2499	0.000315	0.440
110.0	0.4700	0.3760	0.2394	0.000281	0.459
110.0	0.4800	0.3840	0.2295	0.000251	0.479
110.0	0.4900	0.3920	0.2203	0.000225	0.499
110.0	0.5000	0.4000	0.2115	0.000202	0.520
110.0	0.5100	0.4080	0.2033	0.000182	0.541
110.0	0.5200	0.4160	0.1956	0.000164	0.562
110.0	0.5300	0.4240	0.1883	0.000148	0.584
110.0	0.5400	0.4320	0.1814	0.000134	0.607
110.0	0.5500	0.4400	0.1748	0.000121	0.629
110.0	0.5600	0.4480	0.1686	0.000110	0.652
110.0	0.5650	0.4520	0.1657	0.000105	0.664

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC.

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
120.0	0.3559	0.2847	0.4556	0.001472	0.263
120.0	0.3700	0.2960	0.4214	0.001196	0.285
120.0	0.3800	0.3040	0.3995	0.001038	0.300
120.0	0.3900	0.3120	0.3793	0.000903	0.316
120.0	0.4000	0.3200	0.3606	0.000789	0.333
120.0	0.4100	0.3280	0.3432	0.000692	0.350
120.0	0.4200	0.3360	0.3274	0.000608	0.367
120.0	0.4300	0.3440	0.3120	0.000537	0.385
120.0	0.4400	0.3520	0.2980	0.000475	0.403
120.0	0.4500	0.3600	0.2849	0.000421	0.421
120.0	0.4600	0.3680	0.2726	0.000375	0.440
120.0	0.4700	0.3760	0.2612	0.000334	0.459
120.0	0.4800	0.3840	0.2504	0.000298	0.479
120.0	0.4900	0.3920	0.2403	0.000267	0.499
120.0	0.5000	0.4000	0.2308	0.000240	0.520
120.0	0.5100	0.4080	0.2218	0.000216	0.541
120.0	0.5200	0.4160	0.2134	0.000195	0.562
120.0	0.5300	0.4240	0.2054	0.000176	0.584
120.0	0.5400	0.4320	0.1978	0.000159	0.607
120.0	0.5500	0.4400	0.1907	0.000144	0.629
120.0	0.5600	0.4480	0.1840	0.000131	0.652
120.0	0.5700	0.4560	0.1776	0.000119	0.676
120.0	0.5800	0.4640	0.1715	0.000109	0.700
120.0	0.5850	0.4680	0.1686	0.000104	0.712

LAM NAM DON
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LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
130.0	0.3693	0.2954	0.4584	0.001419	0.284
130.0	0.3800	0.3040	0.4328	0.001218	0.300
130.0	0.3900	0.3120	0.4109	0.001060	0.316
130.0	0.4000	0.3200	0.3906	0.000926	0.333
130.0	0.4100	0.3280	0.3718	0.000812	0.350
130.0	0.4200	0.3360	0.3543	0.000714	0.367
130.0	0.4300	0.3440	0.3380	0.000630	0.385
130.0	0.4400	0.3520	0.3228	0.000557	0.403
130.0	0.4500	0.3600	0.3086	0.000494	0.421
130.0	0.4600	0.3680	0.2954	0.000440	0.440
130.0	0.4700	0.3760	0.2829	0.000392	0.459
130.0	0.4800	0.3840	0.2713	0.000350	0.479
130.0	0.4900	0.3920	0.2603	0.000314	0.499
130.0	0.5000	0.4000	0.2500	0.000282	0.520
130.0	0.5100	0.4080	0.2403	0.000254	0.541
130.0	0.5200	0.4160	0.2311	0.000229	0.562
130.0	0.5300	0.4240	0.2225	0.000207	0.58[illegible]
130.0	0.5400	0.4320	0.2143	0.000187	0.607
130.0	0.5500	0.4400	0.2066	0.000169	0.629
130.0	0.5600	0.4480	0.1993	0.000151	0.652
130.0	0.5700	0.4560	0.1924	0.000140	0.676
130.0	0.5800	0.4640	0.1858	0.000128	0.700
130.0	0.5900	0.4720	0.1795	0.000117	0.724
130.0	0.6000	0.4800	0.1736	0.000107	0.749
130.0	0.6041	0.4833	0.1713	0.000103	0.759

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC.

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
140.0	0.3821	0.3057	0.4610	0.001371	0.304
140.0	0.3900	0.3120	0.4425	0.001230	0.316
140.0	0.4000	0.3200	0.4207	0.001074	0.333
140.0	0.4100	0.3280	0.4004	0.000942	0.350
140.0	0.4200	0.3360	0.3816	0.000828	0.367
140.0	0.4300	0.3440	0.3640	0.000731	0.385
140.0	0.4400	0.3520	0.3477	0.000646	0.403
140.0	0.4500	0.3600	0.3324	0.000573	0.421
140.0	0.4600	0.3680	0.3181	0.000510	0.440
140.0	0.4700	0.3760	0.3047	0.000455	0.459
140.0	0.4800	0.3840	0.2921	0.000406	0.479
140.0	0.4900	0.3920	0.2803	0.000364	0.499
140.0	0.5000	0.4000	0.2692	0.000327	0.520
140.0	0.5100	0.4080	0.2588	0.000294	0.541
140.0	0.5200	0.4160	0.2489	0.000265	0.562
140.0	0.5300	0.4240	0.2396	0.000240	0.584
140.0	0.5400	0.4320	0.2308	0.000217	0.607
140.0	0.5500	0.4400	0.2225	0.000197	0.629
140.0	0.5600	0.4480	0.2146	0.000179	0.652
140.0	0.5700	0.4560	0.2072	0.000162	0.676
140.0	0.5800	0.4640	0.2001	0.000148	0.700
140.0	0.5900	0.4720	0.1934	0.000135	0.724
140.0	0.6000	0.4800	0.1870	0.000124	0.749
140.0	0.6100	0.4880	0.1809	0.000113	0.774
140.0	0.6200	0.4960	0.1751	0.000104	0.800
140.0	0.6222	0.4978	0.1738	0.000102	0.805

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
150.0	0.3945	0.3156	0.4635	0.001328	0.324
150.0	0.4000	0.3200	0.4507	0.001233	0.333
150.0	0.4100	0.3280	0.4290	0.001081	0.350
150.0	0.4200	0.3360	0.4088	0.000951	0.367
150.0	0.4300	0.3440	0.3900	0.000839	0.385
150.0	0.4400	0.3520	0.3725	0.000742	0.403
150.0	0.4500	0.3600	0.3561	0.000658	0.421
150.0	0.4600	0.3680	0.3408	0.000585	0.440
150.0	0.4700	0.3760	0.3265	0.000522	0.459
150.0	0.4800	0.3840	0.3130	0.000466	0.479
150.0	0.4900	0.3920	0.3004	0.000418	0.499
150.0	0.5000	0.4000	0.2885	0.000375	0.520
150.0	0.5100	0.4080	0.2773	0.000338	0.541
150.0	0.5200	0.4160	0.2667	0.000304	0.562
150.0	0.5300	0.4240	0.2567	0.000275	0.584
150.0	0.5400	0.4320	0.2473	0.000249	0.607
150.0	0.5500	0.4400	0.2384	0.000226	0.629
150.0	0.5600	0.4480	0.2300	0.000205	0.652
150.0	0.5700	0.4560	0.2220	0.000187	0.676
150.0	0.5800	0.4640	0.2144	0.000170	0.700
150.0	0.5900	0.4720	0.2072	0.000155	0.724
150.0	0.6000	0.4800	0.2003	0.000142	0.749
150.0	0.6100	0.4880	0.1938	0.000130	0.774
150.0	0.6200	0.4960	0.1876	0.000119	0.800
150.0	0.6390	0.5040	0.1817	0.000109	0.826
150.0	0.6397	0.5117	0.1763	0.000101	0.851

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
160.0	0.4064	0.3251	0.4658	0.001289	0.344
160.0	0.4200	0.3360	0.4361	0.001082	0.367
160.0	0.4300	0.3440	0.4160	0.000954	0.385
160.0	0.4400	0.3520	0.3973	0.000844	0.403
160.0	0.4500	0.3600	0.3799	0.000749	0.421
160.0	0.4600	0.3680	0.3635	0.000666	0.440
160.0	0.4700	0.3760	0.3482	0.000594	0.459
160.0	0.4800	0.3840	0.3339	0.000531	0.479
160.0	0.4900	0.3920	0.3204	0.000475	0.499
160.0	0.5000	0.4000	0.3077	0.000427	0.520
160.0	0.5100	0.4080	0.2957	0.000384	0.541
160.0	0.5200	0.4160	0.2845	0.000346	0.562
160.0	0.5300	0.4240	0.2738	0.000313	0.58[illegible]
160.0	0.5400	0.4320	0.2638	0.000283	0.607
160.0	0.5500	0.4400	0.2543	0.000257	0.629
160.0	0.5600	0.4480	0.2453	0.000233	0.652
160.0	0.5700	0.4560	0.2368	0.000212	0.676
160.0	0.5800	0.4640	0.2287	0.000193	0.700
160.0	0.5900	0.4720	0.2210	0.000177	0.724
160.0	0.6000	0.4800	0.2137	0.000161	0.749
160.0	0.6100	0.4880	0.2067	0.000148	0.774
160.0	0.6200	0.4960	0.2001	0.000136	0.800
160.0	0.6300	0.5040	0.1938	0.000124	0.826
160.0	0.6400	0.5120	0.1878	0.000114	0.852
160.0	0.6500	0.5200	0.1821	0.000105	0.879
160.0	0.6564	0.5251	0.1785	0.000100	0.896

LAM NAM OON,
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
170.0	0.4179	0.3343	0.4679	0.001254	0.363
170.0	0.4300	0.3440	0.4420	0.001077	0.385
170.0	0.4400	0.3520	0.4222	0.000953	0.403
170.0	0.4500	0.3600	0.4036	0.000845	0.421
170.0	0.4600	0.3680	0.3863	0.000752	0.440
170.0	0.4700	0.3760	0.3700	0.000670	0.459
170.0	0.4800	0.3840	0.3547	0.000599	0.479
170.0	0.4900	0.3920	0.3404	0.000537	0.499
170.0	0.5000	0.4000	0.3269	0.000482	0.520
170.0	0.5100	0.4080	0.3142	0.000434	0.541
170.0	0.5200	0.4160	0.3023	0.000391	0.562
170.0	0.5300	0.4240	0.2910	0.000353	0.584
170.0	0.5400	0.4320	0.2803	0.000320	0.607
170.0	0.5500	0.4400	0.2702	0.000290	0.629
170.0	0.5600	0.4480	0.2606	0.000263	0.652
170.0	0.5700	0.4560	0.2516	0.000240	0.676
170.0	0.5800	0.4640	0.2430	0.000218	0.700
170.0	0.5900	0.4720	0.2348	0.000199	0.724
170.0	0.6000	0.4800	0.2270	0.000182	0.749
170.0	0.6100	0.4880	0.2196	0.000167	0.774
170.0	0.6200	0.4960	0.2126	0.000153	0.800
170.0	0.6300	0.5040	0.2059	0.000140	0.826
170.0	0.6400	0.5120	0.1995	0.000129	0.852
170.0	0.6500	0.5200	0.1934	0.000119	0.879
170.0	0.6600	0.5280	0.1876	0.000110	0.906
170.0	0.6700	0.5360	0.1821	0.000101	0.934
170.0	0.6725	0.5380	0.1807	0.000099	0.941

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
180.0	0.4291	0.3433	0.4700	0.001221	0.383
180.0	0.4400	0.3520	0.4470	0.001060	0.403
180.0	0.4500	0.3600	0.4274	0.000948	0.421
180.0	0.4600	0.3680	0.4090	0.000843	0.440
180.0	0.4700	0.3760	0.3918	0.000751	0.459
180.0	0.4800	0.3840	0.3756	0.000672	0.479
180.0	0.4900	0.3920	0.3604	0.000602	0.499
180.0	0.5000	0.4000	0.3462	0.000540	0.520
180.0	0.5100	0.4080	0.3327	0.000486	0.541
180.0	0.5200	0.4160	0.3200	0.000438	0.562
180.0	0.5300	0.4240	0.3081	0.000396	0.584
180.0	0.5400	0.4320	0.2968	0.000358	0.607
180.0	0.5500	0.4400	0.2861	0.000325	0.629
180.0	0.5600	0.4480	0.2760	0.000295	0.653
180.0	0.5700	0.4560	0.2664	0.000269	0.676
180.0	0.5800	0.4640	0.2572	0.000245	0.700
180.0	0.5900	0.4720	0.2486	0.000223	0.724
180.0	0.6000	0.4800	0.2404	0.000204	0.749
180.0	0.6100	0.4880	0.2326	0.000187	0.774
180.0	0.6200	0.4960	0.2251	0.000172	0.800
180.0	0.6300	0.5040	0.2180	0.000157	0.826
180.0	0.6400	0.5120	0.2113	0.000145	0.852
180.0	0.6500	0.5200	0.2048	0.000133	0.879
180.0	0.6600	0.5280	0.1987	0.000123	0.906
180.0	0.6700	0.5360	0.1928	0.000113	0.934
180.0	0.6800	0.5440	0.1872	0.000105	0.962
180.0	0.6800	0.5504	0.1828	0.000098	0.985

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (CF) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
190.0	0.4399	0.3520	0.4720	0.001194	0.403
190.0	0.4500	0.3600	0.4511	0.001056	0.421
190.0	0.4600	0.3680	0.4317	0.000939	0.440
190.0	0.4700	0.3760	0.4135	0.000837	0.459
190.0	0.4800	0.3840	0.3965	0.000748	0.479
190.0	0.4900	0.3920	0.3805	0.000670	0.499
190.0	0.5000	0.4000	0.3654	0.000602	0.520
190.0	0.5100	0.4080	0.3512	0.000542	0.541
190.0	0.5200	0.4160	0.3378	0.000488	0.562
190.0	0.5300	0.4240	0.3252	0.000441	0.584
190.0	0.5400	0.4320	0.3133	0.000399	0.607
190.0	0.5500	0.4400	0.3020	0.000362	0.629
190.0	0.5600	0.4480	0.2913	0.000329	0.652
190.0	0.5700	0.4560	0.2812	0.000299	0.676
190.0	0.5800	0.4640	0.2715	0.000273	0.700
190.0	0.5900	0.4720	0.2624	0.000249	0.724
190.0	0.6000	0.4800	0.2537	0.000228	0.749
190.0	0.6100	0.4880	0.2455	0.000208	0.774
190.0	0.6200	0.4960	0.2376	0.000191	0.800
190.0	0.6300	0.5040	0.2301	0.000175	0.826
190.0	0.6400	0.5120	0.2230	0.000161	0.852
190.0	0.6500	0.5200	0.2162	0.000149	0.879
190.0	0.6600	0.5280	0.2097	0.000137	0.906
190.0	0.6700	0.5360	0.2035	0.000126	0.934
190.0	0.6800	0.5440	0.1975	0.000117	0.962
190.0	0.6900	0.5520	0.1919	0.000108	0.990
190.0	0.7000	0.5600	0.1864	0.000100	1.019
190.0	0.7031	0.5625	0.1848	0.000098	1.028

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
200.0	0.4505	0.3604	0.4738	0.001163	0.422
200.0	0.4600	0.3680	0.4584	0.001040	0.440
200.0	0.4700	0.3760	0.4433	0.000928	0.459
200.0	0.4800	0.3840	0.4173	0.000829	0.479
200.0	0.4900	0.3920	0.4005	0.000743	0.499
200.0	0.5000	0.4000	0.3846	0.000667	0.520
200.0	0.5100	0.4080	0.3697	0.000600	0.541
200.0	0.5200	0.4160	0.3556	0.000541	0.562
200.0	0.5300	0.4240	0.3423	0.000489	0.584
200.0	0.5400	0.4320	0.3297	0.000442	0.607
200.0	0.5500	0.4400	0.3179	0.000401	0.629
200.0	0.5600	0.4480	0.3066	0.000364	0.652
200.0	0.5700	0.4560	0.2959	0.000332	0.676
200.0	0.5800	0.4640	0.2858	0.000302	0.700
200.0	0.5900	0.4720	0.2762	0.000276	0.724
200.0	0.6000	0.4800	0.2671	0.000252	0.749
200.0	0.6100	0.4880	0.2584	0.000231	0.774
200.0	0.6200	0.4960	0.2501	0.000212	0.800
200.0	0.6300	0.5040	0.2423	0.000194	0.826
200.0	0.6400	0.5120	0.2348	0.000179	0.852
200.0	0.6500	0.5200	0.2276	0.000165	0.879
200.0	0.6600	0.5280	0.2207	0.000152	0.906
200.0	0.6700	0.5360	0.2142	0.000140	0.934
200.0	0.6800	0.5440	0.2079	0.000129	0.962
200.0	0.6900	0.5520	0.2020	0.000120	0.990
200.0	0.7000	0.5600	0.1962	0.000111	1.019
200.0	0.7100	0.5680	0.1907	0.000103	1.049
200.0	0.7177	0.5741	0.1867	0.000097	1.071

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC.

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
210.0	0.4607	0.3686	0.4756	0.001137	0.442
210.0	0.4700	0.3760	0.4570	0.001023	0.459
210.0	0.4800	0.3840	0.4382	0.000914	0.479
210.0	0.4900	0.3920	0.4205	0.000819	0.499
210.0	0.5000	0.4000	0.4038	0.000735	0.520
210.0	0.5100	0.4080	0.3882	0.000662	0.541
210.0	0.5200	0.4160	0.3733	0.000597	0.562
210.0	0.5300	0.4240	0.3594	0.000539	0.584
210.0	0.5400	0.4320	0.3462	0.000488	0.607
210.0	0.5500	0.4400	0.3338	0.000442	0.629
210.0	0.5600	0.4480	0.3219	0.000402	0.652
210.0	0.5700	0.4560	0.3107	0.000366	0.676
210.0	0.5800	0.4640	0.3001	0.000333	0.700
210.0	0.5900	0.4720	0.2900	0.000304	0.724
210.0	0.6000	0.4800	0.2804	0.000278	0.749
210.0	0.6100	0.4880	0.2713	0.000255	0.774
210.0	0.6200	0.4960	0.2626	0.000233	0.800
210.0	0.6300	0.5040	0.2544	0.000214	0.826
210.0	0.6400	0.5120	0.2465	0.000197	0.852
210.0	0.6500	0.5200	0.2390	0.000181	0.879
210.0	0.6600	0.5280	0.2318	0.000167	0.906
210.0	0.6700	0.5360	0.2249	0.000154	0.934
210.0	0.6800	0.5440	0.2183	0.000143	0.962
210.0	0.6900	0.5520	0.2121	0.000132	0.990
210.0	0.7000	0.5600	0.2060	0.000122	1.019
210.0	0.7100	0.5680	0.2003	0.000113	1.049
210.0	0.7200	0.5760	0.1948	0.000105	1.078
210.0	0.7300	0.5840	0.1895	0.000098	1.108
210.0	0.7318	0.5854	0.1885	0.000096	1.114

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
220.0	0.4707	0.3766	0.4773	0.001113	0.461
220.0	0.4800	0.3840	0.4591	0.001003	0.479
220.0	0.4900	0.3920	0.4405	0.000899	0.499
220.0	0.5000	0.4000	0.4231	0.000807	0.520
220.0	0.5100	0.4080	0.4066	0.000726	0.541
220.0	0.5200	0.4160	0.3912	0.000655	0.562
220.0	0.5300	0.4240	0.3765	0.000591	0.584
220.0	0.5400	0.4320	0.3627	0.000535	0.607
220.0	0.5500	0.4400	0.3497	0.000485	0.629
220.0	0.5600	0.4480	0.3373	0.000441	0.652
220.0	0.5700	0.4560	0.3255	0.000401	0.676
220.0	0.5800	0.4640	0.3144	0.000366	0.700
220.0	0.5900	0.4720	0.3038	0.000334	0.724
220.0	0.6000	0.4800	0.2938	0.000305	0.749
220.0	0.6100	0.4880	0.2842	0.000279	0.774
220.0	0.6200	0.4960	0.2752	0.000256	0.800
220.0	0.6300	0.5040	0.2665	0.000235	0.826
220.0	0.6400	0.5120	0.2582	0.000216	0.852
220.0	0.6500	0.5200	0.2503	0.000199	0.879
220.0	0.6600	0.5280	0.2428	0.000184	0.906
220.0	0.6700	0.5360	0.2356	0.000169	0.934
220.0	0.6800	0.5440	0.2287	0.000157	0.962
220.0	0.6900	0.5520	0.2222	0.000145	0.990
220.0	0.7000	0.5600	0.2159	0.000134	1.019
220.0	0.7100	0.5680	0.2098	0.000124	1.049
220.0	0.7200	0.5760	0.2040	0.000115	1.078
220.0	0.7300	0.5840	0.1985	0.000107	1.108
220.0	0.7400	0.5920	0.1932	0.000100	1.139
220.0	0.7455	0.5964	0.1903	0.000096	1.156

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (CF) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
230.0	0.4805	0.3844	0.4789	0.001091	0.480
230.0	0.4900	0.3720	0.4605	0.000982	0.499
230.0	0.5000	0.4000	0.4423	0.000882	0.520
230.0	0.5100	0.4080	0.4251	0.000794	0.541
230.0	0.5200	0.4160	0.4089	0.000716	0.562
230.0	0.5300	0.4240	0.3937	0.000646	0.584
230.0	0.5400	0.4320	0.3792	0.000585	0.607
230.0	0.5500	0.4400	0.3655	0.000531	0.629
230.0	0.5600	0.4480	0.3526	0.000482	0.652
230.0	0.5700	0.4560	0.3403	0.000439	0.675
230.0	0.5800	0.4640	0.3287	0.000400	0.700
230.0	0.5900	0.4720	0.3177	0.000365	0.724
230.0	0.6000	0.4800	0.3072	0.000334	0.749
230.0	0.6100	0.4880	0.2972	0.000305	0.775
230.0	0.6200	0.4960	0.2877	0.000280	0.800
230.0	0.6300	0.5040	0.2786	0.000257	0.826
230.0	0.6400	0.5120	0.2700	0.000236	0.852
230.0	0.6500	0.5200	0.2617	0.000218	0.879
230.0	0.6600	0.5280	0.2538	0.000201	0.906
230.0	0.6700	0.5360	0.2463	0.000185	0.934
230.0	0.6800	0.5440	0.2391	0.000171	0.962
230.0	0.6900	0.5520	0.2323	0.000158	0.990
230.0	0.7000	0.5600	0.2257	0.000147	1.019
230.0	0.7100	0.5680	0.2194	0.000136	1.049
230.0	0.7200	0.5760	0.2133	0.000126	1.078
230.0	0.7300	0.5840	0.2075	0.000117	1.108
230.0	0.7400	0.5920	0.2019	0.000109	1.139
230.0	0.7500	0.6000	0.1966	0.000101	1.170
230.0	0.7589	0.6071	0.1920	0.000095	1.198

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC.

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3

SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (n) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
240.0	0.4900	0.3920	0.4805	0.001069	0.499
240.0	0.5000	0.4000	0.4615	0.000960	0.520
240.0	0.5100	0.4080	0.4436	0.000864	0.541
240.0	0.5200	0.4160	0.4267	0.000779	0.562
240.0	0.5300	0.4240	0.4108	0.000704	0.584
240.0	0.5400	0.4320	0.3957	0.000637	0.607
240.0	0.5500	0.4400	0.3814	0.000578	0.629
240.0	0.5600	0.4480	0.3679	0.000525	0.652
240.0	0.5700	0.4560	0.3551	0.000477	0.676
240.0	0.5800	0.4640	0.3430	0.000435	0.700
240.0	0.5900	0.4720	0.3315	0.000397	0.724
240.0	0.6000	0.4800	0.3205	0.000363	0.749
240.0	0.6100	0.4880	0.3101	0.000333	0.774
240.0	0.6200	0.4960	0.3002	0.000305	0.800
240.0	0.6300	0.5040	0.2907	0.000280	0.826
240.0	0.6400	0.5120	0.2817	0.000257	0.852
240.0	0.6500	0.5200	0.2731	0.000237	0.879
240.0	0.6600	0.5280	0.2649	0.000218	0.906
240.0	0.6700	0.5360	0.2570	0.000202	0.934
240.0	0.6800	0.5440	0.2495	0.000186	0.962
240.0	0.6900	0.5520	0.2424	0.000172	0.990
240.0	0.7000	0.5600	0.2355	0.000160	1.019
240.0	0.7100	0.5680	0.2289	0.000148	1.049
240.0	0.7200	0.5760	0.2226	0.000137	1.078
240.0	0.7300	0.5840	0.2165	0.000128	1.108
240.0	0.7400	0.5920	0.2107	0.000119	1.139
240.0	0.7500	0.6000	0.2051	0.000110	1.170
240.0	0.7600	0.6080	0.1998	0.000103	1.201
240.0	0.7700	0.6160	0.1946	0.000096	1.233
240.0	0.7720	0.6176	0.1936	0.000095	1.240

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3

SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
250.0	0.4993	0.3995	0.4820	0.001049	0.519
250.0	0.5100	0.4080	0.4621	0.000938	0.541
250.0	0.5200	0.4160	0.4445	0.000845	0.562
250.0	0.5300	0.4240	0.4279	0.000764	0.584
250.0	0.5400	0.4320	0.4122	0.000691	0.607
250.0	0.5500	0.4400	0.3973	0.000627	0.629
250.0	0.5600	0.4480	0.3833	0.000569	0.652
250.0	0.5700	0.4560	0.3699	0.000518	0.676
250.0	0.5800	0.4640	0.3573	0.000472	0.700
250.0	0.5900	0.4720	0.3453	0.000431	0.724
250.0	0.6000	0.4800	0.3339	0.000394	0.749
250.0	0.6100	0.4880	0.3230	0.000361	0.774
250.0	0.6200	0.4960	0.3127	0.000331	0.800
250.0	0.6300	0.5040	0.3028	0.000304	0.826
250.0	0.6400	0.5120	0.2934	0.000279	0.852
250.0	0.6500	0.5200	0.2845	0.000257	0.879
250.0	0.6600	0.5280	0.2759	0.000237	0.906
250.0	0.6700	0.5360	0.2677	0.000219	0.934
250.0	0.6800	0.5440	0.2599	0.000202	0.962
250.0	0.6900	0.5520	0.2525	0.000187	0.990
250.0	0.7000	0.5600	0.2453	0.000173	1.019
250.0	0.7100	0.5680	0.2384	0.000161	1.049
250.0	0.7200	0.5760	0.2319	0.000149	1.078
250.0	0.7300	0.5840	0.2255	0.000138	1.108
250.0	0.7400	0.5920	0.2195	0.000129	1.139
250.0	0.7500	0.6000	0.2137	0.000120	1.170
250.0	0.7600	0.6080	0.2081	0.000112	1.201
250.0	0.7700	0.6160	0.2027	0.000104	1.233
250.0	0.7800	0.6240	0.1976	0.000097	1.265
250.0	0.7847	0.6277	0.1952	0.000094	1.281

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (CF) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
260.0	0.5085	0.4068	0.4835	0.001031	0.538
260.0	0.5200	0.4160	0.4623	0.000914	0.562
260.0	0.5300	0.4240	0.4450	0.000826	0.584
260.0	0.5400	0.4320	0.4287	0.000748	0.607
260.0	0.5500	0.4400	0.4132	0.000678	0.629
260.0	0.5600	0.4480	0.3986	0.000616	0.652
260.0	0.5700	0.4560	0.3847	0.000560	0.676
260.0	0.5800	0.4640	0.3716	0.000511	0.700
260.0	0.5900	0.4720	0.3591	0.000466	0.724
260.0	0.6000	0.4800	0.3472	0.000426	0.749
260.0	0.6100	0.4880	0.3359	0.000390	0.774
260.0	0.6200	0.4960	0.3252	0.000358	0.800
260.0	0.6300	0.5040	0.3149	0.000329	0.826
260.0	0.6400	0.5120	0.3052	0.000302	0.852
260.0	0.6500	0.5200	0.2959	0.000278	0.879
260.0	0.6600	0.5280	0.2870	0.000256	0.906
260.0	0.6700	0.5360	0.2785	0.000237	0.934
260.0	0.6800	0.5440	0.2703	0.000219	0.962
260.0	0.6900	0.5520	0.2625	0.000202	0.990
260.0	0.7000	0.5600	0.2551	0.000187	1.019
260.0	0.7100	0.5680	0.2480	0.000174	1.049
260.0	0.7200	0.5760	0.2411	0.000161	1.078
260.0	0.7300	0.5840	0.2346	0.000150	1.108
260.0	0.7400	0.5920	0.2283	0.000139	1.139
260.0	0.7500	0.6000	0.2222	0.000130	1.170
260.0	0.7600	0.6080	0.2164	0.000121	1.201
260.0	0.7700	0.6160	0.2108	0.000113	1.233
260.0	0.7800	0.6240	0.2055	0.000105	1.265
260.0	0.7900	0.6320	0.2003	0.000098	1.298
260.0	0.7971	0.6377	0.1968	0.000094	1.321

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
270.0	0.5174	0.4139	0.4849	0.001013	0.557
270.0	0.5300	0.4240	0.4621	0.000891	0.584
270.0	0.5400	0.4320	0.4452	0.000806	0.607
270.0	0.5500	0.4400	0.4291	0.000731	0.629
270.0	0.5600	0.4480	0.4139	0.000664	0.652
270.0	0.5700	0.4560	0.3995	0.000604	0.676
270.0	0.5800	0.4640	0.3859	0.000551	0.700
270.0	0.5900	0.4720	0.3729	0.000503	0.724
270.0	0.6000	0.4800	0.3606	0.000460	0.749
270.0	0.6100	0.4880	0.3489	0.000421	0.774
270.0	0.6200	0.4960	0.3377	0.000386	0.800
270.0	0.6300	0.5040	0.3271	0.000354	0.826
270.0	0.6400	0.5120	0.3169	0.000326	0.852
270.0	0.6500	0.5200	0.3072	0.000300	0.879
270.0	0.6600	0.5280	0.2980	0.000276	0.906
270.0	0.6700	0.5360	0.2892	0.000255	0.934
270.0	0.6800	0.5440	0.2807	0.000236	0.962
270.0	0.6900	0.5520	0.2726	0.000218	0.990
270.0	0.7000	0.5600	0.2649	0.000202	1.019
270.0	0.7100	0.5680	0.2575	0.000187	1.049
270.0	0.7200	0.5760	0.2504	0.000174	1.078
270.0	0.7300	0.5840	0.2436	0.000162	1.108
270.0	0.7400	0.5920	0.2370	0.000150	1.139
270.0	0.7500	0.6000	0.2308	0.000140	1.170
270.0	0.7600	0.6080	0.2247	0.000130	1.201
270.0	0.7700	0.6160	0.2189	0.000122	1.233
270.0	0.7800	0.6240	0.2134	0.000113	1.265
270.0	0.7900	0.6320	0.2080	0.000106	1.298
270.0	0.8000	0.6400	0.2028	0.000099	1.331
270.0	0.8092	0.6474	0.1982	0.000093	1.362

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3: SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
270.0	0.5174	0.4139	0.4849	0.001013	0.557
270.0	0.5300	0.4240	0.4621	0.000891	0.584
270.0	0.5400	0.4320	0.4452	0.000806	0.607
270.0	0.5500	0.4400	0.4291	0.000731	0.629
270.0	0.5600	0.4480	0.4139	0.000664	0.652
270.0	0.5700	0.4560	0.3995	0.000604	0.676
270.0	0.5800	0.4640	0.3859	0.000551	0.700
270.0	0.5900	0.4720	0.3729	0.000503	0.724
270.0	0.6000	0.4800	0.3606	0.000460	0.749
270.0	0.6100	0.4880	0.3489	0.000421	0.774
270.0	0.6200	0.4960	0.3377	0.000386	0.800
270.0	0.6300	0.5040	0.3271	0.000354	0.826
270.0	0.6400	0.5120	0.3169	0.000326	0.852
270.0	0.6500	0.5200	0.3072	0.000300	0.879
270.0	0.6600	0.5280	0.2980	0.000276	0.906
270.0	0.6700	0.5360	0.2892	0.000255	0.934
270.0	0.6800	0.5440	0.2807	0.000236	0.962
270.0	0.6900	0.5520	0.2726	0.000218	0.990
270.0	0.7000	0.5600	0.2649	0.000202	1.019
270.0	0.7100	0.5680	0.2575	0.000187	1.049
270.0	0.7200	0.5760	0.2504	0.000174	1.078
270.0	0.7300	0.5840	0.2436	0.000162	1.108
270.0	0.7400	0.5920	0.2370	0.000150	1.139
270.0	0.7500	0.6000	0.2308	0.000140	1.170
270.0	0.7600	0.6080	0.2247	0.000130	1.201
270.0	0.7700	0.6160	0.2189	0.000122	1.233
270.0	0.7800	0.6240	0.2134	0.000113	1.265
270.0	0.7900	0.6320	0.2080	0.000106	1.298
270.0	0.8000	0.6400	0.2028	0.000099	1.331
270.0	0.8092	0.6474	0.1982	0.000093	1.362

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
290.0	0.5348	0.4278	0.4876	0.000980	0.595
290.0	0.5400	0.4320	0.4781	0.000930	0.607
290.0	0.5500	0.4400	0.4609	0.000843	0.629
290.0	0.5600	0.4480	0.4446	0.000766	0.652
290.0	0.5700	0.4560	0.4291	0.000697	0.676
290.0	0.5800	0.4640	0.4145	0.000635	0.700
290.0	0.5900	0.4720	0.4005	0.000580	0.724
290.0	0.6000	0.4800	0.3873	0.000530	0.749
290.0	0.6100	0.4880	0.3747	0.000486	0.774
290.0	0.6200	0.4960	0.3627	0.000445	0.800
290.0	0.6300	0.5040	0.3513	0.000409	0.826
290.0	0.6400	0.5120	0.3404	0.000376	0.852
290.0	0.6500	0.5200	0.3300	0.000346	0.879
290.0	0.6600	0.5280	0.3201	0.000319	0.906
290.0	0.6700	0.5360	0.3106	0.000294	0.934
290.0	0.6800	0.5440	0.3015	0.000272	0.962
290.0	0.6900	0.5520	0.2928	0.000252	0.990
290.0	0.7000	0.5600	0.2845	0.000233	1.019
290.0	0.7100	0.5680	0.2766	0.000216	1.049
290.0	0.7200	0.5760	0.2689	0.000201	1.078
290.0	0.7300	0.5840	0.2616	0.000186	1.108
290.0	0.7400	0.5920	0.2546	0.000173	1.139
290.0	0.7500	0.6000	0.2479	0.000161	1.170
290.0	0.7600	0.6080	0.2414	0.000150	1.201
290.0	0.7700	0.6160	0.2352	0.000140	1.233
290.0	0.7800	0.6240	0.2292	0.000131	1.265
290.0	0.7900	0.6320	0.2234	0.000122	1.298
290.0	0.8000	0.6400	0.2178	0.000114	1.331
290.0	0.8100	0.6480	0.2125	0.000107	1.365
290.0	0.8200	0.6560	0.2074	0.000100	1.399
290.0	0.8300	0.6640	0.2024	0.000094	1.433
290.0	0.8327	0.6661	0.2011	0.000092	1.442

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
290.0	0.5348	0.4270	0.4876	0.000980	0.595
290.0	0.5400	0.4320	0.4781	0.000930	0.607
290.0	0.5500	0.4400	0.4609	0.000843	0.629
290.0	0.5600	0.4480	0.4446	0.000766	0.652
290.0	0.5700	0.4560	0.4291	0.000697	0.676
290.0	0.5800	0.4640	0.4145	0.000635	0.700
290.0	0.5900	0.4720	0.4005	0.000580	0.724
290.0	0.6000	0.4800	0.3873	0.000530	0.749
290.0	0.6100	0.4880	0.3747	0.000486	0.774
290.0	0.6200	0.4960	0.3627	0.000445	0.800
290.0	0.6300	0.5040	0.3513	0.000409	0.826
290.0	0.6400	0.5120	0.3404	0.000376	0.852
290.0	0.6500	0.5200	0.3300	0.000346	0.879
290.0	0.6600	0.5280	0.3201	0.000319	0.906
290.0	0.6700	0.5360	0.3106	0.000294	0.934
290.0	0.6800	0.5440	0.3015	0.000272	0.962
290.0	0.6900	0.5520	0.2928	0.000252	0.990
290.0	0.7000	0.5600	0.2845	0.000233	1.019
290.0	0.7100	0.5680	0.2766	0.000216	1.049
290.0	0.7200	0.5760	0.2689	0.000201	1.078
290.0	0.7300	0.5840	0.2616	0.000186	1.108
290.0	0.7400	0.5920	0.2546	0.000173	1.139
290.0	0.7500	0.6000	0.2479	0.000161	1.170
290.0	0.7600	0.6080	0.2414	0.000150	1.201
290.0	0.7700	0.6160	0.2352	0.000140	1.233
290.0	0.7800	0.6240	0.2292	0.000131	1.265
290.0	0.7900	0.6320	0.2234	0.000122	1.298
290.0	0.8000	0.6400	0.2178	0.000114	1.331
290.0	0.8100	0.6480	0.2125	0.000107	1.365
290.0	0.8200	0.6560	0.2074	0.000100	1.399
290.0	0.8300	0.6640	0.2024	0.000094	1.433
290.0	0.8327	0.6661	0.2011	0.000092	1.442

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TAB E. 3 SIDE SLOPE = 1 : 2

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (CF) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b. (m)	d (m)	V (m/sec)	S (m/m)	A. (m^2)
300.0	0.5432	0.4345	0.4888	0.000965	0.614
300.0	0.5500	0.4400	0.4768	0.000903	0.629
300.0	0.5600	0.4480	0.4599	0.000820	0.652
300.0	0.5700	0.4560	0.4439	0.000746	0.676
300.0	0.5800	0.4640	0.4287	0.000680	0.700
300.0	0.5900	0.4720	0.4143	0.000621	0.724
300.0	0.6000	0.4800	0.4006	0.000568	0.749
300.0	0.6100	0.4880	0.3876	0.000520	0.774
300.0	0.6200	0.4960	0.3752	0.000476	0.800
300.0	0.6300	0.5040	0.3634	0.000437	0.826
300.0	0.6400	0.5120	0.3521	0.000402	0.852
300.0	0.6500	0.5200	0.3414	0.000370	0.879
300.0	0.6600	0.5280	0.3311	0.000341	0.906
300.0	0.6700	0.5360	0.3213	0.000315	0.934
300.0	0.6800	0.5440	0.3119	0.000291	0.962
300.0	0.6900	0.5520	0.3029	0.000269	0.990
300.0	0.7000	0.5600	0.2943	0.000249	1.019
300.0	0.7100	0.5680	0.2861	0.000231	1.049
300.0	0.7200	0.5760	0.2782	0.000215	1.078
300.0	0.7300	0.5840	0.2707	0.000199	1.108
300.0	0.7400	0.5920	0.2634	0.000185	1.139
300.0	0.7500	0.6000	0.2564	0.000173	1.170
300.0	0.7600	0.6080	0.2497	0.000161	1.201
300.0	0.7700	0.6160	0.2433	0.000150	1.233
300.0	0.7800	0.6240	0.2371	0.000140	1.265
300.0	0.7900	0.6320	0.2311	0.000131	1.298
300.0	0.8000	0.6400	0.2254	0.000122	1.331
300.0	0.8100	0.6480	0.2198	0.000115	1.365
300.0	0.8200	0.6560	0.2145	0.000107	1.399
300.0	0.8300	0.6640	0.2094	0.000101	1.433
300.0	0.8400	0.6720	0.2044	0.000094	1.468
300.0	0.8440	0.6752	0.2025	0.000092	1.482

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LOUIS BERGER INTERNATIONAL INC.

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
20.0	0.1458	0.1166	0.3923	0.003613	0.051
20.0	0.1600	0.1280	0.3255	0.002197	0.061
20.0	0.1700	0.1360	0.2884	0.001593	0.069
20.0	0.1800	0.1440	0.2572	0.001172	0.078
20.0	0.1900	0.1520	0.2308	0.000879	0.087
20.0	0.2000	0.1600	0.2083	0.000668	0.096
20.0	0.2100	0.1680	0.1890	0.000515	0.106
20.0	0.2200	0.1760	0.1722	0.000402	0.116
20.0	0.2300	0.1840	0.1575	0.000317	0.127
20.0	0.2400	0.1920	0.1447	0.000253	0.139
20.0	0.2500	0.2000	0.1333	0.000203	0.150
20.0	0.2600	0.2080	0.1233	0.000165	0.162
20.0	0.2700	0.2160	0.1143	0.000135	0.175
20.0	0.2715	0.2172	0.1130	0.000131	0.177

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
30.0	0.1757	0.1406	0.4047	0.002996	0.074
30.0	0.1900	0.1520	0.3463	0.001977	0.087
30.0	0.2000	0.1600	0.3125	0.001504	0.096
30.0	0.2100	0.1680	0.2834	0.001159	0.106
30.0	0.2200	0.1760	0.2583	0.000905	0.116
30.0	0.2300	0.1840	0.2363	0.000714	0.127
30.0	0.2400	0.1920	0.2170	0.000569	0.138
30.0	0.2500	0.2000	0.2000	0.000457	0.150
30.0	0.2600	0.2080	0.1849	0.000371	0.162
30.0	0.2700	0.2160	0.1715	0.000303	0.175
30.0	0.2800	0.2240	0.1594	0.000250	0.188
30.0	0.2900	0.2320	0.1486	0.000207	0.202
30.0	0.3000	0.2400	0.1389	0.000173	0.216
30.0	0.3100	0.2480	0.1301	0.000145	0.231
30.0	0.3193	0.2554	0.1226	0.000124	0.245

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DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
40.0	0.2007	0.1606	0.4138	0.002624	0.097
40.0	0.2100	0.1680	0.3779	0.002061	0.106
40.0	0.2200	0.1760	0.3444	0.001608	0.116
40.0	0.2300	0.1840	0.3151	0.001269	0.127
40.0	0.2400	0.1920	0.2894	0.001011	0.138
40.0	0.2500	0.2000	0.2667	0.000813	0.150
40.0	0.2600	0.2080	0.2465	0.000660	0.162
40.0	0.2700	0.2160	0.2286	0.000539	0.175
40.0	0.2800	0.2240	0.2126	0.000444	0.188
40.0	0.2900	0.2320	0.1982	0.000368	0.202
40.0	0.3000	0.2400	0.1852	0.000308	0.216
40.0	0.3100	0.2480	0.1734	0.000258	0.231
40.0	0.3200	0.2560	0.1628	0.000218	0.246
40.0	0.3300	0.2640	0.1530	0.000185	0.261
40.0	0.3400	0.2720	0.1442	0.000158	0.277
40.0	0.3500	0.2800	0.1361	0.000135	0.294
40.0	0.3583	0.2866	0.1299	0.000119	0.308

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DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
50.0	0.2225	0.1780	0.4209	0.002367	0.119
50.0	0.2300	0.1840	0.3938	0.001982	0.127
50.0	0.2400	0.1920	0.3617	0.001580	0.138
50.0	0.2500	0.2000	0.3333	0.001271	0.150
50.0	0.2600	0.2080	0.3082	0.001031	0.162
50.0	0.2700	0.2160	0.2858	0.000843	0.175
50.0	0.2800	0.2240	0.2657	0.000694	0.188
50.0	0.2900	0.2320	0.2477	0.000576	0.202
50.0	0.3000	0.2400	0.2315	0.000481	0.216
50.0	0.3100	0.2480	0.2168	0.000403	0.231
50.0	0.3200	0.2560	0.2035	0.000341	0.246
50.0	0.3300	0.2640	0.1913	0.000289	0.261
50.0	0.3400	0.2720	0.1802	0.000247	0.277
50.0	0.3500	0.2800	0.1701	0.000211	0.294
50.0	0.3600	0.2880	0.1608	0.000182	0.311
50.0	0.3700	0.2960	0.1522	0.000157	0.329
50.0	0.3800	0.3040	0.1443	0.000136	0.347
50.0	0.3900	0.3120	0.1370	0.000119	0.365
50.0	0.3917	0.3134	0.1358	0.000116	0.368

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DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
60.0	0.2420	0.1936	0.4269	0.002176	0.141
60.0	0.2500	0.2000	0.4000	0.001830	0.150
60.0	0.2600	0.2080	0.3698	0.001484	0.162
60.0	0.2700	0.2160	0.3429	0.001214	0.175
60.0	0.2800	0.2240	0.3189	0.001000	0.188
60.0	0.2900	0.2320	0.2973	0.000829	0.202
60.0	0.3000	0.2400	0.2778	0.000692	0.216
60.0	0.3100	0.2480	0.2601	0.000581	0.231
60.0	0.3200	0.2560	0.2441	0.000490	0.246
60.0	0.3300	0.2640	0.2296	0.000416	0.261
60.0	0.3400	0.2720	0.2163	0.000355	0.277
60.0	0.3500	0.2800	0.2041	0.000304	0.294
60.0	0.3600	0.2880	0.1929	0.000262	0.311
60.0	0.3700	0.2960	0.1826	0.000226	0.329
60.0	0.3800	0.3040	0.1731	0.000196	0.347
60.0	0.3900	0.3120	0.1644	0.000171	0.365
60.0	0.4000	0.3200	0.1563	0.000149	0.384
60.0	0.4100	0.3280	0.1487	0.000131	0.403
60.0	0.4200	0.3360	0.1417	0.000115	0.423
60.0	0.4213	0.3371	0.1408	0.000113	0.426

LAM NAM IOON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
70.0	0.2599	0.2079	0.4320	0.002027	0.162
70.0	0.2700	0.2160	0.4001	0.001652	0.175
70.0	0.2800	0.2240	0.3720	0.001361	0.188
70.0	0.2900	0.2320	0.3468	0.001129	0.202
70.0	0.3000	0.2400	0.3241	0.000942	0.216
70.0	0.3100	0.2480	0.3035	0.000791	0.231
70.0	0.3200	0.2560	0.2848	0.000668	0.246
70.0	0.3300	0.2640	0.2678	0.000567	0.261
70.0	0.3400	0.2720	0.2523	0.000483	0.277
70.0	0.3500	0.2800	0.2381	0.000414	0.294
70.0	0.3600	0.2880	0.2251	0.000356	0.311
70.0	0.3700	0.2960	0.2131	0.000308	0.329
70.0	0.3800	0.3040	0.2020	0.000267	0.347
70.0	0.3900	0.3120	0.1918	0.000232	0.365
70.0	0.4000	0.3200	0.1823	0.000203	0.384
70.0	0.4100	0.3280	0.1735	0.000178	0.403
70.0	0.4200	0.3360	0.1653	0.000157	0.423
70.0	0.4300	0.3440	0.1577	0.000138	0.444
70.0	0.4400	0.3520	0.1507	0.000122	0.465
70.0	0.4481	0.3585	0.1452	0.000111	0.482

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
80.0	0.2764	0.2211	0.4364	0.001905	0.183
80.0	0.2900	0.2320	0.3964	0.001474	0.202
80.0	0.3000	0.2400	0.3704	0.001230	0.216
80.0	0.3100	0.2480	0.3469	0.001033	0.231
80.0	0.3200	0.2560	0.3255	0.000872	0.246
80.0	0.3300	0.2640	0.3061	0.000740	0.261
80.0	0.3400	0.2720	0.2884	0.000631	0.277
80.0	0.3500	0.2800	0.2721	0.000541	0.294
80.0	0.3600	0.2880	0.2572	0.000465	0.311
80.0	0.3700	0.2960	0.2435	0.000402	0.329
80.0	0.3800	0.3040	0.2308	0.000349	0.347
80.0	0.3900	0.3120	0.2192	0.000304	0.365
80.0	0.4000	0.3200	0.2083	0.000265	0.384
80.0	0.4100	0.3280	0.1983	0.000233	0.403
80.0	0.4200	0.3360	0.1890	0.000204	0.423
80.0	0.4300	0.3440	0.1803	0.000180	0.444
80.0	0.4400	0.3520	0.1722	0.000160	0.465
80.0	0.4500	0.3600	0.1646	0.000142	0.486
80.0	0.4600	0.3680	0.1575	0.000126	0.508
80.0	0.4700	0.3760	0.1509	0.000112	0.530
80.0	0.4727	0.3782	0.1492	0.000109	0.536

LAM NAM DON
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LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
90.0	0.2918	0.2334	0.4404	0.001805	0.204
90.0	0.3000	0.2400	0.4167	0.001557	0.216
90.0	0.3100	0.2480	0.3902	0.001307	0.231
90.0	0.3200	0.2560	0.3662	0.001104	0.246
90.0	0.3300	0.2640	0.3444	0.000937	0.261
90.0	0.3400	0.2720	0.3244	0.000799	0.277
90.0	0.3500	0.2800	0.3061	0.000684	0.294
90.0	0.3600	0.2880	0.2894	0.000589	0.311
90.0	0.3700	0.2960	0.2739	0.000509	0.329
90.0	0.3800	0.3040	0.2597	0.000441	0.347
90.0	0.3900	0.3120	0.2465	0.000384	0.365
90.0	0.4000	0.3200	0.2344	0.000336	0.384
90.0	0.4100	0.3280	0.2231	0.000294	0.403
90.0	0.4200	0.3360	0.2126	0.000259	0.423
90.0	0.4300	0.3440	0.2028	0.000228	0.444
90.0	0.4400	0.3520	0.1937	0.000202	0.465
90.0	0.4500	0.3600	0.1852	0.000179	0.486
90.0	0.4600	0.3680	0.1772	0.000159	0.508
90.0	0.4700	0.3760	0.1698	0.000142	0.530
90.0	0.4800	0.3840	0.1628	0.000127	0.553
90.0	0.4900	0.3920	0.1562	0.000114	0.576
90.0	0.4955	0.3964	0.1527	0.000107	0.589

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LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE-4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
100.0	0.3064	0.2451	0.4440	0.001719	0.225
100.0	0.3200	0.2560	0.4069	0.001362	0.246
100.0	0.3300	0.2640	0.3826	0.001156	0.261
100.0	0.3400	0.2720	0.3604	0.000986	0.277
100.0	0.3500	0.2800	0.3401	0.000845	0.294
100.0	0.3600	0.2880	0.3215	0.000727	0.311
100.0	0.3700	0.2960	0.3044	0.000628	0.329
100.0	0.3800	0.3040	0.2886	0.000545	0.347
100.0	0.3900	0.3120	0.2739	0.000474	0.365
100.0	0.4000	0.3200	0.2604	0.000414	0.384
100.0	0.4100	0.3280	0.2479	0.000363	0.403
100.0	0.4200	0.3360	0.2362	0.000319	0.423
100.0	0.4300	0.3440	0.2253	0.000282	0.444
100.0	0.4400	0.3520	0.2152	0.000249	0.465
100.0	0.4500	0.3600	0.2058	0.000221	0.486
100.0	0.4600	0.3680	0.1969	0.000197	0.508
100.0	0.4700	0.3760	0.1886	0.000175	0.530
100.0	0.4800	0.3840	0.1808	0.000157	0.553
100.0	0.4900	0.3920	0.1735	0.000140	0.576
100.0	0.5000	0.4000	0.1667	0.000126	0.600
100.0	0.5100	0.4080	0.1602	0.000113	0.624
100.0	0.5168	0.4135	0.1560	0.000106	0.641

LAM NAM QON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
110.0	0.3201	0.2561	0.4472	0.001645	0.246
110.0	0.3300	0.2640	0.4209	0.001399	0.261
110.0	0.3400	0.2720	0.3965	0.001193	0.277
110.0	0.3500	0.2800	0.3741	0.001022	0.294
110.0	0.3600	0.2880	0.3537	0.000880	0.311
110.0	0.3700	0.2960	0.3348	0.000760	0.329
110.0	0.3800	0.3040	0.3174	0.000659	0.347
110.0	0.3900	0.3120	0.3013	0.000574	0.365
110.0	0.4000	0.3200	0.2865	0.000501	0.384
110.0	0.4100	0.3280	0.2727	0.000440	0.403
110.0	0.4200	0.3360	0.2598	0.000387	0.423
110.0	0.4300	0.3440	0.2479	0.000341	0.444
110.0	0.4400	0.3520	0.2367	0.000302	0.465
110.0	0.4500	0.3600	0.2263	0.000268	0.486
110.0	0.4600	0.3680	0.2166	0.000238	0.508
110.0	0.4700	0.3760	0.2075	0.000212	0.530
110.0	0.4800	0.3840	0.1989	0.000190	0.553
110.0	0.4900	0.3920	0.1909	0.000170	0.576
110.0	0.5000	0.4000	0.1833	0.000153	0.600
110.0	0.5100	0.4080	0.1762	0.000137	0.624
110.0	0.5200	0.4160	0.1695	0.000124	0.649
110.0	0.5300	0.4240	0.1632	0.000112	0.674
110.0	0.5369	0.4295	0.1590	0.000104	0.692

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fn) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
120.0	0.3332	0.2666	0.4502	0.001580	0.267
120.0	0.3400	0.2720	0.4325	0.001420	0.277
120.0	0.3500	0.2800	0.4082	0.001216	0.294
120.0	0.3600	0.2880	0.3858	0.001047	0.311
120.0	0.3700	0.2960	0.3652	0.000904	0.329
120.0	0.3800	0.3040	0.3463	0.000785	0.347
120.0	0.3900	0.3120	0.3287	0.000683	0.365
120.0	0.4000	0.3200	0.3125	0.000597	0.384
120.0	0.4100	0.3280	0.2974	0.000523	0.403
120.0	0.4200	0.3360	0.2834	0.000460	0.423
120.0	0.4300	0.3440	0.2704	0.000406	0.444
120.0	0.4400	0.3520	0.2583	0.000359	0.465
120.0	0.4500	0.3600	0.2469	0.000318	0.486
120.0	0.4600	0.3680	0.2363	0.000283	0.508
120.0	0.4700	0.3760	0.2263	0.000253	0.530
120.0	0.4800	0.3840	0.2170	0.000226	0.553
120.0	0.4900	0.3920	0.2082	0.000202	0.576
120.0	0.5000	0.4000	0.2000	0.000182	0.600
120.0	0.5100	0.4080	0.1922	0.000163	0.624
120.0	0.5200	0.4160	0.1849	0.000147	0.649
120.0	0.5300	0.4240	0.1780	0.000133	0.674
120.0	0.5400	0.4320	0.1715	0.000120	0.700
120.0	0.5500	0.4400	0.1653	0.000109	0.726
120.0	0.5559	0.4448	0.1618	0.000103	0.742

LAM NAM ODN
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
130.0	0.3458	0.2766	0.4530	0.001523	0.287
130.0	0.3600	0.2880	0.4180	0.001228	0.311
130.0	0.3700	0.2960	0.3957	0.001061	0.329
130.0	0.3800	0.3040	0.3751	0.000921	0.347
130.0	0.3900	0.3120	0.3561	0.000802	0.365
130.0	0.4000	0.3200	0.3385	0.000700	0.384
130.0	0.4100	0.3280	0.3222	0.000614	0.403
130.0	0.4200	0.3360	0.3071	0.000540	0.423
130.0	0.4300	0.3440	0.2930	0.000476	0.444
130.0	0.4400	0.3520	0.2798	0.000421	0.465
130.0	0.4500	0.3600	0.2675	0.000374	0.486
130.0	0.4600	0.3680	0.2560	0.000332	0.508
130.0	0.4700	0.3760	0.2452	0.000296	0.530
130.0	0.4800	0.3840	0.2351	0.000265	0.553
130.0	0.4900	0.3920	0.2256	0.000237	0.576
130.0	0.5000	0.4000	0.2167	0.000213	0.600
130.0	0.5100	0.4080	0.2083	0.000192	0.624
130.0	0.5200	0.4160	0.2003	0.000173	0.649
130.0	0.5300	0.4240	0.1928	0.000156	0.674
130.0	0.5400	0.4320	0.1858	0.000141	0.700
130.0	0.5500	0.4400	0.1791	0.000128	0.726
130.0	0.5600	0.4480	0.1727	0.000116	0.753
130.0	0.5700	0.4560	0.1667	0.000106	0.780
130.0	0.5740	0.4592	0.1644	0.000102	0.791

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
140.0	0.3578	0.2863	0.4556	0.001472	0.307
140.0	0.3700	0.2960	0.4261	0.001231	0.329
140.0	0.3800	0.3040	0.4040	0.001068	0.347
140.0	0.3900	0.3120	0.3835	0.000930	0.365
140.0	0.4000	0.3200	0.3646	0.000812	0.384
140.0	0.4100	0.3280	0.3470	0.000712	0.403
140.0	0.4200	0.3360	0.3307	0.000626	0.423
140.0	0.4300	0.3440	0.3155	0.000552	0.444
140.0	0.4400	0.3520	0.3013	0.000489	0.465
140.0	0.4500	0.3600	0.2881	0.000433	0.486
140.0	0.4600	0.3680	0.2757	0.000385	0.508
140.0	0.4700	0.3760	0.2641	0.000344	0.530
140.0	0.4800	0.3840	0.2532	0.000307	0.553
140.0	0.4900	0.3920	0.2430	0.000275	0.576
140.0	0.5000	0.4000	0.2333	0.000247	0.600
140.0	0.5100	0.4080	0.2243	0.000222	0.624
140.0	0.5200	0.4160	0.2157	0.000200	0.649
140.0	0.5300	0.4240	0.2077	0.000181	0.674
140.0	0.5400	0.4320	0.2000	0.000164	0.700
140.0	0.5500	0.4400	0.1928	0.000149	0.726
140.0	0.5600	0.4480	0.1860	0.000135	0.753
140.0	0.5700	0.4560	0.1795	0.000123	0.780
140.0	0.5800	0.4640	0.1734	0.000112	0.807
140.0	0.5900	0.4720	0.1676	0.000102	0.835
140.0	0.5913	0.4730	0.1668	0.000101	0.839

LAM NAM QON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 ; 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
150.0	0.3694	0.2955	0.4580	0.001426	0.327
150.0	0.3800	0.3040	0.4328	0.001226	0.347
150.0	0.3900	0.3120	0.4109	0.001067	0.365
150.0	0.4000	0.3200	0.3906	0.000932	0.384
150.0	0.4100	0.3280	0.3718	0.000817	0.403
150.0	0.4200	0.3360	0.3543	0.000719	0.423
150.0	0.4300	0.3440	0.3380	0.000634	0.444
150.0	0.4400	0.3520	0.3228	0.000561	0.465
150.0	0.4500	0.3600	0.3086	0.000498	0.486
150.0	0.4600	0.3680	0.2954	0.000442	0.508
150.0	0.4700	0.3760	0.2829	0.000395	0.530
150.0	0.4800	0.3840	0.2713	0.000353	0.553
150.0	0.4900	0.3920	0.2603	0.000316	0.576
150.0	0.5000	0.4000	0.2500	0.000284	0.600
150.0	0.5100	0.4080	0.2403	0.000255	0.624
150.0	0.5200	0.4160	0.2311	0.000230	0.649
150.0	0.5300	0.4240	0.2225	0.000208	0.674
150.0	0.5400	0.4320	0.2143	0.000188	0.700
150.0	0.5500	0.4400	0.2066	0.000171	0.726
150.0	0.5600	0.4480	0.1993	0.000155	0.753
150.0	0.5700	0.4560	0.1924	0.000141	0.780
150.0	0.5800	0.4640	0.1858	0.000129	0.807
150.0	0.5900	0.4720	0.1795	0.000117	0.835
150.0	0.6000	0.4800	0.1736	0.000107	0.864
150.0	0.6079	0.4863	0.1692	0.000100	0.887

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC.

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
160.0	0.3806	0.3045	0.4603	0.001384	0.348
160.0	0.3900	0.3120	0.4383	0.001214	0.365
160.0	0.4000	0.3200	0.4167	0.001061	0.384
160.0	0.4100	0.3280	0.3966	0.000930	0.403
160.0	0.4200	0.3360	0.3779	0.000818	0.423
160.0	0.4300	0.3440	0.3606	0.000721	0.444
160.0	0.4400	0.3520	0.3444	0.000638	0.465
160.0	0.4500	0.3600	0.3292	0.000566	0.486
160.0	0.4600	0.3680	0.3151	0.000503	0.508
160.0	0.4700	0.3760	0.3018	0.000449	0.530
160.0	0.4800	0.3840	0.2894	0.000401	0.553
160.0	0.4900	0.3920	0.2777	0.000359	0.576
160.0	0.5000	0.4000	0.2667	0.000323	0.600
160.0	0.5100	0.4080	0.2563	0.000290	0.624
160.0	0.5200	0.4160	0.2465	0.000262	0.649
160.0	0.5300	0.4240	0.2373	0.000237	0.674
160.0	0.5400	0.4320	0.2286	0.000214	0.700
160.0	0.5500	0.4400	0.2204	0.000194	0.726
160.0	0.5600	0.4480	0.2126	0.000176	0.753
160.0	0.5700	0.4560	0.2052	0.000160	0.780
160.0	0.5800	0.4640	0.1982	0.000146	0.807
160.0	0.5900	0.4720	0.1915	0.000133	0.835
160.0	0.6000	0.4800	0.1852	0.000122	0.864
160.0	0.6100	0.4880	0.1792	0.000112	0.893
160.0	0.6200	0.4960	0.1734	0.000102	0.923
160.0	0.6238	0.4990	0.1714	0.000099	0.934

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC.

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
170.0	0.3914	0.3131	0.4625	0.001346	0.368
170.0	0.4000	0.3200	0.4427	0.001198	0.384
170.0	0.4100	0.3280	0.4214	0.001050	0.403
170.0	0.4200	0.3360	0.4015	0.000923	0.423
170.0	0.4300	0.3440	0.3831	0.000814	0.444
170.0	0.4400	0.3520	0.3659	0.000720	0.465
170.0	0.4500	0.3600	0.3498	0.000639	0.486
170.0	0.4600	0.3680	0.3348	0.000568	0.508
170.0	0.4700	0.3760	0.3207	0.000507	0.530
170.0	0.4800	0.3840	0.3074	0.000453	0.553
170.0	0.4900	0.3920	0.2950	0.000406	0.576
170.0	0.5000	0.4000	0.2833	0.000364	0.600
170.0	0.5100	0.4080	0.2723	0.000328	0.624
170.0	0.5200	0.4160	0.2620	0.000296	0.649
170.0	0.5300	0.4240	0.2522	0.000267	0.674
170.0	0.5400	0.4320	0.2429	0.000242	0.700
170.0	0.5500	0.4400	0.2342	0.000219	0.726
170.0	0.5600	0.4480	0.2259	0.000199	0.753
170.0	0.5700	0.4560	0.2180	0.000181	0.780
170.0	0.5800	0.4640	0.2106	0.000165	0.807
170.0	0.5900	0.4720	0.2035	0.000151	0.835
170.0	0.6000	0.4800	0.1968	0.000138	0.864
170.0	0.6100	0.4880	0.1904	0.000126	0.893
170.0	0.6200	0.4960	0.1843	0.000116	0.923
170.0	0.6300	0.5040	0.1785	0.000106	0.953
170.0	0.6391	0.5112	0.1734	0.000098	0.980

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
180.0	0.4018	0.3215	0.4645	0.001311	0.388
180.0	0.4100	0.3280	0.4462	0.001172	0.403
180.0	0.4200	0.3360	0.4252	0.001035	0.423
180.0	0.4300	0.3440	0.4056	0.000913	0.444
180.0	0.4400	0.3520	0.3874	0.000808	0.465
180.0	0.4500	0.3600	0.3704	0.000716	0.486
180.0	0.4600	0.3680	0.3544	0.000637	0.508
180.0	0.4700	0.3760	0.3395	0.000568	0.530
180.0	0.4800	0.3840	0.3255	0.000508	0.553
180.0	0.4900	0.3920	0.3124	0.000455	0.576
180.0	0.5000	0.4000	0.3000	0.000408	0.600
180.0	0.5100	0.4080	0.2884	0.000368	0.624
180.0	0.5200	0.4160	0.2774	0.000331	0.649
180.0	0.5300	0.4240	0.2670	0.000299	0.674
180.0	0.5400	0.4320	0.2572	0.000271	0.700
180.0	0.5500	0.4400	0.2479	0.000246	0.726
180.0	0.5600	0.4480	0.2392	0.000223	0.753
180.0	0.5700	0.4560	0.2308	0.000203	0.780
180.0	0.5800	0.4640	0.2229	0.000185	0.807
180.0	0.5900	0.4720	0.2155	0.000169	0.835
180.0	0.6000	0.4800	0.2083	0.000154	0.864
180.0	0.6100	0.4880	0.2016	0.000141	0.893
180.0	0.6200	0.4960	0.1951	0.000130	0.923
180.0	0.6300	0.5040	0.1890	0.000119	0.953
180.0	0.6400	0.5120	0.1831	0.000109	0.983
180.0	0.6500	0.5200	0.1775	0.000101	1.014
180.0	0.6538	0.5231	0.1754	0.000098	1.026

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC.

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S.(m/m)	A (m^2)
190.0	0.4120	0.3296	0.4664	0.001278	0.407
190.0	0.4200	0.3360	0.4488	0.001153	0.423
190.0	0.4300	0.3440	0.4282	0.001017	0.444
190.0	0.4400	0.3520	0.4089	0.000900	0.465
190.0	0.4500	0.3600	0.3909	0.000798	0.486
190.0	0.4600	0.3680	0.3741	0.000710	0.508
190.0	0.4700	0.3760	0.3584	0.000633	0.530
190.0	0.4800	0.3840	0.3436	0.000566	0.553
190.0	0.4900	0.3920	0.3297	0.000507	0.576
190.0	0.5000	0.4000	0.3167	0.000455	0.600
190.0	0.5100	0.4080	0.3044	0.000409	0.624
190.0	0.5200	0.4160	0.2928	0.000369	0.649
190.0	0.5300	0.4240	0.2818	0.000334	0.674
190.0	0.5400	0.4320	0.2715	0.000302	0.700
190.0	0.5500	0.4400	0.2617	0.000274	0.726
190.0	0.5600	0.4480	0.2524	0.000249	0.753
190.0	0.5700	0.4560	0.2437	0.000226	0.780
190.0	0.5800	0.4640	0.2353	0.000206	0.807
190.0	0.5900	0.4720	0.2274	0.000188	0.835
190.0	0.6000	0.4800	0.2199	0.000172	0.864
190.0	0.6100	0.4880	0.2128	0.000158	0.893
190.0	0.6200	0.4960	0.2059	0.000144	0.923
190.0	0.6300	0.5040	0.1995	0.000133	0.953
190.0	0.6400	0.5120	0.1933	0.000122	0.983
190.0	0.6500	0.5200	0.1874	0.000112	1.014
190.0	0.6600	0.5280	0.1817	0.000104	1.045
190.0	0.6681	0.5345	0.1773	0.000097	1.071

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
200.0	0.4218	0.3375	0.4683	0.001248	0.427
200.0	0.4300	0.3440	0.4507	0.001127	0.444
200.0	0.4400	0.3520	0.4304	0.000997	0.465
200.0	0.4500	0.3600	0.4115	0.000884	0.486
200.0	0.4600	0.3680	0.3938	0.000787	0.508
200.0	0.4700	0.3760	0.3772	0.000701	0.530
200.0	0.4800	0.3840	0.3617	0.000627	0.553
200.0	0.4900	0.3920	0.3471	0.000562	0.576
200.0	0.5000	0.4000	0.3333	0.000504	0.600
200.0	0.5100	0.4080	0.3204	0.000454	0.624
200.0	0.5200	0.4160	0.3082	0.000409	0.649
200.0	0.5300	0.4240	0.2967	0.000370	0.674
200.0	0.5400	0.4320	0.2858	0.000334	0.700
200.0	0.5500	0.4400	0.2755	0.000303	0.726
200.0	0.5600	0.4480	0.2657	0.000276	0.753
200.0	0.5700	0.4560	0.2565	0.000251	0.780
200.0	0.5800	0.4640	0.2477	0.000228	0.807
200.0	0.5900	0.4720	0.2394	0.000209	0.835
200.0	0.6000	0.4800	0.2315	0.000191	0.864
200.0	0.6100	0.4880	0.2240	0.000175	0.893
200.0	0.6200	0.4960	0.2168	0.000160	0.923
200.0	0.6300	0.5040	0.2100	0.000147	0.953
200.0	0.6400	0.5120	0.2035	0.000135	0.983
200.0	0.6500	0.5200	0.1972	0.000124	1.014
200.0	0.6600	0.5280	0.1913	0.000115	1.045
200.0	0.6700	0.5360	0.1856	0.000106	1.077
200.0	0.6800	0.5440	0.1802	0.000098	1.110
200.0	0.6820	0.5456	0.1792	0.000096	1.116

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
210.0	0.4315	0.3452	0.4700	0.001221	0.447
210.0	0.4400	0.3520	0.4520	0.001099	0.465
210.0	0.4500	0.3600	0.4321	0.000975	0.486
210.0	0.4600	0.3680	0.4135	0.000867	0.508
210.0	0.4700	0.3760	0.3961	0.000773	0.530
210.0	0.4800	0.3840	0.3798	0.000691	0.553
210.0	0.4900	0.3920	0.3644	0.000619	0.576
210.0	0.5000	0.4000	0.3500	0.000556	0.600
210.0	0.5100	0.4080	0.3364	0.000500	0.624
210.0	0.5200	0.4160	0.3236	0.000451	0.649
210.0	0.5300	0.4240	0.3115	0.000407	0.674
210.0	0.5400	0.4320	0.3001	0.000369	0.700
210.0	0.5500	0.4400	0.2893	0.000334	0.726
210.0	0.5600	0.4480	0.2790	0.000304	0.753
210.0	0.5700	0.4560	0.2693	0.000276	0.780
210.0	0.5800	0.4640	0.2601	0.000252	0.807
210.0	0.5900	0.4720	0.2514	0.000230	0.835
210.0	0.6000	0.4800	0.2431	0.000210	0.864
210.0	0.6100	0.4880	0.2352	0.000193	0.893
210.0	0.6200	0.4960	0.2276	0.000177	0.923
210.0	0.6300	0.5040	0.2205	0.000162	0.953
210.0	0.6400	0.5120	0.2136	0.000149	0.983
210.0	0.6500	0.5200	0.2071	0.000137	1.014
210.0	0.6600	0.5280	0.2009	0.000126	1.045
210.0	0.6700	0.5360	0.1949	0.000117	1.077
210.0	0.6800	0.5440	0.1892	0.000108	1.110
210.0	0.6900	0.5520	0.1838	0.000100	1.143
210.0	0.6954	0.5563	0.1809	0.000096	1.161

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
220.0	0.4408	0.3527	0.4717	0.001195	0.466
220.0	0.4500	0.3600	0.4527	0.001070	0.486
220.0	0.4600	0.3680	0.4332	0.000952	0.508
220.0	0.4700	0.3760	0.4150	0.000849	0.530
220.0	0.4800	0.3840	0.3979	0.000759	0.553
220.0	0.4900	0.3920	0.3818	0.000680	0.576
220.0	0.5000	0.4000	0.3667	0.000610	0.600
220.0	0.5100	0.4080	0.3524	0.000549	0.624
220.0	0.5200	0.4160	0.3390	0.000495	0.649
220.0	0.5300	0.4240	0.3263	0.000447	0.674
220.0	0.5400	0.4320	0.3144	0.000405	0.700
220.0	0.5500	0.4400	0.3030	0.000367	0.726
220.0	0.5600	0.4480	0.2923	0.000333	0.753
220.0	0.5700	0.4560	0.2821	0.000303	0.780
220.0	0.5800	0.4640	0.2725	0.000276	0.807
220.0	0.5900	0.4720	0.2633	0.000252	0.835
220.0	0.6000	0.4800	0.2546	0.000231	0.864
220.0	0.6100	0.4880	0.2463	0.000211	0.893
220.0	0.6200	0.4960	0.2385	0.000194	0.923
220.0	0.6300	0.5040	0.2310	0.000178	0.953
220.0	0.6400	0.5120	0.2238	0.000164	0.983
220.0	0.6500	0.5200	0.2170	0.000151	1.014
220.0	0.6600	0.5280	0.2104	0.000139	1.045
220.0	0.6700	0.5360	0.2042	0.000128	1.077
220.0	0.6800	0.5440	0.1982	0.000118	1.110
220.0	0.6900	0.5520	0.1925	0.000110	1.143
220.0	0.7000	0.5600	0.1871	0.000101	1.176
220.0	0.7085	0.5668	0.1826	0.000095	1.205

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
230.0	0.4500	0.3600	0.4733	0.001170	0.486
230.0	0.4600	0.3680	0.4529	0.001040	0.508
230.0	0.4700	0.3760	0.4338	0.000928	0.530
230.0	0.4800	0.3840	0.4159	0.000829	0.553
230.0	0.4900	0.3920	0.3991	0.000743	0.576
230.0	0.5000	0.4000	0.3833	0.000667	0.600
230.0	0.5100	0.4080	0.3684	0.000600	0.624
230.0	0.5200	0.4160	0.3544	0.000541	0.649
230.0	0.5300	0.4240	0.3412	0.000489	0.674
230.0	0.5400	0.4320	0.3286	0.000442	0.700
230.0	0.5500	0.4400	0.3168	0.000401	0.726
230.0	0.5600	0.4480	0.3056	0.000364	0.753
230.0	0.5700	0.4560	0.2950	0.000332	0.780
230.0	0.5800	0.4640	0.2849	0.000302	0.807
230.0	0.5900	0.4720	0.2753	0.000276	0.835
230.0	0.6000	0.4800	0.2662	0.000252	0.864
230.0	0.6100	0.4880	0.2575	0.000231	0.893
230.0	0.6200	0.4960	0.2493	0.000212	0.923
230.0	0.6300	0.5040	0.2415	0.000194	0.953
230.0	0.6400	0.5120	0.2340	0.000179	0.983
230.0	0.6500	0.5200	0.2268	0.000165	1.014
230.0	0.6600	0.5280	0.2200	0.000152	1.045
230.0	0.6700	0.5360	0.2135	0.000140	1.077
230.0	0.6800	0.5440	0.2073	0.000129	1.110
230.0	0.6900	0.5520	0.2013	0.000120	1.143
230.0	0.7000	0.5600	0.1956	0.000111	1.176
230.0	0.7100	0.5680	0.1901	0.000103	1.210
230.0	0.7200	0.5760	0.1849	0.000095	1.244
230.0	0.7212	0.5770	0.1843	0.000095	1.248

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
240.0	0.4589	0.3671	0.4749	0.001148	0.505
240.0	0.4700	0.3760	0.4527	0.001010	0.530
240.0	0.4800	0.3840	0.4340	0.000903	0.553
240.0	0.4900	0.3920	0.4165	0.000809	0.576
240.0	0.5000	0.4000	0.4000	0.000726	0.600
240.0	0.5100	0.4080	0.3845	0.000653	0.624
240.0	0.5200	0.4160	0.3698	0.000589	0.649
240.0	0.5300	0.4240	0.3560	0.000532	0.674
240.0	0.5400	0.4320	0.3429	0.000482	0.700
240.0	0.5500	0.4400	0.3306	0.000437	0.726
240.0	0.5600	0.4480	0.3189	0.000397	0.753
240.0	0.5700	0.4560	0.3078	0.000361	0.780
240.0	0.5800	0.4640	0.2973	0.000329	0.807
240.0	0.5900	0.4720	0.2873	0.000300	0.835
240.0	0.6000	0.4800	0.2778	0.000275	0.864
240.0	0.6100	0.4880	0.2687	0.000251	0.893
240.0	0.6200	0.4960	0.2601	0.000231	0.923
240.0	0.6300	0.5040	0.2520	0.000212	0.953
240.0	0.6400	0.5120	0.2441	0.000195	0.983
240.0	0.6500	0.5200	0.2367	0.000179	1.014
240.0	0.6600	0.5280	0.2296	0.000165	1.045
240.0	0.6700	0.5360	0.2228	0.000152	1.077
240.0	0.6800	0.5440	0.2163	0.000141	1.110
240.0	0.6900	0.5520	0.2100	0.000130	1.143
240.0	0.7000	0.5600	0.2041	0.000121	1.176
240.0	0.7100	0.5680	0.1984	0.000112	1.210
240.0	0.7200	0.5760	0.1929	0.000104	1.244
240.0	0.7300	0.5840	0.1877	0.000096	1.279
240.0	0.7336	0.5869	0.1858	0.000094	1.292

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
250.0	0.4676	0.3741	0.4764	0.001126	0.525
250.0	0.4800	0.3840	0.4521	0.000980	0.553
250.0	0.4900	0.3920	0.4338	0.000878	0.576
250.0	0.5000	0.4000	0.4167	0.000788	0.600
250.0	0.5100	0.4080	0.4005	0.000709	0.624
250.0	0.5200	0.4160	0.3852	0.000639	0.649
250.0	0.5300	0.4240	0.3708	0.000577	0.674
250.0	0.5400	0.4320	0.3572	0.000523	0.700
250.0	0.5500	0.4400	0.3444	0.000474	0.726
250.0	0.5600	0.4480	0.3322	0.000431	0.753
250.0	0.5700	0.4560	0.3206	0.000392	0.780
250.0	0.5800	0.4640	0.3097	0.000357	0.807
250.0	0.5900	0.4720	0.2992	0.000326	0.835
250.0	0.6000	0.4800	0.2894	0.000298	0.864
250.0	0.6100	0.4880	0.2799	0.000273	0.893
250.0	0.6200	0.4960	0.2710	0.000250	0.923
250.0	0.6300	0.5040	0.2625	0.000230	0.953
250.0	0.6400	0.5120	0.2543	0.000211	0.983
250.0	0.6500	0.5200	0.2465	0.000194	1.014
250.0	0.6600	0.5280	0.2391	0.000179	1.045
250.0	0.6700	0.5360	0.2320	0.000165	1.077
250.0	0.6800	0.5440	0.2253	0.000153	1.110
250.0	0.6900	0.5520	0.2188	0.000141	1.143
250.0	0.7000	0.5600	0.2126	0.000131	1.176
250.0	0.7100	0.5680	0.2066	0.000121	1.210
250.0	0.7200	0.5760	0.2009	0.000113	1.244
250.0	0.7300	0.5840	0.1955	0.000105	1.279
250.0	0.7400	0.5920	0.1902	0.000097	1.314
250.0	0.7457	0.5965	0.1873	0.000093	1.334

LAM NAM DON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
260.0	0.4762	0.3809	0.4778	0.001106	0.544
260.0	0.4900	0.3920	0.4512	0.000949	0.576
260.0	0.5000	0.4000	0.4333	0.000852	0.600
260.0	0.5100	0.4080	0.4165	0.000767	0.624
260.0	0.5200	0.4160	0.4006	0.000691	0.649
260.0	0.5300	0.4240	0.3857	0.000625	0.674
260.0	0.5400	0.4320	0.3715	0.000565	0.700
260.0	0.5500	0.4400	0.3581	0.000513	0.726
260.0	0.5600	0.4480	0.3455	0.000466	0.753
260.0	0.5700	0.4560	0.3334	0.000424	0.780
260.0	0.5800	0.4640	0.3220	0.000386	0.807
260.0	0.5900	0.4720	0.3112	0.000353	0.835
260.0	0.6000	0.4800	0.3009	0.000322	0.864
260.0	0.6100	0.4880	0.2911	0.000295	0.893
260.0	0.6200	0.4960	0.2818	0.000271	0.923
260.0	0.6300	0.5040	0.2729	0.000248	0.953
260.0	0.6400	0.5120	0.2645	0.000228	0.983
260.0	0.6500	0.5200	0.2564	0.000210	1.014
260.0	0.6600	0.5280	0.2487	0.000194	1.045
260.0	0.6700	0.5360	0.2413	0.000179	1.077
260.0	0.6800	0.5440	0.2343	0.000165	1.110
260.0	0.6900	0.5520	0.2275	0.000153	1.143
260.0	0.7000	0.5600	0.2211	0.000142	1.176
260.0	0.7100	0.5680	0.2149	0.000131	1.210
260.0	0.7200	0.5760	0.2090	0.000122	1.244
260.0	0.7300	0.5840	0.2033	0.000113	1.279
260.0	0.7400	0.5920	0.1978	0.000105	1.314
260.0	0.7500	0.6000	0.1926	0.000098	1.350
260.0	0.7574	0.6060	0.1888	0.000093	1.377

LAM NAM OON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE - 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
270.0	0.4845	0.3876	0.4792	0.001087	0.563
270.0	0.4900	0.3920	0.4686	0.001024	0.576
270.0	0.5000	0.4000	0.4500	0.000919	0.600
270.0	0.5100	0.4080	0.4325	0.000827	0.624
270.0	0.5200	0.4160	0.4161	0.000746	0.649
270.0	0.5300	0.4240	0.4005	0.000674	0.674
270.0	0.5400	0.4320	0.3858	0.000610	0.700
270.0	0.5500	0.4400	0.3719	0.000553	0.726
270.0	0.5600	0.4480	0.3587	0.000502	0.753
270.0	0.5700	0.4560	0.3463	0.000457	0.780
270.0	0.5800	0.4640	0.3344	0.000416	0.807
270.0	0.5900	0.4720	0.3232	0.000380	0.835
270.0	0.6000	0.4800	0.3125	0.000348	0.864
270.0	0.6100	0.4880	0.3023	0.000318	0.893
270.0	0.6200	0.4960	0.2927	0.000292	0.923
270.0	0.6300	0.5040	0.2834	0.000268	0.953
270.0	0.6400	0.5120	0.2747	0.000246	0.983
270.0	0.6500	0.5200	0.2663	0.000227	1.014
270.0	0.6600	0.5280	0.2583	0.000209	1.045
270.0	0.6700	0.5360	0.2506	0.000193	1.077
270.0	0.6800	0.5440	0.2433	0.000178	1.110
270.0	0.6900	0.5520	0.2363	0.000165	1.143
270.0	0.7000	0.5600	0.2296	0.000153	1.176
270.0	0.7100	0.5680	0.2232	0.000142	1.210
270.0	0.7200	0.5760	0.2170	0.000131	1.244
270.0	0.7300	0.5840	0.2111	0.000122	1.279
270.0	0.7400	0.5920	0.2054	0.000114	1.314
270.0	0.7500	0.6000	0.2000	0.000106	1.350
270.0	0.7600	0.6080	0.1948	0.000099	1.386
270.0	0.7690	0.6152	0.1903	0.000093	1.419

LAM NAM QON
INTEGRATED RURAL DEVELOPMENT PROJECT
LOUIS BERGER INTERNATIONAL INC

DESIGN OF QUARTENARY CANALS
Based on Critical Tractive Force

TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
280.0	0.4927	0.3942	0.4806	0.001069	0.583
280.0	0.5000	0.4000	0.4667	0.000988	0.600
280.0	0.5100	0.4080	0.4485	0.000889	0.624
280.0	0.5200	0.4160	0.4315	0.000802	0.649
280.0	0.5300	0.4240	0.4153	0.000724	0.674
280.0	0.5400	0.4320	0.4001	0.000656	0.700
280.0	0.5500	0.4400	0.3857	0.000594	0.726
280.0	0.5600	0.4480	0.3720	0.000540	0.753
280.0	0.5700	0.4560	0.3591	0.000491	0.780
280.0	0.5800	0.4640	0.3468	0.000448	0.807
280.0	0.5900	0.4720	0.3352	0.000409	0.835
280.0	0.6000	0.4800	0.3241	0.000374	0.864
280.0	0.6100	0.4880	0.3135	0.000342	0.893
280.0	0.6200	0.4960	0.3035	0.000314	0.923
280.0	0.6300	0.5040	0.2939	0.000288	0.953
280.0	0.6400	0.5120	0.2848	0.000265	0.983
280.0	0.6500	0.5200	0.2761	0.000244	1.014
280.0	0.6600	0.5280	0.2678	0.000225	1.045
280.0	0.6700	0.5360	0.2599	0.000207	1.077
280.0	0.6800	0.5440	0.2523	0.000192	1.110
280.0	0.6900	0.5520	0.2450	0.000177	1.143
280.0	0.7000	0.5600	0.2381	0.000164	1.176
280.0	0.7100	0.5680	0.2314	0.000152	1.210
280.0	0.7200	0.5760	0.2251	0.000141	1.244
280.0	0.7300	0.5840	0.2189	0.000131	1.279
280.0	0.7400	0.5920	0.2131	0.000122	1.314
280.0	0.7500	0.6000	0.2074	0.000114	1.350
280.0	0.7600	0.6080	0.2020	0.000106	1.386
280.0	0.7700	0.6160	0.1968	0.000099	1.423
280.0	0.7800	0.6240	0.1918	0.000092	1.460
280.0	0.7802	0.6242	0.1916	0.000092	1.461

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TABLE 4 SIDE SLOPE = 1 : 2.5

Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
290.0	0.5008	0.4006	0.4819	0.001052	0.602
290.0	0.5100	0.4080	0.4646	0.000954	0.624
290.0	0.5200	0.4160	0.4469	0.000860	0.649
290.0	0.5300	0.4240	0.4302	0.000777	0.674
290.0	0.5400	0.4320	0.4144	0.000703	0.700
290.0	0.5500	0.4400	0.3994	0.000638	0.726
290.0	0.5600	0.4480	0.3853	0.000579	0.753
290.0	0.5700	0.4560	0.3719	0.000527	0.780
290.0	0.5800	0.4640	0.3592	0.000480	0.807
290.0	0.5900	0.4720	0.3471	0.000439	0.835
290.0	0.6000	0.4800	0.3356	0.000401	0.864
290.0	0.6100	0.4880	0.3247	0.000367	0.893
290.0	0.6200	0.4960	0.3143	0.000337	0.923
290.0	0.6300	0.5040	0.3044	0.000309	0.953
290.0	0.6400	0.5120	0.2950	0.000284	0.983
290.0	0.6500	0.5200	0.2860	0.000262	1.014
290.0	0.6600	0.5280	0.2774	0.000241	1.045
290.0	0.6700	0.5360	0.2692	0.000223	1.077
290.0	0.6800	0.5440	0.2613	0.000206	1.110
290.0	0.6900	0.5520	0.2538	0.000190	1.143
290.0	0.7000	0.5600	0.2466	0.000176	1.176
290.0	0.7100	0.5680	0.2397	0.000163	1.210
290.0	0.7200	0.5760	0.2331	0.000152	1.244
290.0	0.7300	0.5840	0.2267	0.000141	1.279
290.0	0.7400	0.5920	0.2207	0.000131	1.314
290.0	0.7500	0.6000	0.2148	0.000122	1.350
290.0	0.7600	0.6080	0.2092	0.000114	1.386
290.0	0.7700	0.6160	0.2038	0.000106	1.423
290.0	0.7800	0.6240	0.1986	0.000099	1.460
290.0	0.7900	0.6320	0.1936	0.000092	1.498
290.0	0.7913	0.6330	0.1930	0.000092	1.503

LAM NAM DON
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Bottom Width/Depth (b/d)=1.250
Froude Number (Fr) =0.100
Tractive Force (T) =0.200
Correction Factor (Cf) =0.840
Roughness Coefficient (N) =0.025

Q (l/sec)	b (m)	d (m)	V (m/sec)	S (m/m)	A (m^2)
300.0	0.5087	0.4069	0.4831	0.001035	0.621
300.0	0.5200	0.4160	0.4623	0.000920	0.649
300.0	0.5300	0.4240	0.4450	0.000832	0.674
300.0	0.5400	0.4320	0.4287	0.000753	0.700
300.0	0.5500	0.4400	0.4132	0.000682	0.726
300.0	0.5600	0.4480	0.3986	0.000620	0.753
300.0	0.5700	0.4560	0.3847	0.000564	0.780
300.0	0.5800	0.4640	0.3716	0.000514	0.807
300.0	0.5900	0.4720	0.3591	0.000469	0.835
300.0	0.6000	0.4800	0.3472	0.000429	0.864
300.0	0.6100	0.4880	0.3359	0.000393	0.893
300.0	0.6200	0.4960	0.3252	0.000360	0.923
300.0	0.6300	0.5040	0.3149	0.000331	0.953
300.0	0.6400	0.5120	0.3052	0.000304	0.983
300.0	0.6500	0.5200	0.2959	0.000280	1.014
300.0	0.6600	0.5280	0.2870	0.000258	1.045
300.0	0.6700	0.5360	0.2785	0.000238	1.077
300.0	0.6800	0.5440	0.2703	0.000220	1.110
300.0	0.6900	0.5520	0.2625	0.000204	1.143
300.0	0.7000	0.5600	0.2551	0.000189	1.176
300.0	0.7100	0.5680	0.2480	0.000175	1.210
300.0	0.7200	0.5760	0.2411	0.000162	1.244
300.0	0.7300	0.5840	0.2346	0.000151	1.279
300.0	0.7400	0.5920	0.2283	0.000140	1.314
300.0	0.7500	0.6000	0.2222	0.000131	1.350
300.0	0.7600	0.6080	0.2164	0.000122	1.386
300.0	0.7700	0.6160	0.2108	0.000113	1.423
300.0	0.7800	0.6240	0.2055	0.000106	1.460
300.0	0.7900	0.6320	0.2003	0.000099	1.498
300.0	0.8000	0.6400	0.1953	0.000093	1.536
300.0	0.8021	0.6417	0.1943	0.000091	1.544

AUTHORS

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