



The effect of unit weight and slope on the erosion of unprotected slopes
by Richard Lee Foster

A thesis submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of
MASTER OF SCIENCE in Civil Engineering
Montana State University
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Abstract:

laboratory tests were performed on a fine grained forest soil to determine the effect of unit weight and slope on erosion and runoff.

The tests were conducted on slopes of 1:1, 2:1 and 3:1 using unit weights of 80, 85, 90 and 95 lb per cu ft and a simulated rainfall intensity of 6 iph. After collecting the runoff water and solid particles, the weight of solids eroded and volume of runoff water were computed.

From the results and analyses of this study, it was concluded that the slope and unit weight have definite effects on the erosion of unprotected slopes. These effects are:

- 1) On the flattest slope, the specimens compacted to the lowest unit weight experience the highest rate of erosion.
- 2) On the steepest slope, the specimens compacted to the highest unit weight experience the highest rate of erosion.

The analyses indicate that, for a given unit weight, there is a unique slope from which the maximum amount of erosion will occur.

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OF UNPROTECTED SLOPES

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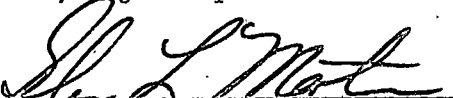
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ABSTRACT

Laboratory tests were performed on a fine grained forest soil to determine the effect of unit weight and slope on erosion and runoff.

The tests were conducted on slopes of 1:1, 2:1 and 3:1 using unit weights of 80, 85, 90 and 95 lb per cu ft and a simulated rainfall intensity of 6 iph. After collecting the runoff water and solid particles, the weight of solids eroded and volume of runoff water were computed.

From the results and analyses of this study, it was concluded that the slope and unit weight have definite effects on the erosion of unprotected slopes. These effects are:

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- 2) On the steepest slope, the specimens compacted to the highest unit weight experience the highest rate of erosion.

The analyses indicate that, for a given unit weight, there is a unique slope from which the maximum amount of erosion will occur.

CHAPTER I

INTRODUCTION

Erosion of slopes, either natural or manmade, is a problem which has been studied from several perspectives. Slope erosion adjacent to roads can cause extensive damage to the road and downslope structures as well as time consuming delays to operations dependent on the road. From an economic standpoint, if the factors which influence erosion can be controlled, great savings in both time and money can be realized.

Many studies of erosion factors have resulted in methods of predicting the amount of runoff under various conditions, but in some instances the studies produced results which were applicable only to singular cases. At the present time there is a definite need for study of the relative effect of individual parameters on erosion, and this isolation of the effect of the individual parameters can be accomplished by varying one parameter while holding all other parameters constant.

The primary objective of this study was to investigate the effect of slope and unit weight variance on the relative erodibility of a selected soil under simulated rainfall conditions in the laboratory. The investigation was made by applying simulated rainfall to soil specimens of predetermined unit weight and slope and collecting the resulting runoff and eroded soil. From the results of these tests, an analysis was made of the effect of the slope and unit weight of the specimens on the runoff and soil loss.

CHAPTER II

REVIEW OF LITERATURE

Erosion by water can be thought of as the water-caused detachment and subsequent transportation of soil particles. Both the detachment and transportation of the particles can occur in two ways; by impact of the raindrop and by the direct force of the running water.

Impact and runoff each erode the soil in a different manner. Erosion by impact is due to the induced momentum or kinetic energy per unit area whereas the runoff erodes the material by a rolling and lifting action due to the shear forces present and the vertical currents set up by the flowing water. In each instance the slope of the material surface has a great influence on the amount of soil eroded.

In the area of splash erosion much of the accomplished research has been devoted to impact energy and the effect of drop size and rainfall intensity, while little effort has been made to evaluate the effect of slope on splash erosion. Erosion on low gradient slopes, due to runoff, has been thoroughly studied for agricultural applications and much of this work is applicable to the erosion of steep slopes with no surface cover.

Attempts have been made to correlate the relative erodibility of a soil with many of its physical characteristics such as grain size, percent of clay size particles and plasticity index. These correlative attempts, because they neglect the effect of slope and in situ conditions of the soil, usually result in a numerical expression indicative of the relative erodibility of the soil which is quite limited in its application.

IMPACT FORCE

The impact of raindrops tends to loosen the soil particles and make them susceptible to runoff erosion. The amount of soil lost from any given slope due to splash depends on the kinetic energy or momentum of the raindrop. Rose (1960) found, for rainfall intensities and durations varying from 2.1ph (inches per hour) for 15 min to 6 iph for 15 min, a constant rate of soil detachment per unit of time. After analyzing both the kinetic energy and momentum of the raindrops, Rose concluded that the rate of soil detachment per unit area was more dependent on the momentum per unit area than on the kinetic energy per unit area.

Rose's results agree with those of McIntyre (1958) who, in previous studies on splash erosion using intensities of 2.6 iph and 3.9 iph, concluded that the momentum is more important than the kinetic energy in the sealing of the soil surface. Ekern (1950), using a saturated, well-graded sand and an unreported rainfall intensity, concluded that erosive capability of a falling mass of water depends on the kinetic energy per unit area of the individual drop.

SOIL MOVEMENT BY SPLASH

Soil splash is an important factor in the transporting of soil particles downslope. As water collects on the soil surface, a portion of the fine particles, which immediately go into suspension, are carried down the slope with the splash. The amount of material which is eroded depends to a large extent on the gradient of the slope.

Ekern (1950) made a study of the effect of slope on impact erosion using a saturated, well-graded sand placed in containers having dimensions

6 in. x 3 in. x 3 in. Ekern's results show that for slopes varying from 0° to 45° the percentage of sand moved downslope by splash varied from 50.1% to 93.6%. The value of 50.1%, obtained from a zero slope, was used as the basis for his equation to predict the percent of material moved downslope for any given gradient. The equation developed by Ekern:

$$\text{Downslope percent} = 50 + \text{slope percent} \quad (1)$$

provides a good approximation of his test results for slopes up to about 35% but is invalid for slopes greater than 35%. From all indications there were no repetitions of the test made.

Ellison (1947b) noted that in the transportation of soil particles by splash most of the trajectories were parabolic and from this he assumed that the horizontal movement was approximately four times the maximum height of the trajectory. It was not indicated at what slope these trajectories were observed.

SPLASH RATE

The rate at which soil is removed by splash is considered by several investigators to be a time-varying process. The dependent factors are the raindrop intensity, drop size, duration, and physical characteristics of the soil material. In tests using an air-dry soil with a constant rainfall intensity of 4.8 iph in which raindrop splash was referenced to time, Ellison (1944) varied the rainfall velocity from test to test and found that the maximum splash rate occurred between 2 and 3 min after the rainfall began.

Observations made during Ellison's tests indicated that the soil surface was sealed against infiltration at the time that maximum soil

splash was measured. Ellison's relationship of the weight of soil in raindrop splash as a function of rainfall duration indicated that after the splash reached a maximum, it decreased rapidly. As the splash rate decreased, the weight of soil in raindrop splash continued to vary slightly with time. Ellison concluded that the water reduced the cohesion between the particles causing them to go into suspension in the surface water. When the soil surface had become sealed and loose particles were carried away, the amount of soil lost by splash was reduced.

McIntyre (1958), on the other hand, found that the splash rates were not affected by the sealing of the surface and he attributed this partially to surface saturation which resulted in minimum cohesion. McIntyre used an air-dry soil and rainfall intensities of 2.6 iph and 3.9 iph and found that both intensities produced a variation in the splash rates after a duration of about 20 min for the 2.6 iph intensity and after about 10 min for the 3.9 iph intensity. McIntyre interpreted this to mean that the surface sealing had no effect on the initial splash rate and he also felt that the permeability of the surface was constantly changing throughout the duration of the rainfall.

From the test results McIntyre concluded that the variation in splash rate indicates that four successive processes occur at the soil surface.

- a) Rapid wetting of the surface causing low cohesion and high splash rates;
- b) Formation of a crust on the surface, which decreases the splash rate and causes water to accumulate;
- c) Removal of part of the crust (the 0.1-mm. skin seal) by turbulence in this water, hence increasing the permeability of the surface;

- d) Percolation of sufficient water to cause dissipation of drop energy on the soil once more and, hence, an increase in splash rate.

With cyclic repetition the permeability of the surface will decrease until the splash rate remains constant.

The above studies, however, fail to take into consideration the effect that the gradient of the slope has on surface sealing. As the gradient of the slope increases, the normal component of the raindrop force decreases, and with an increase in the time required for the surface to seal, the time over which splash erosion occurs increases. Also, with an increase in slope, the greater tangential component of force will tend to remove the larger soil particles as well as carry off the suspended particles.

INFLUENCE OF SPLASH ON PARTICLE SIZE ERODED

Ellison (1944) also investigated the size of particles eroded by splash as compared to particle size eroded by runoff. Plots 5 ft long and 6 ft wide were used by Ellison with varying rainfall intensities and velocities. Ellison found that there was a greater percentage of sand and gravel in the splash than in the original soil. When the particle size in the splash was compared to the particle size in the runoff, a greater percentage of particles larger than .05mm were found in the runoff.

Rose (1961) showed the relationship between runoff and aggregate structure of the soil by using four types of soil and sieving them into four "structural fractions." Rose defined "structural fractions" implicitly as a particle of a certain size made up of smaller particles.

Rose's goal was to compare, within "structural fractions," the detachment of different soil types caused by the same simulated rainfall.

By varying the rainfall intensity and duration, Rose found that both the soil type and size of the "structural aggregate" can affect the amount of detachment and, hence the rate of detachment. For a given rainfall intensity Rose found that the detachment rate increased as the aggregate size decreased and by varying the intensity he noticed that the rate of detachment for the largest size was a linear function of intensity. For the other sizes the rate was non-linear and showed an increase in rate of detachment with an increase in intensity. From his results Rose concluded that structural breakdown is more sensitive to rainfall intensity than to rainfall duration.

RUNOFF EROSION

Runoff, the result of rainfall intensity exceeding the infiltration rate, subjects soil particles to three kinds of detachment action -- rolling, lifting and abrading. The horizontal component of the force acting on a particle may be sufficient to dislodge it by rolling, whereas lifting occurs when the water in a depression has negligible velocity and the flowing water has a horizontal component of velocity. The velocity difference between the stagnant and flowing water creates pressures which cause vertical flow out of the stagnated area that eventually merges with the longitudinal flow. Abrading refers to the particles in transit that strike or "drag over" particles on the soil surface and initiate motion of the previously static particles on the soil surface.

Ellison (1947a) considered slope erosion to be dependent on the "detaching capacity" and "transporting capacity" of an erosive agent and in an investigation of a well-compacted clay he applied clear water to the upper end of the specimen. This applied water, when introduced at the upper end of the slope, represented the maximum "transporting capacity" and the minimum "detaching capacity" because the water was carrying no initial sediment and this resulted in very little erosion. In subsequent trials, when the water initially contained a maximum amount of soil which would represent maximum "detaching capacity" and minimum "transporting capacity," very little erosion was again experienced. Ellison concluded that the maximum quantity of erosion will occur when the initial flow contains just enough abrasive material to detach as much soil as the flow will have the capacity to add to its load.

Osborn (1955) was in general agreement with Ellison when he stated that the amount of soil transported depended on the "transporting capacity" of the runoff and the "transportability" of the soil. Osborn considered that the "transporting capacity" of the water depended on the volume, velocity, and turbulence of the water and he regarded the "transportability" of the soil as a function of the density, size, and shape of the soil particles.

EFFECT OF SLOPE GRADIENT

The effect of slope gradient on erosion and runoff has been the object of several studies but the results of these studies have not been in complete agreement. Some investigators found the slope to be an influencing factor in erosion and runoff while others concluded that slope had

no influence on the runoff and erosion. Intuitively, it would appear that as the hydraulic gradient is increased the velocity and subsequent erosive power would increase.

Borst and Woodburn (1940), using both wet and dry uncompacted soil and simulated rainfall, investigated the effect of slope on erosion and runoff by using test plots of 0.01 acres and varying the slope from 4.2% to 22.5%. The studies by Borst and Woodburn indicated that there is no apparent relationship between slope and runoff. By testing the soil in both a wet and dry condition, the initial moisture content of the soil material was found to have no consistent effect on the amount of runoff or the amount of soil lost from the plot. Borst and Woodburn found that the relationship between erosion and slope could be described as:

$$E = 8.23S^{1.223} \quad (\text{wet initially}) \quad (2)$$

$$E = 4.84S^{1.298} \quad (\text{dry initially}) \quad (3)$$

where: E = quantity of erosion in pounds by dry weight and
S = slope in percent.

Because the rate of runoff was essentially constant for all slopes, it was concluded by Borst and Woodburn that the increase in erosion resulted from increased velocity associated with increased slope. On the other hand, Lutz and Hargrove (1944), in their studies on the effect of runoff and erosion from quartz sand, found that runoff increased logarithmically with increase in slope.

Conner, et al. (1930), after conducting erosion tests on uncompacted soil plots with slopes of 1, 2 and 3%, were in qualitative agreement with

Borst and Woodburn when they concluded that the amount of runoff was not proportional to slope gradient. The results of Conner, however, did indicate that the soil losses were directly proportional to the slope gradient.

When plots were subjected to 1 iph of simulated rainfall at slopes varying from 0 to 20%, Duley and Hays (1932) found that the amount of soil removed increased very slowly as the slope was increased up to 4%. Increases in slope above 4%, however, resulted in a rapid increase in the amount of soil eroded which indicated that at low velocities associated with slopes of low gradient, the water does not have the transporting capabilities it has at steeper slopes. As the slope increases, the velocity of water increases and, even though the depth is less, there is more soil removed.

Nichols and Sexton (1932), using artificial rainfall, ran tests on large plots 50 ft long by 15 ft wide and found that erosion varied uniformly with slope up to about 12%. Because the rate of erosion increased very rapidly above a slope of 12%, this slope defined the "critical slope" for this soil. Neal (1938) also found, for plots subjected to simulated rainfall, that the runoff was not influenced by slope but the rate of erosion increased as the slope increased.

SLOPE EFFECT ON PARTICLE SIZE

Forrest and Lutz (1944) applied simulated rainfall to six plots, with varying slopes, and correlated the depth and velocity of flowing water to the movement of soil particles. By keeping the flow volume constant and varying the slope, an increase in flow velocity accompanied by

a decrease in flow depth was noted. Increase in slope was accompanied by an increase in erosion with the exception of the 1.5% slope, which lost less soil than either the 1% or 2% slopes. The decrease in depth was thought to have more influence on erosion than the increase in velocity. This point was illustrated by some of the test results of Forrest and Lutz showing more large material (3.0 - 0.5 mm) transported on the 1% slope than on the 2.5% slope whereas the loss of fine material was essentially the same for all slopes.

Lutz and Hargrove (1944) also found velocity and depth of flow to be factors which influence the size of particle removed when they noticed that the greatest soil loss occurred when the depth of flow was approximately equal to the particle diameter. This decrease in depth then caused a corresponding decrease in the kinetic energy of the water due to a smaller flow volume striking the particle.

Based on the assumption that the greatest part of erosion can be attributed to overland flow, Hogan (1964) developed a laboratory erosion test which measured the relative erodibility of fine grained soil. Hogan collected 18 types of forest soils, air-dried them and screened them through a No. 4 U.S. standard sieve. The specimens, in both a loose and dense condition, were subjected to overland flow applied at the rate of 700 ml per minute using a slope of 50%. Runoff and eroded soil were collected and measured at the end of each minute and the cumulative total at the end of three minutes was used to compute an erosion number, EN, which was indicative of the relative erodibility of the soil. The equation

developed by Hogan is:

$$EN = 0.1E_d + 0.01E_1 \quad (4)$$

where: E_d = cumulative erosion at the end of three minutes in a dense condition and

E_1 = cumulative erosion at the end of three minutes in a loose condition.

There are several methods of determining relative erodibility of soils including the modified clay ratio and the dispersion ratio. Hogan, however, considered his erosion test to be superior to the use of indirect erosion indicators in determining the relative erodibility of soils.

Scheer (1965) investigated the effect of slope on erosion by using Hogan's erosion test procedure at slopes of 75% and 100%. Two of the three types of soil tested exhibited approximately twice the erosion at 100% than at 50% slope. The results of tests on the third type of soil, a highly plastic clay, showed a definite decrease in erosion as slope increased. For this soil, Scheer concluded that the effect of slope on erosion was secondary and that minor variations in details of handling and preparing samples affected erosion more than the slope change.

Meyer and Monke (1965) made laboratory studies of the mechanics of soil erosion by rainfall and shallow depths of runoff as affected by slope, particle size, and length of slope. Osborn (1955) considered abrasive material to be an erosion factor, whereas Meyer and Monke stated that, "the erosiveness of the runoff depends on its velocity of flow, which increases with slope steepness, amount of runoff, and concentration of runoff in rills or channels." To simplify the testing procedure,

glass beads rather than soil were placed in a bed and the slope was varied from 0 to 20%. Meyer and Monke's results indicated certain values of slope and length of slope below which erosion was essentially zero. The erosion conditions were described by the modified power equations:

$$e_r = C_s (S - S_c)^m \quad (5)$$

and:

$$e_r = C_L (L - L_c)^n \quad (6)$$

where: e_r = amount of soil eroded by runoff per unit of width;

$e_r = 0$ when $L < L_c$ and $S < S_c$;

C_s = constant coefficient;

S = slope;

S_c = critical slope;

m = exponential constant;

C_L = constant coefficient;

L = length of slope;

L_c = critical length of slope and;

n = exponential constant.

Meyer and Monke emphasized the difference between runoff with rainfall and runoff without rainfall in the following statement.

Runoff with rainfall caused greater erosion for the smaller particles but less erosion for the larger particles as compared to the same runoff without rainfall. Increased sediment availability and runoff carrying capacity, due to raindrop-induced runoff turbulence and splash, were dominant for the more easily transported small particles, whereas decreased carrying capacity of the runoff due to decreased flow velocity from splash leveling of the soil bed and to raindrop-impact dissipation were dominant for the larger sizes.

CHAPTER III

MATERIALS, LABORATORY INVESTIGATION AND RESULTS

SOIL MATERIAL

The soil used throughout the study was a cohesive material identified as "Gallatin #1" by Hogan (1964). The sample location and physical properties of the soil material, as shown in Table I, are in agreement with those documented by Hogan.

An area of 200 sq ft on a side slope adjacent to a logging road was cleared of litter, and the top few inches of soil were removed and discarded. Approximately 1200 to 1500 lbs of soil were taken by random sampling and transported to the laboratory.

The high natural water content of the soil necessitated air-drying of the loose material for about one month to bring the soil to hygroscopic moisture conditions.

The soil material was then broken down to pass the No. 4 U.S. standard sieve and stored in 50 lb bags until used in specimen preparation.

DESIGN OF THE EXPERIMENT

Parameters of the test that were held constant were rainfall intensity, rainfall duration, slope length and soil material, while the controlled variables, slope angle and dry unit weight, were combined into a factorial set of combinations with eight replications of each combination.

Slopes of 1:1 (45°), 2:1 (26.5°), and 3:1 (18.5°), which were considered to be representative of slopes in the field, were used throughout the test with various combinations of unit weight as shown in Tables II, III and IV. The maximum dry unit weight of the material, 91.5 lb per cu ft, as determined in accordance with AASHTO Test Designation T 99-57, Method A,

TABLE I

LOCATION AND PHYSICAL
CHARACTERISTICS OF THE SOIL MATERIAL

Soil Identification: Gallatin #1

Sample Location: SE $\frac{1}{4}$ S30, T2N R7E of the Montana Principal
Meridian (In the Bridger Range, approximately
12 mi NNE of Bozeman, Montana)

Atterberg Limits:

Liquid Limit = 49

Plasticity Index = 18

Moisture-density Relationship:

AASHTO TEST designation T 99-57, Method A

Optimum Water Content = 28%

Maximum Dry Unit Weight = 91.5 pcf

Mechanical Analysis:

<u>U.S. Standard Sieve or Particle Diameter</u>	<u>Percent Finer</u>
#10.....	100
#20.....	98
#40.....	94
#100.....	79
#200.....	69
0.05mm.....	62
0.005mm.....	39
0.002mm.....	34

TABLE II

UNIT WEIGHT COMBINATIONS FOR 1:1 SLOPE

RUN NUMBER	CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	CHANNEL FOUR
D-1	80 PCF	80 PCF	80 PCF	80 PCF
D-2	85 PCF	85 PCF	85 PCF	85 PCF
D-3	90 PCF	90 PCF	90 PCF	90 PCF
D-4	95 PCF	95 PCF	95 PCF	95 PCF
D-5	80 PCF	85 PCF	90 PCF	95 PCF
D-6	85 PCF	90 PCF	95 PCF	80 PCF
D-7	90 PCF	95 PCF	80 PCF	85 PCF
D-8	95 PCF	80 PCF	85 PCF	90 PCF

TABLE III
UNIT WEIGHT COMBINATIONS FOR 2:1 SLOPE

RUN NUMBER	CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	CHANNEL FOUR
A-1	80 PCF	80 PCF	80 PCF	80 PCF
A-2	85 PCF	85 PCF	85 PCF	85 PCF
A-3	90 PCF	90 PCF	90 PCF	90 PCF
A-4	95 PCF	95 PCF	95 PCF	95 PCF
A-5	80 PCF	85 PCF	90 PCF	95 PCF
A-6	95 PCF	80 PCF	85 PCF	90 PCF
A-7	90 PCF	95 PCF	80 PCF	85 PCF
A-8	85 PCF	90 PCF	95 PCF	80 PCF

TABLE IV

UNIT WEIGHT COMBINATIONS FOR 3:1 SLOPE

RUN NUMBER	CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	CHANNEL FOUR
E-1	80 PCF	80 PCF	80 PCF	80 PCF
E-2	85 PCF	85 PCF	85 PCF	85 PCF
E-3	90 PCF	90 PCF	90 PCF	90 PCF
E-4	95 PCF	95 PCF	95 PCF	95 PCF
E-5	80 PCF	85 PCF	90 PCF	95 PCF
E-6	85 PCF	90 PCF	95 PCF	80 PCF
E-7	90 PCF	95 PCF	80 PCF	85 PCF
E-8	95 PCF	80 PCF	85 PCF	90 PCF

was assumed to be an upper limit of the dry unit weight of this soil material that would be found near the surface of a constructed slope in the field. Values of dry unit weight of 80, 85, 90 and 95 lb per cu ft were therefore used throughout the study in order to investigate a range of values that could exist in the field.

EROSION SPECIMEN PREPARATION

The desired unit weight was obtained by compressing a known weight of soil into a specimen holder of known volume. Because the experimental apparatus was designed to test four erosion specimens simultaneously, four erosion specimens were fabricated for each test set in the following manner:

The hygroscopic moisture content was determined at the time of specimen preparation and sufficient air-dried material was weighed out to provide for the fabrication of the four erosion specimens in addition to a modest amount for water content determinations and contingencies.

Sufficient water was then added to the soil to raise the water content to 21% and the material was thoroughly hand-mixed and allowed to cure overnight to assure uniform distribution of the moisture throughout the soil mass. Typical examples of the initial weights and amount of water added are shown in Table V.

Following the curing period, a moisture content specimen was taken from the mass, the moisture content determined and the material for each erosion specimen was weighed out in six equal, but separate, parts.

EROSION SPECIMEN HOLDERS

Four specimen holders were fabricated from a 5 in., 6.7 lb standard steel channel as shown in Figure 1 and a steel collar was fabricated as shown in Figure 2.

TABLE V

TYPICAL EXAMPLES OF EROSION SPECIMEN PREPARATION

Desired Dry Unit Weight of Specimen (pcf).....	80	85	90	95
Final Specimen Volume (cu ft).....	0.11	0.11	0.11	0.11
Weight of Dry Soil per Specimen (lb).....	8.80	9.35	9.90	10.45
Hygroscopic Moisture Content of Soil Material (%).....	3.00	4.00	5.00	6.00
Weight of Air-Dried Soil per Specimen (lb).....	9.06	9.72	10.40	11.08
Desired Final Water Content of Specimen (%).....	21.00	21.00	21.00	21.00
Weight of Water to be Added per Specimen (lb).....	1.58	1.59	1.58	1.57
Volume of Water to be Added per Specimen (cc).....	719	722	719	712
Weight of Soil Mass per Specimen (lb).....	10.64	11.31	11.98	12.65
Additional Weight of Dry Soil per Specimen (lb).....	0.50	0.50	0.50	0.50
Additional Weight of Air-Dried Soil per Specimen (lb).....	0.52	0.52	0.52	0.53
Additional Weight of Water to be Added per Specimen (lb).....	0.09	0.08	0.08	0.08
Additional Volume of Water to be Added per Specimen (cc).....	41	39	36	34
Total Weight of Air-Dried Soil to be Mixed (lb).....	9.58	10.24	10.92	11.61
Total Volume of Water to be Added (cc).....	760	761	755	746
Total Weight of Prepared Soil Mass (lb).....	11.23	11.89	12.56	13.23

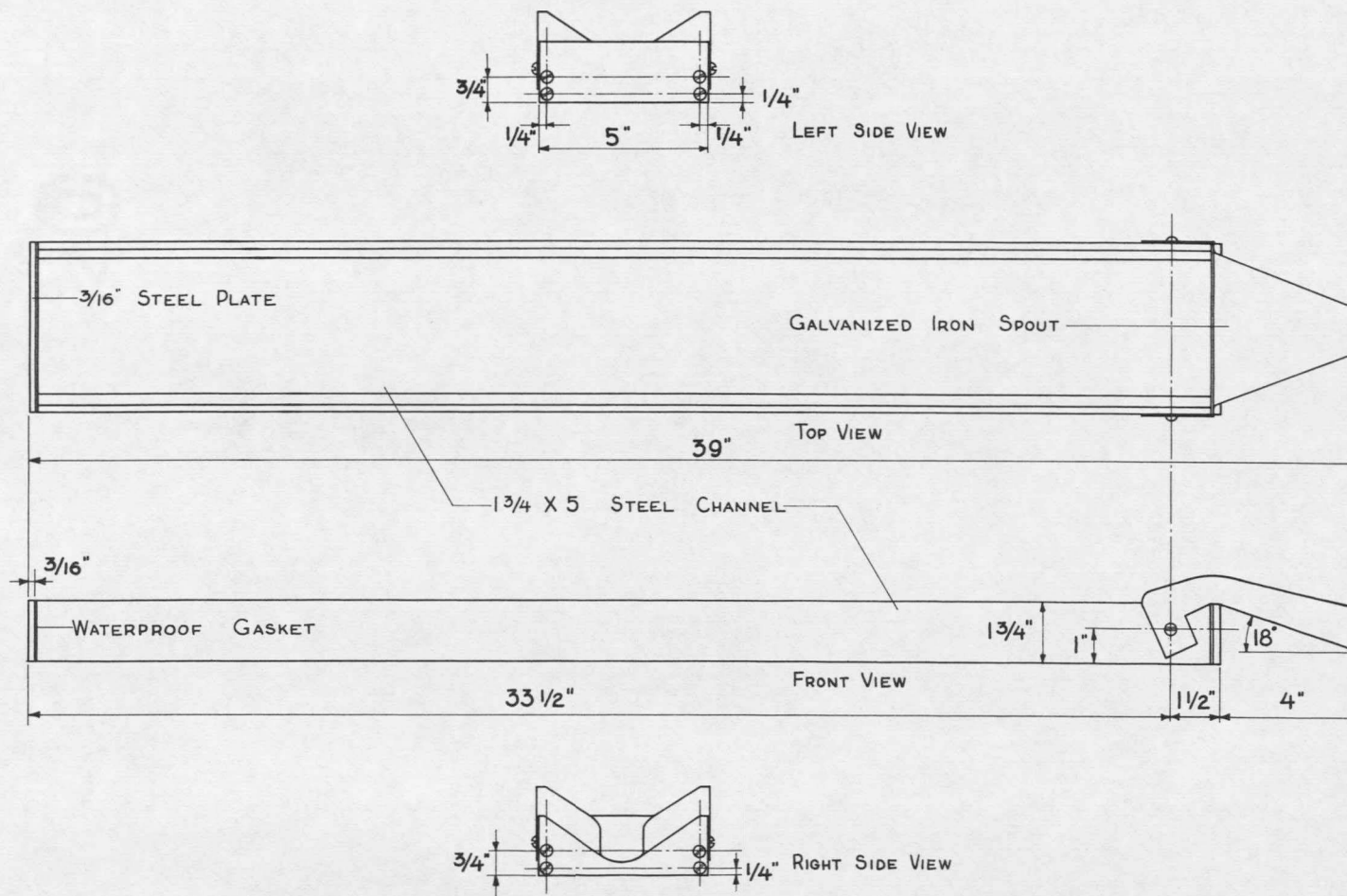
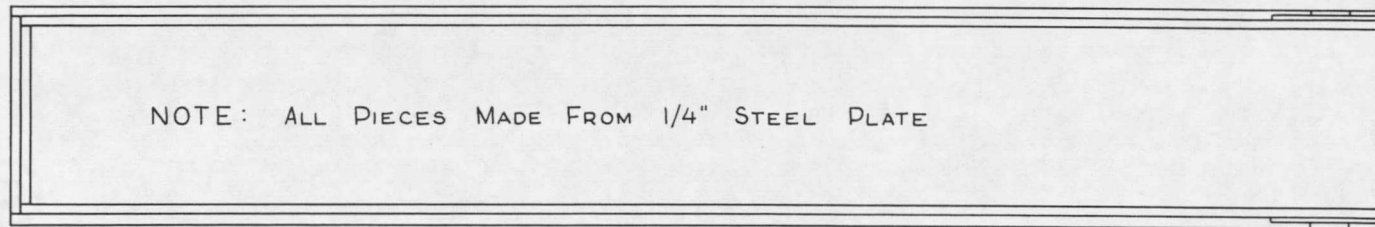


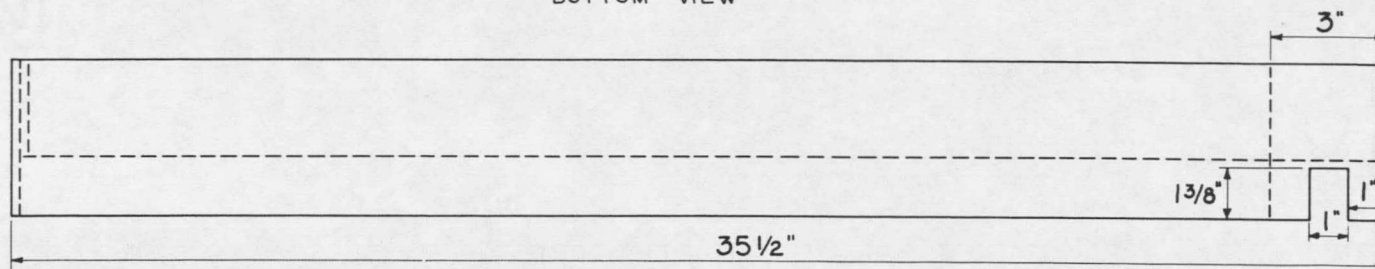
Figure 1 Specimen Holder



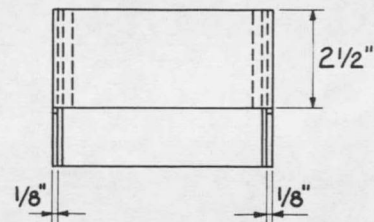
TOP VIEW



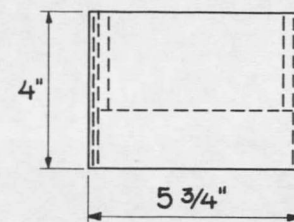
BOTTOM VIEW



SIDE VIEW



RIGHT END VIEW



LEFT END VIEW

Figure 2 Steel Collar

The collar and specimen holder were thoroughly cleaned, the collar was placed on the specimen holder, and two thin spacers, dividing the holder into three equal parts along the longitudinal axis, were placed in the specimen holder and collar. After one of the six parts of the material was placed in each of the three divided spaces, the spacers were removed and the material was leveled. With the bottom layer in a loose but uniformly distributed state, the spacers were replaced and allowed to rest on the top of the first layer. Once again one of the six equal parts of the material was placed in each of the three divided spaces over the previously placed material, the spacers were removed and the material was leveled. The material was then in a loose but uniformly distributed state and ready to compact to the predetermined unit weight. Based on the results of various soil placement methods, it was found that the above mentioned procedure resulted in a nearly uniform unit weight throughout the specimen.

SPECIMEN COMPACTION

A steel compaction "truss" was fabricated, as shown in Figure 3, and was used in conjunction with two dial gauges and a Baldwin universal hydraulic, 200,000 lb capacity testing machine to compact the specimen to a predetermined volume.

The "truss" was placed with the bottom resting on the leveled surface of the loose material in the specimen holder and collar. A dial gauge, with 0.001 in. graduations and 1 in. of travel, was then affixed to each end of the compaction "truss" such that the stem was resting on the top of the collar.

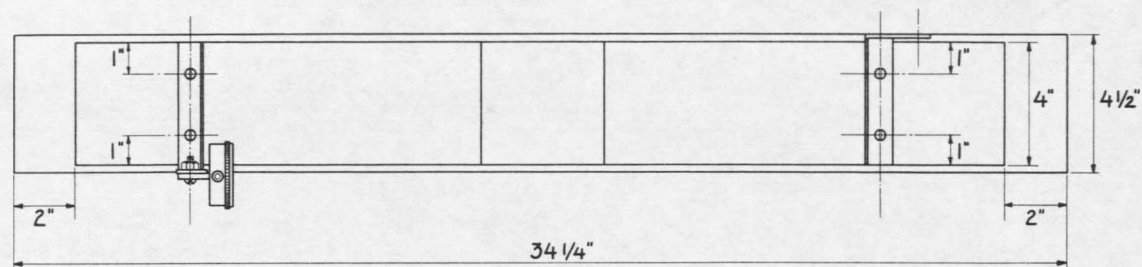
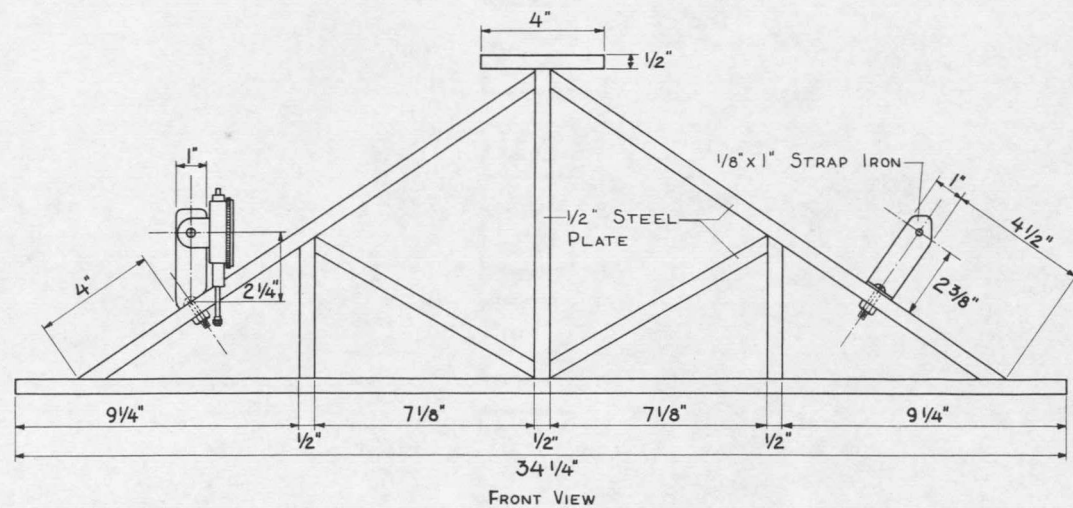
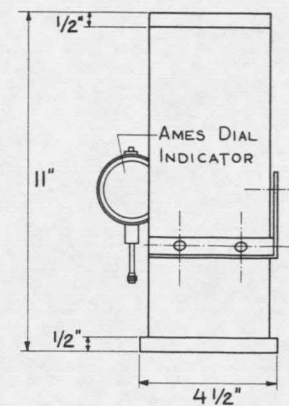


Figure 3 Compaction Truss

After placing the assembly in the testing machine, and centering it so that the load would be applied normal to the leveled surface of the erosion specimen, the material was statically compacted by maintaining a constant, slow rate of travel of the testing machine head. When the dial gauges indicated that the bottom of the compaction "truss" was 0.25 in. below the top of the specimen holders, the erosion specimen was compacted to the predetermined volume and the load was maintained on the specimen until specimen rebound was negligible.

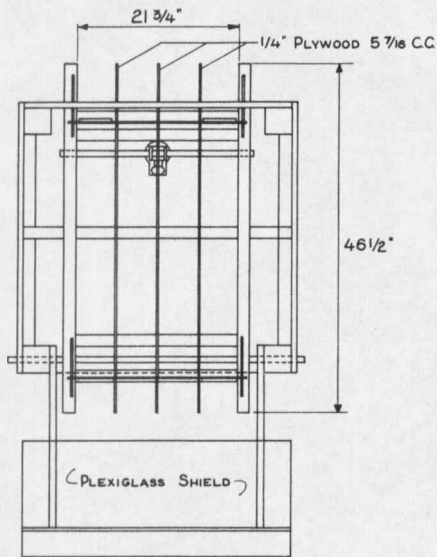
RAINFALL SIMULATION TEST DEVICE

Each of the four erosion specimen holders, containing an erosion specimen prepared as described above, was then placed in its respective "channel position" in the rainfall simulation test device as shown in Figures 4 and 5. The specimen holder was secured in the proper position by a face plate affixed to the front of the frame. A divider separated each "channel position" to guard against the "splashing" of material to an adjacent "channel position" from raindrop impact.

An hydraulic jack was used to raise the rear of the testing frame so that, as the frame rotated around a horizontal steel bar in the front of the frame, the desired slope could be achieved.

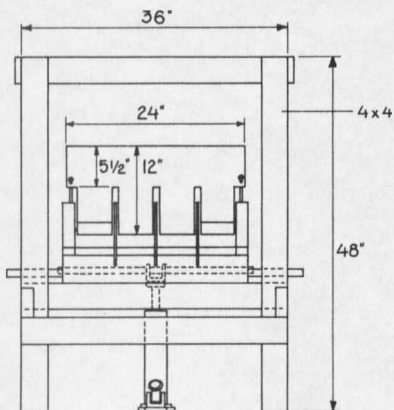
The simulated rainfall was produced by pumping water from a constant head tank through a pressure reducer to a spray nozzle as shown schematically in Figure 6.

The constant head tank, a 40 gal. Jacuzzi water tank, was supplied from the domestic water service and an overflow was provided at the top of the tank. The supply to the tank was regulated during the operation

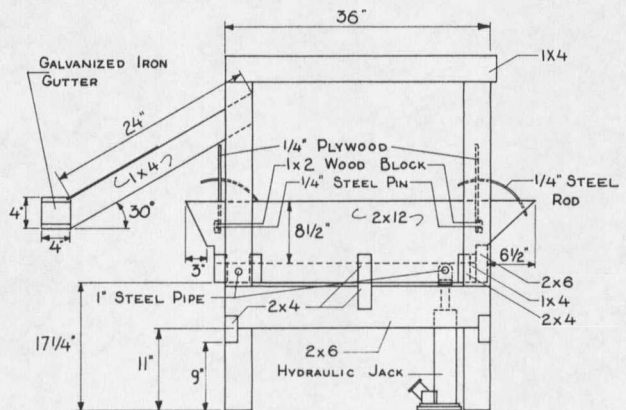


NOTE: THE GUTTER, PLEXIGLASS SHIELD, AND TWO SUPPORT PIECES HAVE BEEN OMITTED FROM THE FRONT VIEW FOR CLARITY.

TOP VIEW



FRONT VIEW



RIGHT SIDE VIEW

Figure 4 Rainfall Simulation Test Device

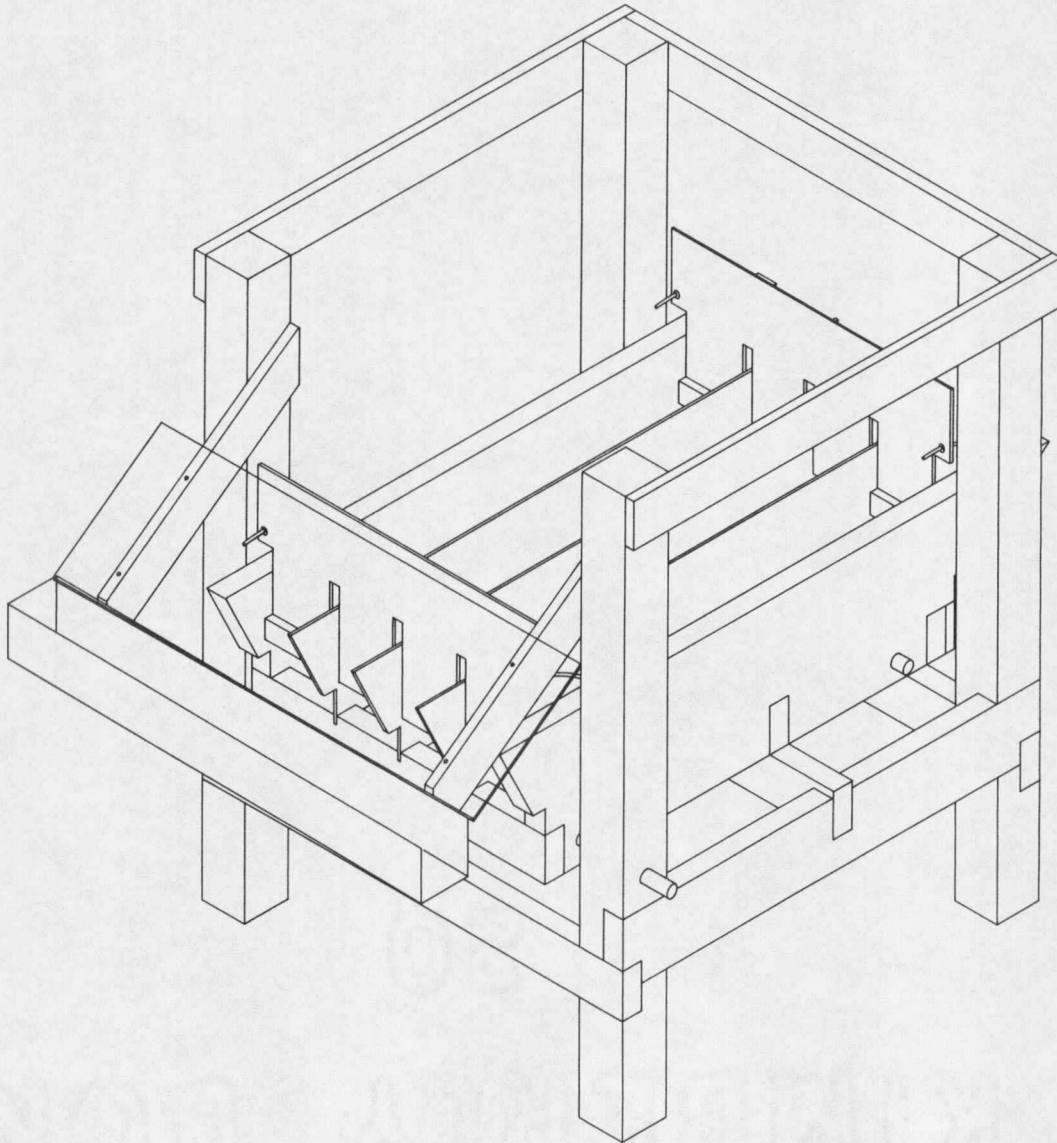


Figure 5 Rainfall Simulation Test Device (Isometric view)

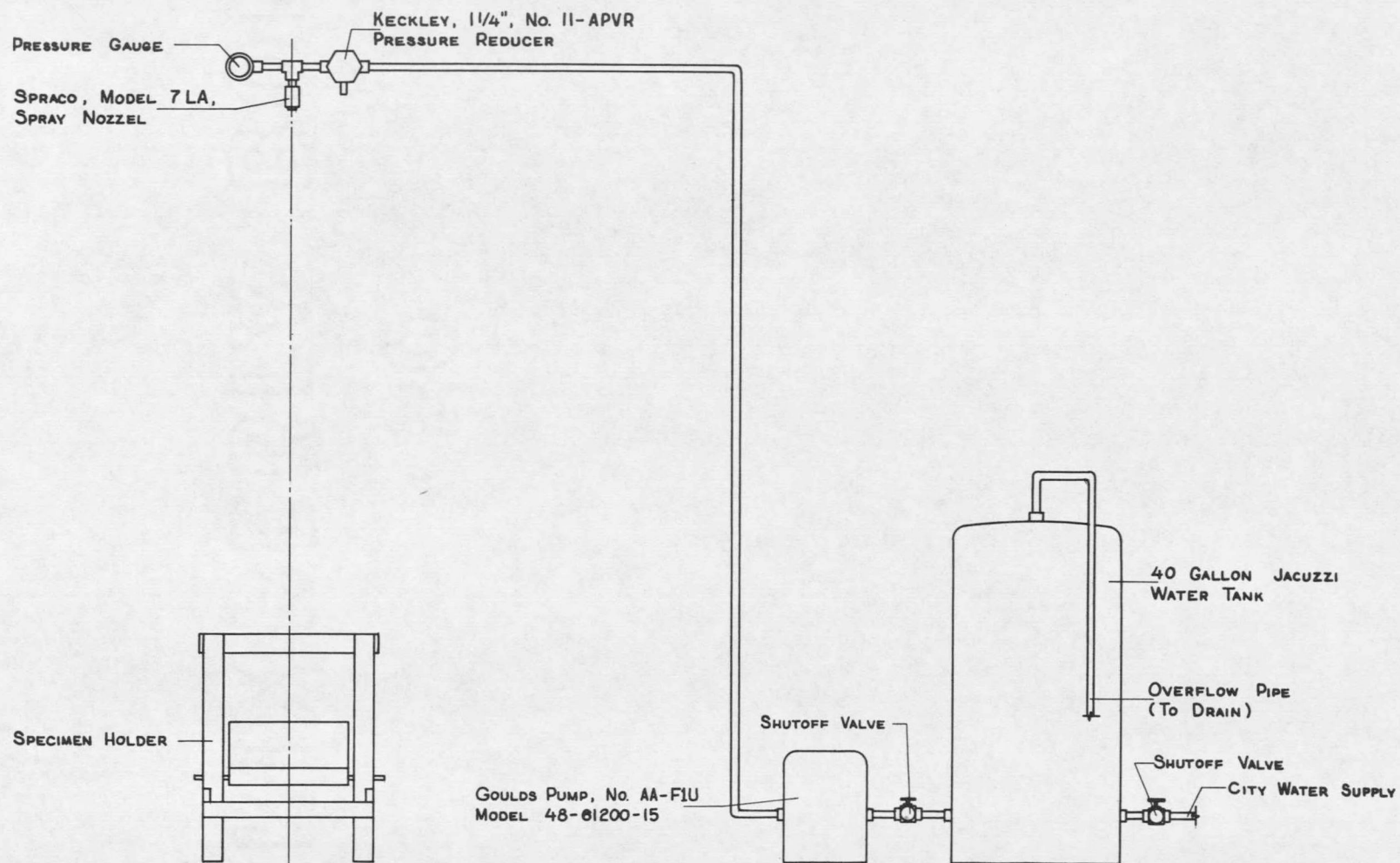


Figure 6 Schematic Flow Diagram

so that a minor amount of overflow occurred to assure that the pump was operating with a constant suction head. The pump used to supply the pressure reducer with a constant diaphragm pressure was a Goulds, No. AA-FLU, Model 48-61200-15. A Keckley, 1 $\frac{1}{4}$ in., No. 11-A PRV, pressure reducer was used to regulate the delivery of the water to the spray nozzle and, in combination with this pressure reducer, a Spraco, Model 7LA, spray nozzle was used to deliver the desired rainfall intensity. The above described system was necessitated by the delivery rate and pressure variation experienced in the domestic water supply.

The system was calibrated by placing sampling cans over a horizontal surface at the elevation of the specimen holder frame and measuring the amount of rainfall for a period of 30 min. The calibration was accomplished by adjusting the nozzle along its vertical axis to provide a uniform simulated rainfall over the entire area of the specimen holder frame. Once this adjustment was achieved, the pressure on the nozzle side of the pressure reducer was varied and the rainfall intensity recorded for each nozzle delivery pressure. Results of this calibration, which were periodically verified during the course of the study, are shown in Figure 7.

Based on the recommendation of Forest Service personnel, a constant rainfall intensity of 6 iph was selected for the study.

A bypass was constructed from corrugated metal downspout so that the simulated rainfall system could be started and allowed to reach an equilibrium condition without subjecting the erosion specimens to simulated rainfall during this period of flow adjustment. The rope-actuated

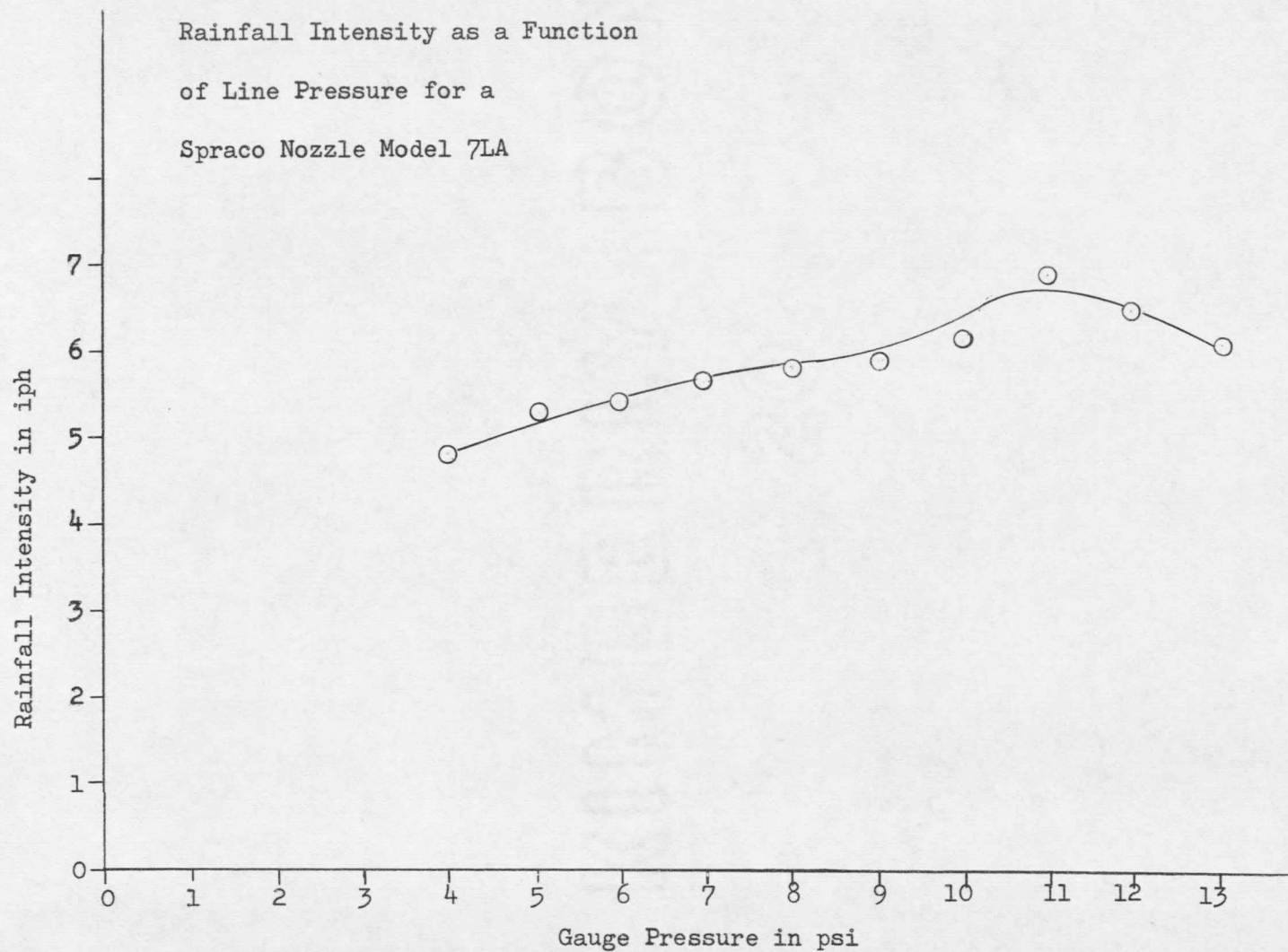


Figure 7 Rainfall Intensity as a Function of Gauge Pressure

bypass system intercepted the water directly below the nozzle and discharged it into a laboratory sink as shown in Figure 8.

RUNOFF COLLECTION

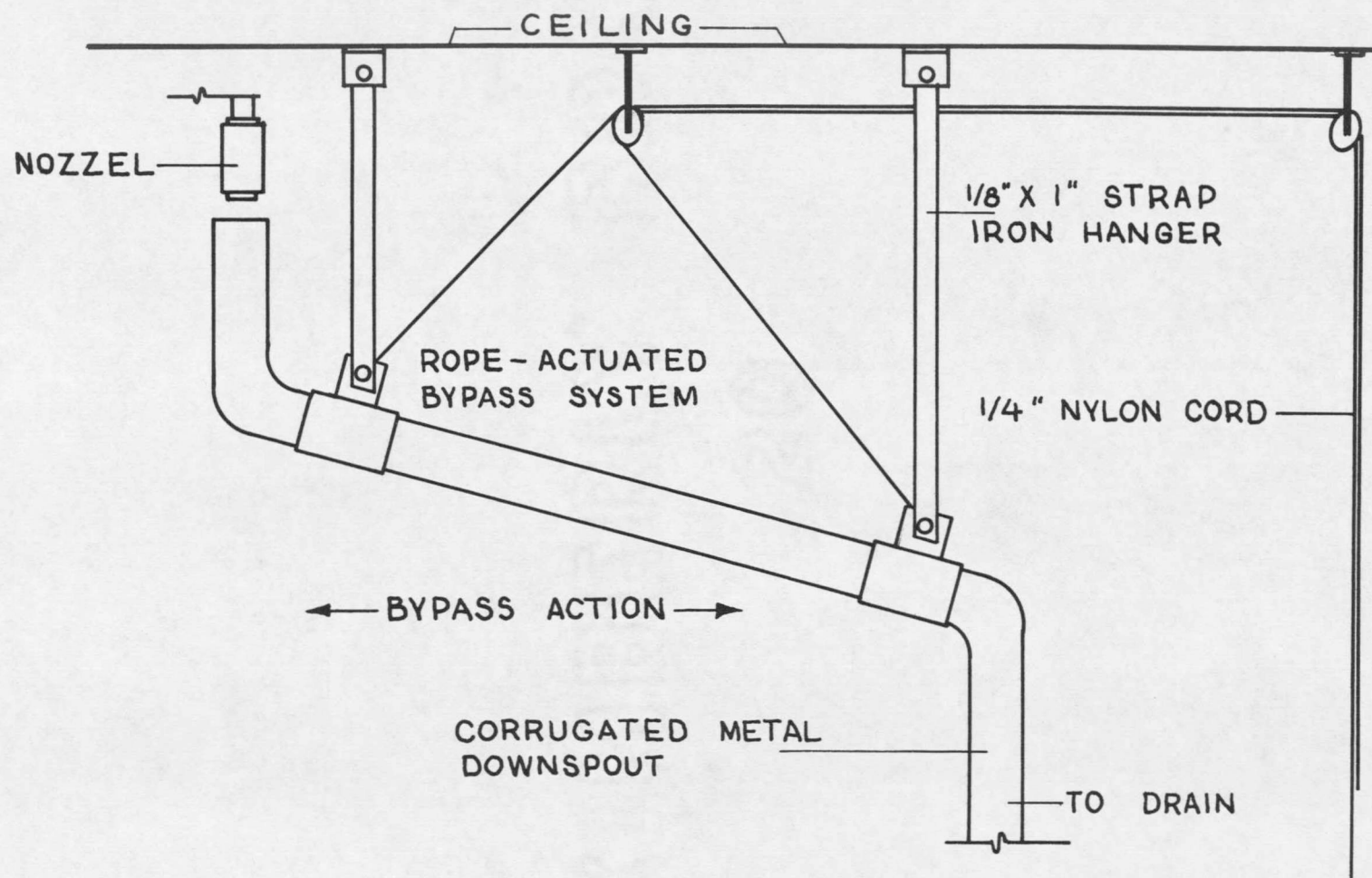
The runoff of both water and soil solids, caused by the simulated rainfall on the erosion specimen, passed over the specimen surface and was directed to a plastic funnel placed in the top of a sampling tube with the aid of a drilled stopper as shown in Figure 9.

To prevent the simulated rainfall from entering the funnel, a plastic hood with a gutter at the lower end was placed over the runoff collection assembly as shown in Figures 4 and 5.

No suitable sampling tubes that would meet the necessary physical tolerances, prescribed by the distance between channels and the needed volume, were available as a "stock" item through suppliers. The necessary dimensions were therefore determined and the sample tubes fabricated by Instrument Service, a specialty service department of Montana State University.

CALIBRATION OF SAMPLING TUBES

Each of the sampling tubes was marked with an identification number and individually calibrated because the physical dimensions of each sampling tube varied slightly. The greatest variation of measurement was near the bottom of the tube where welds were made during tube fabrication. The individual calibration was necessary in order that accurate determinations could be made of the two components of runoff -- soil solids and water.



-32-

Figure 8 Rainfall Bypass System

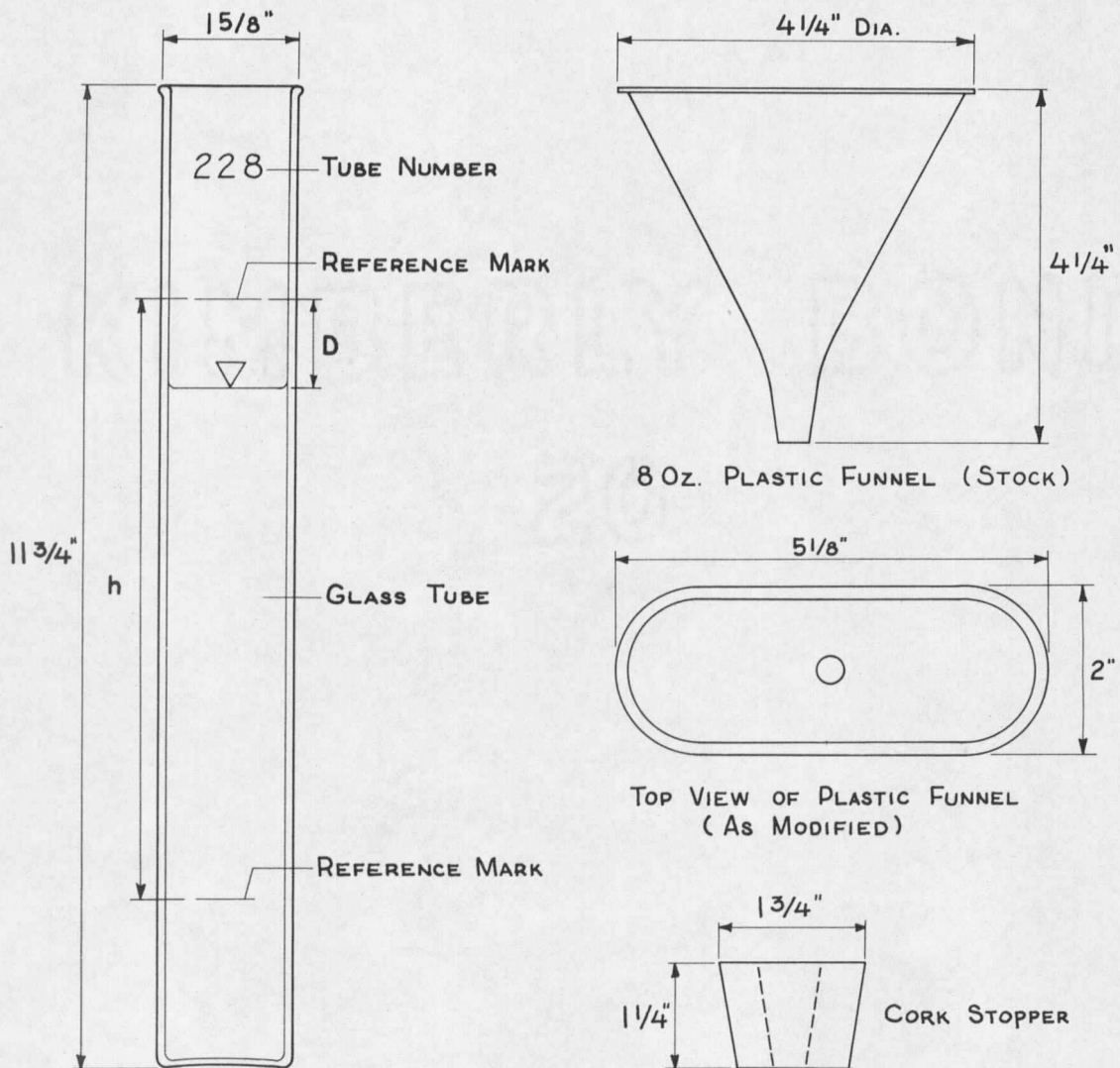


Figure 9 Runoff Collection Equipment

Two volume calibration marks were permanently etched on the outside wall of the tube, a lower one at 50 cc and an upper one at 250 cc as shown in Figure 9. Each volume calibration was accomplished by carefully measuring out the respective amount of distilled water in a graduate, introducing the measured volume of water into the tube and marking the tube at the bottom of the meniscus.

Because the tube was, within close tolerances, of constant diameter between these calibrated volume markings, the tube volume was assumed to be proportional to the distance between the marks. The distance between the calibration marks, h in Figure 9, was measured to the closest 1 mm and recorded as the calibrated tube length. The calibrated tube lengths are shown in Table VI, Appendix A.

The tubes were then individually weighed on a Mettler, Model P1200 balance, and the weights recorded to the nearest 0.01 g and shown as calibrated tube weight in Table VI, Appendix A.

SAMPLE TUBE HOLDER

A sample tube holder was fabricated, as shown in Figure 10, such that it held 8 tubes with alternate tubes having the same center-to-center spacing as the erosion specimen holders. The assembly was fabricated so that the tube holder could travel along its longitudinal axis on ball bearings placed between the holder and the base plate. A mechanical lock was affixed to each end of the assembly to lock the tube holder in each of the two extreme positions.

When runoff sampling was started, the runoff was collected in the tubes occupying positions 1, 3, 5 and 7 of the sample tube holder. When

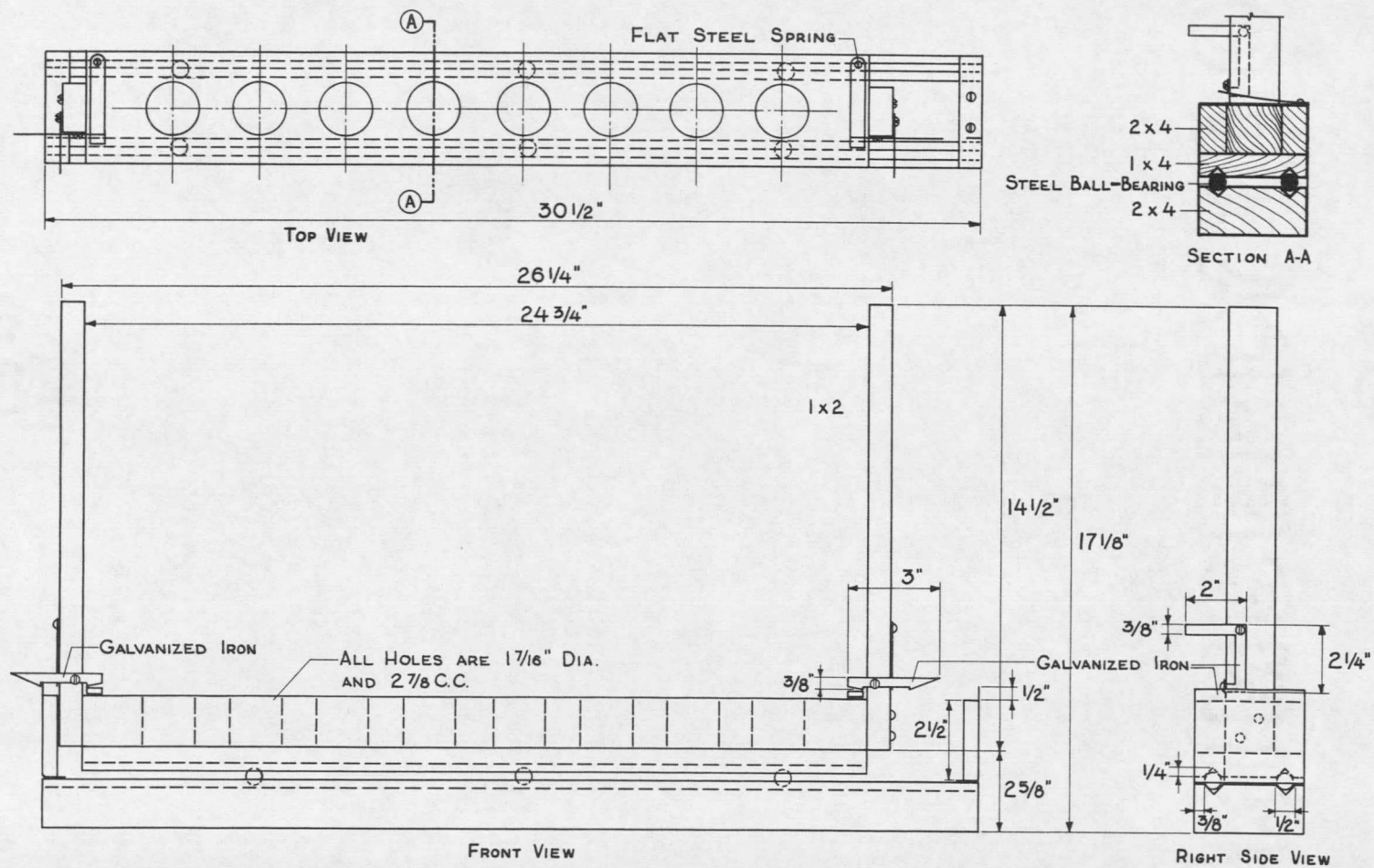


Figure 10 Sample Tube Holder

it was desired to collect the next increment of runoff, as described below, the mechanical lock adjacent to tube position 8 was disengaged and the sample tube holder was translated to the other extreme position, thus engaging the mechanical lock adjacent to tube position 1. In this position the runoff was being collected by the tubes occupying positions 2, 4, 6 and 8. The tubes in positions 1, 3, 5 and 7 could then be set aside for determination of the water and solid components of runoff, as described below, and clean tubes placed in these positions of the sample tube holder.

SEQUENCE OF SAMPLE COLLECTION

The time at which simulated rainfall began falling on the erosion specimens was defined as zero time and the time of first runoff of each erosion specimen was noted (see Tables VII through XXX, Appendix B).

Depending on the rate of runoff, the sample tubes were changed at either 75 or 90 second intervals during the course of each test run. Tables VII through XXX, Appendix B, indicate the sample increment times for each set of samples, with the listed time reflecting the time of tube removal.

DURATION OF SIMULATED RAINFALL

Because rainstorms of a 6 iph intensity would occasionally last more than 60 min the minimum duration of the simulated rainfall for each test run was 60 min. The duration of each test run is indicated by the last time increment in Tables VII through XXX, Appendix B.

PROTECTION FROM EVAPORATION

Many of the tests were conducted during periods when high air

temperature, low humidity and mild breezes presented ideal conditions for evaporation. To offset the effect of the air currents, 9 ft x 12 ft sheets of polyethylene were suspended from the ceiling at a radial distance of 6 to 8 ft from the center of the nozzle.

DETERMINATION OF COMPONENTS OF EROSION

After the completion of a test run, each tube containing the runoff material was individually weighed to the closest 0.01 g and the distance, D in Figure 9, was measured to the closest 1 mm. These values were recorded and used in subsequent calculations. The two components of the total runoff material -- fluid runoff and eroded solids -- could then be determined. By simple proportion:

$$\frac{h}{200} = \frac{D}{V'} \quad (7)$$

where: h = distance between calibrated marks in cm
as shown in Figure 9;

D = distance from 250 cc calibration mark to
bottom of meniscus of material in tube
in cm and;

V' = volume of tube in cc between surface of
material in tube and 250 cc calibration mark

from which:

$$V' = \frac{200D}{h} \quad (8)$$

Noting that the total volume of material in the tube is the algebraic difference between 250 cc and V':

$$V_t = 250 - \frac{200D}{h} \quad (9)$$

where: V_t = total volume of material in tube in cc.

Because:

$$V_t = V_w + V_s \quad (10)$$

where: V_w = volume of water and

V_s = volume of solids

it follows, by equating the righthand members of Equations (9) and (10),

that:

$$V_w + V_s = 250 - \frac{200D}{h} \quad (11)$$

It is fundamental that:

$$W_w = W_t - W_s - W_T \quad (12)$$

where: W_t = total weight of material and tube;

W_w = weight of water;

W_s = weight of solids and;

W_T = calibrated weight of tube.

It is also fundamental that:

$$V_s = \frac{W_s}{G_s \gamma_w} \quad (13)$$

where: G_s = specific gravity of soil solids and

γ_w = unit weight of water (1 gm per cc)

and:

$$V_w = \frac{W_w}{\gamma_w} \quad (14)$$

Substituting the righthand members of Equations (13) and (14) into

Equation (11) yields:

$$\frac{W_w}{\gamma_w} + \frac{W_s}{G_s \gamma_w} = 250 - \frac{200D}{h} \quad (15)$$

If the righthand member of Equation (12) is substituted into Equation (15) for W_w , then:

$$\frac{W_t - W_s - W_T}{\gamma_w} + \frac{W_s}{G_s \gamma_w} = 250 - \frac{200D}{h} \quad (16)$$

Solving Equation (16) for the weight of solids, W_s , yields:

$$W_s = \frac{(250h - 200D)\gamma_w G_s + (W_T - W_t)hG_s}{(1 - G_s)\gamma_w h} \quad (17)$$

which gives the weight of the solid component of the eroded material.

The weight of the water was then determined by the use of Equation (12).

In addition to the above mentioned method of determining the components of erosion, another method, based on the weight of the oven-dry soil in the sampling tubes, was also used. After completing a test run and recording the total weight of material and tube, W_t , and distance, D , the tubes were placed in a large drying oven at 105°C until all the water had been evaporated from the specimen tubes.

At the completion of the drying period the tubes containing oven-dry soil were reweighed and this value recorded as "Weight Dry," W_d . The two components of the total runoff material -- fluid runoff and eroded solids -- could then be determined as follows:

$$W_s = W_d - W_T \quad (18)$$

where: W_s , W_d and W_T are as previously defined.

The volume of water in each tube can be computed as follows:

$$V_w = \frac{(W_t - W_d)}{\gamma_w} \quad (19)$$

where: V_w , W_t and γ_w are as previously defined.

RESULTS OF INVESTIGATION

The weight of solids eroded, W_s , and the volume of runoff water, V_w , were determined from the recorded data and the use of Equations (14) and (17), which were programmed for the IBM 1620 digital computer at the Montana State University Computer Center. The values of the weight of solids eroded are tabulated in Tables VII through XXX, Appendix B and the values of volume of runoff water are tabulated in Tables XXXI through LIV, Appendix C.

DOCUMENTATION

At the conclusion of each run, visual observations were made and the qualitative effect of the rainfall on the specimen surface was noted. Visual observations were supplemented during the actual performance of a test run by photographic documentation. A 16 mm movie camera, using color film and operating at a 10 sec time lapse, was used throughout each run to document the specimen surface erosion pattern. The camera was positioned at a distance of 7 ft above the surface of the specimens and the flood light was positioned above the pressure reducer.

DETERMINATION OF MOISTURE CONTENT CHANGE

To determine the total change in moisture content of the soil over the duration of the run, moisture content samples were taken from the longitudinal center and from each end of the specimens throughout the

full specimen depth, at the conclusion of the run. The difference between each of these values and the initial moisture content, determined at the time of specimen preparation, was assumed to be representative of the change in moisture content for the respective portion of the specimen. Because moisture samples were not obtained during the run, studies of infiltration rates were not made.

CHAPTER IV

ANALYSIS AND DISCUSSION OF RESULTS

OBSERVATIONS OF ERODED SURFACES

When the specimens to be tested on a 1:1 slope were compacted to a dry unit weight of 80 lb per cu ft, the soil washed completely out of the channels in the following runs after a minimum simulated rainfall duration of 45 min: D-1, channel 2; D-6, channel 4; D-7, channel 3; D-8, channel 2. Just prior to the complete washing out of the soil, an increase in the amount of solids eroded occurred.

Moisture samples taken at the time of specimen failure indicated that all specimens were saturated and had water contents varying from 42% to 55%. This type of specimen failure can be described by an analysis based on stresses within an infinite slope and with seepage parallel to the slope as presented by Taylor (1948).

Visual observations made at the conclusion of each run indicated that there were certain erosion patterns which recurred on specimens tested at the same unit weights and slopes. The variation in the erosion patterns indicated the location of the points of maximum erosion on each specimen surface. Observations of the different erosion patterns aid in understanding the process of erosion with regard to volume of water, impact force, "transporting capacity," "detaching capacity," and slope.

The geometric configurations of specimen surface undoubtedly influenced the erosion pattern. The compaction of the specimens produced a flat, level surface; but, after the confining pressure was released, a slight rebound of the surface may have occurred as shown in Figure 11.

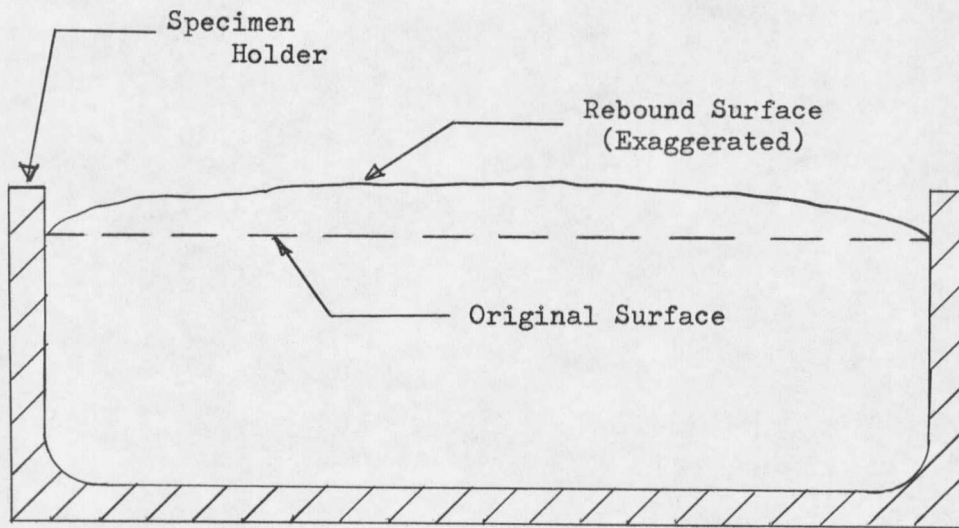


Figure 11 Specimen Surface

The slightly curved surface could have increased the lateral component of flow thereby changing the resulting erosion pattern.

The erosion along the longitudinal edges of all the specimens tested indicated that the conditions present at the channel boundary were conducive to erosion (see Figure 12). At the steel-soil interface the average flow resistance would be lower than the value of the frictional resistance of the soil alone, causing a higher flow velocity along the edge of the channel than on the soil surface. This discontinuity, combined with the fact that surface rebound could increase the lateral flow to the edge of the specimen, explains the accelerated erosion along the specimen edges. Based on the size of the erosion paths present at the

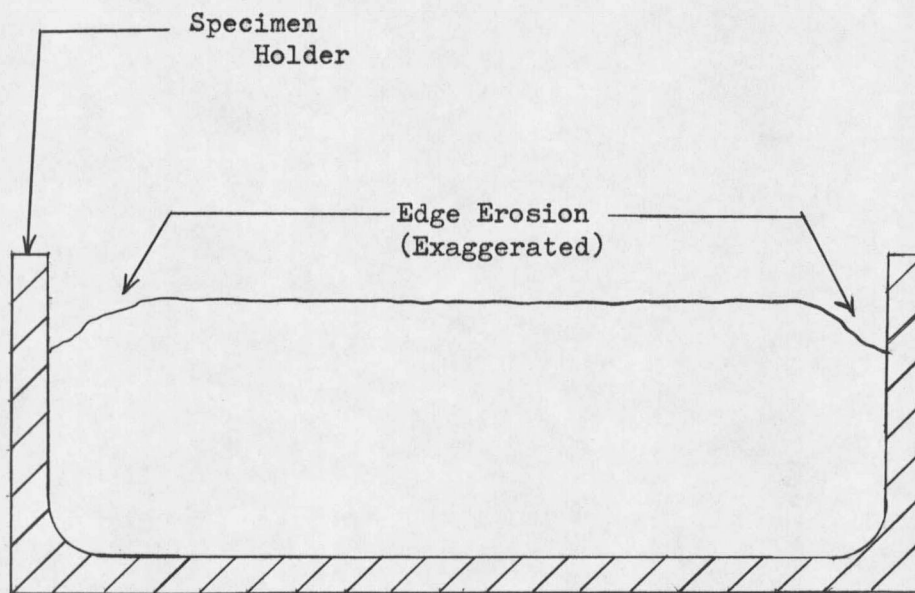
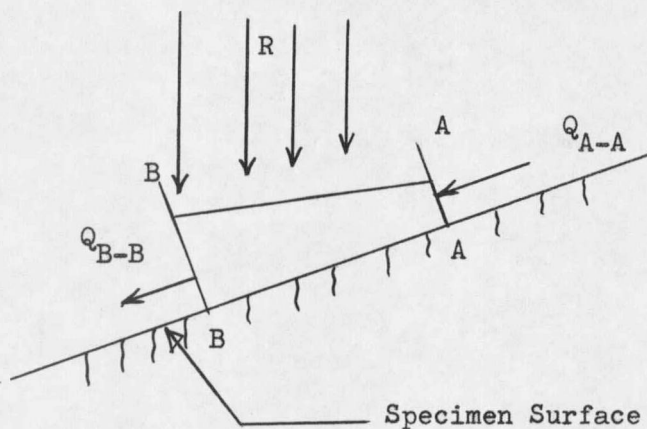


Figure 12 Specimen Edge Erosion

edges of the specimens, it was concluded that the weight of solids eroded from this location did not exceed 5% of the total weight of solids eroded from each channel.

Although Ellison (1947a) did not consider rainfall in his studies of slope erosion, his findings concerning the "detaching capacity" and "transporting capacity" of an erosive agent were thought to be applicable to these tests. As the overland flow moved downslope, increased "transporting capacity" was believed to result from the increase in volume of runoff with respect to distance (see Figure 13). The combination of rainfall impact and overland flow caused the sediment load to increase, thus



Q_{A-A} = Quantity of runoff
at A-A

R = Rainfall between
A-A and B-B

Q_{B-B} = Quantity of runoff
at B-B ($Q_{A-A} + R$)

Figure 13 Quantity of Runoff

increasing the detaching capacity as the flow moved downslope. When the flow reached the lower third of the specimen, the "detaching capacity" was sufficient to cause noticeable scour on the surface of the specimen.

The effects of this scouring process were reflected by the intensive erosion patterns produced on the lower third of the surface of specimens compacted to a dry unit weight of 80 lb per cu ft and tested on a 1:1 slope. The specimens tested on the same slope but at higher unit weights did not show the intensive erosion patterns because the increased unit weight caused greater resistance to erosion and scour.

The erosion patterns present on the surface of the specimens compacted to a dry unit weight of 80 lb per cu ft and tested on a 3:1 slope indicated that moderate erosion had occurred on the middle third of the specimen as well as intensive erosion on the lower third. The lower two-thirds of the specimen surfaces tested on this 3:1 slope, but at higher unit weights, had a less intensive erosion pattern.

The normal, R_N , and tangential, R_T , components of the raindrop impact force (see Figure 14) are essential factors in the erosion process. Considering the action of these components on the three slopes tested, the normal component, which increases as slope decreases, is the component instrumental in loosening the soil particles while the tangential component is instrumental in moving the loosened particles downslope.

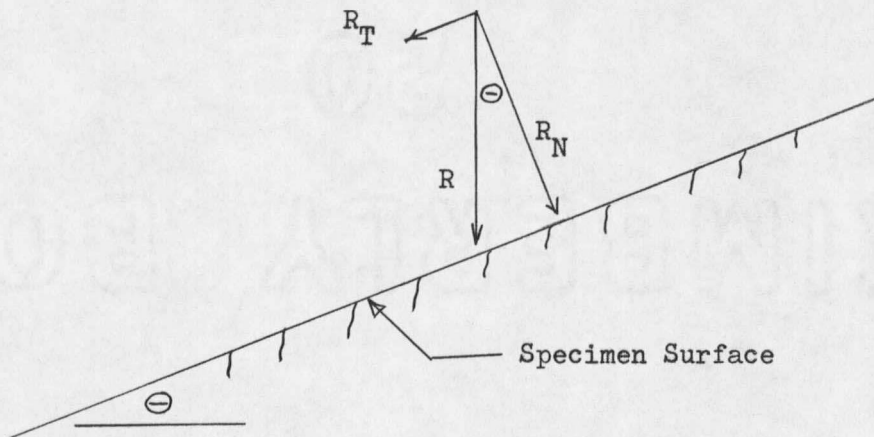


Figure 14 Components of Raindrop Impact Force

Because the specimen length was constant throughout all runs, the imposed slopes caused different areas of horizontal projections. Therefore, the rainfall intensity, being measured on a horizontal projection, resulted in a greater volume of water on the flatter slopes.

The combination of the greater volume of water and the increased normal component of raindrop impact force on the 3:1 slope caused more

soil particles to go into suspension on this slope than on the 1:1 slope. Although both the "transporting capacity" and "detaching capacity" increased as slope decreased, it is probable that "detaching capacity" has the greater effect on erosion.

The larger volume of water available on the flatter slope and the lower gradient would tend to cause a greater depth of flow over the specimen surface on the 3:1 slope than on either the 1:1 or 2:1 slopes.

The erosion patterns observed on all specimens tested on the 2:1 slopes differed markedly from those on the other two slopes because lateral erosion, rather than longitudinal erosion, gave the effect of "terracing." These lateral erosion patterns are thought to have resulted because surface rebound caused greater lateral flow. This "terracing" was not apparent on the 3:1 slope, probably due to the greater depth of flow.

At the conclusion of each run all specimen surfaces had an articulated, "pebbly" appearance. This characteristic appearance was more pronounced on specimens tested on the flatter slopes where there was a larger normal component of raindrop impact.

The surface of the specimens was composed of many small soil "packets" of individual soil particles. The raindrop force was thought to have eroded the smaller packets faster than the larger ones by eroding the outer perimeter of the packets and proceeding to the center similar to the process described by Rose (1961).

SOIL LOSSES FROM SPLASH

Although this study was not designed to investigate soil loss caused

by splash, it was recognized that this form of soil loss did occur. At the conclusion of each run, soil particles were in evidence on the lower portion of the channel dividers which indicated that soil particles were not splashed from one channel to another.

MOISTURE CONTENT CHANGE

The average value of the change in moisture content throughout the depth of each specimen is shown in Tables VII through XXX, Appendix B. For a given unit weight there was no discernible variation in the change of moisture content with slope, however, the moisture content change did vary with the unit weight.

WEIGHT OF SOLIDS ERODED

A factorial analysis (see Appendix D) performed using the values of cumulative weight of solids eroded indicated that no reduction in accuracy would be introduced by considering only the first four runs on each slope.

The analysis also indicates that slope had a definite effect on the weight of solids eroded. The values of cumulative weight of solids eroded for the first four runs on each slope, as shown in Appendix B, indicate a relationship between weight of solids eroded and slope as shown in Figure 15.

This relationship between quantity of erosion and slope is not in agreement with the conclusions of Osborn (1955), Borst and Woodburn (1940), Duley and Hays (1932), and Meyer and Monke (1965), who concluded that an increase in slope (without qualification as to the slope limits) results in an increase in soil loss. The tests by these investigators, however,

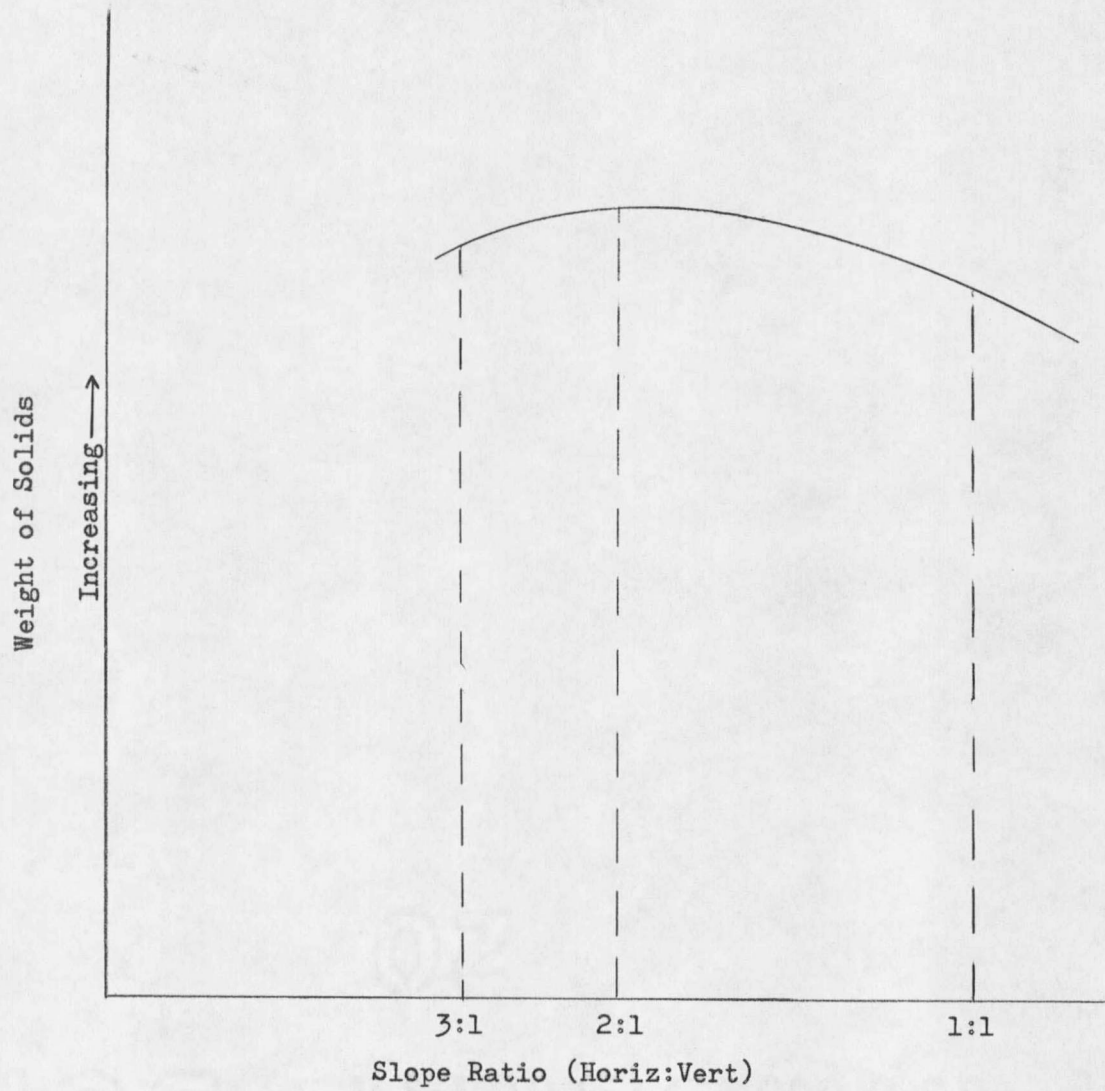


Figure 15 Relationship Between Weight
of Solids Eroded and Slope

did not consider unit weight as a variable and were conducted on relatively flat slopes which never exceeded 25%, whereas the slopes tested in this study varied from a minimum of 33% to a maximum of 100%.

By considering the raindrop impact force, the volume of water flowing, and the velocity of flow, the relationship between slope and weight of solids eroded can be understood. The normal component of raindrop impact force, which increases as slope decreases, loosens the soil particles and transports some of them in the subsequent splash drops. With more loose soil available to be transported on the flatter slopes, the velocity of the water and the volume of water available to transport this loose soil become important factors.

The horizontal projection of the specimen surface area decreases as the slope increases causing more water to be available for transportation of particles on the flatter slopes. As the slope increases, the increase in the velocity of flow will cause an increase in the weight of solids eroded similar to the findings of Duley and Hays (1932).

The combined effect of velocity, volume, and impact on the weight of solids eroded suggests the possibility of a slope from which the maximum amount of erosion will occur. This combined effect would result in the relationship between slope and weight of solids eroded, shown in Figure 15.

The results indicate, during the first 11 min of each run, a relationship between the weight of solids eroded and the unit weight. The consistency of the relationship, however, deteriorates during the last time periods of each run. This is in agreement with the results of the

factorial analyses (Tables LV through LVIII, Appendix D) which indicate that the unit weight has a significant effect on the weight of solids eroded only during the first 11 min.

The interaction between the slope and unit weight has an effect on the weight of solids eroded as shown by the factorial analysis, which indicates that these two variables are interdependent.

VOLUME OF RUNOFF WATER

The results of the factorial analysis (Tables LIX through LXII, Appendix D) indicate that the unit weight, the slope, and the slope-unit weight interaction have an effect on the volume of runoff water for all time periods.

The values of cumulative volume of runoff water for the first four runs at each slope (Appendix C) indicate a relationship between runoff water and unit weight, as shown in Figure 16.

The increase in runoff water with an increase in unit weight is believed to be due to the reduction of infiltration of surface water into the soil. During the early time periods the volume of water on the slope did not increase as the slope decreased which may have been a result of the high splash rates believed to be present on the lower slopes during these time periods. When the splash rate stabilized, however, the volume of runoff water increased as slope decreased.

ADJUSTMENT OF WEIGHT OF SOLIDS ERODED

The decrease in horizontal projection of surface area, with an increase in slope, resulted in a smaller volume of water striking the specimen surface. For a small slope angle and a large specimen surface

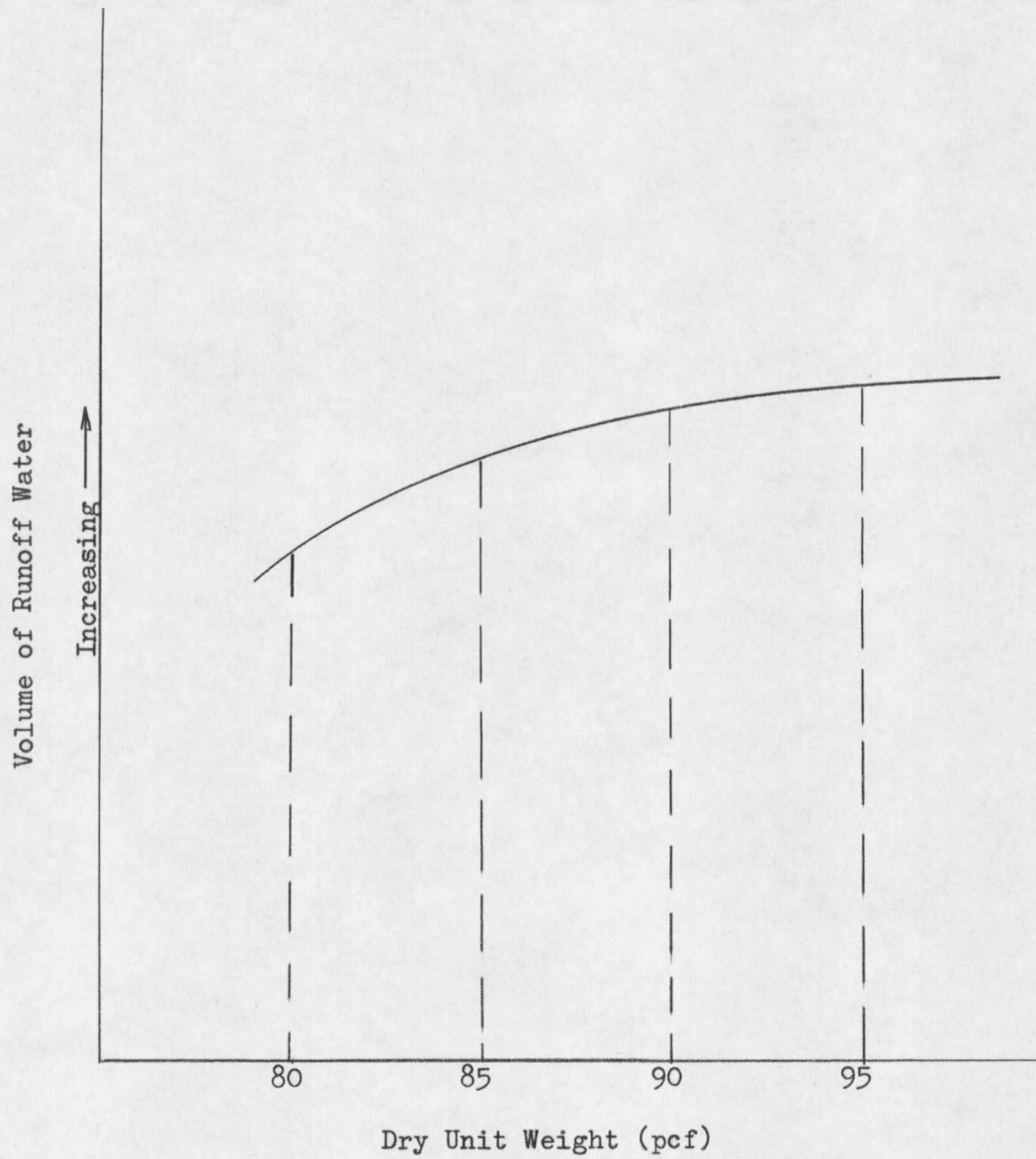


Figure 16 Relationship Between Volume
of Runoff Water and Unit Weight

area, the variation in area is not critical; for relatively small surface areas and steep slope angles, as were used in these tests, this area variation becomes significant.

In this study the weight of solids eroded is based on the horizontally projected area; therefore, it is necessary to correct the volumes of runoff water and weights of solids eroded to a horizontal area equivalent. To simplify the analysis, the average volumes of runoff water, for each of the runs analyzed, were corrected to a horizontal area equivalent by:

$$V_a = \frac{V_o}{\cos i} \quad (21)$$

where: V_a = average adjusted cumulative volume of runoff water at each time increment;

V_o = actual average cumulative volume of runoff water at each time increment and;

i = slope angle in degrees.

The relationship between the average weight of solids eroded and the average volume of runoff water is approximated by a linear function as shown in Figure 18 and Table LXXI, Appendix E. Using the linear, least squares analysis, for each slope and unit weight, the average adjusted weights of solids eroded from each run were obtained from:

$$W_{sa} = \frac{V_a - b}{m} \quad (22)$$

where: W_{sa} = average adjusted cumulative weight of solids eroded at each time increment;

V_a = as defined in Equation (21);

b = intercept and;

m = slope of the line.

RELATIONSHIPS INVOLVING THE ADJUSTED WEIGHT OF SOLIDS

The adjustment of the weight of solids eroded made it possible to study the effect of slope on erosion without the volume of water being a variable.

When values of the average adjusted weight of solids were plotted as a function of time, the resulting relationship approximated a linear function, as shown in Figure 19 and Table LXXII, Appendix F. The rate of erosion for each run was obtained from:

$$A = \frac{W_{sa} - B}{T} \quad (23)$$

where: A = slope (rate of erosion);

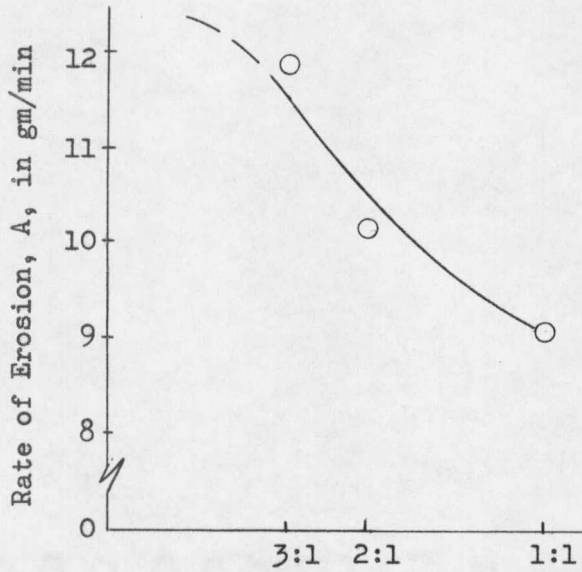
W_{sa} = as defined in Equation (22);

B = intercept and;

T = time in minutes.

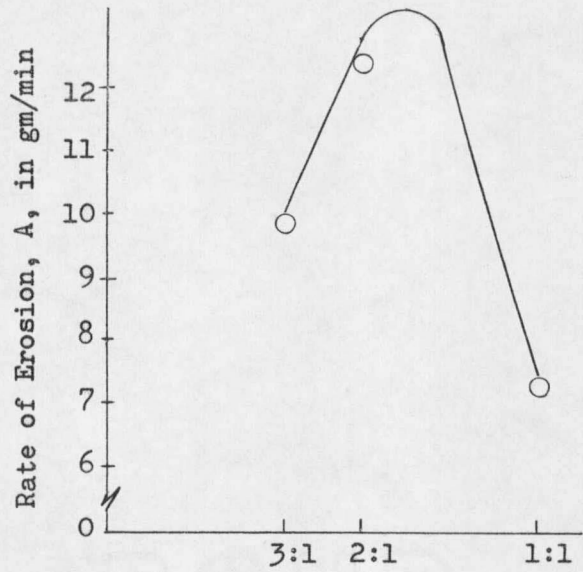
By plotting the rate of erosion, A, as a function of slope for each unit weight, the relative effect of slope on the rate of erosion is shown in Figure 17. For specimens compacted to the lowest unit weight, Figure 17(a), the highest rate of erosion occurred on the flattest slope. Specimens compacted to the highest unit weight, Figure 17(d), experienced the highest rate of erosion on the steepest slope.

At the lowest unit weight, on the flattest slope, it is possible that the combination of high impact force and the greater depth of flow caused the relatively high rate of erosion. As the unit weight was increased to its maximum value, it appears that the high flow velocity caused the relatively high rate of erosion on the steepest slope.



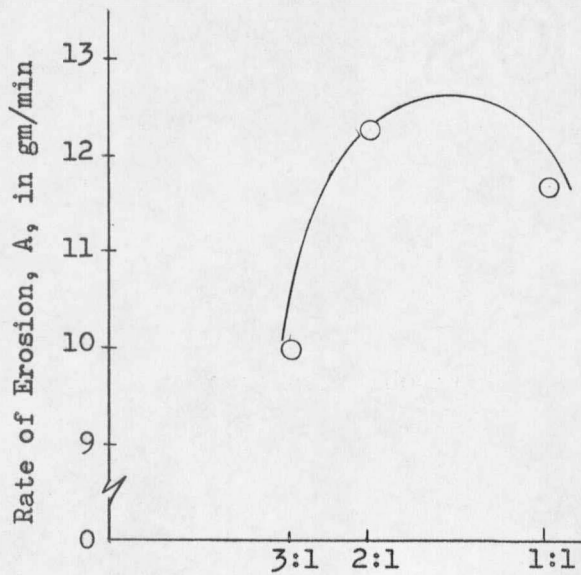
Slope Ratio (Horiz:Vert)

(a) Unit Weight 80 pcf



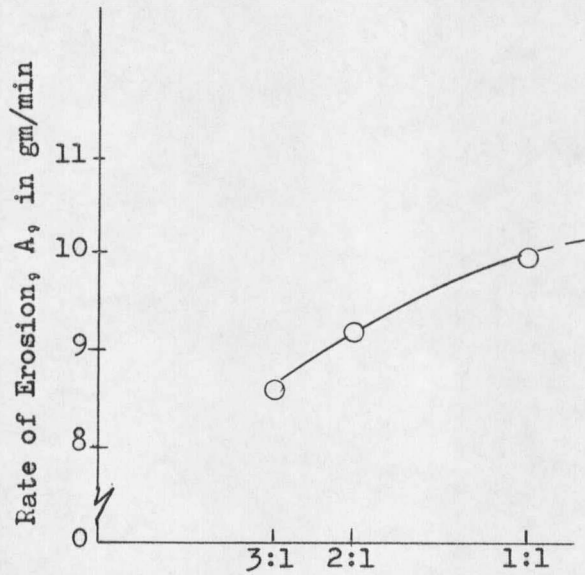
Slope Ratio (Horiz:Vert)

(b) Unit Weight 85 pcf



Slope Ratio (Horiz:Vert)

(c) Unit Weight 90 pcf



Slope Ratio (Horiz:Vert)

(d) Unit Weight 95 pcf

Figure 17 Relationship Between Rate of Erosion and Slope

The relationship between rate of erosion, A, and slope in Figures 17(b) and 17(c) shows very clearly that there is a unique slope, for a given unit weight, from which a maximum amount of erosion will occur. Although this unique slope is not explicitly defined for either 85 or 90 lb per cu ft, it is implied from Figures 17(b) and 17(c) that the unique slopes for these unit weights would fall between a 2:1 and 1:1 slope. At the lowest unit weight, Figure 17(a), this unique slope appears to be less than the 3:1 slope while at the highest unit weight, Figure 17(d), this unique slope appears to be greater than the 1:1 slope.

Although earlier investigators made no mention of the effects of unit weight, the results of this study indicate that the unit weight is an instrumental variable to be considered in erosion.

Because the study was performed in the laboratory on small scale specimens, it should not be construed that the findings are directly applicable to field conditions without detailed study of the "scale" effect.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Based on the results and analysis of this study, the following conclusions regarding the effect of unit weight and slope on the erosion of unprotected slopes were reached:

1. The relationship between the weight of solids eroded and the slope indicates the existence of a unique slope from which a maximum amount of erosion will occur.
2. Analyses based on the average adjusted weight of solids eroded indicate:
 - a) On the flattest slope, the specimens compacted to the lowest unit weight experience the highest rate of erosion.
 - b) On the steepest slope, the specimens compacted to the highest unit weight experience the highest rate of erosion.

RECOMMENDATIONS FOR FURTHER STUDY

Based on the results and analyses of this research, it is recommended that further study be made in the following areas:

1. Repeat this study using a $1\frac{1}{2}:1$ slope to verify the above conclusions at this slope.
2. Repeat this study using rainfall intensities below 6 iph to determine the effect of variation of rainfall intensity on erosion.
3. Evaluate the change of the impact force and flow velocity as the slope and rainfall intensity are varied.
4. Vary the specimen surface area and depth of specimen to determine any "scale" effect.

APPENDIX

APPENDIX A

SAMPLING TUBE CALIBRATIONS

TABLE VI
SAMPLING TUBE CALIBRATIONS

TUBE NUMBER	CALIBRATED WEIGHT	CALIBRATED LENGTH
1	185.41	19.11
2	184.30	19.35
3	167.21	19.11
4	183.05	19.53
5	174.12	18.86
6	185.20	19.43
7	180.73	18.20
8	183.29	19.00
9	170.28	18.37
10	167.88	18.56
11	163.54	19.15
12	168.29	18.50
13	162.40	18.60
14	163.80	19.58
15	167.10	18.40
16	189.02	19.14
17	184.08	19.20
18	170.29	19.32
19	165.90	18.75
20	184.37	19.38
21	170.40	19.25
22	166.30	18.38
23	184.80	19.20
24	186.35	18.99
25	167.21	18.30
27	164.51	18.69
28	164.49	18.75
29	162.60	18.89
30	178.58	18.44
31	169.65	18.30
32	165.20	18.62
33	173.71	19.20
34	182.60	19.18
35	168.60	19.60
36	166.60	18.16
37	180.92	18.21
38	180.59	18.08
39	175.40	18.50
40	168.70	18.60
41	174.19	18.74
42	164.10	18.96
43	163.65	18.45
44	172.64	17.79

TABLE VI. (CONT)

45	164.60	18.70
46	171.10	19.10
47	176.33	17.16
48	176.05	18.10
49	165.03	18.84
50	170.50	19.20
51	164.82	18.75
52	173.55	17.50
53	172.39	18.97
54	159.90	19.30
55	173.05	17.72
56	164.50	18.80
57	172.97	18.95
58	166.52	18.75
59	166.50	18.40
60	165.93	19.50
61	161.71	19.80
62	164.10	19.10
63	177.00	17.50
64	171.10	18.00
65	172.77	19.30
66	168.21	17.70
67	171.12	17.60
68	178.18	17.40
69	164.67	18.00
70	168.35	17.90
71	173.73	19.20
72	168.89	19.80
73	174.32	19.30
74	174.15	19.30
75	170.49	17.90
76	170.42	17.60
77	176.41	19.40
78	171.00	19.50
79	172.10	19.60
80	168.50	18.00
81	172.13	19.50
82	170.43	19.90
83	172.59	19.50
85	172.25	19.50
86	174.81	17.50
87	166.12	20.10
88	168.78	19.90
89	170.20	19.10
90	175.92	19.10
91	173.18	18.80

TABLE VI (CONT)

92	171.53	19.60
93	172.15	18.50
94	167.54	19.00
95	168.28	17.70
96	172.75	17.70
97	169.10	17.70
98	172.64	19.70
99	175.18	19.40
100	163.48	19.20
101	169.65	19.70
102	168.05	19.80
103	171.17	19.40
104	171.79	19.60
105	174.55	19.60
106	169.85	19.80
107	167.93	19.40
108	171.75	19.70
109	169.40	19.60
110	175.48	18.20
111	161.51	19.80
112	176.70	19.30
113	174.73	19.30
114	172.98	19.70
115	172.10	19.60
116	171.15	19.80
117	175.23	19.20
118	173.00	19.40
119	174.15	19.10
120	176.21	18.40
121	176.52	19.20
122	168.43	19.70
123	167.80	19.70
124	167.95	19.00
125	172.22	19.50
126	174.92	18.80
127	163.45	19.20
128	173.35	19.10
129	168.30	18.90
130	167.70	19.20
131	170.10	18.90
132	164.18	19.40
133	168.29	18.70
134	169.15	18.80
135	170.46	19.50
136	167.90	19.00
137	172.73	19.50

TABLE VI (CONT)

138	173.41	18.60
139	164.48	19.60
140	166.32	19.40
141	181.77	18.00
142	170.31	18.90
143	167.30	19.10
144	164.79	19.40
145	174.27	18.90
146	172.99	19.60
147	176.15	18.50
148	173.32	18.50
149	166.15	19.10
150	181.48	18.20
151	176.10	18.50
152	172.40	18.90
153	172.98	18.80
154	170.78	18.70
155	170.75	19.10
156	159.81	19.80
157	169.72	18.70
158	164.91	19.20
159	163.99	19.60
160	173.75	19.40
161	170.63	18.80
162	165.12	18.00
163	172.19	19.30
164	174.01	18.60
165	174.17	18.60
166	169.20	19.50
167	170.75	18.60
168	174.99	18.30
169	168.79	18.70
170	166.00	19.30
171	171.43	18.25
172	166.78	18.80
173	171.03	18.70
174	169.55	18.95
175	170.47	18.50
176	167.50	19.00
177	172.24	18.50
178	171.91	18.40
179	172.86	18.50
180	166.31	19.40
181	170.34	18.70
182	165.31	19.10
183	171.84	18.50

TABLE VI (CONT)

184	170.61	19.10
185	171.46	19.00
186	164.62	19.40
187	167.40	19.10
188	173.44	18.00
189	175.59	17.80
190	175.58	18.00
191	166.88	19.50
192	173.91	18.70
193	178.20	18.20
194	163.99	19.40
195	172.89	18.40
196	172.86	18.40
197	167.94	19.20
198	176.42	17.80
199	169.72	18.25
200	167.92	19.00
201	169.77	18.50
202	171.65	18.70
203	168.83	18.75
204	171.72	18.60
205	170.49	18.60
206	171.12	18.60
207	169.05	19.20
208	171.27	18.55
209	172.56	18.40
210	172.54	18.50
211	177.17	18.11
212	176.01	17.70
213	168.50	18.60
214	173.21	18.15
215	169.22	18.75
216	173.56	18.00
217	174.75	18.10
218	168.27	19.15
219	168.20	19.05
220	165.24	19.30
221	170.30	18.60
222	172.87	18.40
223	166.79	19.00
224	171.62	18.60
225	171.35	18.50
226	170.71	18.50
227	171.05	18.10
228	175.07	18.40
229	174.74	18.20

TABLE VI (CONT)

230	174.50	18.35
231	173.78	18.25
232	175.16	17.75
233	169.61	18.40
234	169.39	18.50
235	171.93	18.15
236	171.93	18.35
237	173.18	18.35
238	177.53	17.65
239	168.55	18.40
240	171.89	18.80
241	171.04	18.90
242	169.85	18.75
243	171.92	18.35
244	170.68	18.50
245	171.12	18.20
246	167.39	18.70
247	173.82	18.10
248	174.35	18.20
249	177.93	17.60
250	172.79	18.30
251	167.76	18.90
252	173.35	18.15
253	173.45	18.30
254	170.61	18.50
255	168.87	18.60
256	168.18	18.75
257	174.60	18.30
258	172.48	18.70
259	171.57	18.40
260	174.27	18.15
261	172.03	18.30
262	173.29	18.00
263	174.70	18.15
264	174.82	18.20
265	173.30	17.95
266	174.09	18.30
267	170.00	18.25
268	172.93	18.10
269	171.84	18.40
270	166.30	18.70

APPENDIX B

WEIGHT OF SOLIDS ERODED

TABLE VII

WEIGHT OF SOLIDS ERODED

RUN NUMBER A1
UNIT WEIGHT CHAN 1 80PCF
CHAN 2 80PCF
CHAN 3 80PCF
CHAN 4 80PCF
DATE FEB 5 66
SUPERVISOR DLR
PREPARED WATER CONTENT (PERCENT)
CHAN 1 22.8
CHAN 2 22.5
CHAN 3 21.7
CHAN 4 22.0
FINAL WATER CONTENT (PERCENT)
CHAN NO TOP MIDDLE BOTTOM
1 34.5 39.7 42.6
2 34.4 35.7 38.3
3 35.4 38.4 41.8
4 37.8 40.5 43.2
RAINFALL INTENSITY 6 IPH
SLOPE OF CHANNEL 2H 1V
TIME TO FIRST RUNOFF
MIN SEC
CHAN 1 01 20
CHAN 2 01 00
CHAN 3 01 30
CHAN 4 01 30

CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	TIME AFTER TEST START (MIN) (SEC)
ONE	TWO	THREE	FOUR	
40.7	40.8	21.5	23.7	3 00
57.0	54.0	39.8	44.2	4 30
66.8	63.3	58.8	61.7	6 00
85.1	82.7	74.7	74.1	7 30
100.9	100.5	91.8	85.6	9 00
118.1	118.3	108.1	96.9	10 30
135.2	134.4	121.1	104.9	12 00
153.1	150.0	134.9	118.0	13 30
172.9	167.6	148.7	127.3	15 00
192.7	184.3	164.9	140.8	16 30
208.1	201.4	180.3	148.5	18 00
225.5	216.1	197.6	161.0	19 30

TABLE VII (CONT)

242.4	231.4	214.2	172.9	21	00
259.6	246.9	231.5	184.7	22	30
274.6	261.7	245.5	192.0	24	00
291.7	277.8	258.2	206.7	25	30
308.3	293.8	270.5	214.7	27	00
324.3	305.8	283.6	224.2	28	30
338.9	321.1	299.3	232.9	30	00
355.0	333.1	313.9	243.9	31	30
370.3	345.4	331.5	256.0	33	00
384.9	357.3	344.2	267.3	34	30
396.6	370.1	358.6	276.7	36	00
399.2	370.4	373.3	295.2	37	30
416.7	387.3	386.2	305.4	39	00
429.9	397.1	400.5	315.2	40	30
442.0	411.7	415.3	326.7	42	00
458.6	423.6	429.9	336.7	43	30
474.0	435.4	447.8	348.7	45	00
486.2	451.6	461.0	355.5	46	30
501.5	462.5	478.5	366.1	48	00
516.9	477.7	492.9	376.7	49	30
531.3	493.9	502.9	385.2	51	00
546.0	505.3	516.8	394.0	52	30
556.3	518.8	530.2	405.4	54	00
571.0	528.6	544.4	417.3	55	30
584.1	538.6	557.2	427.9	57	00
596.5	550.8	572.0	436.1	58	30
610.7	560.9	583.5	445.7	60	00
624.8	574.0	598.5	456.9	61	30
641.5	590.1	611.7	467.6	63	00
641.5	600.9	623.8	480.2	64	30
655.7	610.5	638.7	490.5	66	00
669.5	621.7	654.5	503.2	67	30
686.5	638.0	666.2	511.8	69	00
701.5	650.4	677.5	522.9	70	30
714.1	662.1	692.7	535.3	72	00
728.8	673.5	696.1	548.0	73	30
746.7	688.1	705.6	559.0	75	00
763.7	702.0	716.4	569.9	76	30
777.3	711.5	731.2	579.9	78	00
792.0	723.9	746.3	592.9	79	30
807.9	739.3	757.1	604.0	81	00
822.9	753.3	767.7	615.5	82	30
837.5	763.3	783.0	627.7	84	00
852.4	777.8	797.4	637.8	85	30
869.4	788.8	809.8	654.1	87	00
886.3	801.5	819.1	665.8	88	30

TABLE VII (CONT)

901.4	809.2	831.6	676.0	90	00
914.6	822.1	841.9	694.0	91	30
932.0	834.0	854.0	710.4	93	00
953.7	845.0	868.3	722.0	94	30
969.9	857.7	878.3	735.6	96	00
988.8	869.1	889.6	750.8	97	30
1006.2	880.4	904.9	766.6	99	00
1022.8	893.0	920.1	778.5	100	30
1039.8	907.1	932.0	788.3	102	00
1056.7	919.4	946.9	803.5	103	30
1074.9	930.6	960.2	820.3	105	00
1089.8	942.1	974.2	835.1	106	30
1107.4	956.6	987.0	847.3	108	00
1123.9	967.4	1002.2	860.8	109	30
1144.7	967.4	1012.6	874.1	111	00
1161.6	979.7	1025.5	886.3	112	30
1174.7	988.8	1040.5	901.8	114	00
1194.2	1007.5	1053.1	915.5	115	30
1213.5	1021.5	1069.0	931.1	117	00
1234.4	1033.7	1080.0	943.9	118	30
1247.6	1045.1	1092.4	961.1	120	00

TABLE VIII

WEIGHT OF SOLIDS ERODED

RUN NUMBER A2
 UNIT WEIGHT CHAN 1 85PCF
 CHAN 2 85PCF
 CHAN 3 85PCF
 CHAN 4 85PCF
 DATE JAN 21 66
 SUPERVISOR DLR
 PREPARED WATER CONTENT (PERCENT)
 CHAN 1
 CHAN 2
 CHAN 3
 CHAN 4
 FINAL WATER CONTENT (PERCENT)
 CHAN NO TOP MIDDLE BOTTOM
 1
 2
 3
 4
 RAINFALL INTENSITY 6.1PH
 SLOPE OF CHANNEL 2H 1V
 TIME TO FIRST RUNOFF
 MIN SEC
 CHAN 1 00 45
 CHAN 2 00 45
 CHAN 3 00 45
 CHAN 4 00 45

CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	TIME AFTER TEST START (MIN) (SEC)	
ONE	TWO	THREE	FOUR		
16.7	12.6	15.7	3.0	1	30
40.5	29.2	46.2	28.4	3	00
63.4	48.4	76.9	45.2	4	30
84.6	67.8	107.0	60.0	6	00
99.9	88.0	122.1	74.1	7	30
115.2	106.2	140.7	92.0	9	00
134.5	124.1	160.8	119.0	10	30
149.6	144.5	179.4	136.4	12	00
168.7	161.7	197.7	155.4	13	30
187.9	177.3	214.8	174.5	15	00
214.8	196.5	231.6	193.4	16	30
230.8	211.6	243.9	213.3	18	00

TABLE VIII (CONT)

246.7	226.1	262.1	234.4	19	30
262.3	243.0	277.5	252.4	21	00
278.5	260.3	293.6	269.0	22	30
294.9	277.3	312.9	286.8	24	00
312.3	290.5	333.4	302.3	25	30
330.3	307.9	349.7	315.9	27	00
347.5	320.6	367.9	332.6	28	30
365.2	336.4	385.3	352.0	30	00
379.9	347.3	401.9	369.2	31	30
397.6	361.0	416.3	382.8	33	00
416.2	373.3	433.3	402.0	34	30
435.4	389.9	448.3	416.7	36	00
453.4	403.2	462.9	428.4	37	30
468.9	417.2	478.9	440.3	39	00
484.5	431.1	496.4	454.6	40	30
502.1	444.0	513.7	465.6	42	00
516.9	456.8	526.7	482.1	43	30
534.5	470.4	541.7	495.5	45	00
548.9	481.9	561.2	512.8	46	30
568.0	496.9	583.3	527.8	48	00
583.8	510.0	633.1	545.7	49	30
598.4	519.8	648.6	559.8	51	00
615.8	528.3	696.9	574.9	52	30
629.1	542.2	712.4	588.7	54	00
641.5	553.7	769.3	602.3	55	30
656.0	566.4	786.8	614.9	57	00
671.4	580.2	799.4	629.6	58	30
685.1	592.9	814.9	646.3	60	00
699.1	602.9	832.7	662.5	61	30
714.9	616.4	845.4	676.3	63	00
731.4	631.8	857.2	691.8	64	30
749.8	646.4	872.4	704.9	66	00
763.0	660.3	889.2	717.9	67	30
777.0	670.7	889.2	733.7	69	00
790.7	687.2	906.2	746.2	70	30
805.1	698.5	921.3	762.8	72	00
835.6	711.4	935.4	780.1	73	30
851.7	723.0	949.1	793.1	75	00
867.3	738.4	963.1	803.1	76	30
882.9	749.0	978.8	815.9	78	00
896.2	761.0	994.0	828.0	79	30
911.3	776.0	1004.6	840.8	81	00
927.6	791.4	1021.7	855.0	82	30
941.3	806.4	1032.6	869.9	84	00
956.0	823.4	1046.2	882.3	85	30
969.1	840.9	1060.4	895.9	87	00

TABLE VIII (CONT)

981.6	851.1	1075.7	907.0	88	30
993.2	867.4	1089.9	919.8	90	00
1005.9	879.8	1105.2	935.6	91	30
1019.0	891.0	1128.6	950.5	93	00
1035.1	903.0	1141.8	964.2	94	30
1050.0	914.7	1155.4	979.5	96	00
1066.2	927.1	1168.1	991.4	97	30
1082.9	941.0	1180.1	1002.2	99	00
1098.3	958.2	1193.6	1013.8	100	30
1114.8	971.3	1204.9	1023.6	102	00
1130.3	986.4	1216.3	1035.5	103	30
1145.2	1000.8	1230.4	1050.8	105	00
1159.0	1014.8	1244.5	1065.4	106	30
1173.0	1031.4	1258.1	1079.7	108	00
1190.4	1035.1	1272.1	1091.1	109	30
1204.7	1049.1	1284.7	1106.7	111	00
1222.8	1063.2	1299.2	1120.0	112	30
1238.0	1075.4	1311.5	1136.5	114	00
1251.9	1089.4	1323.9	1153.3	115	30
1270.4	1101.7	1336.3	1168.6	117	00
1283.5	1118.0	1349.2	1182.0	118	30
1300.6	1130.9	1361.0	1199.7	120	00

TABLE IX
WEIGHT OF SOLIDS ERODED

RUN NUMBER A3
UNIT WEIGHT CHAN 1 90PCF
CHAN 2 90PCF
CHAN 3 90PCF
CHAN 4 90PCF
DATE SEP 29 66
SUPERVISOR RLF
PREPARED WATER CONTENT (PERCENT)
CHAN 1 24.3
CHAN 2 24.7
CHAN 3 25.6
CHAN 4 23.8
FINAL WATER CONTENT (PERCENT)
CHAN NO TOP MIDDLE BOTTOM
1 41.7 33.6 41.4
2 34.4 39.7 37.2
3 33.2 34.5 31.4
4 40.1 33.2 36.8
RAINFALL INTENSITY 6 IPH
SLOPE OF CHANNEL 2H 1V
TIME TO FIRST RUNOFF
MIN SEC
CHAN 1 00 55
CHAN 2 00 45
CHAN 3 00 35
CHAN 4 00 45

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)	
9.2	9.4	17.8	14.9	2	00
26.5	31.2	43.3	33.4	3	30
43.6	49.6	63.9	47.0	5	00
57.5	65.0	83.2	60.6	6	30
68.1	83.5	101.8	62.3	8	00
81.4	99.2	119.7	76.2	9	30
98.1	116.3	142.6	91.4	11	00
112.5	134.3	162.8	105.0	12	30
125.9	153.5	182.0	116.2	14	00
140.4	171.6	207.1	129.6	15	30

TABLE IX (CONT)

154.5	193.0	224.8	142.0	17	00
167.1	210.8	241.9	150.4	18	30
178.4	228.4	262.0	164.8	20	00
194.0	247.8	280.3	174.8	21	30
211.7	269.6	303.1	193.1	23	00
224.7	284.6	330.2	206.6	24	30
238.4	302.9	350.5	217.7	26	00
254.0	318.6	370.1	229.1	27	30
264.0	336.2	389.4	240.8	29	00
280.5	352.1	455.8	254.6	30	30
290.8	368.4	472.7	266.9	32	00
303.3	384.0	490.1	279.7	33	30
318.7	400.9	509.9	294.9	35	00
333.5	417.8	532.9	309.6	36	30
349.9	435.0	552.7	321.5	38	00
364.4	451.5	569.3	331.7	39	30
377.7	467.3	586.4	344.2	41	00
390.7	482.5	605.4	357.0	42	30
407.3	501.1	624.1	370.1	44	00
420.7	516.9	641.5	383.0	45	30
434.7	533.6	656.3	394.4	47	00
450.8	550.5	671.9	406.6	48	30
462.1	566.3	671.9	419.4	50	00
475.6	580.9	680.9	430.6	51	30
489.1	599.4	695.9	445.1	53	00
504.2	615.4	712.5	457.7	54	30
520.2	625.9	729.6	471.3	56	00
535.8	642.4	742.4	483.8	57	30
553.0	657.8	758.7	495.6	59	00
569.1	673.6	777.7	507.2	60	30
585.6	688.4	792.6	519.3	62	00
605.7	706.8	810.1	535.8	63	30
626.8	717.7	827.7	548.3	65	00
649.0	734.1	846.9	562.2	66	30
679.7	754.5	862.4	574.2	68	00
698.7	774.8	880.5	586.4	69	30
720.5	794.4	898.6	597.3	71	00
740.9	814.9	916.6	611.9	72	30

TABLE X

WEIGHT OF SOLIDS ERODED

RUN NUMBER A4
 UNIT WEIGHT CHAN 1 95PCF
 CHAN 2 95PCF
 CHAN 3 95PCF
 CHAN 4 95PCF
 DATE JAN 29 66
 SUPERVISOR DLR
 PREPARED WATER CONTENT (PERCENT)
 CHAN 1
 CHAN 2
 CHAN 3
 CHAN 4
 FINAL WATER CONTENT (PERCENT)
 CHAN NO TOP MIDDLE BOTTOM
 1
 2
 3
 4
 RAINFALL INTENSITY 6 IPH
 SLOPE OF CHANNEL 2H 1V
 TIME TO FIRST RUNOFF
 MIN SEC
 CHAN 1 00 30
 CHAN 2 00 25
 CHAN 3 00 45
 CHAN 4 00 35

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN)(SEC)
17.4	28.3	13.9	19.9	1 30
45.1	57.6	39.0	47.2	3 00
65.4	80.2	54.5	65.9	4 30
84.2	95.4	69.9	77.9	6 00
102.4	109.7	85.9	91.4	7 30
132.5	125.8	109.1	107.0	9 00
145.8	158.8	123.3	122.1	10 30
158.1	173.8	136.9	138.9	12 00
170.2	187.6	147.1	151.0	13 30
182.1	202.4	159.8	168.8	15 00
198.6	216.3	174.1	178.3	16 30
212.1	225.7	187.9	187.6	18 00

TABLE X (CONT)

222.9	236.1	202.1	198.8	19	30
232.3	246.8	211.4	209.6	21	00
243.7	260.4	224.2	222.3	22	30
255.6	274.0	234.1	235.6	24	00
269.2	288.8	244.6	246.3	25	30
281.0	298.3	254.9	254.0	27	00
295.7	310.0	268.6	263.3	28	30
312.3	319.0	279.6	270.8	30	00
324.9	331.4	292.2	280.8	31	30
335.9	343.8	301.8	292.8	33	00
350.6	358.7	315.2	304.6	34	30
362.2	372.8	326.3	318.8	36	00
375.1	386.2	337.8	328.5	37	30
387.6	394.5	347.7	336.5	39	00
399.4	404.2	359.6	346.0	40	30
412.1	413.3	368.8	351.2	42	00
423.8	423.0	379.7	358.9	43	30
435.3	433.1	389.0	368.3	45	00
443.8	444.1	398.6	379.6	46	30
453.9	456.2	404.7	388.3	48	00
466.2	468.8	415.0	397.2	49	30
479.1	481.5	424.8	406.8	51	00
493.3	495.4	436.5	414.9	52	30
504.4	505.1	447.4	421.9	54	00
514.5	514.6	457.9	433.3	55	30
523.3	521.8	467.0	440.2	57	00
530.6	534.2	477.7	451.5	58	30
538.4	545.3	484.7	461.7	60	00
549.0	554.1	493.9	471.3	61	30
559.6	563.9	500.7	479.9	63	00
574.2	577.3	513.7	486.6	64	30
589.4	587.2	525.0	493.2	66	00
599.8	597.6	535.6	501.2	67	30
613.1	608.8	546.6	506.8	69	00
624.8	613.8	556.2	515.6	70	30
634.4	621.7	563.0	525.0	72	00
642.2	631.6	570.9	531.6	73	30
650.0	640.1	579.1	541.1	75	00
662.9	651.8	587.6	550.7	76	30
676.7	659.2	593.9	559.4	78	00
688.4	672.3	613.1	567.8	79	30
699.1	680.9	622.7	575.0	81	00
712.7	691.2	636.4	586.5	82	30
725.8	700.2	645.3	598.0	84	00
735.4	709.7	656.9	607.7	85	30
744.0	717.9	664.4	616.7	87	00

TABLE X (CONT)

756.8	729.3	670.6	624.7	88	30
767.8	740.1	676.9	634.3	90	00
778.3	751.2	685.1	642.4	91	30
786.5	760.5	693.1	647.2	93	00
800.2	769.7	706.1	655.2	94	30
812.5	781.1	713.3	667.5	96	00
824.4	792.4	724.8	676.1	97	30
833.4	803.6	733.3	676.1	99	00
844.3	814.2	743.1	685.8	100	30
856.9	820.4	752.2	696.2	102	00
865.6	832.3	760.7	704.8	103	30
873.4	842.3	768.4	711.9	105	00
887.3	853.4	779.7	723.2	106	30
906.3	867.4	791.0	731.2	108	00
917.2	878.2	802.6	738.9	109	30
924.5	886.9	813.2	746.4	111	00
936.9	900.4	823.7	759.0	112	30
950.8	910.2	832.4	770.3	114	00
963.6	920.8	842.1	779.7	115	30
973.2	930.5	852.9	784.7	117	00
987.6	940.1	865.4	795.1	118	30
999.7	949.4	880.0	804.1	120	00

TABLE XI

WEIGHT OF SOLIDS ERODED

RUN NUMBER A5
 UNIT WEIGHT CHAN 1 80PCF
 CHAN 2 85PCF
 CHAN 3 90PCF
 CHAN 4 95PCF
 DATE MAR 24 66
 SUPERVISOR DLR
 PREPARED WATER CONTENT (PERCENT)
 CHAN 1 18.7
 CHAN 2 30.6
 CHAN 3 20.2
 CHAN 4 18.5
 FINAL WATER CONTENT (PERCENT)
 CHAN NO TOP MIDDLE BOTTOM
 1 37.4 39.4 45.0
 2 30.1 32.4 36.8
 3 29.0 27.6 34.2
 4 27.2 25.6 28.1
 RAINFALL INTENSITY 6 IPH
 SLOPE OF CHANNEL 2H 1V
 TIME TO FIRST RUNOFF
 MIN SEC
 CHAN 1 01 40
 CHAN 2 01 00
 CHAN 3 00 55
 CHAN 4 00 30

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
35.6	52.8	42.8	49.0	3 30
56.7	77.8	56.9	68.9	5 00
90.9	100.4	74.0	82.2	6 30
110.5	131.7	95.0	95.9	8 00
129.6	152.4	107.4	109.7	9 30
151.4	173.6	128.2	121.1	11 00
176.9	187.5	141.5	134.8	12 30
197.3	201.5	154.4	151.4	15 00
215.9	214.4	168.6	159.9	16 30
235.3	226.2	181.7	169.9	18 00
254.8	235.9	196.8	180.9	19 30
276.6	245.3	211.2	194.6	21 00

TABLE XI (CONT)

303.9	260.0	222.4	206.0	22	30
326.0	274.2	238.1	215.5	24	00
348.7	283.9	252.9	231.0	25	30
371.6	293.6	264.4	243.2	27	00
394.4	310.5	277.7	258.7	28	30
419.6	325.6	294.2	272.4	30	00
442.4	341.0	306.7	283.5	31	30
462.9	356.2	319.9	294.7	33	00
488.3	369.9	332.4	306.7	34	30
509.8	384.1	347.7	318.3	36	00
532.3	393.0	361.4	330.0	37	30
554.0	403.9	375.8	342.2	39	00
573.2	417.7	384.1	354.8	40	30
593.7	431.7	395.9	366.1	42	00
612.4	443.7	407.4	377.6	43	30
634.4	457.5	418.8	387.6	45	00
655.8	471.7	434.5	402.3	46	30
673.4	486.0	443.6	410.0	48	00
691.6	501.7	455.8	419.1	49	30
712.8	516.2	472.6	429.2	51	00
734.9	526.4	487.0	442.9	52	30
754.1	537.6	497.9	454.2	54	00
770.7	549.9	510.5	465.9	55	30
793.9	564.4	523.4	482.1	57	00
809.6	576.2	534.2	493.7	58	30
827.0	594.4	545.2	503.7	60	00
847.2	606.0	557.9	511.1	61	30
866.9	630.7	568.9	521.7	63	00
885.9	644.2	580.4	534.8	64	30
906.5	654.4	595.1	549.0	66	00
926.5	670.5	609.0	559.5	67	30
948.2	679.8	621.1	571.4	69	00
968.6	692.7	629.2	591.0	70	30
988.3	704.7	646.3	604.3	72	00
1007.4	725.3	664.8	614.9	73	30
1030.0	743.4	681.6	622.8	75	00
1050.3	762.6	696.0	630.9	76	30
1071.0	772.3	712.9	638.7	78	00
1099.0	783.2	726.0	648.1	79	30
1116.2	793.0	736.9	656.5	80	45
1131.0	803.0	746.8	660.7	82	00
1144.9	811.0	756.7	670.4	83	15
1195.1	821.4	769.2	675.5	84	30
1236.9	828.6	777.6	681.8	85	45
1249.8	837.9	787.7	686.7	87	00
1264.1	847.8	796.7	693.1	88	15

TABLE XI (CONT)

1274.5	858.1	808.9	696.5	89	30
1288.2	867.8	822.3	701.3	90	45
1301.8	879.7	837.7	710.3	92	00
1313.0	893.2	848.2	718.2	93	15
1326.6	903.2	853.4	726.9	94	30
1335.6	913.2	862.4	731.8	95	45
1349.1	924.0	872.0	737.7	97	00
1364.8	937.1	882.3	745.5	98	15
1380.4	947.7	889.4	755.2	99	30
1392.9	954.9	897.3	762.8	100	45
1402.9	962.6	904.7	770.5	102	00
1415.3	974.6	915.2	779.1	103	15
1427.5	983.7	922.2	784.4	104	30
1440.6	992.1	952.9	791.3	105	45
1451.6	1004.9	959.1	797.2	107	00
1466.8	1016.3	969.5	803.4	108	15
1480.4	1022.9	976.6	811.9	109	30
1491.9	1033.6	985.3	813.6	110	45
1501.6	1040.6	998.5	818.5	112	00
1513.5	1049.0	1007.2	824.9	113	15
1526.4	1058.7	1012.4	831.5	114	30
1536.3	1067.8	1019.2	839.4	115	45
1547.6	1075.7	1025.3	846.4	117	00
1560.7	1084.2	1034.6	855.5	118	15
1571.2	1094.9	1039.2	865.8	119	30
1582.1	1102.3	1046.5	873.8	120	45

TABLE XII
WEIGHT OF SOLIDS ERODED

RUN NUMBER A6
UNIT WEIGHT CHAN 1 95PCF
CHAN 2 80PCF
CHAN 3 85PCF
CHAN 4 90PCF
DATE FEB 19 66
SUPERVISOR DLR
PREPARED WATER CONTENT (PERCENT)
CHAN 1 20.4
CHAN 2 20.5
CHAN 3 21.0
CHAN 4 21.6
FINAL WATER CONTENT (PERCENT)
CHAN NO TOP MIDDLE BOTTOM
1 31.0 31.8 31.7
2 55.0 40.1 42.5
3 36.2 42.2 38.5
4 33.4 31.4 35.6
RAINFALL INTENSITY 6 IPH
SLOPE OF CHANNEL 2H 1V
TIME TO FIRST RUNOFF
MIN SEC
CHAN 1 00 35
CHAN 2 01 10
CHAN 3 01 00
CHAN 4 01 00

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN)(SEC)	
28.7	3.7	7.8	14.8	1	30
62.5	21.3	33.7	40.1	3	00
82.2	36.3	50.5	55.2	4	30
108.0	50.8	66.3	71.1	6	00
126.4	66.3	81.6	85.2	7	30
147.8	79.7	96.2	102.2	9	00
165.5	93.5	110.5	117.4	10	30
184.8	115.8	126.9	132.8	12	00
203.1	136.1	145.1	150.1	13	30
221.9	152.2	161.6	164.0	15	00
236.3	171.1	175.9	179.7	16	30
256.7	185.1	192.5	193.7	18	00

TABLE XII (CONT)

274.7	203.2	206.7	207.2	19	30
288.8	223.6	226.8	220.8	21	00
300.6	239.7	244.0	233.6	22	30
315.2	260.2	257.1	248.0	24	00
331.4	278.2	271.1	260.4	25	30
349.5	350.2	285.9	271.5	27	00
365.6	363.0	297.9	284.1	28	30
383.0	378.3	315.3	294.8	30	00
398.6	394.5	329.2	305.0	31	30
411.1	413.4	346.7	314.8	33	00
427.6	444.7	363.4	327.7	34	30
444.2	461.5	376.2	341.8	36	00
458.3	479.4	389.0	351.2	37	30
468.7	494.8	401.3	360.1	39	00
481.4	502.4	410.5	369.9	40	30
491.7	516.9	422.2	377.1	42	00
504.6	527.6	435.6	384.3	43	30
516.2	539.2	447.7	391.5	45	00
527.3	552.2	456.3	398.5	46	30
536.5	570.3	476.8	407.0	48	00
548.9	582.5	490.4	417.1	49	30
559.4	596.8	503.4	426.9	51	00
570.0	604.8	518.5	433.6	52	30
582.0	616.4	534.9	442.1	54	00
592.6	630.4	550.0	449.5	55	30
604.9	643.5	565.7	449.5	57	00
616.4	654.3	580.2	457.1	58	30
627.5	667.3	596.2	465.7	60	00
641.3	682.4	606.4	474.0	61	30
650.0	698.8	620.3	482.4	63	00
659.9	712.2	635.7	490.9	64	30
673.0	730.9	648.6	500.8	66	00
686.2	745.6	666.3	510.7	67	30
697.8	760.5	685.0	519.8	69	00
712.2	775.2	700.2	529.0	70	30
722.1	792.7	714.3	538.5	72	00
735.5	804.5	727.6	547.3	73	30
746.3	821.3	739.9	556.0	75	00
760.0	839.2	756.3	565.7	76	30
770.7	857.2	772.4	577.0	78	00
786.5	870.6	772.4	588.3	79	30
801.1	884.8	786.6	605.2	81	00
816.0	900.6	802.2	612.7	82	30
830.4	918.9	816.6	623.8	84	00
838.2	929.2	827.4	629.7	85	15
844.9	941.7	834.1	635.7	86	30

TABLE XII (CONT)

854.7	954.9	845.3	642.0	87	45
867.7	967.5	854.7	666.5	89	00
877.4	980.0	867.0	675.2	90	15
890.3	991.8	877.4	682.6	91	30
898.5	1006.3	886.4	688.3	92	45
906.1	1018.2	899.8	694.4	94	00
918.3	1029.1	910.7	705.1	95	15
925.5	1039.9	923.9	722.1	96	30
938.6	1055.1	936.9	728.7	97	45
947.5	1071.3	947.0	734.4	99	00
957.5	1083.0	959.1	742.8	100	15
965.9	1094.8	967.0	748.8	101	30
975.7	1107.2	978.8	755.8	102	45
987.9	1117.1	986.7	762.8	104	00
997.2	1127.5	997.4	770.2	105	15
1008.2	1137.3	1008.8	777.3	106	30
1016.9	1147.8	1020.5	788.3	107	45
1029.4	1152.1	1030.1	795.6	109	00
1039.3	1162.1	1043.9	803.7	110	15
1046.3	1171.5	1055.8	810.6	111	30
1054.5	1184.2	1066.4	820.7	112	45
1062.9	1195.0	1081.5	828.5	114	00
1074.4	1208.4	1094.3	837.3	115	15
1081.1	1219.5	1108.8	844.9	116	30
1092.0	1232.1	1122.1	852.9	117	45
1101.9	1241.3	1133.3	865.6	119	00
1113.5	1255.0	1145.6	874.5	120	15

TABLE XIII

WEIGHT OF SOLIDS ERODED

RUN NUMBER A7
 UNIT WEIGHT CHAN 1 90PCF
 CHAN 2 95PCF
 CHAN 3 80PCF
 CHAN 4 85PCF
 DATE FEB 26 66
 SUPERVISOR DLR
 PREPARED WATER CONTENT (PERCENT)
 CHAN 1 20.6
 CHAN 2 20.8
 CHAN 3 20.8
 CHAN 4 21.8
 FINAL WATER CONTENT (PERCENT)
 CHAN NO TOP MIDDLE BOTTOM
 1 34.0 33.9 34.0
 2 29.5 27.6 32.7
 3 36.8 38.2 44.7
 4 35.0 35.2 38.6
 RAINFALL INTENSITY 6 IPH
 SLOPE OF CHANNEL 2H 1V
 TIME TO FIRST RUNOFF
 MIN SEC
 CHAN 1 00 45
 CHAN 2 00 30
 CHAN 3 01 05
 CHAN 4 01 00

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
18.2	28.4	5.0	7.9	1 30
49.6	53.8	15.7	33.8	3 00
67.9	73.3	29.8	49.3	4 30
84.0	92.1	46.3	59.8	6 00
101.2	118.7	63.7	74.9	7 30
120.5	134.6	86.2	96.3	9 00
135.4	152.3	105.3	113.6	10 30
147.7	164.2	122.4	130.9	12 00
161.7	175.9	140.8	141.6	13 30
177.1	190.3	159.3	161.0	15 00
198.4	200.9	175.1	177.2	16 30
215.5	210.5	190.8	190.8	18 00

TABLE XIII (CONT)

228.6	221.8	207.2	203.0	19	30
245.6	232.8	224.1	218.0	21	00
262.0	243.5	243.6	232.0	22	30
274.7	253.3	263.8	247.5	24	00
287.7	268.2	275.5	257.9	25	30
300.8	279.0	292.1	271.7	27	00
311.3	291.6	305.8	281.7	28	30
324.4	304.5	314.2	296.1	30	00
337.5	314.5	328.0	309.1	31	30
350.5	326.1	340.2	323.3	33	00
369.3	340.8	353.0	337.5	34	30
383.5	350.4	366.7	350.2	36	00
396.0	360.8	424.2	364.9	37	30
412.6	372.5	442.5	380.3	39	00
429.8	382.1	461.5	394.0	40	30
439.8	391.8	481.1	407.4	42	00
479.7	403.8	497.8	417.2	43	30
492.9	418.0	516.7	433.7	45	00
503.3	432.6	539.0	448.2	46	30
514.8	448.1	553.4	460.8	48	00
529.9	461.1	570.5	472.0	49	30
542.9	476.5	588.7	486.1	51	00
616.3	490.9	602.7	500.9	52	30
631.6	503.3	619.9	513.8	54	00
642.2	519.7	637.3	524.9	55	30
657.4	534.3	653.6	538.3	57	00
674.9	546.3	670.5	552.9	58	30
685.3	560.0	690.0	566.2	60	00
697.6	573.2	705.0	577.8	61	30
710.4	587.1	722.3	591.9	63	00
722.2	601.6	740.4	603.1	64	30
732.6	615.2	752.5	613.7	66	00
747.2	626.6	766.8	625.0	67	30
758.5	641.1	783.3	638.6	69	00
772.1	657.1	795.3	651.2	70	30
786.0	670.8	809.9	661.7	72	00
798.5	684.8	827.1	672.9	73	30
813.4	700.5	843.9	685.0	75	00
828.7	710.9	861.7	697.5	76	30
839.2	725.3	878.1	709.0	78	00
850.3	738.8	893.6	721.4	79	30
860.7	751.1	912.2	733.8	81	00
871.9	765.9	930.5	748.2	82	30
887.5	783.2	946.0	760.9	84	00
903.7	796.2	964.1	773.2	85	30
917.1	815.9	983.5	790.5	87	00

TABLE XIII (CONT)

929.0	834.5	997.4	806.8	88	30
939.8	842.9	1009.7	815.0	89	45
950.6	855.7	1025.1	825.6	91	00
960.2	867.8	1039.6	834.6	92	15
968.3	883.2	1054.3	847.9	93	30
975.2	892.1	1070.3	855.8	94	45
985.9	904.3	1083.4	867.3	96	00
994.3	915.0	1097.5	878.8	97	15
1003.2	925.4	1110.5	892.9	98	30
1009.7	934.2	1124.0	903.9	99	45
1021.3	943.8	1136.6	914.2	101	00
1032.0	955.9	1151.9	926.3	102	15
1043.2	968.2	1160.1	939.0	103	30
1052.1	979.1	1169.9	950.6	104	45
1062.6	992.7	1183.8	964.4	106	00
1073.8	1007.1	1198.3	976.7	107	15
1085.0	1014.0	1212.8	994.8	108	30
1092.8	1025.0	1226.0	1008.7	109	45
1102.9	1033.5	1239.5	1022.2	111	00
1115.2	1045.6	1254.9	1038.6	112	15
1124.4	1057.3	1269.7	1052.8	113	30
1130.1	1065.4	1277.7	1066.5	114	45
1148.6	1079.5	1290.7	1080.4	116	00
1156.5	1087.8	1302.7	1093.4	117	15
1171.2	1096.7	1318.3	1106.1	118	30
1181.0	1105.8	1331.1	1120.0	119	45
1192.6	1116.7	1331.1	1134.2	121	00

TABLE XIV

WEIGHT OF SOLIDS ERODED.

RUN NUMBER A8
UNIT WEIGHT CHAN 1 85PCF
CHAN 2 90PCF
CHAN 3 95PCF
CHAN 4 80PCF
DATE MAR 5 66
SUPERVISOR DLR
PREPARED WATER CONTENT (PERCENT)
CHAN 1 21.1
CHAN 2 28.4
CHAN 3 20.2
CHAN 4 22.0
FINAL WATER CONTENT (PERCENT)
CHAN NO TOP MIDDLE BOTTOM
1 36.2 40.7 41.3
2 35.0 21.4 36.4
3 29.0 28.3 31.7
4 38.1 39.9 41.7
RAINFALL INTENSITY 6 IPH
SLOPE OF CHANNEL 2H 1V
TIME TO FIRST RUNOFF
MIN SEC
CHAN 1 00 55
CHAN 2 00 40
CHAN 3 00 40
CHAN 4 01 10

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
18.0	26.2	0.0	0.0	1 30
45.3	40.2	26.1	28.9	3 00
67.9	44.8	45.1	47.0	4 30
88.0	64.0	62.9	64.6	6 00
107.0	83.7	79.6	85.2	7 30
128.0	103.5	97.5	88.1	9 00
155.0	115.1	114.7	105.0	10 30
171.4	134.3	130.2	126.1	12 00
188.0	151.8	142.8	145.4	13 30
207.8	171.0	159.0	165.0	15 00
226.5	191.8	177.2	181.6	16 30
245.3	213.9	186.1	202.0	18 00

TABLE XIV (CONT)

262.2	232.6	199.6	222.6	19	30
284.4	253.7	214.8	239.6	21	00
307.6	277.7	227.1	258.1	22	30
330.5	294.5	239.6	275.8	24	00
350.1	313.1	250.4	292.9	25	30
371.3	330.0	261.1	310.3	27	00
391.8	343.7	274.4	322.2	28	30
405.4	359.6	287.4	336.3	30	00
421.9	371.3	295.6	350.1	31	30
441.0	389.8	308.5	364.4	33	00
457.5	409.7	319.9	380.0	34	30
474.7	424.1	332.1	396.6	36	00
491.0	438.4	341.7	414.1	37	30
511.8	454.1	354.2	429.7	39	00
531.4	478.0	366.0	442.1	40	30
544.7	496.8	376.2	457.0	42	00
552.3	512.0	386.0	471.1	43	30
567.9	528.7	398.2	471.1	45	00
585.2	543.0	408.5	483.1	46	30
602.4	560.4	418.6	499.7	48	00
617.1	576.7	428.8	518.6	49	30
635.6	597.6	441.3	568.7	51	00
652.6	614.8	455.6	581.2	52	30
671.5	628.4	469.1	597.7	54	00
687.9	643.8	477.6	613.5	55	30
707.7	663.7	491.1	633.3	57	00
725.1	685.1	502.7	645.7	58	30
739.8	704.1	517.4	665.0	60	00
754.8	726.2	526.9	680.3	61	30
772.2	744.0	542.0	696.3	63	00
795.4	759.5	557.2	704.8	64	30
814.0	776.7	569.9	721.5	66	00
831.0	789.9	581.4	741.1	67	30
849.6	806.6	594.1	762.9	69	00
879.4	825.0	610.0	775.7	70	30
897.9	837.3	623.1	792.6	72	00
913.0	853.6	634.9	808.9	73	30
932.1	871.8	647.9	825.0	75	00
947.3	894.1	665.9	834.9	76	30
964.1	909.0	682.7	854.9	78	00
977.5	920.3	691.7	865.9	79	15
995.2	936.3	705.5	879.6	80	30
1009.6	951.8	714.5	888.2	81	45
1023.7	966.2	724.5	901.7	83	00
1039.2	978.2	733.2	913.6	84	15
1051.7	987.9	743.6	925.1	85	30

TABLE XIV (CONT)

1068.8	999.2	756.5	936.2	86	45
1086.5	1012.4	768.2	951.0	88	00
1099.8	1024.9	776.5	965.9	89	15
1115.6	1040.0	788.1	978.6	90	30
1132.5	1050.6	801.2	988.7	91	45
1148.3	1068.3	812.8	1001.1	93	00
1163.8	1084.5	821.9	1013.3	94	15
1181.3	1099.3	836.0	1021.3	95	30
1197.4	1117.8	846.1	1035.2	96	45
1215.9	1131.5	852.7	1049.9	98	00
1233.7	1146.7	865.7	1058.6	99	15
1252.2	1161.5	879.3	1074.3	100	30
1269.5	1173.1	893.9	1089.6	101	45
1289.1	1184.4	910.7	1092.1	103	00
1309.1	1200.5	921.2	1102.7	104	15
1331.3	1215.4	930.8	1118.1	105	30
1347.3	1224.5	948.2	1136.1	106	45
1363.1	1235.9	959.3	1153.7	108	00
1384.6	1247.9	971.3	1165.7	109	15
1397.5	1260.2	995.2	1181.2	110	30
1408.4	1275.2	1020.0	1199.6	111	45
1425.6	1288.7	1043.6	1216.5	113	00
1432.8	1308.0	1066.5	1230.9	114	15
1441.4	1321.8	1086.2	1248.2	115	30
1453.4	1333.8	1108.2	1267.8	116	45
1466.3	1345.6	1135.7	1286.1	118	00
1478.4	1358.5	1155.9	1305.4	119	15
1485.8	1371.5	1181.4	1317.1	120	30

TABLE XV

WEIGHT OF SOLIDS ERODED

RUN NUMBER D1
UNIT WEIGHT CHAN 1 80PCF
CHAN 2 80PCF
CHAN 3 80PCF
CHAN 4 80PCF
DATE JUL 25 66
SUPERVISOR RLF
PREPARED WATER CONTENT (PERCENT)
CHAN 1 23.6
CHAN 2 23.5
CHAN 3 22.8
CHAN 4 23.5
FINAL WATER CONTENT (PERCENT)
CHAN NO TOP MIDDLE BOTTOM
1 42.8 47.9 46.0
2 42.0 44.6 50.3
3 39.3 43.4 47.6
4 43.7 44.4 46.1
RAINFALL INTENSITY 6 IPH
SLOPE OF CHANNEL 1H 1V
TIME TO FIRST RUNOFF
MIN SEC
CHAN 1 01 00
CHAN 2 01 00
CHAN 3 00 55
CHAN 4 00 50

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
22.7	17.0	15.7	14.5	3 00
50.1	41.1	34.3	32.5	5 00
65.3	55.1	45.4	41.5	6 30
76.8	68.0	56.3	49.8	8 00
86.9	75.0	64.5	56.9	9 30
99.8	82.3	71.2	64.4	11 00
111.5	89.5	75.7	70.3	12 30
121.2	100.1	82.1	75.9	14 00
128.5	110.1	86.1	80.1	15 30
139.0	120.1	95.7	86.8	17 00
147.7	129.3	103.1	93.8	18 30
156.1	138.9	106.1	99.9	20 00

TABLE XV (CONT)

167.2	150.8	112.0	105.8	21	30
178.3	160.1	120.2	111.1	23	00
186.2	170.4	126.4	111.1	24	30
196.9	186.9	134.6	120.1	26	00
206.2	200.6	144.6	125.8	27	30
216.3	215.7	154.6	132.3	29	00
227.8	227.2	161.9	142.4	30	30
237.2	243.6	171.4	147.6	32	00
246.9	255.8	181.9	157.3	33	30
257.6	272.4	191.1	165.9	35	00
265.8	283.2	201.3	172.6	36	30
277.1	297.3	212.7	179.2	38	00
287.8	310.1	219.5	187.7	39	30
295.9	320.4	230.1	198.3	41	00
307.3	335.8	242.5	210.1	42	30
316.5	352.4	259.5	218.1	44	00
325.1	372.8	274.4	227.5	45	30
334.9	387.6	287.9	236.6	47	00
348.0	404.9	303.2	247.6	48	30
360.8	422.3	317.5	257.3	50	00
370.2	439.1	331.1	260.3	51	30
382.4	457.7	351.7	270.1	53	00
392.9	475.6	356.0	282.0	54	15
402.9	492.7	371.3	290.9	55	30
412.1	507.3	385.4	301.5	56	45
418.5	528.5	396.9	311.4	58	00
428.9	543.9	405.9	311.4	59	15
440.8	564.7	419.6	320.1	60	30
448.3	585.2	432.1	331.2	61	45
457.5	603.2	446.4	340.9	63	00
468.2	631.6	459.0	351.2	64	15
472.5	719.1	469.6	363.8	65	30
482.2	809.5	481.8	377.8	66	45
489.3	892.7	493.2	387.8	67	45
500.2	925.0	502.0	398.9	68	45
508.8	1006.7	514.2	408.4	69	45
518.0	1109.7	523.9	408.4	70	45
525.2	1260.6	533.2	417.4	71	45
535.5	1296.3	545.4	429.5	72	45
548.3	1332.4	555.0	438.3	73	45
563.4	1360.0	564.3	450.4	74	45
577.3	1394.6	575.4	463.1	75	45
591.4	1420.0	585.6	471.3	76	45
605.5	1443.7	592.6	481.5	77	45
615.1	1457.7	607.1	493.7	78	45
697.2	1490.9	618.4	504.2	79	45

TABLE XVI

WEIGHT OF SOLIDS ERODED

RUN NUMBER D2
 UNIT WEIGHT CHAN 1 85PCF
 CHAN 2 86PCF
 CHAN 3 85PCF
 CHAN 4 85PCF
 DATE AUG
 SUPERVISOR RLF
 PREPARED WATER CONTENT (PERCENT)
 CHAN 1 25.1
 CHAN 2 25.2
 CHAN 3 23.3
 CHAN 4 23.8
 FINAL WATER CONTENT (PERCENT)
 CHAN NO TOP MIDDLE BOTTOM
 1 40.2 38.7 44.8
 2 37.8 33.9 38.9
 3 39.3 40.5 40.6
 4 32.1 37.8 33.3
 RAINFALL INTENSITY 6 IPH
 SLOPE OF CHANNEL 1H 1V
 TIME TO FIRST RUNOFF
 MIN SEC
 CHAN 1 00 55
 CHAN 2 00 50
 CHAN 3 00 45
 CHAN 4 00 30

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN.) (SEC.)
15.2	16.5	10.0	7.7	2 00
31.9	37.5	32.5	22.1	3 30
41.7	50.0	45.5	30.7	4 45
48.1	59.1	54.1	36.6	6 00
53.1	67.8	63.1	41.3	7 15
62.7	77.5	74.9	48.4	8 30
69.9	86.4	85.8	58.0	9 45
79.6	97.4	97.1	66.1	11 00
88.8	106.7	107.2	70.7	12 15
98.4	116.2	117.1	75.8	13 30
104.8	122.7	122.8	79.5	14 45
112.9	132.7	132.0	85.9	16 00

TABLE XVI (CONT)

121.6	139.2	138.3	89.5	17	15
130.8	147.1	144.8	94.0	18	30
139.7	155.4	151.1	98.2	19	45
145.7	163.4	160.1	103.3	21	00
152.7	171.9	167.3	107.5	22	15
160.3	179.9	174.6	109.7	23	30
165.7	189.7	181.7	114.8	24	45
173.7	196.0	185.7	118.0	26	00
183.2	203.1	191.6	121.2	27	15
189.1	208.8	194.2	123.4	28	30
198.4	216.5	201.2	130.0	30	00
206.1	223.9	209.8	134.5	31	30
210.8	231.6	215.3	139.2	33	00
217.1	239.2	224.1	142.6	34	30
225.6	246.9	232.3	145.5	36	00
233.6	254.5	237.7	149.2	37	30
239.9	264.4	242.8	154.4	39	00
246.1	272.8	246.1	159.3	40	30
254.1	281.4	251.8	161.9	42	00
260.4	289.5	256.5	167.0	43	30
268.5	296.6	262.9	171.0	45	00
275.7	301.6	269.4	178.2	46	30
284.2	310.1	277.8	182.2	48	00
293.0	317.2	284.5	187.4	49	30
301.9	325.6	284.5	191.4	51	00
309.9	333.6	291.9	195.6	52	30
318.3	344.2	298.8	199.8	54	00
326.8	354.0	307.2	205.9	55	30
336.4	360.9	314.3	212.5	57	00
345.0	372.3	324.1	217.3	58	30
355.4	380.6	331.5	223.5	60	00
364.1	386.2	340.3	226.1	61	30
375.3	389.5	347.2	231.5	63	00
387.2	399.6	355.3	234.4	64	30
401.2	407.8	363.9	242.0	66	00
415.4	417.3	370.0	244.7	67	30
428.8	428.1	374.7	247.9	69	00
441.6	438.7	381.1	256.0	70	30
464.1	449.4	390.8	260.8	72	00
482.7	460.3	400.2	265.0	73	30
504.1	470.7	410.7	271.6	75	00
526.4	480.3	419.9	276.5	76	30
546.0	489.8	433.4	283.5	78	00
558.8	500.5	442.2	284.8	79	30
572.0	511.1	457.7	290.1	81	00

TABLE XVII

WEIGHT OF SOLIDS ERODED

RUN NUMBER D3
UNIT WEIGHT CHAN 1 90PCF
CHAN 2 90PCF
CHAN 3 90PCF
CHAN 4 90PCF
DATE AUG 8 66
SUPERVISOR RLF
PREPARED WATER CONTENT (PERCENT)
CHAN 1 21.5
CHAN 2 20.8
CHAN 3 19.1
CHAN 4 22.7
FINAL WATER CONTENT (PERCENT)
CHAN NO TOP MIDDLE BOTTOM
1 33.5 33.6 37.5
2 33.8 28.8 37.4
3 35.2 32.5 35.2
4 35.2 35.4 36.9
RAINFALL INTENSITY 6 IPH
SLOPE OF CHANNEL H 1V1
TIME TO FIRST RUNOFF
MIN SEC
CHAN 1 00 40
CHAN 2 00 30
CHAN 3 00 55
CHAN 4 00 40

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
26.9	25.9	26.0	22.1	2 00
44.1	42.1	44.2	39.3	3 30
57.9	59.3	60.1	53.2	5 00
70.7	71.8	73.7	65.2	6 30
82.9	85.1	87.5	78.7	8 00
98.8	98.2	101.4	91.8	9 30
113.9	114.7	116.6	107.4	11 00
124.8	132.2	133.2	121.1	12 30
139.2	149.4	147.5	133.6	14 00
152.2	165.3	159.8	144.7	15 30
161.8	181.0	172.3	153.8	17 00
173.3	194.9	186.2	166.4	18 30

TABLE XVII (CONT.)

185.0	208.7	198.1	178.9	20	00
199.0	222.8	212.4	189.0	21	30
212.3	235.3	223.0	201.5	23	00
223.8	249.7	234.1	213.5	24	30
236.6	263.9	245.2	224.4	26	00
248.1	278.2	256.1	235.7	27	30
259.3	291.1	268.7	246.6	29	00
272.6	303.8	280.4	256.4	30	30
288.5	316.3	293.0	266.6	32	00
302.1	327.9	304.4	277.9	33	30
312.2	337.4	314.0	287.3	35	00
323.5	347.7	325.6	298.6	36	30
323.5	358.9	333.9	307.0	38	00
332.2	369.9	344.2	316.1	39	30
342.3	380.1	354.7	324.1	41	00
351.5	391.0	364.1	331.0	42	30
360.3	447.4	373.4	341.0	44	00
370.3	487.3	381.7	350.1	45	30
379.9	498.3	390.7	357.8	47	00
389.9	508.7	401.8	367.6	48	30
400.5	517.3	411.9	377.1	50	00
409.9	523.2	421.4	387.8	51	30
420.5	532.7	432.1	396.3	53	00
428.7	539.8	433.6	404.5	54	30
437.8	548.0	443.0	416.6	56	00
446.8	560.3	453.5	427.6	57	30
456.8	568.6	463.3	435.0	59	00
466.9	578.5	473.8	446.0	60	30
474.5	590.9	483.8	455.0	62	00
484.3	600.2	493.2	463.2	63	30
495.4	609.3	502.8	471.7	65	00
504.6	613.6	513.1	481.7	66	30
515.3	625.6	522.4	493.8	68	00
525.2	634.5	532.7	501.2	69	30
535.1	645.3	540.7	509.3	71	00
547.5	656.3	549.2	516.7	72	30
555.9	667.5	558.3	529.4	74	00
567.7	676.4	566.7	536.7	75	30
578.3	686.3	574.9	543.5	77	00
590.2	700.1	583.2	551.5	78	30

TABLE XVIII
WEIGHT OF SOLIDS ERODED

RUN NUMBER D4
UNIT WEIGHT CHAN 1 95PCF
CHAN 2 95PCF
CHAN 3 95PCF
CHAN 4 95PCF
DATE AUG 11 66
SUPERVISOR RLF
PREPARED WATER CONTENT (PERCENT)
CHAN 1 21.7
CHAN 2 39.2
CHAN 3 22.3
CHAN 4 23.2
FINAL WATER CONTENT (PERCENT)
CHAN NO TOP MIDDLE BOTTOM
1 27.4 29.3 30.7
2 29.9 25.4 28.7
3 30.4 29.6 28.2
4 32.2 26.8 32.6
RAINFALL INTENSITY 6 IPH
SLOPE OF CHANNEL 1H 1V
TIME TO FIRST RUNOFF
MIN SEC
CHAN 1 00 40
CHAN 2 00 30
CHAN 3 00 25
CHAN 4 00 20

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN):(SEC)
27.9	25.2	34.2	31.9	2 00
44.6	43.3	52.2	49.4	3 30
58.1	58.7	65.5	63.4	5 00
69.3	72.0	78.4	75.5	6 30
80.1	81.7	89.9	88.9	8 00
93.7	92.5	104.3	105.2	9 30
102.9	105.8	118.6	121.3	11 00
112.7	120.2	131.8	138.2	12 30
126.4	133.1	142.8	148.8	14 00
137.5	145.0	153.5	164.0	15 30
149.0	156.5	165.0	177.2	17 00
161.9	167.8	176.6	190.4	18 30

TABLE XVIII (CONT)

175.5	178.6	187.9	202.0	20	00
187.0	190.9	199.2	213.8	21	30
198.3	202.6	210.1	225.1	23	00
208.4	214.9	219.9	236.5	24	30
217.6	224.4	226.7	246.9	26	00
229.7	236.2	237.2	256.8	27	30
240.9	247.4	246.7	267.1	29	00
250.3	255.0	254.2	274.2	30	15
260.4	261.5	259.9	282.3	31	30
268.0	266.9	267.5	290.5	32	45
275.1	273.7	275.5	299.0	34	00
281.3	280.9	282.9	306.8	35	15
287.6	289.0	290.0	314.9	36	30
294.5	296.4	296.2	321.8	37	45
300.4	303.9	301.2	329.3	39	00
307.0	314.8	308.5	338.5	40	30
318.3	325.0	316.4	346.7	42	00
327.8	335.3	327.2	357.0	43	30
338.7	344.7	337.7	368.4	45	00
346.9	351.5	348.3	378.4	46	30
355.2	361.4	357.2	389.4	48	00
365.6	370.6	366.8	399.1	49	30
373.4	380.4	377.3	409.2	51	00
382.4	390.5	386.5	417.7	52	30
392.0	401.1	393.5	427.0	54	00
402.8	410.4	402.5	434.3	55	30
410.6	411.9	409.6	441.8	57	00
417.6	420.1	416.7	447.2	58	30
426.3	430.0	423.5	453.5	60	00
436.6	437.4	430.2	460.5	61	30
445.9	445.1	439.0	468.1	63	00
455.4	454.7	448.9	475.6	64	30
463.0	464.3	456.9	485.0	66	00

TABLE XIX

WEIGHT OF SOLIDS ERODED

RUN NUMBER D5
UNIT WEIGHT CHAN 1 80 PCF
CHAN 2 85 PCF
CHAN 3 90 PCF
CHAN 4 95 PCF
DATE UG 16 661
SUPERVISOR DLR
PREPARED WATER CONTENT (PERCENT)
CHAN 1 22.1
CHAN 2 21.8
CHAN 3 22.0
CHAN 4 21.8
FINAL WATER CONTENT (PERCENT)
CHAN NO TOP MIDDLE BOTTOM
1 42.7 45.5 47.1
2 40.2 33.9 38.1
3 37.1 32.0 33.9
4 28.5 27.5 25.5
RAINFALL INTENSITY 6 IPH
SLOPE OF CHANNEL 1H 1V
TIME TO FIRST RUNOFF
MIN SEC
CHAN 1 01 40
CHAN 2 01 15
CHAN 3 00 35
CHAN 4 00 20

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
3.8	6.0	20.9	16.1	2 00
33.9	28.4	38.6	52.2	3 30
59.5	51.3	53.0	61.9	5 00
78.8	67.3	64.4	71.1	6 30
96.9	83.0	76.5	79.2	8 00
120.3	100.0	90.5	93.7	9 30
137.3	117.5	101.3	104.5	11 00
137.3	135.9	112.8	114.8	12 30
153.3	152.5	124.1	124.8	14 00
171.4	168.2	134.7	132.6	15 30
184.9	182.8	145.2	139.8	17 00
198.5	200.4	160.5	150.2	18 30

TABLE XIX (CONT)

210.4	217.1	171.8	160.0	20	00
223.0	234.0	184.4	170.5	21	30
236.2	250.3	194.1	178.5	23	00
249.2	266.3	204.6	186.9	24	30
260.1	281.3	213.3	197.3	26	00
273.0	298.7	223.2	205.5	27	30
285.2	315.1	233.0	213.6	29	00
298.3	331.0	241.5	221.0	30	30
310.8	346.0	251.9	231.0	32	00
322.5	358.5	261.1	239.8	33	30
332.7	368.9	268.3	249.1	35	00
344.4	382.2	277.5	257.6	36	30
355.0	398.4	287.5	268.5	38	00
366.0	414.1	297.7	278.9	39	30
377.7	430.7	308.0	287.9	41	00
387.4	445.2	315.6	294.5	42	30
397.8	459.6	323.6	303.2	44	00
397.8	459.6	323.6	303.2	45	30
409.5	475.2	331.4	312.3	47	00
422.0	488.4	338.8	320.1	48	30
430.5	504.0	348.1	330.8	50	00
442.9	517.6	357.7	339.8	51	30
454.6	529.5	365.4	352.4	53	00
468.0	546.7	375.9	363.1	54	30
480.5	562.4	386.1	375.0	56	00
494.5	580.0	397.0	387.5	57	30
510.0	595.8	407.8	396.2	59	00
525.2	608.2	417.1	404.9	60	30
541.4	623.3	428.2	417.5	62	00
557.1	642.2	439.3	430.5	63	30
573.3	656.3	449.2	440.6	65	00
592.5	670.7	459.4	452.9	66	30
615.2	679.5	468.8	463.0	68	00
641.4	694.4	477.5	473.4	69	30
658.7	708.1	485.8	482.8	71	00
678.9	723.2	494.0	493.7	72	30
699.4	738.0	501.8	504.2	74	00
720.8	754.8	512.2	517.5	75	30

TABLE XX

WEIGHT OF SOLIDS ERODED

RUN NUMBER D6
 UNIT WEIGHT CHAN 1 85PCF
 CHAN 2 90PCF
 CHAN 3 95PCF
 CHAN 4 80PCF
 DATE AUG 23 66
 SUPERVISOR DLR
 PREPARED WATER CONTENT (PERCENT)
 CHAN 1 22.2
 CHAN 2 23.4
 CHAN 3 22.3
 CHAN 4 22.7

FINAL WATER CONTENT (PERCENT)
 CHAN NO TOP MIDDLE BOTTOM
 1 40.9 44.9 44.6
 2 36.8 32.2 35.3
 3 38.1 33.4 31.7
 4

RAINFALL INTENSITY 6 IPH
 SLOPE OF CHANNEL 1H 1V
 TIME TO FIRST RUNOFF

MIN SEC
 CHAN 1 01 30
 CHAN 2 00 45
 CHAN 3 00 30
 CHAN 4 01 50

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN)(SEC)
3.9	10.8	20.7	7.2	2 00
19.0	26.8	34.9	24.4	3 30
31.4	40.3	49.5	37.6	5 00
40.9	40.3	58.8	46.6	6 30
52.1	48.4	68.3	52.5	8 00
63.4	56.5	78.9	58.8	9 30
75.0	66.5	90.4	67.8	11 00
81.4	75.5	101.4	77.4	12 30
90.6	83.8	109.8	84.6	14 00
98.3	91.2	116.5	90.9	15 30
106.1	99.2	125.0	98.0	17 00
114.7	105.6	132.5	105.7	18 30

TABLE XX (CONT)

124.1	112.9	141.5	110.4	20	00
132.1	120.7	149.6	119.6	21	30
142.3	126.5	157.4	127.8	23	00
151.5	136.2	167.0	141.6	24	30
161.5	145.0	174.9	157.8	26	00
170.0	151.7	183.1	171.7	27	30
179.2	161.3	191.2	192.8	29	00
190.7	170.9	198.9	216.2	30	30
204.4	181.7	209.7	240.0	32	00
215.9	189.7	218.2	267.5	33	30
226.2	197.1	227.6	288.1	35	00
240.0	206.3	239.0	316.0	36	30
250.3	216.2	249.8	336.8	38	00
259.4	223.2	257.2	356.8	39	30
272.5	232.6	265.9	372.8	41	00
284.9	240.2	273.3	391.6	42	30
297.2	247.5	280.4	415.6	44	00
306.4	258.8	285.9	471.1	45	30
318.1	266.4	295.2	503.0	47	00
329.0	277.5	304.2	605.4	48	30
340.1	284.8	312.3	727.3	50	00
352.3	296.0	320.3	985.0	51	30
366.9	305.8	330.0	1146.2	53	00
381.5	316.8	336.8	1274.5	54	30
387.0	327.6	342.7	1452.9	56	00
402.2	338.3	347.8	1543.4	57	30
418.5	349.3	357.3	1723.4	59	00
434.0	362.2	367.0	1838.3	60	30
450.4	367.1	373.6	1976.8	62	00
473.3	376.7	382.2	2005.8	63	30
494.3	388.4	384.8	2041.6	65	00
515.0	401.1	392.3	2074.9	66	30
539.6	410.8	400.9	2104.4	68	00
561.3	420.8	408.3	2128.9	69	30
583.7	434.0	417.6	2158.0	71	00
602.4	443.0	426.4	2179.3	72	30
619.8	453.0	433.8	2195.7	74	00

TABLE XXI

WEIGHT OF SOLIDS ERODED

RUN NUMBER D7
 UNIT WEIGHT CHAN 1 90PCF
 CHAN 2 95PCF
 CHAN 3 80PCF
 CHAN 4 85PCF
 DATE AUG 29 66
 SUPERVISOR DLR
 PREPARED WATER CONTENT (PERCENT)
 CHAN 1 22.4
 CHAN 2 22.7
 CHAN 3 21.4
 CHAN 4 21.0
 FINAL WATER CONTENT (PERCENT)
 CHAN NO TOP MIDDLE BOTTOM
 1 41.6 41.6 33.4
 2 38.9 32.9 34.1
 3 43.6 50.1 54.7
 4 39.9 42.3 40.5
 RAINFALL INTENSITY 6 IPH
 SLOPE OF CHANNEL 1H 1V
 TIME TO FIRST RUNOFF
 MIN SEC
 CHAN 1 01 05
 CHAN 2 00 55
 CHAN 3 01 45
 CHAN 4 01 15

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
7.0	17.8	0.0	8.7	2 00
25.4	39.4	14.7	29.3	3 30
39.0	55.0	35.9	43.2	5 00
48.5	68.7	47.6	57.0	6 30
55.7	80.2	58.4	65.7	8 00
69.1	92.4	71.1	80.0	9 30
80.7	107.9	84.9	93.8	11 00
87.2	123.8	99.3	109.0	12 30
95.4	136.0	110.9	117.8	14 00
103.7	151.3	119.0	126.6	15 30
111.1	165.4	127.5	136.0	17 00
120.6	179.0	137.2	146.0	18 30

TABLE XXI (CONT)

128.1	188.4	146.8	153.2	20	00
135.4	202.4	154.4	163.1	21	30
142.5	215.6	164.3	172.4	23	00
150.8	232.1	176.8	185.8	24	30
156.9	243.8	183.5	225.5	26	00
165.1	256.6	226.5	236.0	27	30
175.1	271.7	241.1	247.6	29	00
185.2	285.9	257.2	257.1	30	30
197.7	300.9	272.4	268.4	32	00
206.4	314.3	285.4	281.5	33	30
215.2	326.4	301.0	291.7	35	00
221.3	338.1	313.8	298.8	36	30
227.1	353.2	333.4	309.5	38	00
237.3	366.6	353.7	320.1	39	30
243.0	380.2	368.5	329.2	41	00
250.9	390.0	387.0	338.6	42	30
259.5	402.5	407.1	350.3	44	00
266.0	413.3	558.9	360.0	45	30
273.0	421.6	775.1	371.2	47	00
281.7	430.8	992.0	382.6	48	30
286.5	440.5	1335.0	393.0	50	00
292.6	452.2	1510.3	393.0	51	30
301.0	463.5	1664.7	405.7	53	00
310.5	492.5	1753.9	417.9	54	30
320.9	502.5	1781.6	427.5	56	00
331.1	512.2	1803.4	438.3	57	30
341.2	520.6	1823.3	446.1	59	00
352.1	532.5	1840.8	458.0	60	30
361.0	541.7	1857.2	466.2	62	00
370.1	552.0	1876.7	475.4	63	30
375.2	562.7	1890.9	486.2	65	00
384.6	566.4	1899.6	496.4	66	30
398.0	577.8	1916.9	508.0	68	00
410.9	586.3	1929.3	518.6	69	30
424.9	595.7	1940.3	530.8	71	00
440.5	606.6	1952.9	540.9	72	30
455.6	617.7	1966.2	556.7	74	00

TABLE XXII

WEIGHT OF SOLIDS ERODED

RUN NUMBER D8
 UNIT WEIGHT CHAN 1 95PCF
 CHAN 2 80PCF
 CHAN 3 85PCF
 CHAN 4 90PCF
 DATE SEPT
 SUPERVISOR RLF
 PREPARED WATER CONTENT (PERCENT)
 CHAN 1 19.5
 CHAN 2 19.2
 CHAN 3 20.4
 CHAN 4 20.0
 FINAL WATER CONTENT (PERCENT)
 CHAN NO TOP MIDDLE BOTTOM
 1 32.0 33.1 29.0
 2 50.1 51.8 48.0
 3 40.1 44.5 35.2
 4 36.4 39.1 44.1
 RAINFALL INTENSITY 6 IPH
 SLOPE OF CHANNEL 1H 1V
 TIME TO FIRST RUNOFF
 MIN SEC
 CHAN 1 01 10
 CHAN 2 01 30
 CHAN 3 01 00
 CHAN 4 01 20

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
18.8	0.0	15.0	7.1	2 00
46.2	23.1	52.6	24.6	3 30
68.2	45.3	69.8	39.8	5 00
85.5	61.8	86.4	51.4	6 30
101.1	79.3	100.3	60.5	8 00
116.5	93.8	115.8	69.2	9 30
133.4	110.0	131.7	82.1	11 00
148.6	123.3	146.2	93.0	12 30
156.8	132.8	154.9	101.5	14 00
169.7	145.8	167.1	111.4	15 30
181.8	160.0	177.4	120.9	17 00
192.0	173.1	187.6	128.3	18 30

TABLE XXII (CONT)

203.3	187.6	199.2	137.6	20	00
217.2	202.9	207.7	144.8	21	30
228.3	218.3	217.7	154.5	23	00
239.2	233.4	226.0	161.5	24	30
253.1	254.0	240.6	173.9	26	00
260.4	268.8	248.0	182.4	27	30
273.2	286.9	258.7	191.4	29	00
287.6	302.5	269.5	204.0	30	30
297.6	317.1	279.3	213.9	32	00
309.9	332.4	288.3	226.1	33	30
319.8	346.2	298.6	238.1	35	00
330.7	359.7	309.5	249.1	36	30
330.7	374.6	318.9	257.1	38	00
341.1	387.8	329.0	267.0	39	30
351.7	402.6	337.8	275.2	41	00
360.2	422.1	346.9	285.4	42	30
367.9	434.8	356.3	296.5	44	00
377.6	455.0	365.0	306.6	45	30
384.9	473.8	374.3	317.6	47	00
390.6	491.9	383.4	327.5	48	30
398.4	508.8	391.7	335.7	50	00
405.3	534.4	399.8	344.7	51	30
412.0	562.0	409.3	353.0	53	00
421.3	680.0	417.8	363.2	54	30
430.7	899.0	427.3	372.1	56	00
443.2	1021.1	437.7	383.1	57	30
452.4	1278.0	448.4	392.5	59	00
465.1	1510.6	459.2	403.4	60	30
473.2	1616.1	471.1	412.8	62	00
479.6	1733.7	482.6	422.1	63	30
488.0	1875.4	493.8	433.4	65	00
497.3	1922.7	507.2	454.3	66	30
508.5	1952.9	521.6	466.3	68	00
517.5	2000.9	534.4	480.3	69	30
526.6	2028.4	548.6	494.0	71	00
534.0	2047.8	562.7	508.4	72	30
541.4	2069.6	577.9	520.1	74	00
548.4	2089.7	594.0	535.9	75	30

TABLE XXIII
WEIGHT OF SOLIDS ERODED

RUN NUMBER E1
UNIT WEIGHT CHAN 1 80PCF
CHAN 2 80PCF
CHAN 3 80PCF
CHAN 4 80PCF
DATE SEP 10 66
SUPERVISOR RLF
PREPARED WATER CONTENT (PERCENT)
CHAN 1 21.8
CHAN 2 23.1
CHAN 3 21.9
CHAN 4 22.0
FINAL WATER CONTENT (PERCENT)
CHAN NO TOP MIDDLE BOTTOM
1 42.6 45.0 44.2
2 40.3 43.3 45.5
3 39.9 43.1 44.7
4 39.7 41.9 43.3
RAINFALL INTENSITY 6 IPH
SLOPE OF CHANNEL 3H 1V
TIME TO FIRST RUNOFF
MIN SEC
CHAN 1 02 00
CHAN 2 01 45
CHAN 3 02 10
CHAN 4 02 20

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)	
26.6	23.5	19.1	15.9	3	30
46.9	44.1	35.5	31.5	5	00
66.4	66.6	52.1	44.6	6	30
83.0	84.9	65.8	57.5	8	00
102.1	101.7	83.8	70.1	9	30
123.2	121.3	98.8	83.0	11	00
144.8	142.1	112.6	100.8	12	30
166.9	159.9	125.5	112.7	14	00
185.1	178.2	140.1	125.0	15	30
202.2	199.0	154.6	137.3	17	00
220.3	220.5	169.7	149.8	18	30
237.8	242.3	182.9	160.7	20	00

TABLE XXIII (CONT)

257.5	264.7	198.7	228.6	21	30
274.2	282.9	210.6	241.4	23	00
288.6	304.8	238.5	241.4	24	30
305.8	326.8	238.5	255.4	26	00
321.2	359.7	248.8	262.7	27	30
336.3	379.0	261.0	272.6	29	00
351.6	434.3	273.3	285.6	30	30
368.4	450.8	286.2	296.9	32	00
384.4	468.2	299.4	307.1	33	30
398.3	483.2	310.9	316.1	35	00
416.1	500.7	323.6	328.4	36	30
429.3	582.4	335.7	341.0	38	00
457.2	598.2	347.6	352.4	39	30
473.2	615.4	360.1	363.4	41	00
488.5	633.8	371.2	375.4	42	30
503.4	652.4	383.6	386.9	44	00
518.2	661.1	398.1	399.1	45	30
533.8	676.8	408.5	411.2	47	00
548.5	692.1	420.4	422.0	48	30
566.0	709.6	431.0	430.1	50	00
581.2	723.1	442.3	440.9	51	30
596.2	738.1	453.4	451.4	53	00
611.6	786.1	464.6	459.8	54	30
625.2	799.8	475.4	470.1	56	00
642.4	799.8	486.3	478.3	57	30
659.4	813.2	495.8	488.5	59	00
672.5	827.9	505.7	499.8	60	30
687.5	839.3	517.8	508.9	62	00
701.0	851.9	529.2	518.5	64	00
717.6	861.6	539.4	526.9	65	30
731.0	869.7	550.6	537.2	67	00
750.2	886.7	564.1	550.1	68	30
766.5	899.8	578.9	564.6	70	00
782.8	915.0	589.6	577.2	71	30
797.4	931.4	602.5	588.2	73	00
809.6	947.0	617.7	603.7	74	00

TABLE XXIV
WEIGHT OF SOLIDS ERODED

RUN NUMBER E2
UNIT WEIGHT CHAN 1 85PCF
CHAN 2 85PCF
CHAN 3 85PCF
CHAN 4 85PCF
DATE SEP 15 66.
SUPERVISOR RLF
PREPARED WATER CONTENT (PERCENT)
CHAN 1 25.4
CHAN 2 24.0
CHAN 3 23.8
CHAN 4 23.5
FINAL WATER CONTENT (PERCENT)
CHAN NO TOP MIDDLE BOTTOM
1 38.1 35.0 36.8
2 36.7 39.2 36.9
3 45.1 42.9 41.6
4 39.4 39.5 36.1
RAINFALL INTENSITY 6 IPH
SLOPE OF CHANNEL 3H. 1V
TIME TO FIRST RUNOFF
MIN SEC
CHAN 1
CHAN 2
CHAN 3
CHAN 4

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
22.2	28.6	11.8	21.1	2 30
39.1	48.2	26.5	40.9	4 00
49.9	65.4	40.5	52.9	5 30
64.1	82.6	52.8	67.1	7 00
79.4	99.9	68.5	80.0	8 30
95.5	117.8	81.1	92.4	10 00
112.1	138.3	94.6	108.9	11 30
129.0	159.0	110.5	124.1	13 00
143.1	176.9	123.9	135.5	14 30
155.3	195.4	138.6	149.3	16 00
168.9	214.1	149.5	161.6	17 30
175.0	230.3	170.0	173.2	19 00

TABLE XXIV (CONT)

185.6	247.5	183.2	230.4	20	30
198.3	268.7	195.6	245.5	22	00
213.0	286.5	209.3	258.8	23	30
227.7	304.5	222.2	271.4	25	00
240.1	321.2	232.4	283.3	26	30
251.8	336.7	246.9	294.6	28	00
262.2	352.8	256.9	305.2	29	30
276.6	369.1	269.2	317.3	31	00
288.8	384.6	278.8	328.1	32	30
298.3	397.7	289.9	354.7	34	00
309.4	411.7	301.7	368.9	35	30
317.4	428.2	312.5	379.5	37	00
326.9	441.5	323.5	392.5	38	30
337.2	455.7	334.6	406.7	40	00
346.7	469.2	344.9	420.8	41	30
357.2	485.6	355.8	435.8	43	00
367.2	499.4	368.3	447.9	44	30
378.2	513.8	377.7	460.7	46	00
386.5	525.9	391.2	473.2	47	30
396.5	541.1	400.2	483.3	49	00
405.8	556.3	411.0	495.9	50	30
417.3	572.6	422.9	507.7	52	00
427.8	587.8	434.2	521.3	53	30
437.6	602.8	447.0	536.1	55	00
451.0	621.2	459.1	549.9	56	30
462.6	637.4	475.3	563.1	58	00
472.6	655.6	489.7	577.7	59	30
485.0	670.4	507.4	588.7	61	00
495.5	684.1	525.4	601.4	62	30
507.2	698.4	543.1	610.9	64	00
517.9	707.4	562.5	622.3	65	30
529.7	723.1	585.3	635.4	67	00
540.1	736.5	603.9	647.5	68	30
551.5	751.2	627.3	657.4	70	00
560.9	767.2	647.7	666.3	71	30
570.5	785.4	671.5	683.6	73	00
581.3	801.0	700.2	694.9	74	30

TABLE XXV

WEIGHT OF SOLIDS ERODED

RUN NUMBER E3
 UNIT WEIGHT CHAN 1 90PCF
 CHAN 2 90PCF
 CHAN 3 90PCF
 CHAN 4 90PCF
 DATE SEP 19 66
 SUPERVISOR RLF
 PREPARED WATER CONTENT (PERCENT)
 CHAN 1 21.9
 CHAN 2 22.2
 CHAN 3 23.0
 CHAN 4 22.2
 FINAL WATER CONTENT (PERCENT)

CHAN NO	TOP	MIDDLE	BOTTOM
1	34.1	32.1	34.6
2	28.9	28.8	33.4
3	30.3	32.4	33.7
4	30.9	32.8	34.4

 RAINFALL INTENSITY 6 IPH
 SLOPE OF CHANNEL 3H 1V
 TIME TO FIRST RUNOFF

	MIN	SEC
CHAN 1	00	45
CHAN 2	00	30
CHAN 3	00	20
CHAN 4	00	45

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
10.6	21.4	16.2	13.8	1 30
30.3	43.1	30.2	29.8	2 30
50.3	61.2	47.0	50.8	3 45
65.5	77.5	59.5	66.6	5 00
77.4	92.3	77.5	81.4	6 15
92.0	110.1	90.8	95.2	7 30
104.3	126.9	102.9	107.5	8 45
117.5	143.3	115.0	121.5	10 00
131.5	159.0	127.6	135.2	11 15
142.5	174.1	140.7	151.1	12 30
154.0	188.4	152.1	164.9	13 45
166.2	202.8	163.2	179.0	15 00

TABLE XXV (CONT)

178.5	216.5	174.2	191.0	16	15
189.7	228.8	184.3	207.3	17	30
203.8	242.2	196.9	221.2	18	45
215.8	255.5	206.8	235.6	20	00
226.2	267.8	217.8	249.2	21	15
237.5	279.8	226.3	261.4	22	30
249.2	292.7	235.9	275.5	23	45
259.0	304.5	244.9	288.1	25	00
270.4	315.1	256.4	299.9	26	15
283.3	330.7	267.9	315.1	27	30
295.0	342.9	276.3	327.3	28	45
306.2	351.6	284.1	338.5	30	00
315.1	362.5	293.2	350.3	31	15
324.8	375.5	301.9	359.7	32	30
335.4	387.6	313.4	369.8	33	45
344.2	399.0	321.8	381.8	35	00
354.7	411.7	331.6	402.4	36	15
364.7	424.8	341.1	412.2	37	30
374.4	436.8	349.0	423.2	38	45
385.8	450.4	356.4	430.1	40	00
398.1	461.3	365.1	440.0	41	15
408.4	471.8	370.8	448.8	42	30
419.6	484.9	381.1	458.3	43	45
429.8	495.8	388.0	468.6	45	00
440.5	504.9	399.2	480.9	46	15
448.6	517.8	406.6	494.5	47	30
457.6	530.9	415.4	508.9	48	45
468.0	536.9	423.6	520.8	50	00
480.5	546.5	431.7	532.7	51	15
493.3	565.6	441.4	545.4	52	30
507.5	565.6	449.7	557.5	53	45
514.2	598.3	455.3	570.5	55	00
524.0	610.3	462.5	584.3	56	15
531.7	619.1	468.0	593.7	57	30
541.2	630.6	476.8	606.9	58	45
549.2	637.5	486.0	619.5	60	00
560.3	647.2	494.2	632.1	61	15
569.3	658.6	500.1	643.7	62	30
577.7	668.0	508.9	654.7	63	45
588.3	678.3	517.0	668.0	65	00
595.9	688.3	525.6	681.4	66	15

TABLE XXVI

WEIGHT OF SOLIDS ERODED

RUN NUMBER E4
 UNIT WEIGHT CHAN 1 95PCF
 CHAN 2 95PCF
 CHAN 3 95PCF
 CHAN 4 95PCF
 DATE SEP 21 66
 SUPERVISOR RLF
 PREPARED WATER CONTENT (PERCENT)
 CHAN 1 21.7
 CHAN 2 23.4
 CHAN 3 24.3
 CHAN 4 23.1
 FINAL WATER CONTENT (PERCENT)

CHAN NO	TOP	MIDDLE	BOTTOM
1	33.9	32.8	33.9
2	32.3	28.2	32.5
3	29.7	29.1	30.9
4	31.8	32.5	30.1

 RAINFALL INTENSITY 6 IPH
 SLOPE OF CHANNEL 3H 1V
 TIME TO FIRST RUNOFF

	MIN	SEC
CHAN 1	00	50
CHAN 2	00	40
CHAN 3	00	45
CHAN 4	00	45

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
17.3	22.7	17.9	20.0	2 00
37.3	46.6	36.2	39.9	3 30
55.0	63.6	47.3	56.4	5 00
70.1	81.6	61.5	69.9	6 30
85.5	97.8	72.7	81.8	8 00
97.9	113.2	84.0	93.6	9 30
113.4	129.5	94.8	106.8	11 00
130.2	144.1	106.4	120.1	12 30
145.1	158.2	121.9	134.4	14 00
157.8	172.7	133.7	144.4	15 30
170.2	185.4	143.8	155.4	17 00
183.8	199.2	153.1	168.4	18 30

TABLE XXVI (CONT)

198.3	216.1	165.8	180.1	20	00
209.9	230.4	176.2	190.8	21	30
223.1	243.6	185.2	204.6	23	00
237.1	260.3	199.1	220.5	24	30
249.1	274.1	210.2	232.2	26	00
262.5	286.4	219.8	246.1	27	30
275.9	300.4	229.8	257.5	29	00
289.2	315.9	240.4	269.1	30	30
302.9	330.1	250.4	282.6	32	00
314.6	342.5	261.6	294.8	33	30
327.8	355.9	269.0	306.2	35	00
338.9	367.4	280.1	317.0	36	30
348.0	379.2	288.8	327.7	38	00
358.7	394.1	298.1	336.6	39	30
370.9	406.2	309.7	347.1	41	00
383.0	419.1	317.2	356.8	42	30
392.1	433.1	326.6	365.8	44	00
401.6	442.9	337.9	378.1	45	30
408.2	449.0	348.7	383.6	47	00
421.5	457.4	356.1	392.6	48	30
432.5	468.8	365.4	401.2	50	00
445.4	481.1	375.8	412.3	51	30
458.0	494.3	385.8	422.3	53	00
466.9	506.3	394.4	432.2	54	30
476.4	517.6	403.9	440.9	56	00
487.0	528.6	416.6	450.8	57	30
499.9	539.0	427.0	459.7	59	00
510.5	552.0	436.7	469.2	30	30
522.6	562.6	447.8	477.8	62	00
533.2	576.8	458.6	488.0	63	30
542.9	588.4	471.6	496.3	65	00
556.0	599.5	479.8	504.1	66	30
566.0	610.8	488.5	516.2	68	00
577.1	623.0	495.2	525.4	69	30
590.5	630.3	505.8	533.9	71	00
603.8	640.3	514.7	542.4	72	30

TABLE XXVII

WEIGHT OF SOLIDS ERODED

RUN NUMBER E5
 UNIT WEIGHT CHAN 1 80 PCF
 CHAN 2 85 PCF
 CHAN 3 90 PCF
 CHAN 4 95 PCF
 DATE OCT 7 66
 SUPERVISOR RLF
 PREPARED WATER CONTENT (PERCENT)
 CHAN 1 22.6
 CHAN 2 21.9
 CHAN 3 23.2
 CHAN 4 22.0
 FINAL WATER CONTENT (PERCENT)
 CHAN NO TOP MIDDLE BOTTOM
 1 45.7 49.8 45.5
 2 45.2 38.2 44.3
 3 38.8 36.0 44.3
 4 42.2 29.1 36.4
 RAINFALL INTENSITY 6 IPH
 SLOPE OF CHANNEL 3H 1V
 TIME TO FIRST RUNOFF
 MIN SEC
 CHAN 1 01 35
 CHAN 2 01 15
 CHAN 3 01 00
 CHAN 4 00 50

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
.0	4.1	6.9	4.6	2 00
14.6	23.2	24.4	24.5	3 30
27.3	40.0	38.6	43.1	5 00
41.8	52.0	48.7	59.6	6 30
54.5	64.3	57.5	74.4	8 00
64.3	76.2	67.3	90.7	9 30
75.1	87.9	78.4	106.1	11 00
90.9	102.9	91.2	123.1	12 30
103.6	115.3	105.7	136.8	14 00
114.7	159.1	115.3	152.0	15 30
133.0	170.7	125.8	166.5	17 00
143.9	183.4	134.9	180.2	18 30

TABLE XXVII (CONT)

156.5	197.2	146.8	192.2	20	00
171.4	212.4	160.3	209.6	21	30
185.8	226.3	173.0	224.9	23	00
213.7	244.0	209.2	233.0	24	30
213.7	252.4	209.2	250.8	26	00
226.9	267.2	222.4	266.7	27	30
242.2	281.2	235.9	281.1	29	00
257.3	295.7	247.8	294.1	30	30
270.9	319.7	258.9	306.9	32	00
286.6	329.8	271.8	319.6	33	30
298.0	342.5	283.8	332.3	35	00
312.2	357.1	298.8	345.1	36	30
326.3	370.5	314.5	358.0	38	00
339.2	387.8	335.3	372.9	39	30
354.7	402.7	349.2	383.0	41	00
368.7	417.0	359.3	394.3	42	30
382.4	429.8	372.4	408.0	44	00
393.3	443.7	383.5	421.3	45	30
411.2	456.3	395.1	434.0	47	00
425.0	468.1	409.6	448.8	48	30
473.7	482.9	428.1	463.6	50	00
499.7	494.7	442.1	476.4	51	30
518.9	509.6	457.0	488.4	53	00
539.7	528.3	473.4	501.3	54	30
560.8	554.0	475.2	515.7	56	00
575.7	569.3	491.5	527.4	57	30
602.0	582.3	510.9	537.8	59	00
625.8	596.6	528.3	554.4	60	30
656.0	626.6	552.6	570.3	62	00
673.9	648.0	571.6	585.6	63	30
700.7	667.6	589.6	600.3	65	00
729.3	683.3	612.0	613.5	66	30
749.7	702.6	627.2	627.0	68	00
780.5	726.4	654.0	642.4	69	30
815.3	751.5	675.5	654.4	71	00
838.2	774.2	691.3	669.2	72	30

TABLE XXVIII
WEIGHT OF SOLIDS ERODED

RUN NUMBER E6
UNIT WEIGHT CHAN 1 85PCF
CHAN 2 90PCF
CHAN 3 95PCF
CHAN 4 80PCF
DATE OCT 21 66
SUPERVISOR RLF
PREPARED WATER CONTENT (PERCENT)
CHAN 1 21.9
CHAN 2 22.8
CHAN 3 21.9
CHAN 4 20.7
FINAL WATER CONTENT (PERCENT)
CHAN NO TOP MIDDLE BOTTOM
1 41.2 346. 044.
2 237. 034. 435.
3 932. 031. 832.
4 144. 548. 244.
RAINFALL INTENSITY 6 IPH
SLOPE OF CHANNEL 3H 1V
TIME TO FIRST RUNOFF
MIN SEC
CHAN 1 01 40
CHAN 2 00 50
CHAN 3 00 30
CHAN 4 01 30

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
.0	16.8	27.0	1.8	2 00
18.9	40.3	53.8	19.6	3 30
36.9	60.3	73.4	39.0	5 00
53.8	78.5	92.3	54.5	6 30
68.6	94.6	105.3	65.7	8 00
82.3	111.5	119.3	77.7	9 30
97.7	130.0	134.6	77.7	11 00
113.9	145.6	153.1	150.0	12 30
130.7	161.5	167.7	165.6	14 00
144.0	177.3	180.6	178.7	15 30
158.8	196.0	196.4	191.7	17 00
172.2	213.0	208.6	202.6	18 30

TABLE XXVIII (CONT)

187.3	230.6	219.9	217.1	20	00
201.0	247.2	233.5	231.4	21	30
216.9	266.7	248.4	248.4	23	00
231.8	283.1	258.9	263.9	24	30
247.4	287.8	270.7	277.6	26	00
261.1	304.5	283.6	292.1	27	30
276.0	318.7	297.0	306.3	29	00
290.1	335.2	308.0	321.4	30	30
304.6	347.4	319.6	335.1	32	00
319.6	362.4	334.2	349.0	33	30
334.4	378.5	345.3	360.2	35	00
350.2	393.0	356.9	369.5	36	30
364.9	472.1	369.6	382.9	38	00
379.7	488.0	381.1	397.3	39	30
395.2	503.8	392.2	408.9	41	00
411.4	521.6	405.4	423.2	42	30
426.1	592.7	416.5	435.8	44	00
442.9	608.6	428.0	448.0	45	30
462.7	627.0	439.0	461.1	47	00
480.8	643.6	450.8	475.8	48	30
496.7	657.6	462.0	487.3	50	00
515.4	674.0	474.4	501.6	51	30
534.7	689.4	496.8	515.4	53	00
554.8	699.1	510.4	532.7	54	30
572.3	715.6	522.2	546.5	56	00
595.1	730.7	535.2	561.5	57	30
615.5	747.7	547.3	581.4	59	00
637.8	766.1	563.0	601.5	60	30
667.2	779.4	574.4	622.2	62	00
690.3	796.1	589.0	643.7	63	30
714.2	810.0	602.7	662.7	65	00
737.7	825.1	616.7	680.6	66	30
763.7	842.0	632.7	697.0	68	00
787.6	859.2	643.1	713.1	69	30
806.0	875.6	657.0	734.8	71	00

TABLE XXIX

WEIGHT OF SOLIDS ERODED

RUN NUMBER E7
UNIT WEIGHT CHAN 1 90PCF
CHAN 2 95PCF
CHAN 3 80PCF
CHAN 4 85PCF
DATE OCT 28 66
SUPERVISOR RLF
PREPARED WATER CONTENT (PERCENT)
CHAN 1 21.3
CHAN 2 21.5
CHAN 3 21.8
CHAN 4 21.3
FINAL WATER CONTENT (PERCENT)
CHAN NO TOP MIDDLE BOTTOM
1 34.1 42.3 37.7
2 32.9 31.6 32.2
3 44.9 47.0 46.8
4 36.1 40.8 42.4
RAINFALL INTENSITY 6 IPH
SLOPE OF CHANNEL 3H 1V
TIME TO FIRST RUNOFF
MIN SEC
CHAN 1 01 00
CHAN 2 00 35
CHAN 3 01 25
CHAN 4 01 10

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
8.5	32.5	2.8	6.9	2 00
31.5	58.5	29.8	28.3	3 30
51.6	80.9	51.0	45.6	5 00
51.6	101.0	72.2	62.1	6 30
67.2	121.9	89.8	77.9	8 00
83.3	139.3	106.2	94.9	9 30
101.7	158.6	127.8	110.3	11 00
116.9	178.6	145.3	123.7	12 30
131.4	195.1	160.9	138.0	14 00
151.0	212.9	181.5	157.4	15 30
172.1	231.9	196.6	170.9	17 00
188.8	250.0	217.5	186.3	18 30

TABLE XXIX (CONT)

202.9	266.8	234.9	200.5	20	00
220.2	281.6	251.1	214.3	21	30
239.0	300.7	272.7	227.3	23	00
256.1	316.1	289.4	238.3	24	30
270.0	330.7	306.4	251.1	26	00
287.4	346.0	323.4	267.2	27	30
302.9	360.5	340.5	281.3	29	00
318.6	378.7	356.4	296.0	30	30
332.4	393.0	372.1	312.4	32	00
348.2	407.9	388.3	327.8	33	30
361.4	424.6	406.9	344.6	35	00
377.0	441.2	423.1	358.6	36	30
391.7	455.8	440.5	374.1	38	00
406.5	468.6	459.8	389.1	39	30
420.6	484.9	477.4	409.2	41	00
435.4	498.3	492.7	424.9	42	30
449.2	514.6	507.9	443.5	44	00
467.6	530.2	525.2	460.2	45	30
481.9	544.9	542.8	475.6	47	00
494.6	560.3	559.4	491.8	48	30
509.8	572.7	579.3	504.7	50	00
525.3	583.8	595.7	520.9	51	30
541.9	597.3	612.5	534.0	53	00
555.7	613.2	630.2	548.0	54	30
570.4	628.7	648.7	560.6	56	00
585.6	644.3	670.3	574.7	57	30
603.6	661.3	697.7	590.0	59	00
619.0	674.1	727.4	604.1	60	30
633.7	687.8	754.4	617.2	62	00
647.7	702.4	779.6	632.9	63	30
661.0	716.1	802.7	646.5	65	00
675.6	730.3	827.9	662.6	66	30
688.6	745.0	849.3	679.2	68	00
707.1	757.3	899.6	695.7	69	30
720.6	765.3	931.1	712.0	71	00

TABLE XXX

WEIGHT OF SOLIDS ERODED

RUN NUMBER E8
UNIT WEIGHT CHAN 1 95PCF
CHAN 2 80PCF
CHAN 3 85PCF
CHAN 4 90PCF
DATE NOV 19 66
SUPERVISOR RLF
PREPARED WATER CONTENT (PERCENT)
CHAN 1 21.6
CHAN 2 23.8
CHAN 3 21.9
CHAN 4 24.4
FINAL WATER CONTENT (PERCENT)
CHAN NO TOP MIDDLE BOTTOM
1 36.5 29.7 35.7
2 45.8 46.4 47.2
3 44.2 44.6 40.3
4 41.8 38.6 35.9
RAINFALL INTENSITY 6 IPH
SLOPE OF CHANNEL 3H 1V
TIME TO FIRST RUNOFF
MIN SEC
CHAN 1 00 35
CHAN 2 01 15
CHAN 3 00 55
CHAN 4 00 45

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
.0	8.9	15.5	15.8	2 00
26.0	37.7	39.6	40.3	3 30
50.3	62.8	60.2	62.0	5 00
69.8	84.7	75.0	79.7	6 30
91.2	106.3	90.9	99.3	8 00
109.2	126.1	104.6	116.6	9 30
127.0	145.7	122.1	132.2	11 00
140.2	167.3	138.3	149.3	12 30
158.5	186.6	155.2	167.5	14 00
175.4	203.0	170.5	182.9	15 30
193.0	223.0	185.6	196.6	17 00
209.6	240.7	200.1	211.8	18 30

TABLE XXX (CONT)

224.0	260.0	213.3	225.7	20	00
242.0	277.4	226.9	240.8	21	30
260.0	296.8	243.3	260.1	23	00
277.1	312.2	255.7	274.3	24	30
293.3	331.5	271.6	290.7	26	00
310.0	348.8	286.0	303.7	27	30
329.0	367.8	300.6	314.7	29	00
343.8	386.6	313.9	326.7	30	30
361.4	406.8	327.9	341.1	32	00
377.0	425.6	342.3	355.4	33	30
391.6	445.3	358.0	370.1	35	00
409.6	466.2	373.7	382.2	36	30
425.9	484.0	387.3	397.1	38	00
441.9	503.5	404.1	411.3	39	30
459.0	525.0	418.7	426.6	41	00
475.6	543.3	432.2	438.3	42	30
490.9	564.8	447.7	454.8	44	00
509.3	587.5	460.0	466.8	45	30
533.7	609.2	474.2	480.8	47	00
549.5	632.0	486.9	494.8	48	30
566.1	653.4	502.7	508.6	50	00
581.8	674.6	516.3	521.3	51	30
598.8	696.7	533.4	538.9	53	00
616.3	725.7	547.8	553.7	54	30
632.3	757.5	561.9	567.7	56	00
649.8	784.9	574.8	581.1	57	30
669.6	817.2	591.3	594.0	59	00
685.3	848.5	608.5	608.1	60	30
702.7	879.3	624.1	621.7	62	00
718.7	908.2	640.5	635.7	63	30
735.8	934.8	657.8	649.1	65	00
754.3	963.6	674.9	660.9	66	30
772.0	997.0	694.5	674.2	68	00
792.5	1024.6	711.9	686.6	69	30
810.8	1050.9	734.7	702.2	71	00

APPENDIX C
VOLUME OF RUNOFF WATER

TABLE XXXI

VOLUME OF RUNOFF WATER
RUN NUMBER ~~AND~~ A1

FOR INFORMATION CONCERNING THIS RUN SEE TABLE VII.

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN)(SEC)	
273.2	289.7	187.5	170.8	3	00
464.5	486.7	430.8	401.9	4	30
657.2	693.1	676.8	635.0	6	00
890.1	938.1	872.0	815.3	7	30
1127.9	1195.2	1077.3	1005.3	9	00
1366.4	1450.2	1283.7	1196.3	10	30
1610.1	1692.3	1490.8	1384.3	12	00
1849.3	1926.9	1702.3	1567.7	13	30
2098.2	2185.0	1928.3	1760.8	15	00
2348.3	2442.5	2152.6	1959.2	16	30
2593.8	2702.3	2374.7	2163.6	18	00
2843.8	2965.7	2600.2	2365.2	19	30
3094.0	3231.2	2832.8	2564.4	21	00
3348.1	3484.9	3062.8	2762.6	22	30
3596.8	3738.6	3294.6	2963.7	24	00
3850.1	3994.4	3528.5	3170.0	25	30
4100.3	4255.1	3768.7	3380.6	27	00
4355.1	4510.6	3996.4	3588.3	28	30
4619.1	4771.2	4234.4	3802.4	30	00
4877.9	5025.1	4468.4	4010.9	31	30
5141.5	5283.3	4706.8	4229.7	33	00
5408.9	5548.5	4954.3	4459.4	34	30
5666.6	5815.5	5209.2	4691.0	36	00
5945.0	6094.2	5465.3	4917.4	37	30
6212.3	6368.1	5717.9	5144.4	39	00
6459.6	6623.3	5952.4	5353.0	40	30
6727.6	6897.2	6203.5	5569.8	42	00
6998.8	7158.6	6443.9	5785.1	43	30
7267.7	7425.3	6688.3	6003.9	45	00
7535.9	7692.0	6933.5	6223.9	46	30
7803.1	7964.1	7178.1	6451.7	48	00
8067.8	8231.0	7429.1	6686.3	49	30
8315.6	8484.4	7667.0	6909.7	51	00
8578.0	8746.3	7904.7	7139.2	52	30
8842.6	9010.5	8143.3	7372.5	54	00
9115.5	9271.6	8365.7	7604.3	55	30
9393.9	9551.6	8589.2	7839.1	57	00

TABLE XXXI (CONT)

9667.4	9817.7	8818.8	8065.1	58	30
9937.1	10084.7	9054.5	8297.6	60	00
10210.8	10348.0	9279.1	8536.2	61	30
10489.8	10610.8	9513.7	8777.0	63	00
10772.3	10876.4	9741.5	9003.0	64	30
11048.5	11151.9	9991.2	9265.6	66	00
11325.8	11426.0	10241.8	9512.0	67	30
11601.6	11689.7	10485.4	9748.1	69	00
11872.3	11955.6	10734.5	9986.8	70	30
12146.0	12228.2	10988.3	10225.8	72	00
12416.8	12495.9	11246.6	10460.4	73	30
12702.5	12768.5	11499.5	10716.0	75	00
12967.2	13027.4	11744.4	10956.9	76	30
13244.6	13295.4	11993.1	11209.7	78	00
13530.0	13575.4	12243.0	11467.8	79	30
13809.2	13841.5	12490.1	11723.4	81	00
14088.3	14106.8	12732.9	11975.4	82	30
14370.4	14379.9	12976.3	12238.3	84	00
14646.3	14641.7	13212.5	12496.1	85	30
14930.3	14919.3	13463.3	12754.6	87	00
15210.8	15191.5	13713.1	13017.8	88	30
15498.7	15465.5	13955.4	13280.4	90	00
15776.3	15732.1	14201.7	13545.2	91	30
16064.4	16015.2	14460.9	13822.2	93	00
16340.5	16288.1	14709.9	14090.7	94	30
16624.9	16547.6	14956.2	14362.9	96	00
16909.7	16824.7	15207.3	14624.9	97	30
17192.7	17100.6	15461.3	14897.4	99	00
17473.7	17373.9	15713.1	15167.9	100	30
17759.9	17647.0	15966.2	15440.4	102	00
18045.0	17919.9	16210.8	15705.7	103	30
18332.9	18208.6	16464.4	15978.8	105	00
18614.5	18487.9	16718.7	16251.4	106	30
18913.9	18770.9	16981.6	16535.0	108	00
19188.8	19053.6	17237.8	16814.8	109	30
19468.5	19339.3	17486.1	17080.2	111	00
19750.0	19615.9	17742.7	17356.0	112	30
20042.5	19899.6	17999.6	17626.6	114	00
20331.3	20169.6	18257.7	17901.9	115	30
20618.8	20451.1	18515.7	18182.5	117	00
20908.3	20725.7	18774.0	18461.3	118	30
21211.4	21011.7	19050.5	18741.4	120	00

TABLE XXXII

VOLUME OF RUNOFF WATER
RUN NUMBER--A2

FOR INFORMATION CONCERNING THIS RUN SEE TABLE VIII.

CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	TIME AFTER TEST START (MIN)(SEC)
ONE	TWO	THREE	FOUR	
16.7	54.0	39.8	36.9	1 30
156.9	205.6	239.7	219.2	3 00
364.8	432.3	445.9	427.1	4 30
566.4	653.2	652.7	626.1	6 00
779.7	889.6	870.8	833.0	7 30
1000.3	1127.7	1087.1	1032.1	9 00
1223.6	1366.8	1303.7	1239.7	10 30
1448.7	1599.9	1519.4	1439.9	12 00
1677.3	1838.3	1755.4	1657.5	13 30
1899.6	2070.7	1981.4	1863.1	15 00
2135.5	2325.6	2228.5	2088.8	16 30
2375.5	2569.0	2464.2	2310.5	18 00
2626.0	2816.9	2709.6	2545.5	19 30
2870.3	3045.2	2954.0	2771.7	21 00
3125.3	3286.7	3192.9	3003.7	22 30
3383.2	3527.3	3434.8	3238.5	24 00
3640.4	3769.4	3673.1	3479.6	25 30
3895.3	4006.8	3911.1	3707.3	27 00
4162.8	4259.7	4163.1	3933.8	28 30
4432.5	4517.9	4426.3	4174.6	30 00
4680.3	4755.6	4663.8	4391.4	31 30
4937.3	5002.7	4917.2	4629.3	33 00
5203.2	5250.3	5168.6	4869.2	34 30
5463.1	5498.4	5426.2	5106.3	36 00
5724.1	5744.6	5687.8	5344.7	37 30
5983.5	5987.4	5949.2	5576.7	39 00
6261.5	6242.1	6219.7	5819.3	40 30
6507.2	6483.1	6488.1	6062.0	42 00
6767.4	6733.8	6743.9	6302.9	43 30
7035.8	6981.8	7001.9	6553.4	45 00
7306.5	7221.1	7259.0	6797.0	46 30
7575.9	7465.5	7524.8	7044.8	48 00
7844.1	7696.3	7744.9	7287.2	49 30
8114.7	7937.4	8006.4	7518.6	51 00
8372.4	8168.0	8228.4	7759.8	52 30
8640.1	8404.5	8484.2	8010.2	54 00
8900.3	8644.1	8699.6	8262.5	55 30

TABLE XXXII (CONT)

9166.2	8899.9	8962.8	8518.7	57	00
9439.6	9160.0	9237.6	8777.4	58	30
9705.2	9415.0	9492.4	9019.2	60	00
9969.9	9668.7	9760.2	9268.4	61	30
10234.8	9929.5	10028.3	9522.4	63	00
10509.1	10191.5	10302.3	9779.8	64	30
10778.7	10451.8	10571.4	10037.0	66	00
11066.3	10727.2	10842.2	10297.9	67	30
11335.4	10988.6	11111.7	10546.2	69	00
11629.3	11268.8	11382.7	10812.2	70	30
11906.7	11536.1	11631.3	11062.5	72	00
12167.6	11813.2	11899.1	11321.7	73	30
12444.7	12086.2	12170.0	11577.0	75	00
12720.4	12352.3	12438.7	11840.8	76	30
12984.6	12614.5	12691.4	12089.3	78	00
13274.3	12900.1	12969.0	12362.1	79	30
13562.2	13183.8	13244.3	12628.3	81	00
13835.6	13452.0	13505.6	12882.9	82	30
14115.4	13725.0	13772.0	13133.7	84	00
14397.6	14008.1	14041.3	13391.9	85	30
14685.0	14284.7	14300.2	13664.1	87	00
14971.7	14569.1	14572.6	13920.9	88	30
15255.1	14843.7	14844.6	14185.8	90	00
15540.7	15125.7	15121.6	14453.8	91	30
15826.7	15406.2	15386.3	14723.1	93	00
16105.0	15677.9	15652.0	14983.3	94	30
16388.7	15952.7	15913.8	15239.3	96	00
16676.2	16229.9	16180.2	15498.5	97	30
16957.3	16497.8	16445.0	15754.3	99	00
17250.5	16773.6	16713.9	16018.6	100	30
17527.2	17038.7	16979.1	16280.2	102	00
17810.1	17306.0	17249.1	16540.7	103	30
18114.1	17593.1	17534.8	16814.0	105	00
18404.8	17867.4	17811.1	17087.6	106	30
18700.7	18144.0	18084.0	17355.4	108	00
18987.9	18433.3	18348.0	17614.9	109	30
19277.0	18705.5	18616.4	17875.7	111	00
19574.2	18989.3	18885.0	18140.4	112	30
19856.3	19264.2	19148.7	18394.9	114	00
20155.3	19547.7	19424.7	18663.7	115	30
20442.9	19831.1	19695.3	18922.2	117	00
20740.3	20106.6	19964.4	19180.3	118	30
21031.5	20378.7	20234.0	19443.7	120	00

TABLE XXXIII

VOLUME OF RUNOFF WATER
RUN NUMBER--A3

FOR INFORMATION CONCERNING THIS RUN SEE TABLE IX.

CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	TIME AFTER TEST START	
ONE	TWO	THREE	FOUR	(MIN)	(SEC)
133.5	127.7	168.7	140.6	2	00
369.0	363.6	407.2	350.4	3	30
605.3	606.8	654.9	567.5	5	00
848.1	837.7	889.7	787.8	6	30
1088.8	1072.3	1123.3	1009.3	8	00
1326.5	1308.3	1363.5	1231.8	9	30
1572.5	1552.0	1613.0	1440.1	11	00
1802.8	1789.9	1860.9	1655.8	12	30
2055.0	2026.7	2108.9	1862.9	14	00
2294.5	2266.7	2359.7	2097.2	15	30
2545.8	2505.7	2603.2	2308.2	17	00
2802.2	2734.2	2838.4	2508.5	18	30
3044.4	2968.6	3088.3	2733.5	20	00
3296.9	3211.5	3331.6	2948.3	21	30
3550.4	3456.7	3586.9	3179.1	23	00
3797.7	3682.4	3823.9	3401.9	24	30
4054.0	3938.1	4088.2	3631.1	26	00
4307.5	4184.4	4341.4	3834.1	27	30
4553.9	4431.2	4595.9	4058.4	29	00
4814.1	4677.4	4805.9	4289.1	30	30
5060.3	4929.0	5061.2	4525.1	32	00
5319.4	5182.3	5311.6	4746.9	33	30
5563.7	5434.8	5569.7	4986.0	35	00
5829.8	5692.9	5834.2	5232.8	36	30
6075.9	5942.2	6092.3	5466.2	38	00
6330.2	6186.1	6355.9	5714.5	39	30
6582.5	6438.4	6622.8	5936.4	41	00
6841.6	6689.2	6882.1	6178.5	42	30
7108.7	6952.6	7139.6	6417.7	44	00
7362.5	7194.8	7401.2	6668.4	45	30
7624.3	7455.2	7664.9	6912.2	47	00
7879.1	7703.1	7924.6	7150.1	48	30
8140.1	7967.1	8210.3	7403.1	50	00
8385.1	8218.3	8476.8	7645.7	51	30
8642.7	8473.2	8736.1	7876.5	53	00
8903.5	8736.0	8992.4	8111.1	54	30
9153.8	8942.3	9255.3	8358.2	56	00

TABLE XXXIII (CONT)

9428.8	9210.5	9522.4	8591.1	57	30
9683.3	9465.9	9781.4	8820.2	59	00
9936.1	9724.2	10054.2	9065.9	60	30
10188.3	9971.9	10318.3	9319.8	62	00
10442.7	10228.8	10586.6	9573.5	63	30
10687.2	10479.0	10859.6	9829.3	65	00
10952.8	10740.2	11133.8	10087.1	66	30
11217.3	11005.1	11404.3	10334.9	68	00
11483.5	11265.0	11679.7	10585.7	69	30
11742.3	11515.0	11961.8	10837.9	71	00
12001.1	11773.1	12243.1	11092.6	72	30

TABLE XXXIV

VOLUME OF RUNOFF WATER
RUN NUMBER--A4

FOR INFORMATION CONCERNING THIS RUN SEE TABLE X.

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)	
127.4	138.5	79.4	99.8	1	30
344.3	366.4	274.9	308.2	3	00
553.7	580.8	477.6	509.5	4	30
759.5	792.9	661.1	694.6	6	00
971.8	1005.8	852.5	892.5	7	30
1169.7	1221.1	1045.1	1085.8	9	00
1391.3	1417.9	1254.3	1283.6	10	30
1613.0	1641.0	1472.2	1491.1	12	00
1833.4	1857.0	1684.0	1694.3	13	30
2051.0	2071.1	1889.2	1886.2	15	00
2279.4	2288.9	2097.1	2085.7	16	30
2495.6	2511.4	2291.9	2274.9	18	00
2724.7	2732.8	2497.4	2472.7	19	30
2947.0	2953.2	2701.6	2661.4	21	00
3176.8	3176.1	2914.4	2866.4	22	30
3424.6	3415.7	3137.8	3076.3	24	00
3673.8	3660.3	3367.8	3295.9	25	30
3913.3	3903.6	3582.2	3505.2	27	00
4163.0	4139.9	3805.0	3720.7	28	30
4423.0	4386.6	4033.9	3940.9	30	00
4692.8	4649.2	4272.0	4168.4	31	30
4964.0	4904.0	4505.5	4395.3	33	00
5228.9	5166.4	4740.1	4635.8	34	30
5501.7	5415.5	4972.4	4860.3	36	00
5760.6	5657.5	5194.6	5077.0	37	30
6008.1	5890.4	5410.1	5290.4	39	00
6249.6	6124.2	5627.3	5505.9	40	30
6486.4	6357.3	5844.0	5724.8	42	00
6725.8	6595.2	6063.1	5939.6	43	30
6942.4	6816.5	6298.4	6190.3	45	00
7186.1	7046.6	6516.6	6402.0	46	30
7441.0	7275.1	6737.2	6616.8	48	00
7717.9	7530.8	6983.4	6852.9	49	30
7987.4	7787.5	7228.7	7089.0	51	00
8244.6	8043.9	7472.3	7326.4	52	30
8505.5	8294.6	7694.9	7552.2	54	00
8745.5	8533.6	7917.0	7767.0	55	30

TABLE XXXIV (CONT)

8987.0	8774.4	8137.9	7983.9	57	00
9231.2	9012.5	8363.0	8206.0	58	30
9471.8	9246.7	8582.3	8415.9	60	00
9715.9	9491.4	8810.6	8641.2	61	30
9971.4	9735.7	9038.6	8868.3	63	00
10227.5	9990.2	9275.4	9100.8	64	30
10494.3	10253.3	9513.8	9345.2	66	00
10755.6	10529.2	9754.7	9596.4	67	30
11020.5	10779.4	9989.4	9823.3	69	00
11263.0	11021.8	10216.0	10040.0	70	30
11507.4	11257.4	10440.8	10254.6	72	00
11751.4	11491.9	10665.1	10472.5	73	30
12001.7	11728.5	10899.0	10698.2	75	00
12247.0	11972.2	11131.0	10924.6	76	30
12498.3	12214.0	11365.1	11149.0	78	00
12767.4	12476.9	11615.2	11385.5	79	30
13041.6	12737.8	11867.9	11631.8	81	00
13310.8	13006.5	12122.3	11874.5	82	30
13581.7	13265.8	12378.7	12112.8	84	00
13837.5	13523.1	12622.4	12344.4	85	30
14085.5	13764.9	12855.5	12565.0	87	00
14339.1	14014.9	13093.6	12795.3	88	30
14589.3	14265.3	13324.6	13020.4	90	00
14842.9	14511.2	13557.6	13252.8	91	30
15087.7	14771.3	13792.3	13490.5	93	00
15359.0	15037.2	14037.6	13734.5	94	30
15635.4	15308.1	14295.7	13981.0	96	00
15912.3	15580.2	14555.0	14235.3	97	30
16187.4	15836.3	14801.9	14507.3	99	00
16441.7	16085.6	15046.1	14742.2	100	30
16686.0	16323.6	15280.3	14971.3	102	00
16943.4	16574.4	15526.1	15208.5	103	30
17202.5	16819.7	15771.3	15443.2	105	00
17461.2	17065.6	16014.0	15677.7	106	30
17744.7	17327.2	16268.5	15924.8	108	00
18026.2	17600.5	16538.0	16181.5	109	30
18302.0	17859.6	16795.6	16434.2	111	00
18581.6	18126.7	17067.5	16694.3	112	30
18858.6	18387.2	17331.0	16939.1	114	00
19130.8	18649.2	17587.9	17181.4	115	30
19408.8	18903.9	17846.3	17431.7	117	00
19682.0	19169.7	18108.5	17682.0	118	30
19964.9	19442.3	18381.3	17936.2	120	00

TABLE XXXV

VOLUME OF RUNOFF WATER
RUN NUMBER--A5

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XI.

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN)(SEC)	
46.4	120.1	113.5	182.8	2	00
250.4	328.5	308.1	384.2	3	30
463.7	538.1	473.8	590.6	5	00
696.0	750.2	647.5	784.5	6	30
931.3	965.3	820.8	986.9	8	00
1161.6	1186.6	1003.4	1201.3	9	30
1393.2	1409.2	1175.6	1399.2	11	00
1627.5	1622.3	1355.3	1622.5	12	30
1856.0	1817.8	1538.2	1845.0	15	00
2070.8	2019.3	1742.9	2066.5	16	30
2284.8	2192.5	1939.2	2271.1	18	00
2538.9	2378.3	2146.7	2481.2	19	30
2775.7	2571.9	2346.9	2670.7	21	00
3018.9	2779.7	2557.6	2896.4	22	30
3253.3	2985.3	2772.3	3063.2	24	00
3503.2	3188.0	2995.1	3301.2	25	30
3739.6	3403.1	3214.6	3534.3	27	00
4004.0	3628.2	3436.2	3792.0	28	30
4257.5	3850.9	3670.9	4035.9	30	00
4527.7	4081.4	3914.2	4281.8	31	30
4803.9	4308.1	4162.5	4527.7	33	00
5061.2	4531.2	4386.6	4768.2	34	30
5334.4	4758.0	4627.8	5008.8	36	00
5631.3	4977.4	4851.5	5259.8	37	30
5914.3	5187.1	5074.4	5515.7	39	00
6202.5	5405.0	5297.6	5770.5	40	30
6479.0	5618.3	5529.6	6009.1	42	00
6759.0	5850.2	5766.9	6261.3	43	30
7036.9	6067.4	6005.5	6500.4	45	00
7307.9	6310.0	6256.0	6745.0	46	30
7591.5	6544.4	6492.2	6988.9	48	00
7874.8	6781.3	6746.2	7253.7	49	30
8158.2	7013.2	6990.1	7495.6	51	00
8443.1	7236.5	7245.6	7753.1	52	30
8734.2	7478.2	7510.0	8005.3	54	00
9019.5	7709.9	7766.0	8265.7	55	30
9310.0	7949.4	8023.7	8517.2	57	00

TABLE XXXV (CONT)

9601.1	8198.1	8280.5	8774.3	58	30
9887.6	8444.6	8543.0	9020.6	60	00
10179.3	8696.9	8812.2	9278.7	61	30
10468.7	8946.3	9078.5	9532.2	63	00
10758.4	9201.7	9331.4	9789.8	64	30
11044.1	9457.5	9595.0	10041.9	66	00
11337.9	9710.9	9855.8	10307.9	67	30
11619.5	9967.0	10112.0	10553.5	69	00
11906.0	10252.2	10348.7	10814.0	70	30
12189.8	10533.8	10635.3	11059.1	72	00
12484.0	10825.9	10915.4	11316.7	73	30
12779.1	11112.6	11200.6	11557.5	75	00
13066.7	11392.7	11473.3	11807.8	76	30
13356.6	11647.7	11736.9	12042.3	78	00
13649.1	11909.5	12004.8	12299.3	79	30
13892.8	12129.8	12216.6	12493.5	80	45
14144.9	12343.6	12431.9	12688.8	82	00
14396.1	12564.4	12665.1	12879.8	83	15
14642.8	12798.2	12894.7	13085.8	84	30
14868.1	13018.8	13122.1	13276.8	85	45
15124.1	13233.3	13342.1	13481.3	87	00
15371.0	13463.8	13573.4	13685.0	88	15
15627.4	13682.9	13797.2	13898.0	89	30
15879.0	13894.2	14017.3	14097.6	90	45
16134.8	14113.5	14246.7	14297.8	92	00
16404.9	14350.9	14490.8	14510.1	93	15
16653.0	14569.2	14706.3	14716.9	94	30
16914.9	14806.9	14933.2	14913.5	95	45
17170.4	15041.5	15158.4	15117.4	97	00
17434.7	15286.7	15380.3	15337.9	98	15
17678.9	15516.0	15607.5	15558.0	99	30
17934.7	15741.6	15840.5	15778.2	100	45
18187.3	15970.0	16067.1	16004.0	102	00
18452.8	16197.2	16295.3	16258.3	103	15
18698.4	16424.7	16532.3	16489.0	104	30
18960.1	16659.1	16763.5	16703.8	105	45
19214.6	16887.9	16982.8	16920.4	107	00
19459.0	17110.3	17197.3	17133.4	108	15
19735.6	17341.9	17423.6	17361.7	109	30
19988.7	17573.5	17639.9	17593.7	110	45
20245.4	17809.5	17853.1	17836.9	112	00
20507.3	18040.5	18066.2	18065.3	113	15
20752.6	18269.9	18287.3	18298.2	114	30
21008.7	18505.2	18520.1	18523.6	115	45
21268.0	18742.0	18744.4	18756.4	117	00
21516.4	18972.7	18948.8	18986.2	118	15

TABLE XXXV (CONT)

21768.9	19208.4	19197.1	19220.4	119	30
22030.4	19454.6	19425.2	19459.2	120	45

TABLE XXXVI

VOLUME OF RUNOFF WATER
RUN NUMBER--A6

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XII.

CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	TIME AFTER TEST START (MIN)(SEC)
ONE	TWO	THREE	FOUR	
128.0	37.7	46.4	68.4	1 30
330.8	192.6	223.1	255.0	3 00
539.4	356.0	400.9	443.3	4 30
752.4	566.7	583.4	633.1	6 00
966.8	785.1	766.6	826.9	7 30
1196.3	1018.7	960.0	1037.0	9 00
1421.7	1247.4	1146.0	1230.8	10 30
1654.9	1491.4	1348.9	1434.9	12 00
1889.8	1739.2	1549.5	1641.2	13 30
2123.4	1986.5	1750.5	1847.3	15 00
2364.9	2240.2	1959.0	2053.4	16 30
2604.2	2483.0	2167.1	2262.2	18 00
2839.2	2727.4	2369.2	2464.7	19 30
3083.0	2979.3	2578.0	2672.9	21 00
3322.2	3220.3	2788.7	2880.9	22 30
3570.0	3474.5	3007.1	3093.0	24 00
3815.2	3728.4	3218.8	3303.1	25 30
4058.5	3933.7	3435.1	3515.7	27 00
4298.5	4195.2	3644.4	3718.4	28 30
4550.8	4467.4	3860.4	3940.1	30 00
4787.6	4718.8	4070.9	4140.6	31 30
5036.1	4982.9	4296.6	4357.8	33 00
5282.2	5250.6	4520.2	4573.2	34 30
5529.3	5540.7	4742.1	4787.2	36 00
5769.9	5809.5	4958.4	4998.4	37 30
5999.3	6057.0	5175.3	5202.3	39 00
6237.4	6298.9	5399.5	5415.7	40 30
6466.7	6535.0	5613.7	5615.7	42 00
6698.3	6784.2	5834.3	5823.5	43 30
6928.2	7031.0	6055.7	6028.1	45 00
7152.5	7277.3	6274.5	6229.7	46 30
7391.7	7523.8	6499.6	6440.5	48 00
7628.7	7779.8	6723.3	6655.6	49 30
7867.7	8031.9	6956.9	6865.5	51 00
8095.7	8278.9	7199.3	7072.5	52 30
8332.6	8535.3	7463.5	7288.5	54 00
8569.3	8777.0	7720.6	7499.3	55 30

TABLE XXXVI (CONT)

8802.3	9043.6	7976.5	7764.1	57	00
9033.6	9301.5	8232.9	7975.0	58	30
9274.3	9556.5	8488.7	8186.9	60	00
9507.5	9814.7	8752.7	8397.4	61	30
9744.9	10071.4	9011.2	8613.7	63	00
9982.6	10329.3	9272.1	8826.4	64	30
10236.5	10609.7	9567.2	9055.3	66	00
10479.6	10885.5	9839.5	9277.7	67	30
10737.6	11171.6	10122.0	9502.0	69	00
10979.1	11443.4	10381.9	9723.6	70	30
11227.6	11717.8	10637.5	9946.4	72	00
11471.7	11993.7	10899.8	10166.1	73	30
11726.2	12276.8	11173.8	10393.7	75	00
11981.7	12563.5	11449.8	10616.2	76	30
12249.0	12859.0	11743.3	10852.3	78	00
12500.6	13148.8	12037.6	11080.0	79	30
12759.0	13444.6	12317.7	11303.6	81	00
13021.5	13734.9	12598.1	11548.7	82	30
13286.7	14032.5	12892.2	11794.7	84	00
13504.7	14280.8	13122.4	11991.3	85	15
13705.3	14503.9	13340.1	12181.5	86	30
13922.4	14750.1	13578.6	12387.4	87	45
14145.3	15007.8	13823.1	12577.6	89	00
14367.8	15256.5	14062.4	12775.9	90	15
14586.6	15512.8	14303.5	12984.8	91	30
14807.8	15759.6	14543.9	13192.0	92	45
15033.4	16012.4	14784.7	13394.2	94	00
15252.2	16261.5	15025.5	13598.1	95	15
15480.4	16511.7	15268.6	13800.2	96	30
15704.5	16757.2	15516.9	14007.1	97	45
15930.7	17008.7	15770.4	14214.7	99	00
16155.2	17255.4	16014.9	14425.8	100	15
16373.5	17497.9	16257.7	14625.6	101	30
16595.9	17746.5	16493.9	14832.4	102	45
16820.1	18001.1	16743.1	15036.4	104	00
17044.9	18246.2	16990.2	15250.6	105	15
17271.8	18498.0	17240.1	15452.1	106	30
17497.6	18748.3	17480.6	15660.1	107	45
17727.1	19006.0	17734.3	15877.7	109	00
17947.4	19251.3	17974.0	16087.4	110	15
18175.7	19494.7	18215.4	16294.3	111	30
18402.8	19738.1	18456.2	16499.4	112	45
18629.2	19986.1	18701.8	16711.6	114	00
18852.8	20231.2	18950.2	16932.4	115	15
19076.9	20472.9	19189.6	17152.1	116	30
19295.0	20715.1	19428.4	17365.8	117	45

TABLE XXXVI (CONT)

19518.9	20961.7	19677.4	17581.3	119	00
19739.3	21185.4	19921.9	17797.9	120	15

TABLE XXXVII

VOLUME OF RUNOFF WATER
RUN NUMBER--A7

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XIII.

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)	
92.9	102.4	34.7	43.0	1	30
294.5	300.4	224.3	224.9	3	00
521.2	488.9	413.4	397.5	4	30
731.6	697.2	601.1	566.9	6	00
959.3	905.0	794.6	746.7	7	30
1178.2	1124.1	1003.6	936.6	9	00
1415.4	1327.2	1217.1	1129.6	10	30
1627.4	1525.1	1427.1	1311.0	12	00
1859.1	1722.8	1631.9	1495.9	13	30
2075.4	1917.3	1844.8	1691.3	15	00
2303.1	2120.2	2052.1	1872.6	16	30
2518.4	2323.5	2270.7	2066.7	18	00
2756.4	2526.9	2488.0	2247.2	19	30
2981.2	2736.4	2710.9	2429.1	21	00
3229.3	2949.9	2937.8	2616.0	22	30
3454.1	3156.3	3166.7	2824.3	24	00
3687.3	3349.6	3382.8	3020.3	25	30
3905.4	3549.6	3599.3	3213.0	27	00
4143.1	3750.3	3812.3	3403.4	28	30
4379.1	3952.3	4037.6	3614.2	30	00
4614.7	4156.8	4251.2	3822.2	31	30
4841.1	4361.5	4464.5	4021.8	33	00
5095.9	4592.6	4696.1	4237.1	34	30
5324.8	4815.3	4921.6	4439.0	36	00
5579.4	5039.3	5137.8	4656.9	37	30
5814.9	5259.0	5399.9	4874.6	39	00
6065.0	5501.2	5664.6	5085.8	40	30
6300.5	5729.3	5921.1	5302.3	42	00
6527.9	5957.8	6187.5	5510.3	43	30
6768.8	6196.3	6458.0	5728.6	45	00
7028.7	6432.7	6729.6	5950.1	46	30
7270.4	6666.5	7010.0	6167.9	48	00
7531.9	6911.7	7282.0	6388.2	49	30
7773.0	7141.3	7550.4	6612.5	51	00
7976.5	7382.8	7828.9	6835.0	52	30
8223.0	7622.9	8115.6	7068.6	54	00
8480.3	7874.0	8397.7	7295.3	55	30

TABLE XXXVII (CONT)

8724.8	8121.7	8684.6	7522.0	57	00
8992.8	8383.1	8970.7	7757.1	58	30
9239.0	8638.4	9251.6	7984.2	60	00
9509.8	8892.1	9533.8	8209.7	61	30
9754.1	9147.4	9814.4	8440.2	63	00
10017.6	9400.4	10097.2	8667.1	64	30
10263.8	9645.4	10384.9	8892.0	66	00
10527.7	9904.5	10672.1	9135.7	67	30
10770.4	10151.3	10949.4	9362.3	69	00
11039.1	10399.7	11237.1	9595.0	70	30
11283.0	10657.6	11523.7	9828.5	72	00
11545.8	10931.3	11810.1	10056.2	73	30
11795.6	11202.6	12091.7	10289.4	75	00
12056.0	11476.2	12375.4	10506.4	76	30
12307.5	11749.6	12664.8	10747.9	78	00
12575.8	12007.5	12950.9	10985.3	79	30
12819.9	12255.1	13231.0	11212.3	81	00
13086.9	12513.0	13516.9	11448.6	82	30
13347.6	12796.8	13819.6	11700.3	84	00
13627.9	13085.9	14120.6	11952.9	85	30
13901.3	13381.4	14420.7	12215.0	87	00
14187.1	13671.5	14714.1	12467.5	88	30
14406.8	13915.1	14978.0	12680.5	89	45
14652.9	14163.6	15241.5	12899.4	91	00
14875.1	14402.9	15510.3	13116.3	92	15
15126.3	14653.7	15776.6	13338.0	93	30
15351.1	14892.2	16029.2	13556.5	94	45
15603.6	15140.9	16295.8	13786.2	96	00
15823.4	15371.2	16547.8	13996.3	97	15
16077.5	15615.2	16809.6	14229.5	98	30
16305.7	15851.4	17065.9	14449.0	99	45
16557.8	16103.0	17334.8	14679.1	101	00
16787.1	16342.4	17611.4	14904.8	102	15
17027.7	16584.8	17874.2	15122.5	103	30
17256.4	16829.8	18138.0	15336.6	104	45
17511.7	17086.6	18409.5	15570.4	106	00
17742.2	17334.5	18679.2	15801.2	107	15
17974.7	17575.6	18921.8	16019.1	108	30
18201.3	17823.6	19183.9	16244.0	109	45
18444.4	18073.5	19451.4	16478.8	111	00
18677.3	18327.4	19726.5	16714.4	112	15
18937.6	18583.7	20000.0	16943.2	113	30
19143.5	18819.1	20257.9	17159.7	114	45
19399.8	19087.4	20545.8	17402.6	116	00
19616.7	19322.0	20799.8	17624.8	117	15
19859.2	19568.8	21059.0	17850.5	118	30

TABLE XXXVII (CONT)

20096.1	19826.3	21335.0	18086.0	119	45
20341.9	20075.5	21601.7	18325.6	121	00

TABLE XXXVIII.

VOLUME OF RUNOFF WATER
RUN NUMBER--A8

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XIV.

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
66.2	106.7	188.1	33.2	1 30
263.5	309.1	388.2	228.1	3 00
497.9	528.7	614.3	427.2	4 30
699.4	749.5	827.5	615.3	6 00
941.4	971.8	1050.5	814.6	7 30
1159.3	1196.0	1281.1	1034.2	9 00
1378.1	1427.9	1513.2	1255.3	10 30
1608.4	1654.2	1735.4	1463.7	12 00
1825.7	1880.0	1966.5	1679.3	13 30
2058.1	2108.1	2192.5	1900.9	15 00
2291.7	2338.8	2420.9	2129.7	16 30
2522.3	2581.8	2649.8	2346.6	18 00
2754.6	2833.1	2886.6	2574.2	19 30
2997.5	3073.3	3116.6	2796.8	21 00
3241.2	3327.2	3360.0	3035.7	22 30
3494.4	3585.8	3585.5	3249.5	24 00
3738.3	3844.4	3821.4	3469.0	25 30
3990.0	4079.9	4044.0	3692.4	27 00
4228.3	4321.7	4276.4	3921.8	28 30
4468.1	4559.6	4492.1	4135.9	30 00
4711.0	4808.4	4724.5	4357.6	31 30
4962.2	5042.0	4950.7	4588.2	33 00
5217.9	5298.4	5184.8	4828.2	34 30
5472.0	5560.0	5410.3	5058.8	36 00
5733.4	5812.1	5653.7	5294.0	37 30
5982.1	6073.5	5879.9	5516.5	39 00
6247.1	6344.5	6119.2	5753.4	40 30
6512.2	6604.5	6348.8	5981.5	42 00
6770.9	6872.5	6599.2	6210.5	43 30
7025.3	7129.2	6824.6	6442.0	45 00
7296.6	7386.7	7063.5	6686.5	46 30
7561.4	7659.6	7299.2	6928.4	48 00
7816.3	7924.1	7543.4	7182.0	49 30
8092.6	8211.0	7782.8	7402.3	51 00
8360.8	8495.8	8030.7	7663.9	52 30
8637.3	8783.0	8270.5	7916.1	54 00
8902.8	9061.7	8509.2	8168.7	55 30

TABLE XXXVIII (CONT)

9191.2	9345.9	8761.7	8443.5	57	00
9453.8	9622.1	9007.5	8700.8	58	30
9735.3	9907.1	9248.9	8964.9	60	00
10004.8	10179.8	9497.5	9220.8	61	30
10286.8	10468.1	9748.3	9476.4	63	00
10563.4	10763.3	10010.7	9738.4	64	30
10844.3	11047.0	10308.7	9997.0	66	00
11121.8	11335.0	10601.4	10253.6	67	30
11399.2	11621.3	10889.1	10516.2	69	00
11659.5	11907.9	11175.9	10778.8	70	30
11940.6	12200.7	11461.9	11042.7	72	00
12213.7	12493.8	11749.6	11302.5	73	30
12487.4	12780.5	12041.8	11565.2	75	00
12772.2	13068.8	12328.8	11833.2	76	30
13062.3	13363.6	12616.7	12100.2	78	00
13302.2	13615.6	12863.5	12321.9	79	15
13546.8	13874.9	13113.7	12550.4	80	30
13777.8	14122.4	13359.3	12771.3	81	45
14013.2	14391.7	13603.6	12996.3	83	00
14256.5	14653.7	13853.5	13226.1	84	15
14492.8	14926.8	14093.3	13448.1	85	30
14733.4	15186.4	14340.7	13677.9	86	45
14973.8	15451.6	14590.6	13908.7	88	00
15211.8	15705.2	14833.4	14139.6	89	15
15452.8	15965.6	15081.2	14365.7	90	30
15694.5	16222.4	15332.8	14598.0	91	45
15933.6	16477.5	15576.5	14829.7	93	00
16183.0	16738.4	15827.2	15057.5	94	15
16424.6	16993.3	16071.0	15282.2	95	30
16677.2	17251.4	16309.9	15515.2	96	45
16923.6	17506.9	16562.8	15744.4	98	00
17174.2	17763.8	16816.4	15980.0	99	15
17419.5	18016.5	17061.4	16211.5	100	30
17676.2	18272.9	17309.3	16444.3	101	45
17929.3	18525.0	17562.6	16695.5	103	00
18184.2	18776.5	17817.0	16933.2	104	15
18444.6	19030.6	18068.5	17168.0	105	30
18706.1	19282.6	18321.6	17405.1	106	45
18964.0	19542.8	18570.7	17640.2	108	00
19226.5	19795.8	18828.5	17880.5	109	15
19482.6	20046.2	19075.5	18114.4	110	30
19736.2	20301.2	19323.5	18353.1	111	45
19997.4	20565.5	19583.5	18594.9	113	00
20249.6	20820.7	19838.5	18833.8	114	15
20510.9	21078.5	20092.6	19066.6	115	30
20777.3	21332.9	20348.5	19313.3	116	45

TABLE XXXV.III (CONT)

21039.3	21592.6	20603.5	19550.2	118	00
21294.2	21851.4	20857.1	19791.3	119	15
21563.5	22115.6	21118.8	20038.6	120	30

TABLE XXXIX

VOLUME OF RUNOFF WATER
RUN NUMBER--D1

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XV.

CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	TIME AFTER TEST START (MIN)(SEC)
ONE	TWO	THREE	FOUR	
182.8	183.0	225.3	197.1	3 00
454.0	439.3	490.3	406.0	5 00
655.3	649.0	685.9	568.4	6 30
867.1	858.3	878.3	730.9	8 00
1055.6	1063.2	1070.1	904.6	9 30
1242.1	1257.8	1263.5	1072.7	11 00
1432.9	1460.8	1457.7	1253.7	12 30
1641.9	1674.1	1660.0	1436.4	14 00
1831.1	1889.6	1845.4	1603.8	15 30
2032.6	2095.3	2038.1	1784.3	17 00
2229.6	2328.3	2226.7	1978.1	18 30
2436.1	2538.9	2421.8	2172.3	20 00
2632.6	2764.4	2626.3	2377.3	21 30
2844.3	2977.8	2820.6	2568.5	23 00
3041.2	3199.0	3018.9	2783.4	24 30
3265.8	3423.2	3235.8	2986.1	26 00
3464.3	3655.8	3435.6	3171.4	27 30
3682.0	3905.6	3646.3	3367.1	29 00
3882.4	4151.4	3856.2	3560.8	30 30
4080.9	4386.1	4068.2	3768.2	32 00
4280.7	4613.9	4278.0	3991.0	33 30
4491.4	4891.7	4478.8	4189.4	35 00
4686.1	5123.4	4687.7	4380.6	36 30
4896.5	5371.5	4914.3	4586.5	38 00
5102.5	5610.5	5127.8	4786.0	39 30
5290.4	5843.3	5329.3	4981.9	41 00
5496.2	6089.8	5553.4	5196.9	42 30
5706.1	6351.9	5783.0	5392.1	44 00
5899.3	6582.4	5999.9	5597.9	45 30
6123.1	6851.1	6237.8	5817.6	47 00
6326.9	7112.2	6459.5	6022.5	48 30
6538.0	7391.3	6706.5	6239.5	50 00
6752.9	7669.3	6937.3	6472.1	51 30
6957.4	7956.0	7176.7	6685.6	53 00
7130.8	8163.8	7391.4	6871.2	54 15
7318.3	8401.0	7595.2	7065.9	55 30
7497.6	8631.0	7793.2	7251.1	56 45

TABLE XXXIX (CONT)

7675.9	8864.3	7990.1	7429.8	58	00
7844.2	9068.9	8178.8	7639.5	59	15
8032.2	9296.8	8366.0	7824.3	60	30
8206.3	9513.8	8560.4	8018.4	61	45
8379.3	9723.4	8742.9	8196.4	63	00
8555.6	9931.5	8940.3	8377.0	64	15
8733.0	10172.8	9124.8	8562.3	65	30
8913.8	10426.3	9327.4	8759.2	66	45
9063.4	10646.9	9528.4	8925.8	67	45
9207.5	10843.8	9728.0	9082.5	68	45
9345.2	11084.5	9892.3	9237.1	69	45
9495.6	11305.7	10079.5	9237.1	70	45
9640.8	11548.9	10247.3	9384.6	71	45
9796.7	11749.9	10416.8	9543.8	72	45
9948.1	11939.3	10591.8	9701.6	73	45
10084.2	12126.2	10755.7	9849.7	74	45
10238.9	12353.2	10929.4	10015.5	75	45
10381.4	12510.4	11097.8	10162.3	76	45
10543.6	12704.6	11271.1	10316.5	77	45
10682.7	12883.9	11440.1	10476.3	78	45
10859.2	13175.2	11612.9	10634.4	79	45

TABLE XL

VOLUME OF RUNOFF WATER
RUN NUMBER--D2

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XVI.

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)	
159.6	176.9	135.7	120.9	2	00
405.6	451.6	350.3	305.1	3	30
583.8	647.4	519.7	463.4	4	45
768.2	839.5	680.9	609.8	6	00
947.0	1041.5	850.5	774.7	7	15
1138.1	1247.9	1022.6	935.3	8	30
1312.4	1469.0	1196.8	1120.3	9	45
1505.6	1683.3	1391.8	1289.2	11	00
1666.8	1869.4	1550.2	1441.1	12	15
1902.0	2096.4	1751.1	1622.2	13	30
2085.1	2296.5	1917.1	1771.4	14	45
2270.7	2496.3	2089.5	1917.5	16	00
2454.2	2697.2	2254.1	2078.7	17	15
2638.3	2890.0	2412.6	2226.6	18	30
2830.7	3131.7	2580.7	2382.5	19	45
3008.1	3345.3	2764.3	2535.7	21	00
3193.7	3559.2	2940.8	2712.1	22	15
3379.3	3757.8	3119.7	2840.9	23	30
3560.6	3966.0	3305.2	3004.3	24	45
3747.2	4159.2	3479.2	3139.2	26	00
3929.8	4352.5	3649.2	3271.3	27	15
4106.5	4538.6	3795.0	3391.9	28	30
4329.7	4776.7	3996.1	3552.3	30	00
4553.5	5017.7	4201.1	3713.8	31	30
4756.0	5239.5	4383.1	3878.7	33	00
4979.2	5481.6	4575.1	4042.3	34	30
5199.2	5719.6	4788.1	4213.5	36	00
5414.5	5952.2	4980.4	4376.4	37	30
5628.7	6184.9	5176.9	4543.4	39	00
5837.1	6415.8	5378.6	4711.4	40	30
6050.0	6650.3	5579.7	4892.7	42	00
6268.6	6907.0	5790.3	5051.6	43	30
6492.0	7142.4	5989.9	5207.9	45	00
6716.4	7382.0	6185.1	5358.2	46	30
6942.7	7628.9	6383.1	5512.6	48	00
7174.0	7872.0	6580.4	5672.1	49	30
7406.1	8107.4	6580.4	5820.1	51	00

TABLE XL (CONT)

7645.3	8357.8	6782.0	5976.1	52	30
7873.5	8594.6	6992.6	6134.3	54	00
8099.6	8844.4	7203.3	6315.8	55	30
8324.5	9094.0	7417.6	6488.1	57	00
8549.8	9342.0	7618.2	6664.1	58	30
8778.6	9577.0	7822.4	6837.2	60	00
9011.4	9827.2	8036.2	7004.1	61	30
9239.6	10074.9	8273.1	7179.6	63	00
9464.8	10306.5	8459.9	7335.5	64	30
9696.8	10549.1	8676.3	7516.8	66	00
9929.6	10787.9	8877.9	7683.2	67	30
10157.4	11021.9	9075.0	7840.5	69	00
10380.0	11252.0	9260.2	8001.1	70	30
10612.0	11488.4	9455.0	8168.1	72	00
10838.6	11742.1	9657.2	8352.0	73	30
11085.0	11983.9	9866.2	8518.5	75	00
11334.3	12231.4	10068.1	8670.5	76	30
11564.1	12474.6	10313.1	8866.8	78	00
11806.1	12716.3	10508.6	9033.3	79	30
12028.1	12941.6	10713.8	9191.5	81	00

TABLE XLI

VOLUME OF RUNOFF WATER
RUN NUMBER--D3

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XVII.

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
210.8	262.4	193.3	209.0	2 00
464.3	520.5	422.0	453.7	3 30
690.6	773.5	657.9	705.9	5 00
910.6	1012.3	876.1	931.3	6 30
1137.2	1259.1	1100.8	1189.5	8 00
1354.3	1489.7	1299.8	1401.1	9 30
1577.3	1734.8	1511.1	1634.8	11 00
1782.5	1978.4	1712.1	1838.1	12 30
1991.0	2225.7	1919.5	2063.8	14 00
2200.1	2478.5	2129.4	2282.9	15 30
2406.4	2732.9	2341.7	2519.8	17 00
2638.8	3002.8	2554.7	2732.3	18 30
2857.0	3265.5	2762.3	2946.6	20 00
3076.2	3524.7	2976.8	3154.1	21 30
3308.3	3786.9	3191.5	3370.8	23 00
3533.7	4060.2	3394.3	3571.2	24 30
3760.7	4307.6	3597.0	3783.2	26 00
3993.3	4575.1	3812.9	3995.9	27 30
4221.1	4837.9	4026.8	4219.4	29 00
4457.4	5093.3	4248.2	4425.4	30 30
4693.4	5350.5	4454.7	4643.6	32 00
4927.1	5619.3	4669.0	4849.8	33 30
5163.3	5875.9	4880.7	5075.9	35 00
5403.8	6132.6	5096.1	5293.2	36 30
5403.8	6397.5	5311.1	5501.6	38 00
5648.5	6652.7	5534.2	5711.3	39 30
5887.3	6914.3	5746.3	5909.5	41 00
6127.6	7173.9	5960.9	6107.0	42 30
6365.7	7388.6	6193.2	6318.7	44 00
6599.3	7614.3	6408.7	6545.6	45 30
6832.5	7875.8	6627.8	6778.3	47 00
7065.3	8130.6	6845.8	7013.5	48 30
7321.1	8393.8	7065.4	7254.8	50 00
7564.4	8664.0	7288.3	7487.2	51 30
7803.5	8938.9	7505.1	7716.8	53 00
8036.1	9198.6	7771.6	7949.4	54 30
8272.6	9455.6	7990.5	8183.2	56 00

TABLE XLI (CONT)

8508.3	9715.6	8214.9	8430.3	57	30
8745.3	9974.9	8442.6	8671.2	59	00
8984.0	10242.6	8666.4	8902.2	60	30
9224.8	10506.4	8885.7	9139.2	62	00
9459.2	10768.1	9106.8	9370.3	63	30
9697.6	11031.3	9336.3	9616.1	65	00
9941.0	11310.0	9569.9	9872.8	66	30
10177.4	11574.6	9798.2	10137.8	68	00
10418.3	11847.8	10034.6	10351.0	69	30
10660.3	12110.3	10267.0	10629.6	71	00
10902.6	12367.3	10493.2	10872.5	72	30
11137.0	12635.5	10723.0	11153.1	74	00
11376.2	12894.2	10943.5	11383.3	75	30
11630.0	13150.4	11171.2	11623.2	77	00
11866.1	13411.9	11394.1	11856.2	78	30

TABLE XLII

VOLUME OF RUNOFF WATER
RUN NUMBER--D4

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XVIII.

CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	TIME AFTER TEST START	
ONE	TWO	THREE	FOUR	(MIN)	(SEC)
205.2	250.1	219.4	264.9	2	00
438.2	515.0	457.6	521.0	3	30
660.5	757.3	679.8	803.6	5	00
885.3	1011.2	889.8	1041.7	6	30
1098.8	1246.1	1102.2	1289.0	8	00
1304.0	1489.9	1318.2	1533.0	9	30
1522.5	1726.9	1531.4	1777.1	11	00
1743.8	1975.9	1737.1	2029.3	12	30
1965.3	2215.0	1945.7	2269.2	14	00
2194.3	2474.4	2168.4	2528.2	15	30
2422.4	2720.2	2392.5	2784.8	17	00
2654.2	2969.5	2602.1	3034.0	18	30
2881.9	3201.1	2822.3	3267.7	20	00
3109.2	3483.5	3043.1	3501.5	21	30
3339.0	3729.2	3270.2	3742.0	23	00
3569.1	3993.3	3492.7	3987.8	24	30
3794.5	4242.9	3718.7	4243.2	26	00
4022.9	4535.0	3928.4	4478.3	27	30
4262.2	4789.9	4153.1	4722.5	29	00
4457.0	5025.9	4350.9	4927.2	30	15
4657.9	5249.5	4562.9	5124.2	31	30
4859.4	5465.0	4752.2	5326.1	32	45
5049.4	5677.1	4935.4	5526.4	34	00
5243.2	5922.3	5115.7	5725.4	35	15
5438.7	6138.5	5306.3	5944.8	36	30
5634.4	6354.4	5491.1	6163.7	37	45
5835.7	6569.0	5678.8	6368.8	39	00
6072.6	6836.5	5893.7	6620.6	40	30
6305.2	7092.0	6116.3	6863.2	42	00
6545.5	7362.9	6344.1	7116.6	43	30
6779.7	7625.9	6565.7	7369.6	45	00
7019.0	7896.8	6795.7	7608.6	46	30
7242.2	8143.2	7021.8	7854.6	48	00
7477.1	8416.6	7251.6	8085.9	49	30
7718.6	8691.9	7490.5	8327.9	51	00
7958.7	8973.2	7714.3	8556.3	52	30
8196.6	9234.4	7940.4	8782.4	54	00

TABLE XLII (CONT)

8436.2	9500.8	8160.4	9004.2	55	30
8669.0	9758.6	8381.6	9224.5	57	00
8904.5	10033.1	8625.7	9455.1	58	30
9129.2	10279.5	8840.2	9672.2	60	00
9354.3	10575.3	9056.1	9907.7	61	30
9583.7	10828.9	9273.4	10125.0	63	00
9817.1	11131.5	9532.9	10361.1	64	30
10066.6	11397.8	9777.7	10614.3	66	00

TABLE XLIII

VOLUME OF RUNOFF WATER
RUN NUMBER--D5

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XIX.

CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	TIME AFTER TEST START	(MIN) (SEC)
ONE	TWO	THREE	FOUR		
65.4	125.3	181.8	231.8	2	00
293.5	370.3	399.2	404.9	3	30
522.7	628.4	601.4	589.5	5	00
746.7	878.0	822.6	774.3	6	30
969.4	1125.4	1029.6	962.0	8	00
1207.6	1381.1	1253.1	1161.2	9	30
1419.9	1624.7	1451.6	1339.3	11	00
1702.7	1873.2	1651.2	1510.6	12	30
1915.9	2113.0	1856.6	1710.3	14	00
2145.8	2364.2	2077.2	1896.0	15	30
2347.0	2588.7	2264.3	2072.9	17	00
2572.0	2847.0	2550.9	2247.3	18	30
2779.9	3098.6	2774.2	2460.5	20	00
2991.4	3345.5	2986.5	2652.0	21	30
3202.4	3597.9	3199.4	2826.7	23	00
3423.1	3860.5	3405.6	2988.9	24	30
3626.5	4105.0	3622.2	3188.4	26	00
3835.4	4348.6	3851.2	3377.2	27	30
4049.6	4602.9	4063.1	3565.0	29	00
4277.2	4847.1	4274.8	3731.5	30	30
4479.0	5087.5	4486.6	3930.9	32	00
4688.7	5326.6	4710.4	4114.2	33	30
4894.3	5561.6	4908.3	4304.4	35	00
5114.5	5799.5	5122.5	4471.9	36	30
5325.3	6046.6	5342.5	4667.1	38	00
5543.6	6296.0	5567.7	4853.8	39	30
5756.0	6549.1	5774.8	5036.1	41	00
5961.2	6791.7	5991.0	5215.3	42	30
6185.7	7050.6	6212.9	5387.5	44	00
6185.7	7050.6	6212.9	5387.5	45	30
6389.6	7302.1	6441.9	5566.4	47	00
6608.4	7541.9	6676.6	5729.2	48	30
6821.1	7786.2	6885.6	5911.7	50	00
7036.5	8018.1	7089.3	6070.3	51	30
7254.8	8279.7	7324.7	6254.4	53	00
7470.7	8544.4	7549.1	6434.6	54	30
7687.3	8809.0	7774.4	6632.6	56	00

TABLE XLIII (CONT)

7911.9	9104.8	7987.6	6809.6	57	30
8128.7	9359.3	8205.4	6994.5	59	00
8352.3	9621.6	8432.3	7177.1	60	30
8575.9	9903.5	8663.3	7365.5	62	00
8804.0	10171.3	8894.2	7557.9	63	30
9018.7	10422.6	9113.0	7736.4	65	00
9245.5	10682.8	9345.4	7936.3	66	30
9472.9	10934.8	9559.4	8104.9	68	00
9710.0	11185.6	9766.4	8261.4	69	30
9938.6	11447.2	9993.8	8442.0	71	00
10173.5	11710.3	10218.3	8622.8	72	30
10402.0	11975.8	10494.9	8821.0	74	00
10636.2	12243.0	10753.7	9013.8	75	30

TABLE XLIV
VOLUME OF RUNOFF WATER
RUN NUMBER--D6

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XX.

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)	
86.7	148.4	172.2	42.2	2	00
292.0	386.1	368.0	178.2	3	30
496.0	610.5	574.2	338.6	5	00
714.1	896.6	775.8	491.4	6	30
927.5	1119.4	973.4	649.2	8	00
1141.2	1332.9	1148.0	791.7	9	30
1353.3	1547.8	1338.5	941.8	11	00
1567.4	1756.5	1517.9	1097.6	12	30
1776.7	1960.4	1708.2	1252.7	14	00
1976.5	2184.7	1904.7	1413.3	15	30
2630.4	2807.1	2672.6	2766.8	20	00
2852.8	3048.4	2896.6	2993.5	21	30
3086.0	3295.3	3124.3	3227.5	23	00
3299.7	3536.7	3328.6	3442.7	24	30
3529.4	3785.9	3563.6	3659.4	26	00
3761.3	4037.0	3788.8	3885.5	27	30
3994.4	4287.0	4016.7	4110.4	29	00
4228.4	4537.1	4239.3	4325.1	30	30
4457.2	4775.2	4466.5	4545.0	32	00
4690.6	5021.5	4687.0	4761.5	33	30
4919.7	5266.8	4911.5	4973.0	35	00
5164.5	5520.3	5140.7	5199.4	36	30
5396.4	5770.5	5366.5	5420.6	38	00
5632.5	6018.2	5590.9	5642.5	39	30
5867.2	6276.2	5824.9	5867.6	41	00
6108.9	6524.1	6051.0	6072.4	42	30
6344.1	6777.8	6283.8	6296.6	44	00
6582.6	7023.8	6510.1	6512.3	45	30
6820.7	7272.2	6738.3	6733.7	47	00
7065.6	7517.9	6965.0	6951.6	48	30
7287.9	7778.7	7209.3	7180.2	50	00
7535.5	8029.5	7439.0	7400.5	51	30
7792.7	8300.3	7681.3	7627.6	53	00
8040.2	8564.6	7925.3	7855.8	54	30
8312.6	8816.6	8163.3	8078.0	56	00
8567.9	9075.9	8400.8	8299.1	57	30
8826.6	9339.4	8636.1	8516.1	59	00

TABLE XLIV (CONT)

9098.8	9619.7	8875.6	8742.4	60	30
9377.5	9907.1	9127.4	8978.0	62	00
9643.6	10190.1	9380.2	9216.9	63	30
9914.2	10462.1	9623.6	9444.6	65	00
10175.3	10726.2	9856.9	9672.0	66	30
10439.8	10995.4	10101.4	9900.5	68	00
10718.6	11282.5	10356.9	10137.8	69	30
11005.0	11562.4	10613.1	10383.4	71	00
11285.6	11833.3	10855.2	10600.2	72	30

TABLE XLV

VOLUME OF RUNOFF WATER
RUN NUMBER--D7

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XXI.

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN)(SEC)	
88.3	136.3	46.5	104.4	2	00
276.2	372.1	169.4	302.2	3	30
450.8	560.7	337.8	500.0	5	00
640.4	776.2	529.0	709.8	6	30
828.1	976.7	702.1	910.5	8	00
1014.6	1176.8	891.9	1118.3	9	30
1207.5	1380.3	1082.7	1318.7	11	00
1405.9	1587.6	1266.5	1515.7	12	30
1602.1	1796.4	1462.2	1704.3	14	00
1788.2	2007.9	1634.6	1881.7	15	30
1987.6	2226.5	1843.1	2068.1	17	00
2188.3	2461.3	2032.9	2262.1	18	30
2382.5	2681.2	2222.9	2466.3	20	00
2574.4	2900.4	2408.4	2644.0	21	30
2773.6	3124.6	2604.5	2843.8	23	00
2994.1	3374.0	2816.3	3061.8	24	30
3161.6	3572.3	2980.5	3210.9	26	00
3358.1	3811.4	3144.3	3415.3	27	30
3561.6	4055.9	3348.6	3605.0	29	00
3756.4	4315.1	3546.0	3800.5	30	30
3957.1	4565.8	3765.4	3999.9	32	00
4160.9	4806.5	3959.9	4206.6	33	30
4357.2	5059.3	4169.2	4388.4	35	00
4545.0	5279.5	4360.4	4580.3	36	30
4748.9	5526.1	4570.2	4767.2	38	00
4962.2	5776.4	4780.5	4974.2	39	30
5166.4	6027.5	4996.7	5188.0	41	00
5384.8	6273.9	5196.5	5384.3	42	30
5593.9	6521.5	5408.2	5593.4	44	00
5810.9	6776.8	5635.5	5787.5	45	30
6018.9	7004.3	5832.6	5991.3	47	00
6230.8	7243.6	6047.5	6211.6	48	30
6421.8	7457.4	6113.6	6392.9	50	00
6628.8	7715.2	6250.4	6565.4	51	30
6831.3	7950.2	6415.1	6757.5	53	00
7050.9	8188.5	6618.3	6969.9	54	30
7252.9	8420.5	6852.5	7187.9	56	00

TABLE XLV (CONT)

7450.1	8639.9	7072.5	7381.6	57	30
7648.8	8854.9	7303.2	7561.7	59	00
7858.5	9094.2	7525.6	7715.6	60	30
8075.0	9319.8	7751.1	7878.0	62	00
8290.3	9546.2	7991.8	8083.2	63	30
8508.1	9785.7	8269.3	8294.5	65	00
8718.1	10014.5	8489.8	8469.2	66	30
8934.2	10243.5	8731.4	8649.0	68	00
9158.0	10478.3	8965.1	8837.4	69	30
9373.5	10710.7	9195.6	8999.3	71	00
9604.9	10961.1	9414.2	9151.8	72	30
9831.2	11213.5	9689.2	9347.6	74	00

TABLE XLVI

VOLUME OF RUNOFF WATER
RUN NUMBER--D8

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XXII.

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
125.3	304.0	118.5	106.1	2 00
337.3	507.9	304.8	293.9	3 30
561.6	734.3	500.7	489.1	5 00
789.6	964.7	697.2	676.1	6 30
1004.4	1211.6	911.1	861.9	8 00
1229.3	1445.7	1107.5	1046.1	9 30
1434.3	1682.2	1306.9	1253.5	11 00
1646.2	1904.0	1500.7	1427.3	12 30
1837.8	2105.7	1675.3	1610.5	14 00
2027.6	2305.8	1857.2	1776.1	15 30
2221.9	2516.9	2059.1	1945.5	17 00
2420.2	2720.7	2244.3	2113.0	18 30
2615.8	2937.0	2433.3	2279.6	20 00
2832.1	3161.3	2628.9	2453.6	21 30
3036.0	3387.2	2829.5	2627.4	23 00
3240.8	3604.5	3013.7	2784.4	24 30
3482.2	3865.3	3254.1	2979.0	26 00
3660.5	4069.7	3420.2	3121.4	27 30
3875.5	4304.8	3618.8	3293.6	29 00
4096.0	4538.0	3821.3	3468.0	30 30
4296.9	4769.3	4029.1	3634.3	32 00
4491.6	4994.2	4226.4	3804.5	33 30
4686.4	5225.0	4428.6	3975.3	35 00
4898.0	5450.9	4628.9	4142.2	36 30
5164.3	5692.2	4844.2	4321.2	38 00
5383.9	5928.5	5038.5	4499.0	39 30
5593.9	6165.2	5246.2	4681.9	41 00
5800.2	6417.2	5448.6	4865.1	42 30
5999.0	6646.4	5646.0	5042.9	44 00
6206.7	6906.2	5845.9	5227.0	45 30
6415.4	7140.6	6043.2	5408.1	47 00
6609.0	7375.2	6227.8	5591.9	48 30
6808.5	7619.1	6442.8	5779.7	50 00
7017.1	7899.9	6647.5	5964.2	51 30
7215.1	8150.8	6838.3	6140.2	53 00
7425.0	8322.6	7035.6	6307.6	54 30
7632.3	8547.8	7238.4	6477.3	56 00

TABLE XLVI (CONT)

7848.3	8677.4	7478.0	6666.1	57	30
8051.5	8884.0	7685.3	6838.6	59	00
8261.2	9100.9	7923.9	7024.9	60	30
8470.4	9342.1	8145.1	7218.7	62	00
8689.4	9580.5	8355.5	7403.1	63	30
8896.5	9824.5	8582.4	7582.7	65	00
9095.2	10070.3	8788.1	7763.1	66	30
9303.5	10365.5	9025.9	7947.6	68	00
9506.6	10648.4	9228.2	8125.4	69	30
9708.1	10927.3	9443.2	8300.3	71	00
9914.0	11204.5	9640.6	8479.8	72	30
10120.7	11483.3	9853.9	8647.1	74	00
10330.9	11745.1	10057.3	8853.4	75	30

TABLE XLVII

VOLUME OF RUNOFF WATER
RUN NUMBER--E1

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XXIII.

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN)(SEC)
282.1	294.7	233.7	261.1	3 30
507.2	517.8	432.8	464.6	5 00
730.4	762.6	645.5	676.1	6 30
974.3	1008.0	866.0	901.8	8 00
1211.1	1254.1	1070.7	1113.7	9 30
1453.3	1507.8	1289.3	1333.4	11 00
1688.8	1745.9	1483.7	1538.5	12 30
1925.4	1979.8	1654.1	1746.8	14 00
2162.5	2231.0	1870.0	1952.2	15 30
2403.1	2483.5	2086.7	2161.5	17 00
2636.5	2730.1	2302.3	2368.9	18 30
2873.9	2979.9	2509.5	2570.7	20 00
3120.8	3250.4	2736.6	2828.7	21 30
3366.7	3499.0	2957.1	3037.8	23 00
3609.4	3749.6	3156.9	3266.2	24 30
3858.2	4012.2	3417.5	3483.6	26 00
4085.3	4246.0	3626.0	3652.4	27 30
4326.8	4505.4	3843.1	3872.2	29 00
4563.5	4723.0	4061.7	4094.7	30 30
4799.2	4984.4	4291.8	4319.7	32 00
5052.5	5256.4	4519.1	4522.9	33 30
5297.4	5517.7	4740.9	4727.9	35 00
5544.1	5777.9	4967.5	4931.1	36 30
5800.9	5977.4	5203.5	5148.8	38 00
6036.4	6238.0	5432.9	5356.8	39 30
6293.0	6497.3	5660.4	5566.1	41 00
6545.6	6766.0	5897.7	5774.0	42 30
6807.7	7027.6	6136.8	6007.0	44 00
7053.3	7293.2	6363.1	6234.0	45 30
7303.0	7564.1	6597.9	6455.9	47 00
7542.2	7818.7	6831.7	6689.9	48 30
7791.1	8078.9	7065.7	6921.0	50 00
8031.3	8318.7	7290.0	7131.3	51 30
8261.7	8558.9	7508.1	7337.8	53 00
8502.9	8780.5	7737.2	7561.6	54 30
8731.1	9025.4	7966.6	7774.0	56 00
8983.4	9287.0	8191.8	7984.0	57 30

TABLE XLVII (CONT)

9229.3	9525.9	8413.6	8194.1	59	00
9476.6	9770.5	8635.4	8397.3	60	30
9698.6	9981.9	8822.8	8576.1	62	00
9931.7	10206.7	9019.0	8768.3	64	00
10163.8	10433.4	9221.5	8974.1	65	30
10405.5	10672.0	9439.1	9185.1	67	00
10659.3	10925.3	9658.3	9394.7	68	30
10921.7	11198.1	9893.1	9618.5	70	00
11174.4	11448.0	10106.5	9823.7	71	30
11434.2	11709.6	10332.2	10038.1	73	00
11700.1	11966.7	10559.7	10255.7	74	00

TABLE XLVIII

VOLUME OF RUNOFF WATER
RUN NUMBER--E2

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XXIV.

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)
212.5	244.7	167.8	211.4	2 30
463.9	496.1	405.6	452.1	4 00
663.4	747.6	638.0	660.9	5 30
924.6	1013.7	866.4	890.5	7 00
1171.1	1281.6	1090.8	1116.3	8 30
1422.6	1547.8	1313.7	1343.1	10 00
1672.1	1811.5	1534.5	1564.5	11 30
1931.7	2083.8	1775.6	1806.9	13 00
2187.9	2349.8	2013.8	2039.4	14 30
2447.0	2623.4	2244.9	2282.3	16 00
2702.1	2895.4	2457.4	2509.3	17 30
2968.2	3170.5	2683.5	2736.9	19 00
3214.4	3432.7	2911.5	3001.8	20 30
3468.8	3711.6	3159.0	3237.8	22 00
3726.6	3998.3	3398.8	3472.2	23 30
3981.4	4274.7	3638.8	3708.9	25 00
4237.9	4550.6	3879.5	3935.2	26 30
4496.8	4827.9	4122.2	4174.9	28 00
4740.8	5087.1	4343.6	4393.1	29 30
4993.6	5358.7	4577.0	4613.6	31 00
5249.5	5641.7	4816.9	4846.1	32 30
5509.2	5914.4	5044.0	5052.5	34 00
5764.7	6199.9	5286.5	5289.9	35 30
6030.8	6474.8	5532.5	5505.3	37 00
6296.3	6755.8	5785.0	5739.3	38 30
6557.0	7030.6	6032.0	5990.4	40 00
6812.8	7300.1	6281.4	6233.1	41 30
7073.2	7573.3	6529.6	6477.6	43 00
7334.2	7838.0	6778.0	6697.4	44 30
7591.9	8115.0	7022.5	6929.8	46 00
7845.3	8395.4	7264.3	7169.8	47 30
8076.6	8669.9	7519.8	7406.5	49 00
8327.5	8941.8	7764.7	7639.2	50 30
8592.9	9219.3	8012.4	7881.7	52 00
8855.8	9503.8	8268.8	8126.7	53 30
9123.1	9782.0	8518.5	8368.2	55 00
9385.3	10062.4	8765.2	8613.2	56 30

TABLE XLV.III (CONT)

9651.7	10338.7	9016.0	8858.3	58	00
9912.8	10622.0	9272.5	9107.3	59	30
10188.4	10904.2	9526.8	9345.7	61	00
10447.6	11184.9	9770.2	9568.5	62	30
10710.5	11456.1	10017.9	9791.6	64	00
10974.2	11734.2	10270.3	10032.3	65	30
11244.7	12008.9	10527.0	10277.5	67	00
11500.6	12282.7	10778.9	10513.1	68	30
11772.6	12563.5	11039.5	10755.2	70	00
12038.6	12849.5	11306.0	10998.6	71	30
12311.2	13135.4	11575.8	11242.3	73	00
12575.8	13424.0	11848.3	11488.2	74	30

TABLE XLIX
VOLUME OF RUNOFF WATER
RUN NUMBER--E3

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XXV.

CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	TIME AFTER TEST START (MIN)(SEC)
ONE	TWO	THREE	FOUR	
115.2	255.7	189.7	131.4	1 30
304.2	518.4	379.5	319.2	2 30
529.4	807.0	643.2	556.3	3 45
757.5	1087.4	871.6	784.2	5 00
953.1	1372.6	1107.2	1010.4	6 15
1162.5	1666.0	1340.0	1228.6	7 30
1363.7	1973.2	1596.2	1426.9	8 45
1588.9	2259.2	1821.3	1646.3	10 00
1814.0	2529.4	2077.3	1872.0	11 15
2047.4	2810.4	2311.3	2102.8	12 30
2266.6	3086.2	2573.7	2330.5	13 45
2484.8	3370.1	2815.5	2561.1	15 00
2704.1	3637.8	3054.4	2787.3	16 15
2930.6	3908.1	3281.8	3012.1	17 30
3163.2	4176.9	3531.3	3248.9	18 45
3379.8	4451.9	3755.0	3467.0	20 00
3607.6	4736.4	4005.0	3700.9	21 15
3829.9	4994.2	4231.4	3911.6	22 30
4058.5	5275.1	4483.1	4146.9	23 45
4288.2	5550.1	4708.0	4367.4	25 00
4515.4	5823.3	4960.7	4599.8	26 15
4741.9	6117.5	5189.6	4826.2	27 30
4954.9	6406.8	5429.4	5056.5	28 45
5183.5	6695.2	5661.7	5287.0	30 00
5409.6	6977.9	5898.6	5508.8	31 15
5647.5	7282.6	6129.1	5724.8	32 30
5876.1	7580.1	6367.2	5932.6	33 45
6113.4	7889.9	6596.3	6156.6	35 00
6341.8	8180.7	6863.7	6379.1	36 15
6574.0	8482.1	7091.7	6600.9	37 30
6811.9	8771.0	7318.2	6820.6	38 45
7044.9	9062.6	7530.4	7031.9	40 00
7276.4	9350.7	7733.7	7236.7	41 15
7505.2	9642.7	7950.1	7457.2	42 30
7729.8	9925.0	8177.7	7671.1	43 45
7969.5	10232.9	8407.7	7895.4	45 00
8188.7	10519.3	8624.6	8115.0	46 15

TABLE XLIX. (CONT)

8418.9	10819.8	8842.0	8340.8	47	30
8652.7	11116.5	9073.7	8579.0	48	45
8881.2	11408.2	9293.4	8804.0	50	00
9110.5	11694.3	9520.1	9031.8	51	15
9348.7	11971.0	9744.4	9258.4	52	30
9580.5	12258.6	9971.5	9485.9	53	45
9809.3	12552.1	10191.4	9713.5	55	00
10038.7	12845.6	10418.7	9939.3	56	15
10278.3	13147.2	10644.1	10166.2	57	30
10513.2	13433.2	10876.0	10401.2	58	45
10746.4	13725.4	11091.2	10612.7	60	00
10975.4	14029.2	11319.6	10852.7	61	15
11205.7	14330.3	11545.8	11079.2	62	30
11433.2	14617.3	11784.9	11311.2	63	45
11671.7	14920.9	12028.6	11540.8	65	00
11898.0	15211.2	12261.8	11763.8	66	15

TABLE L.

VOLUME OF RUNOFF WATER
RUN NUMBER--E4

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XXVI.

CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	CHANNEL NUMBER	TIME AFTER TEST START	(MIN) (SEC)
ONE	TWO	THREE	FOUR		
173.6	241.6	204.6	196.6	2	00
411.2	519.6	443.8	438.2	3	30
651.5	785.6	659.7	666.1	5	00
896.0	1057.1	874.9	890.5	6	30
1137.0	1310.9	1083.6	1113.7	8	00
1362.5	1555.3	1292.9	1331.8	9	30
1612.0	1814.9	1513.5	1555.0	11	00
1855.8	2074.7	1716.6	1785.0	12	30
2104.5	2349.2	1932.1	2017.9	14	00
2335.7	2602.1	2138.2	2225.4	15	30
2581.2	2861.4	2361.0	2449.7	17	00
2829.5	3131.1	2586.8	2679.3	18	30
3087.6	3407.9	2826.9	2936.6	20	00
3333.4	3669.9	3049.2	3182.6	21	30
3590.6	3956.9	3289.7	3429.7	23	00
3842.1	4225.2	3512.4	3671.6	24	30
4106.4	4515.4	3753.8	3930.7	26	00
4345.3	4797.8	3986.5	4178.6	27	30
4588.3	5072.6	4209.3	4412.3	29	00
4837.9	5343.8	4432.7	4643.7	30	30
5085.9	5622.6	4663.4	4890.8	32	00
5325.6	5889.7	4875.6	5121.6	33	30
5582.6	6173.4	5102.2	5367.5	35	00
5828.6	6441.8	5317.3	5601.8	36	30
6073.1	6713.4	5517.5	5818.1	38	00
6305.6	6987.1	5730.6	6052.2	39	30
6541.4	7262.4	5942.5	6285.2	41	00
6755.5	7525.0	6142.4	6508.2	42	30
6954.0	7778.1	6368.1	6751.7	44	00
7168.1	8052.1	6602.0	7016.9	45	30
7415.7	8318.6	6839.1	7270.6	47	00
7660.8	8565.5	7052.7	7503.0	48	30
7897.0	8812.4	7274.6	7732.3	50	00
8122.2	9081.3	7499.3	7967.1	51	30
8353.7	9337.8	7717.0	8195.0	53	00
8581.4	9606.1	7949.0	8431.1	54	30
8849.2	9873.9	8173.6	8654.2	56	00

TABLE L (CONT)

9089.9	10099.5	8441.3	8872.0	57	30
9320.2	10313.8	8692.6	9085.6	59	00
9538.4	10523.5	8951.3	9296.8	30	30
9776.7	10763.1	9231.8	9524.8	62	00
10008.1	11010.0	9513.1	9745.5	63	30
10250.1	11255.8	9772.0	9961.3	65	00
10481.2	11489.3	10005.4	10171.5	66	30
10717.2	11722.3	10274.8	10394.5	68	00
10955.5	11971.2	10555.8	10622.2	69	30
11196.5	12218.5	10813.8	10846.6	71	00
11434.1	12468.0	11079.7	11072.7	72	30

TABLE LI.

VOLUME OF RUNOFF WATER
RUN NUMBER--E5

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XXVII.

CHANNEL	CHANNEL	CHANNEL	CHANNEL	TIME AFTER	
NUMBER	NUMBER	NUMBER	NUMBER	TEST	START
29.3	89.2	117.1	112.2	2	00
237.9	337.4	342.9	340.2	3	30
452.8	575.0	558.1	569.0	5	00
669.9	810.6	768.1	783.9	6	30
892.0	1043.8	981.6	1000.9	8	00
1112.1	1274.2	1195.0	1231.0	9	30
1325.1	1498.9	1394.4	1444.0	11	00
1536.2	1714.1	1594.7	1655.2	12	30
1754.5	1940.9	1809.6	1877.4	14	00
1977.2	2137.7	2029.6	2105.5	15	30
2191.0	2364.2	2247.0	2332.9	17	00
2409.8	2586.9	2459.2	2550.7	18	30
2630.4	2807.1	2672.6	2766.8	20	00
2852.8	3048.4	2896.6	2993.5	21	30
3086.0	3295.3	3124.3	3227.5	23	00
3299.7	3536.7	3328.6	3442.7	24	30
3529.4	3785.9	3563.6	3659.4	26	00
3761.3	4037.0	3788.8	3885.5	27	30
3994.4	4287.0	4016.7	4110.4	29	00
4228.4	4537.1	4239.3	4325.1	30	30
4457.2	4775.2	4466.5	4545.0	32	00
4690.6	5021.5	4687.0	4761.5	33	30
4919.7	5266.8	4911.5	4973.0	35	00
5164.5	5520.3	5140.7	5199.4	36	30
5396.4	5770.5	5366.5	5420.6	38	00
5632.5	6018.2	5590.9	5642.5	39	30
5867.2	6276.2	5824.9	5867.6	41	00
6108.9	6524.1	6051.0	6072.4	42	30
6344.1	6777.8	6283.8	6296.6	44	00
6582.6	7023.8	6510.1	6512.3	45	30
6820.7	7272.2	6738.3	6733.7	47	00
7065.6	7517.9	6965.0	6951.6	48	30
7287.9	7778.7	7209.3	7180.2	50	00
7535.5	8029.5	7439.0	7400.5	51	30
7792.7	8300.3	7681.3	7627.6	53	00
8040.2	8564.6	7925.3	7855.8	54	30
8312.6	8816.6	8163.3	8078.0	56	00

TABLE LI (CONT)

8567.9	9075.9	8400.8	8299.1	57	30
8826.6	9339.4	8636.1	8516.1	59	00
9098.8	9619.7	8875.6	8742.4	60	30
9377.5	9907.1	9127.4	8978.0	62	00
9643.6	10190.1	9380.2	9216.9	63	30
9914.2	10462.1	9623.6	9444.6	65	00
10175.3	10726.2	9856.9	9672.0	66	30
10439.8	10995.4	10101.4	9900.5	68	00
10718.6	11282.5	10356.9	10137.8	69	30
11005.0	11562.4	10613.1	10383.4	71	00
11285.6	11833.3	10855.2	10600.2	72	30

TABLE LII

VOLUME OF RUNOFF WATER
RUN NUMBER--E6

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XXVIII.

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN)(SEC)	
49.5	173.9	237.0	26.6	2	00
279.2	434.4	500.2	252.3	3	30
524.7	707.2	756.3	488.5	5	00
780.1	978.3	1020.9	729.7	6	30
1011.9	1249.1	1261.0	946.1	8	00
1240.4	1507.3	1497.3	1159.2	9	30
1479.3	1785.1	1746.0	1447.4	11	00
1723.4	2054.7	1983.7	1702.3	12	30
1953.3	2329.2	2217.1	1917.4	14	00
2198.5	2590.5	2450.6	2129.0	15	30
2445.1	2868.7	2694.9	2350.7	17	00
2690.2	3128.0	2926.9	2561.0	18	30
2923.7	3401.7	3163.3	2779.5	20	00
3163.5	3658.0	3388.8	2989.8	21	30
3395.6	3914.7	3615.4	3197.5	23	00
3629.1	4166.0	3839.6	3408.8	24	30
3859.2	4425.1	4063.6	3622.8	26	00
4101.0	4687.2	4292.3	3847.8	27	30
4326.5	4938.6	4512.3	4070.3	29	00
4560.9	5194.9	4739.4	4300.4	30	30
4807.6	5455.7	4968.3	4523.8	32	00
5053.2	5719.7	5203.1	4764.4	33	30
5291.5	5974.1	5421.4	4989.8	35	00
5537.8	6229.1	5651.8	5221.5	36	30
5772.2	6429.6	5877.7	5451.6	38	00
6020.8	6692.2	6106.7	5682.8	39	30
6283.4	6957.0	6337.0	5913.3	41	00
6539.0	7223.2	6579.0	6147.6	42	30
6774.9	7429.5	6809.7	6375.5	44	00
7027.5	7686.2	7037.5	6602.4	45	30
7263.8	7942.8	7260.4	6818.3	47	00
7516.3	8194.2	7486.0	7038.4	48	30
7761.5	8450.6	7717.7	7265.4	50	00
8020.9	8702.0	7944.9	7483.1	51	30
8270.4	8965.8	8168.0	7715.3	53	00
8539.6	9234.2	8404.6	7956.8	54	30
8797.4	9500.1	8635.6	8205.0	56	00

TABLE LII (CONT)

9049.2	9761.9	8870.8	8449.5	57	30
9302.9	10031.4	9105.0	8703.5	59	00
9581.4	10301.3	9344.1	8965.3	60	30
9842.2	10565.8	9571.1	9210.9	62	00
10121.4	10830.0	9815.7	9479.8	63	30
10387.3	11103.5	10055.4	9738.4	65	00
10650.5	11353.4	10282.6	9986.3	66	30
10919.4	11629.2	10514.4	10238.4	68	00
11193.6	11889.1	10739.9	10486.7	69	30
11465.3	12165.5	10979.5	10744.7	71	00

TABLE LIII

VOLUME OF RUNOFF WATER
RUN NUMBER--E7

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XXIX.

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN)(SEC)	
120.3	228.8	54.9	92.8	2	00
358.8	495.8	291.9	334.9	3	30
610.9	765.3	538.5	569.4	5	00
610.9	1021.5	780.7	795.8	6	30
855.2	1282.7	1025.3	1013.8	8	00
1097.2	1539.7	1266.2	1239.2	9	30
1340.4	1800.2	1509.4	1481.4	11	00
1584.9	2054.8	1744.5	1711.6	12	30
1829.5	2316.9	1987.7	1945.5	14	00
2072.3	2579.9	2232.4	2182.5	15	30
2325.0	2839.5	2476.9	2417.1	17	00
2580.0	3104.5	2726.3	2663.5	18	30
2826.9	3360.7	2967.7	2904.9	20	00
3076.0	3609.6	3207.5	3123.8	21	30
3330.1	3881.3	3460.2	3310.3	23	00
3587.0	4145.5	3707.2	3494.6	24	30
3832.9	4404.4	3942.7	3728.5	26	00
4090.7	4666.0	4197.8	3981.1	27	30
4338.3	4928.4	4441.5	4223.8	29	00
4600.9	5200.4	4699.9	4473.8	30	30
4850.0	5458.2	4942.0	4722.1	32	00
5106.4	5723.3	5193.4	4980.6	33	30
5351.6	5986.7	5450.2	5240.3	35	00
5599.1	6240.9	5699.8	5493.7	36	30
5849.1	6501.0	5957.0	5753.2	38	00
6098.1	6757.1	6204.3	6009.5	39	30
6349.4	7024.2	6455.3	6266.2	41	00
6604.3	7298.7	6704.1	6520.8	42	30
6861.7	7571.4	6953.8	6770.4	44	00
7126.3	7851.8	7214.0	7031.7	45	30
7378.3	8123.1	7471.2	7285.0	47	00
7637.4	8393.2	7735.4	7545.5	48	30
7896.8	8669.4	7989.0	7799.5	50	00
8161.5	8948.8	8251.9	8059.0	51	30
8409.6	9213.8	8500.1	8301.9	53	00
8670.3	9480.4	8750.3	8546.8	54	30
8926.5	9748.5	9006.4	8792.2	56	00

TABLE LIII (CONT)

9180.8	10011.0	9267.1	9046.4	57	30
9429.5	10279.3	9532.7	9296.8	59	00
9694.5	10550.5	9802.7	9552.9	60	30
9944.5	10820.9	10073.8	9794.8	62	00
10216.2	11100.7	10356.1	10085.0	63	30
10459.2	11368.3	10626.9	10327.9	65	00
10719.2	11632.6	10901.6	10606.1	66	30
10971.1	11906.1	11176.7	10850.0	68	00
11234.6	12174.1	11441.6	11139.8	69	30
11497.4	12460.8	11729.4	11393.2	71	00

TABLE LIV
VOLUME OF RUNOFF WATER
RUN NUMBER--E8

FOR INFORMATION CONCERNING THIS RUN SEE TABLE XXX.

CHANNEL NUMBER ONE	CHANNEL NUMBER TWO	CHANNEL NUMBER THREE	CHANNEL NUMBER FOUR	TIME AFTER TEST START (MIN) (SEC)	
263.4	113.0	124.1	152.4	2	00
510.0	376.8	361.0	426.9	3	30
766.9	654.6	616.4	702.6	5	00
1012.9	900.6	842.2	941.9	6	30
1273.6	1167.1	1081.1	1190.2	8	00
1511.7	1413.2	1313.7	1423.1	9	30
1751.8	1659.5	1539.7	1650.9	11	00
1997.0	1899.4	1768.8	1879.7	12	30
2259.9	2160.5	2015.8	2123.0	14	00
2487.7	2375.2	2224.3	2339.4	15	30
2735.4	2628.2	2460.4	2571.7	17	00
2986.4	2870.7	2686.8	2800.9	18	30
3220.8	3121.5	2913.6	3026.9	20	00
3465.3	3368.4	3148.2	3256.7	21	30
3706.5	3618.7	3378.5	3479.3	23	00
3944.2	3855.8	3610.3	3697.5	24	30
4193.5	4106.8	3841.0	3923.9	26	00
4442.8	4342.9	4072.3	4141.3	27	30
4695.6	4589.1	4303.5	4361.0	29	00
4941.3	4838.8	4530.1	4578.3	30	30
5196.4	5104.1	4768.7	4812.5	32	00
5442.7	5367.8	4998.9	5065.3	33	30
5692.4	5630.1	5224.1	5286.2	35	00
5948.6	5899.4	5459.6	5542.4	36	30
6204.7	6186.7	5688.9	5775.0	38	00
6463.1	6456.5	5923.9	6000.5	39	30
6719.7	6736.6	6153.5	6219.0	41	00
6974.9	7006.0	6381.2	6432.4	42	30
7239.8	7288.6	6613.9	6650.8	44	00
7495.8	7547.8	6844.0	6866.0	45	30
7747.9	7827.8	7084.2	7097.9	47	00
8008.0	8098.3	7326.4	7330.5	48	30
8265.9	8382.5	7570.6	7567.8	50	00
8523.4	8652.2	7809.3	7788.5	51	30
8767.1	8923.8	8039.9	8004.1	53	00
9031.7	9205.9	8282.4	8236.4	54	30
9285.3	9478.8	8515.5	8452.4	56	00

TABLE LIV (CONT)

9548.7	9753.2	8754.5	8678.8	57	30
9799.9	10043.6	8985.2	8892.8	59	00
10049.6	10322.1	9218.9	9115.1	60	30
10308.2	10621.4	9463.2	9346.7	62	00
10570.7	10903.5	9696.3	9560.6	63	30
10828.3	11199.7	9942.0	9792.4	65	00
11076.7	11487.0	10179.6	10002.9	66	30
11333.6	11770.1	10425.8	10222.3	68	00
11595.4	12047.7	10658.4	10436.6	69	30
11865.2	12335.1	10915.8	10670.5	71	00

APPENDIX D
RESULTS OF FACTORIAL ANALYSES

RESULTS OF FACTORIAL ANALYSES

The results of all the runs were analyzed statistically using a factorial analysis to determine the effect of the slope, unit weight, and unit weight-slope interaction on the weight of solids eroded and the volume of runoff water. The F values obtained from these analyses were compared to the 5% points of the F-distribution for the corresponding degrees of freedom, DF. An F value, determined for a given variable (factor), which is larger than the F value at the 5% point indicates that this particular variable has a significant effect.

Factorial analyses performed on the results of only the first four runs at each slope indicated that the results of these four runs could be used in subsequent calculations and considerations instead of the results of all eight runs at each slope. Results of analyses based on both four and eight replications indicate that slope has an effect on both the weight of solids eroded and the volume of runoff water.

The effect of unit weight on the weight of solids eroded is significant only during the early time period for the analyses based on both eight replications and four replications. In contrast to the unit weight effect, however, the unit weight-slope interaction for eight replications has increasing importance as time increases and becomes significant at the 44 min time period. The results of the analyses based on four replications indicate that the interaction effect is significant at all time periods.

For both four and eight replications, the effect of unit weight on the volume of runoff water is significant at all time periods. The effect of the unit weight-slope interaction on the volume of runoff water is not significant for eight replications; however, the interaction effect is significant when four replications are considered.

TABLE LV

RESULTS OF FACTORIAL ANALYSIS
WEIGHT OF SOLIDS, EIGHT REPLICATIONS, 11 MINUTES

EFFECT OF SLOPE AND UNIT WEIGHT ON WEIGHT OF
SOLIDS ERODED

A REPRESENTS SLOPE

B REPRESENTS UNIT WEIGHT

EIGHT REPLICATIONS

TIME PERIOD IS FIRST 11 MINUTES

SIGNIFICANCE LEVEL-5 PERCENT

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	SUM SQUARES	MEAN SQUARES	F VALUE
REPS	7	5212.2	744.6	1.9
A	2	15688.6	7844.3	20.2
B	3	5101.5	1700.5	4.3
AB	6	3309.0	551.5	1.4
ERROR	77	30015.5	389.8	
TOTAL	95	59326.8		

TABLE LVI

RESULTS OF FACTORIAL ANALYSIS
WEIGHT OF SOLIDS, EIGHT REPLICATIONS, 23 MINUTES

EFFECT OF SLOPE AND UNIT WEIGHT ON WEIGHT OF
SOLIDS ERODED

A REPRESENTS SLOPE

B REPRESENTS UNIT WEIGHT

EIGHT REPLICATIONS

TIME PERIOD IS FIRST 23 MINUTES

SIGNIFICANCE LEVEL=5 PERCENT

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	SUM SQUARES	MEAN SQUARES	F VALUE
REPS	7	15496.4	2213.8	1.9
A	2	97045.2	48522.6	42.4
B	3	412.1	137.4	0.1
AB	6	11751.4	1958.6	1.7
ERROR	77	88182.3	1144.6	
TOTAL	95	212887.4		

TABLE LVII

RESULTS OF FACTORIAL ANALYSIS
WEIGHT OF SOLIDS, EIGHT REPLICATIONS, 32 MINUTES

EFFECT OF SLOPE AND UNIT WEIGHT ON WEIGHT OF
SOLIDS ERODED

A REPRESENTS SLOPE

B REPRESENTS UNIT WEIGHT

EIGHT REPLICATIONS

TIME PERIOD IS FIRST 32 MINUTES

SIGNIFICANCE LEVEL-5 PERCENT

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	SUM SQUARES	MEAN SQUARES	F VALUE
REPS	7	33403.5	4771.9	2.1
A	7	171728.1	85864.1	37.8
B	3	2314.4	771.4	0.3
AB	6	16159.4	2693.2	1.2
ERROR	77	174648.0	2268.2	
TOTAL	95	398253.4		

TABLE LVIII

RESULTS OF FACTORIAL ANALYSIS
WEIGHT OF SOLIDS, EIGHT REPLICATIONS, 44 MINUTES

EFFECT OF SLOPE AND UNIT WEIGHT ON WEIGHT OF
SOLIDS ERODED

A REPRESENTS SLOPE

B REPRESENTS UNIT WEIGHT

EIGHT REPLICATIONS

TIME PERIOD IS FIRST 44 MINUTES

SIGNIFICANCE LEVEL-5 PERCENT

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	SUM SQUARES	MEAN SQUARES	F VALUE
REPS	7	71878.0	10268.8	2.3
A	2	174001.0	87000.5	20.0
B	3	24553.0	8184.3	1.8
AB	6	159866.0	26644.3	6.1
ERROR	77	334914.0	4349.5	
TOTAL	95	765212.0		

TABLE LIX

RESULTS OF FACTORIAL ANALYSIS
VOLUME OF WATER, EIGHT REPLICATIONS, 11 MINUTES

EFFECT OF SLOPE AND UNIT WEIGHT ON VOLUME OF
RUNOFF WATER

A REPRESENTS SLOPE

B REPRESENTS UNIT WEIGHT

EIGHT REPLICATIONS

TIME PERIOD IS FIRST 11 MINUTES

SIGNIFICANCE LEVEL-5 PERCENT

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	SUM SQUARES	MEAN SQUARES	F VALUE
REPS	7	684290.0	97755.7	4.1
A	2	817120.0	408560.0	17.3
B	3	737090.0	245696.7	10.4
AB	6	213820.0	35636.7	1.5
ERROR	77	1819360.0	23628.1	
TOTAL	95	4271680.0		

TABLE LX

RESULTS OF FACTORIAL ANALYSIS
VOLUME OF WATER, EIGHT REPLICATIONS, 23 MINUTES

EFFECT OF SLOPE AND UNIT WEIGHT ON VOLUME OF
RUNOFF WATER

A REPRESENTS SLOPE

B REPRESENTS UNIT WEIGHT

EIGHT REPLICATIONS

TIME PERIOD IS FIRST 23 MINUTES

SIGNIFICANCE LEVEL-5 PERCENT

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	SUM SQUARES	MEAN SQUARES	F VALUE
REPS	7	3201400.0	457342.9	5.4
A	2	4074200.0	2037100.0	24.2
B	3	1677200.0	559066.7	6.7
AB	6	936800.0	156133.3	1.9
ERROR	77	6457000.0	83857.1	
TOTAL	95	16346600.0		

TABLE LXI

RESULTS OF FACTORIAL ANALYSIS
VOLUME OF WATER, EIGHT REPLICATIONS, 32 MINUTES

EFFECT OF SLOPE AND UNIT WEIGHT ON VOLUME OF
RUNOFF WATER

A REPRESENTS SLOPE

B REPRESENTS UNIT WEIGHT

EIGHT REPLICATIONS

TIME PERIOD IS FIRST 32 MINUTES

SIGNIFICANCE LEVEL-5 PERCENT

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	SUM SQUARES	MEAN SQUARES	F VALUE
REPS	7	6193700.0	884814.3	6.3
A	2	6779300.0	3389650.0	24.2
B	3	2366900.0	788966.7	5.6
AB	6	1976800.0	329466.7	2.4
ERROR	77	10782200.0	140028.6	
TOTAL	95	28098900.0		

TABLE LXII

RESULTS OF FACTORIAL ANALYSIS
VOLUME OF WATER, EIGHT REPLICATIONS, 44 MINUTES

EFFECT OF SLOPE AND UNIT WEIGHT ON VOLUME OF
RUNOFF WATER

A REPRESENTS SLOPE

B REPRESENTS UNIT WEIGHT

EIGHT REPLICATIONS

TIME PERIOD IS FIRST 44 MINUTES

SIGNIFICANCE LEVEL=5 PERCENT

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	SUM SQUARES	MEAN SQUARES	F VALUE
REPS	7	11497800.0	1642542.8	6.1
A	2	13122500.0	6561250.0	24.6
B	3	2950900.0	983333.3	3.7
AB	6	3514300.0	585716.7	2.2
ERROR	77	20698700.0	268814.3	
TOTAL	95	51784200.0		

TABLE LXIII.

RESULTS OF FACTORIAL ANALYSIS
WEIGHT OF SOLIDS, FOUR REPLICATIONS, 11 MINUTES

EFFECT OF SLOPE AND UNIT WEIGHT ON WEIGHT OF
SOLIDS ERODED

A REPRESENTS SLOPE

B REPRESENTS UNIT WEIGHT

FOUR REPLICATIONS

TIME PERIOD IS FIRST 11 MINUTES

SIGNIFICANCE LEVEL-5 PERCENT

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	SUM SQUARES	MEAN SQUARES	F VALUE
REPS	3	2562.56	854.19	4.55
A	2	6960.04	3480.02	18.57
B	3	3660.23	1220.08	6.50
AB	6	5519.46	919.91	4.9
ERROR	33	6184.69	187.41	
TOTAL	47	24886.98		

TABLE LXIV

RESULTS OF FACTORIAL ANALYSIS
WEIGHT OF SOLIDS, FOUR REPLICATIONS, 23 MINUTES

EFFECT OF SLOPE AND UNIT WEIGHT ON WEIGHT OF
SOLIDS ERODED

A REPRESENTS SLOPE

B REPRESENTS UNIT WEIGHT

FOUR REPLICATIONS.

TIME PERIOD IS FIRST 23 MINUTES.

SIGNIFICANCE LEVEL-5 PERCENT

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	SUM SQUARES	MEAN SQUARES	F VALUE
REPS	3	7829.20	2609.73	3.76
A	2	45734.10	22867.05	32.98
B	3	5551.90	1850.63	2.67
AB	6	21992.60	3665.43	5.29
ERROR	33	22882.30	693.40	
TOTAL	47	103990.10		

TABLE LXV

RESULTS OF FACTORIAL ANALYSIS
WEIGHT OF SOLIDS, FOUR REPLICATIONS, 32 MINUTES

EFFECT OF SLOPE AND UNIT WEIGHT ON WEIGHT OF
SOLIDS ERODED

A REPRESENTS SLOPE

B REPRESENTS UNIT WEIGHT

FOUR REPLICATIONS

TIME PERIOD IS FIRST 32 MINUTES

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	SUM SQUARES	MEAN SQUARES	F VALUE
REPS	3	21258.10	7086.03	3.96
A	2	95563.40	47781.70	26.68
B	3	11222.30	3740.77	2.09
AB	6	36453.10	6075.52	3.39
ERROR	33	59102.90	1790.99	
TOTAL	47	223599.80		

TABLE LXVI

RESULTS OF FACTORIAL ANALYSIS
WEIGHT OF SOLIDS, FOUR REPLICATIONS, 44 MINUTES

EFFECT OF SLOPE AND UNIT WEIGHT ON WEIGHT OF
SOLIDS ERODED

A REPRESENTS SLOPE

B REPRESENTS UNIT WEIGHT

FOUR REPLICATIONS

TIME PERIOD IS FIRST 44 MINUTES

SIGNIFICANCE LEVEL-5 PERCENT

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	SUM SQUARES	MEAN SQUARES	F VALUE
REPS	3	45046.20	15015.40	4.59
A	2	171509.80	85754.90	26.19
B	3	21520.20	7173.40	2.19
AB	6	67250.70	11208.45	3.42
ERROR	33	108036.80	3273.84	
TOTAL	47	413363.70		

TABLE LXVII

RESULTS OF FACTORIAL ANALYSIS
VOLUME OF WATER, FOUR REPLICATIONS, 11 MINUTES

EFFECT OF SLOPE AND UNIT WEIGHT ON VOLUME OF
RUNOFF WATER.

A REPRESENTS SLOPE

B REPRESENTS UNIT WEIGHT

FOUR REPLICATIONS

TIME PERIOD IS FIRST 11 MINUTES

SIGNIFICANCE LEVEL-5 PERCENT

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	SUM SQUARES	MEAN SQUARES	F VALUE
REPS	3	339400.00	113133.33	9.89
A	2	451140.00	225570.00	19.72
B	3	984770.00	328256.66	28.69
AB	6	407920.00	67986.66	5.94
ERROR	33	377460.00	11438.18	
TOTAL	47	2560690.00		

TABLE LXVIII

RESULTS OF FACTORIAL ANALYSIS
VOLUME OF WATER, FOUR REPLICATIONS, 23 MINUTES

EFFECT OF SLOPE AND UNIT WEIGHT ON VOLUME OF
RUNOFF WATER

A REPRESENTS SLOPE

B REPRESENTS UNIT WEIGHT

FOUR REPLICATIONS

TIME PERIOD IS FIRST 23 MINUTES

SIGNIFICANCE LEVEL-5 PERCENT

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	SUM SQUARES	MEAN SQUARES	F VALUE
REPS	3	1853300.0	617766.7	13.50
A	2	2142410.0	1071205.0	23.43
B	3	2648030.0	882676.7	19.30
AB	6	1612630.0	268771.7	5.9
ERROR	33	1508920.0	45724.8	
TOTAL	47	9765290.0		

TABLE LXVIX

RESULTS OF FACTORIAL ANALYSIS
VOLUME OF WATER, FOUR REPLICATIONS, 32 MINUTES

EFFECT OF SLOPE AND UNIT WEIGHT ON VOLUME OF
RUNOFF WATER

A REPRESENTS SLOPE

B REPRESENTS UNIT WEIGHT

FOUR REPLICATIONS

TIME PERIOD IS FIRST 32 MINUTES

SIGNIFICANCE LEVEL-5 PERCENT

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	SUM SQUARES	MEAN SQUARES	F VALUE
REPS	3	3399900.0	1133300.0	17.35
A	2	3399800.0	1699900.0	26.02
B	3	4038100.0	1346033.0	20.60
AB	6	2993400.0	498900.0	7.64
ERROR	33	2156000.0	65333.3	
TOTAL	47	15987200.0		

TABLE LXX

RESULTS OF FACTORIAL ANALYSIS
VOLUME OF WATER, FOUR REPLICATIONS, 44 MINUTES

EFFECT OF SLOPE AND UNIT WEIGHT ON VOLUME OF
RUNOFF WATER

A REPRESENTS SLOPE

B REPRESENTS UNIT WEIGHT

FOUR REPLICATIONS

TIME PERIOD IS FIRST 44 MINUTES

SIGNIFICANCE LEVEL-5 PERCENT

ANALYSIS OF VARIANCE TABLE

SOURCE	DF	SUM SQUARES	MEAN SQUARES	F VALUE
REPS	3	7463800.0	2487933.3	17.53
A	2	6588900.0	3294450.0	23.22
B	3	5951200.0	1983733.0	13.98
AB	6	5797200.0	966200.0	6.89
ERROR	33	4682500.0	141893.0	
TOTAL	47	30483600.0		

APPENDIX E

AVERAGE VOLUME OF RUNOFF WATER AS A FUNCTION OF

AVERAGE WEIGHT OF SOLIDS ERODED

Figure 18 shows the relationship between the average volume of runoff water and the average weight of solids eroded for run number A-3. This relationship is representative of the relationships found for the first four runs conducted on each slope. Both the experimental points and the least squares fitting line are shown and the slopes of the lines and the intercepts for the other runs are tabulated in Table LXXI.

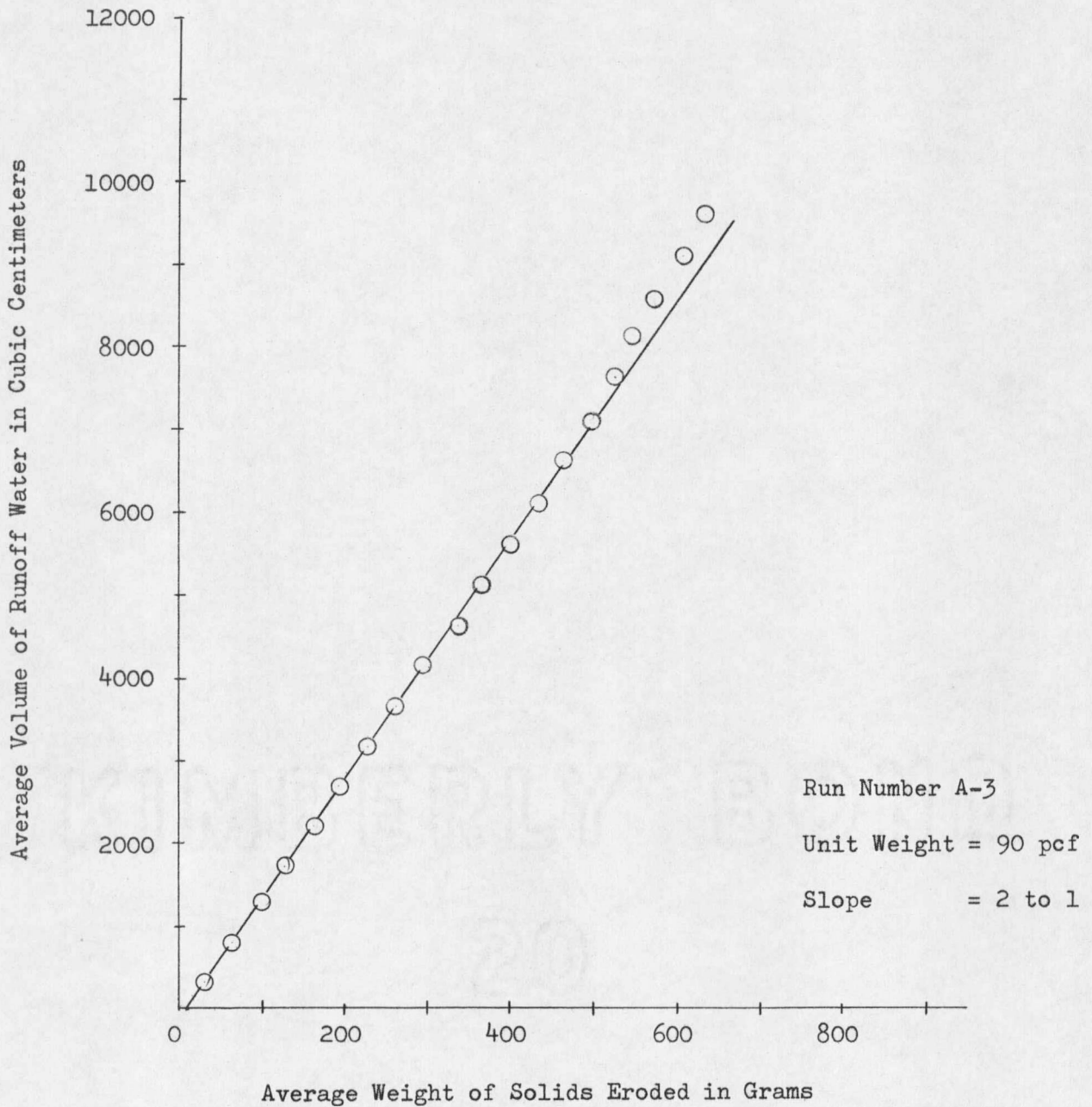


Figure 18 Relationship Between Average Volume of Runoff Water and Average Weight of Solids Eroded

TABLE LXXI

SLOPES AND INTERCEPTS FOR THE AVERAGE VOLUME OF RUNOFF WATER
AS A FUNCTION OF AVERAGE WEIGHT OF SOLIDS ERODED

<u>RUN NUMBER</u>	<u>SLOPE HORIZ:VERT</u>	<u>UNIT WEIGHT PCF</u>	<u>SLOPE OF LEAST SQUARES LINE</u>	<u>INTERCEPT</u>
A-1	2:1	80	17.4	-653
A-2	2:1	85	14.3	-619
A-3	2:1	90	14.7	-138
A-4	2:1	95	18.1	-994
D-1	1:1	80	21.5	-344
D-2	1:1	85	27.1	-771
D-3	1:1	90	18.3	-463
D-4	1:1	95	22.4	-894
E-1	3:1	80	13.7	-120
E-2	3:1	85	17.6	-400
E-3	3:1	90	20.4	-688
E-4	3:1	95	19.6	-544

APPENDIX F

AVERAGE ADJUSTED WEIGHT OF SOLIDS ERODED

AS A FUNCTION OF TIME

Figure 19 shows the relationship between the average adjusted weight of solids eroded and time for run number D-3. This relationship is typical of the relationships found for the first four runs conducted on each slope. The slopes (rate of erosion, A) and intercepts for the other runs are tabulated in Table LXXII.

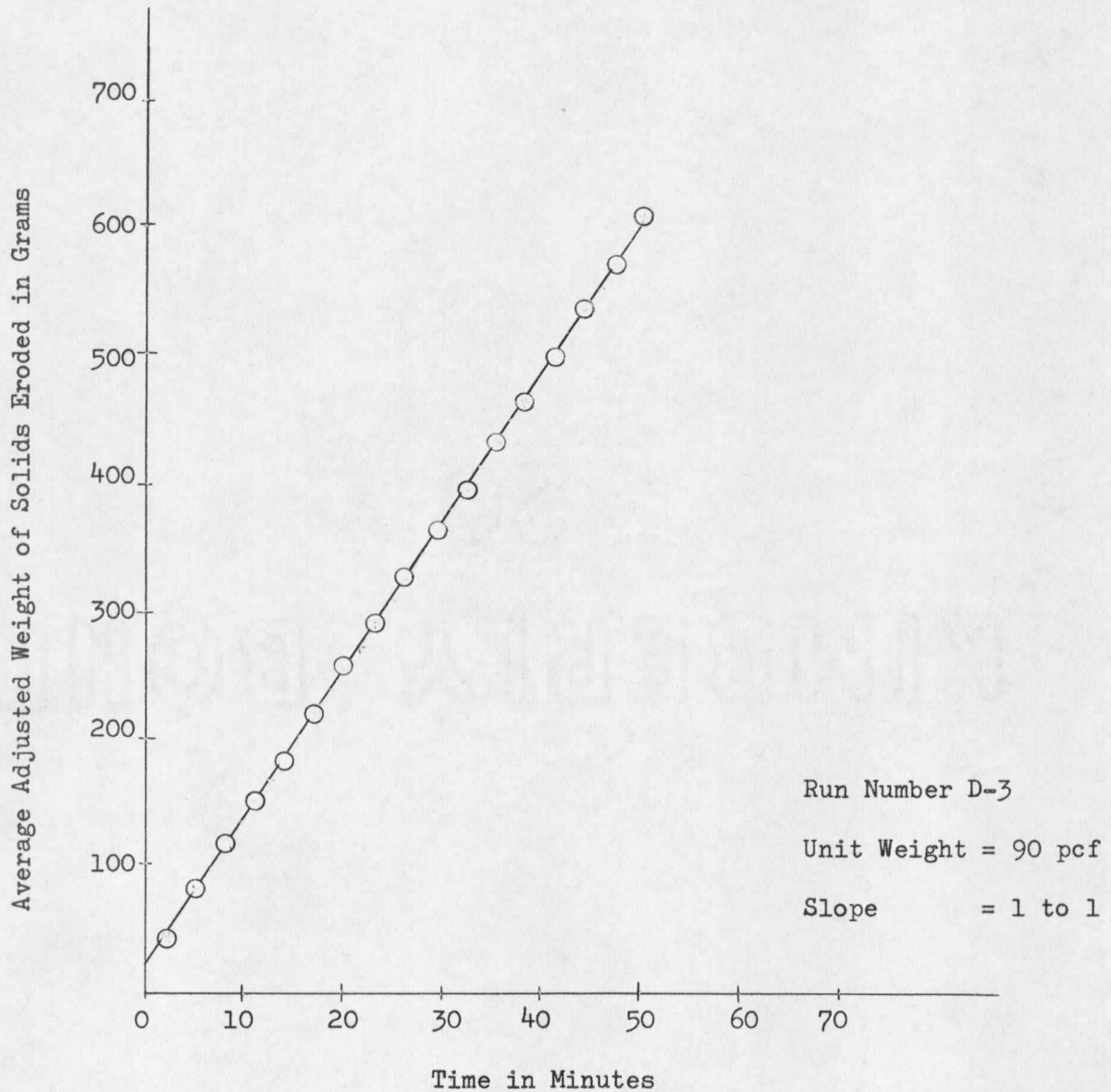


Figure 19 Relationship Between Average Adjusted Weight of Solids Eroded and Time.

TABLE LXXII

SLOPES AND INTERCEPTS FOR AVERAGE ADJUSTED WEIGHT OF
SOLIDS ERODED AS A FUNCTION OF TIME

<u>RUN NUMBER</u>	<u>SLOPE HORIZ: VERT</u>	<u>UNIT WEIGHT PCF</u>	<u>RATE OF EROSION, A, (gm/min)</u>	<u>INTERCEPT</u>
A-1	2:1	80	10.2	20
A-2	2:1	85	12.4	35
A-3	2:1	90	12.3	0
A-4	2:1	95	9.2	50
D-1	1:1	80	9.1	0
D-2	1:1	85	7.3	25
D-3	1:1	90	11.7	15
D-4	1:1	95	10.0	30
E-1	3:1	80	11.9	-15
E-2	3:1	85	9.9	12
E-3	3:1	90	10.0	30
E-4	3:1	95	8.6	20

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