APPENDIX D

Floodplain Boundary Maps

APPENDIX E

FLO-2D Model Overview

FLO-2D Brief Description

FLO-2D is a two-dimensional, finite difference flood routing model using either a diffusive wave or the full dynamic wave version of the momentum equation for unconfined, overland flow and channel flow. It simulates the progression of a flood hydrograph, conserving flow volume over a system of square grid elements. FLO-2D is an ideal model for river channel overbank flooding, alluvial fan flows, flow through urban areas, or the hydraulic design of flood mitigation measures. It is on FEMA's list of approved hydraulic models.

The model has number of components which can enhance the detail of a flood simulation including channel-floodplain discharge exchange, loss of storage due to buildings, flow obstruction, rill and gully flow, street flow, bridge and culvert flow, levee and levee failure, mud and debris flow, sediment transport, rainfall and infiltration. These components are described below.

Creating a data base

FLO-2D data base requires a representation of the potential flow surface topography in a square grid format. A simple procedure has been devised with CADD software for generating the grid system. The first step is to digitize a suitable topographic map of the potential the flow surface. Most CADD systems contain survey routines which enable a grid system to be overlaid on a digitized map and the coordinates and elevations exported to file. Any size grid element can be used by the model, but the timestep is governed by wave celerity and very small grid elements will require very small timesteps. A typical square grid element is 200 ft to 500 ft, but grid elements ranging from 50 ft to 2,000 ft have been used in simulations. The number of grid elements is essentially unlimited. In the final step a preprocessor program converts the grid system data to a file used by FLO-2D. This file constitutes the majority of the data required by the model and no further adjustment to this file is necessary.

Routing Algorithm Stability and Volume Conservation

Typically timesteps range from 1 to 60 seconds. The timestep is incremented or decremented according to strict flood routing numerical stability criteria. Numerical stability has been linked to volume conservation which is the basis for the model accuracy. When the model accurately conserves volume the model runs faster. If the model is gaining or losing volume, the timesteps decrease. Volume conservation is carefully tracked and is reported both during the simulation and in output files.

Overland and Channel Flow - Exchange of Channel and Floodplain Discharge

Overland flow is simulated in eight directions (4 compass and 4 diagonal directions).One-dimensional, channel flow is simulated with rectangular, trapezoidal or natural shaped cross sections. A preprocessor program will convert HEC-2 cross sections into a data file formatted for FLO-2D. The channel geometry of natural cross sections are represented by multiple regression equations which simplify the computational requirements of the model. The channel width can be larger than the grid element allowing for more detailed floodplain simulations. When the flow in the channel exceeds the bank height, an interactive routine in FLO-2D will compute the overbank discharge. This channel-floodplain flow interaction can occur in both directions with overland return flow to the channel. With urban flooding, the model can simulate channel overbank flow through neighborhoods , down streets and then have return flow to the channel at a downstream location. Tributary inflow is unlimited.

Rainfall and Infiltration

Rainfall can be simulated on the potential flow surface before or during the flood simulation. The rainfall is then routed as overland sheet flow or as rill and gully flow until it intercepts a main channel. Infiltration is simulated with the Green-Ampt infiltration model and can be spatially variable on the flow surface.

Street, Bridge and Culvert Flow

Street discharge is simulated as flow in a shallow rectangular channel. Streets may intersect and are delineated with a width and curb height. Bridge and culvert flow on the grid system can be simulated by user specified relationships between the discharge and headwater depth.

Levee Simulation and Failure

Levees can be simulated by specifying flow directions and crest elevations. Levee failure can occur by overtopping or by inundation at a levee elevation for a specified time period. Levee failure is simulated on a grid element by grid element basis.

Flow Obstruction and Floodplain Storage Loss

Flow around buildings and obstructions and floodplain storage loss due to structures can be simulated on a grid element basis also. A portion or the entire grid element can be removed from potential inundation. Similarly, the flow transfer between grid elements can be partially or entirely obstructed.

Multiple Channel Overland Flow

Overland flow can be concentrated in small rills and gullies. When specific grid elements are assigned multiple channels, discharge between those elements occurs as concentrated flow in small, rectangular channels and not as overland sheet flow. Rainfall on the overland portion of each grid element is routed into the element rill or gully. More than one gully can be specified for a grid element. When the rill or gully depth is exceeded, the channel is expanded by a preassigned incremental width to contain the gully flow. On the falling limb of the hydrograph, when the flow depth decreases to less than one foot, the channel width is incrementally decreased. Variable rill and gully channel characteristics can be spatially delineated on the grid system.

Mud and Debris Flows - Debris Basins

Hyperconcentrated sediment flow is simulated using viscosity and yield stress relationships as function of sediment concentration. Several such relationships have been analyzed representing different soil types and conditions. Viscous mudflows may cease flowing on very rough surfaces or mild slopes. Conversely, mudflows can be diluted by rainfall inflow. Storage in small debris basins and spillway discharge can be simulated.

Sediment Transport - Aggradation and Degradation

Sediment transport is computed for alluvial systems using the Zeller-Fullerton equation for arid regions. Almost any sediment transport relationship can be programmed into the model. Aggradation and degradation is predicted if the sediment transport routine is invoked. Scour and deposition are distributed uniformly on the grid element surface or channel bed.

Limiting Froude Numbers

For alluvial systems, channel and overland maximum Froude numbers can be designated such that when the Froude number is exceeded in a particular grid element, the model will increase the element roughness value by 0.001. This routine is effective for avoiding supercritical flow in sand bed systems. On the falling limb of the hydrograph, the roughness values will decrease until the original roughness value is reached.

Output

Spatially and temporally varied output including flow depth, velocity, discharge hydrograph, sediment concentration and bed elevation are written to file. Discharge hydrographs can be established for any channel or any overland grid element in the system. Outflow grid elements can be reviewed separately. Grid elements can be grouped together as cross sections to generate flow hydrographs. Maximum depth, velocity and discharge files are automatically created. The output can be reviewed graphically. The flood progression over the flow surface can be viewed along with a plot of the inflow hydrograph while the model is running.

Additional Information

The FLO-2D model comes complete with a manual, pre- and post-processor programs and example simulations. Information on the FLO-2D model can be obtained by writing to FLO-2D, P.O. Box 66, Nutrioso, AZ 85932, calling (520) 339-1935 or by email: jsobflo2d@aol.com. The cost of the modeling system is $1,495.

II. FLO-2D MODEL THEORY

FLO-2D is a simple volume conservation model. It moves the flood volume around on a series on tiles for overland flow or through stream segments for channel routing. Floodwave celerity and floodwave progression over the flow domain is controlled by topography and resistance to flow. Flood routing in two dimensions is accomplished through a numerical integration of the equations of motion and the conservation of fluid volume. The FLO-2D constitutive equations can be solved for either a water flood or a hyperconcentrated sediment flow. A presentation of the governing equations is followed by a discussion on mud and debris flow modeling.

2.1 Governing Equations

The constitutive equations include the continuity equation

$$\frac{\partial h}{\partial t} + \frac{\partial h V_x}{\partial x} + \frac{\partial h V_y}{\partial y} = i$$

and the two-dimensional equations of motion (dynamic wave equation):

$$S_{fx} = S_{ox} - \frac{\partial h}{\partial x} - \frac{V_x}{g}\frac{\partial V_x}{\partial x} - \frac{V_y}{g}\frac{\partial V_x}{\partial y} - \frac{1}{g}\frac{\partial V_x}{\partial t}$$

$$S_{fy} = S_{oy} - \frac{\partial h}{\partial y} - \frac{V_y}{g}\frac{\partial V_y}{\partial y} - \frac{V_x}{g}\frac{\partial V_y}{\partial x} - \frac{1}{g}\frac{\partial V_y}{\partial t}$$

where h is the flow depth, and V_x and V_y are the depth-averaged velocity components along the x- and y-coordinates. The excess rainfall intensity i may be nonzero on the flow surface. The friction slope components S_{fx} and S_{fy} are written as function of bed slope S_{ox} and S_{oy}, pressure gradient and convective and local acceleration terms. A diffusive wave approximation to the equations of motion is defined by neglecting the last three acceleration terms. By neglecting the pressure gradient term, a kinematic wave representation of the momentum equation is derived.

Henderson (1966) computed the magnitude of momentum equation components for a steep alluvial channel for a fast rising hydrograph:

Momentum Equation Term:	S_o	$\partial y/\partial x$	$V\partial V/g\partial x$	$\partial V/g\partial t$
Magnitude (ft/mi)	26	0.5	0.12 - 0.25	0.05

This illustrates that on most steep slopes, the application of the kinematic wave is sufficient to model floodwave progression and that the contribution of the acceleration terms can be neglected except on mild slopes. The pressure gradient term in the momentum equation is important for improving overland flow simulation with complex topography. It can have significant effects on the wave propagation, and the effects can increase with mild slopes or steep hydrographs. The pressure gradient (diffusive wave equation) is required if the grid system has depressions. Usually, explicit numerical schemes for the diffusive wave equation require moderate slopes and permit only slight discharge variation (small timesteps) to limit mass balance errors. The timestep is varied in the FLO-2D model according to numerical stability, thus eliminating these constraints.

FLO-2D provides the option of using either the diffusive wave or the full dynamic wave equation for flood routing. The diffusive wave approximation has broader application than the kinematic wave model (Ponce et al., 1978) and very little accuracy is sacrificed when compared to the full dynamic model (Akan and Yen, 1981). General criteria for selecting a channel routing technique is given in the following table (as adapted from US Army Corps of Engineers, Technical Engineering and Design Guides No. 19, 1997).

Table 1. Guidelines for Selecting a Flood Routing Method

Physical Processes[1]	Recommended Routing Equation
1. Steep alluvial fans, watersheds or floodplains	Diffusive wave, kinematic wave
2. Mild slope floodplains, backwater areas which influence hydrograph, overbank flows	Dynamic wave, diffusive wave
3. Bed slope > 10 ft/mile and TS v/d > 171	Dynamic wave, diffusive wave, kinematic wave
4. Bed slopes ~ 2 to 10 ft/mile and TSv/d < 171	Dynamic wave, diffusive wave
5. Bed slope < 2 ft/mile and TS $(g/d)^{0.5}$ > 30	Dynamic wave, diffusive wave
6. Bed slope < 2 ft/mile and TS $(g/d)^{0.5}$ < 30	Dynamic wave

[1]T = hydrograph time of rise to the peak; S = bed slope; v = average flow velocity; d = average flow depth; g = acceleration due to gravity (32.2 fps^2)

2.2 FLO-2D Logic - How the Model Works

The differential form of the continuity and momentum equations in the FLO-2D model is solved with a central, finite difference scheme. This explicit algorithm solves the momentum equation for the flow velocity across grid element boundaries one node at a time. Explicit numerical schemes are simple to formulate but are limited to small timesteps by strict numerical stability criteria. These explicit schemes generally require significant computational time when simulating slowly rising flood waves, channels with non-prismatic features, abrupt changes in slope and ponded flow areas.

The solution domain is discretized into uniform, square grid elements. The computational procedure involves calculating the discharge across each of the boundaries in the eight potential flow directions. Each grid element hydraulic computation begins with an estimate of the flow depth at the grid element boundary. The estimated boundary flow depth is an average of the two grid element flow depths. The flow velocity at the boundary is the dependent variable. The diffusive wave equation is solved for the velocity using the linear estimate of the flow depth at the previous timestep and the slope between the grid elements. Although a number of non-linear estimates of the depth were attempted in earlier versions of the model, they did not significantly enhance or improve the results. If the full dynamic wave option is applied, the computed diffusive wave velocity is used as the first approximation in the Newton-Raphson second order method of tangents for determining the roots of the full dynamic wave equation.

The discharge across the grid element boundary is computed by multiplying the velocity times the cross sectional flow area. After the discharge is computed for all eight directions, the net change in discharge in or out of the grid element is multiplied by the timestep to determine the net change in the water volume (See Figure 3). This net change in volume is then divided by the available surface area (storage area) to obtain the increase or decrease in flow depth for the timestep. The channel routing integration is performed essentially the same way, except that the flow depth is a function of the cross section geometry. The routing algorithm is explained in more detail in a later section.

A key to the finite difference flood routing is the numerical stability criteria which is checked for the every grid element on every timestep. If the stability criteria are exceeded, the timestep is decreased and all the previous hydraulic computations for that timestep are discarded. The FLO-2D flood routing scheme proceeds on the basis that the timestep is sufficiently small to insure numerical stability. Most explicit schemes are subject to the Courant-Friedrich-Lewy (CFL) condition for numerical stability (Jin and Fread, 1997). FLO-2D uses the CFL condition for floodplain diffusive wave routing. The timestep Δt is limited by:

$$\Delta t = C\, \Delta x / (v + c)$$

where:

C is the Courant number ($C < 1.0$)
Δx is the grid element width
v is the computed average cross section velocity
c is the computed wave celerity

While C can vary from 0.3 to 1.0 depending on the type of explicit routing algorithm, a value of 1.0 is employed in the FLO-2D model.

For full dynamic wave routing, the numerical stability criteria is variable with the grid element discharge flux. It is expressed as:

$$\Delta t < \zeta S_o \Delta x^2 / q_o$$

where q_o is the unit discharge, S_o is the water surface slope and ζ is an empirical coefficient (Ponce and Theurer, 1982). The coefficient ζ is a variable unique to the grid element discharge flux and is adjusted by the model during runtime based within a range set by the user.

Before the CFL and the full dynamic wave equation numerical stability criteria are checked, the percent change in depth is checked to preclude additional numerical stability analysis. If the percent change in depth is greater than that specified by the user or if either of the over stability criteria are exceeded, then the timestep is decreased and all the hydraulic computations for that timestep are voided. If numerical stability is not maintained, volume conservation will be violated and fluid volume will be either generated or lost as reported in the various output files (See Figure 4).

Timesteps generally range from 0.1 second to 60 seconds. The model starts with the minimum timestep and increases it until the numerical stability condition is exceeded, then the timestep is decremented. If stability conditions continue to be exceeded, the timestep is decreased until the minimum timestep is reached. If the minimum timestep is not small enough to conserve volume or maintain numerical stability, then the minimum timestep can be reduced or the input data can be adjusted. The timesteps are a function of the discharge flux for a given grid element and its size. Small grid elements with a steep rising hydrograph and large peak discharge require small timesteps. Accuracy is not compromised if small timesteps are used, but the computational time can be lengthy if the grid system is large.

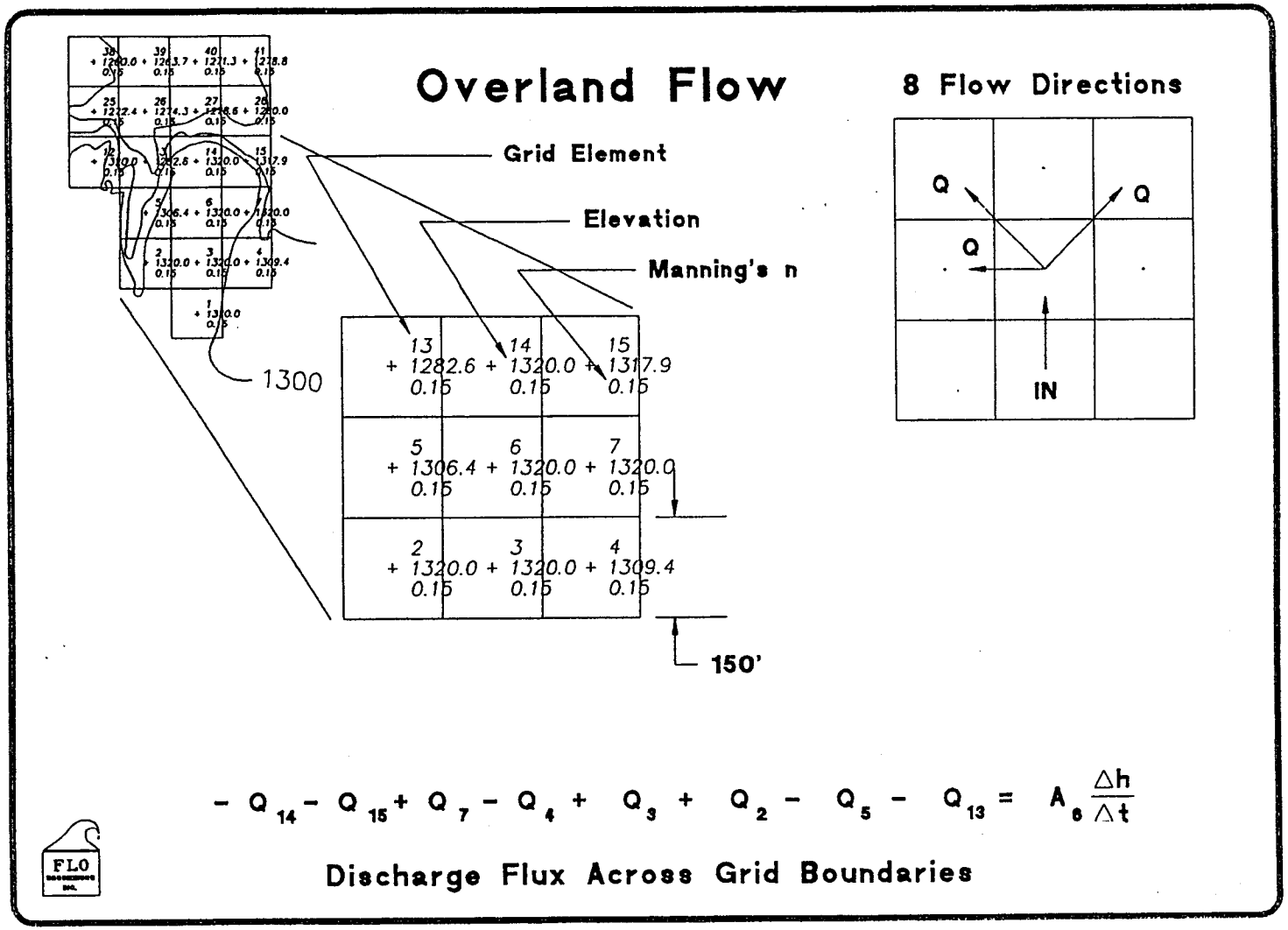

Figure 4. Discharge Flux Across Grid Element Boundaries

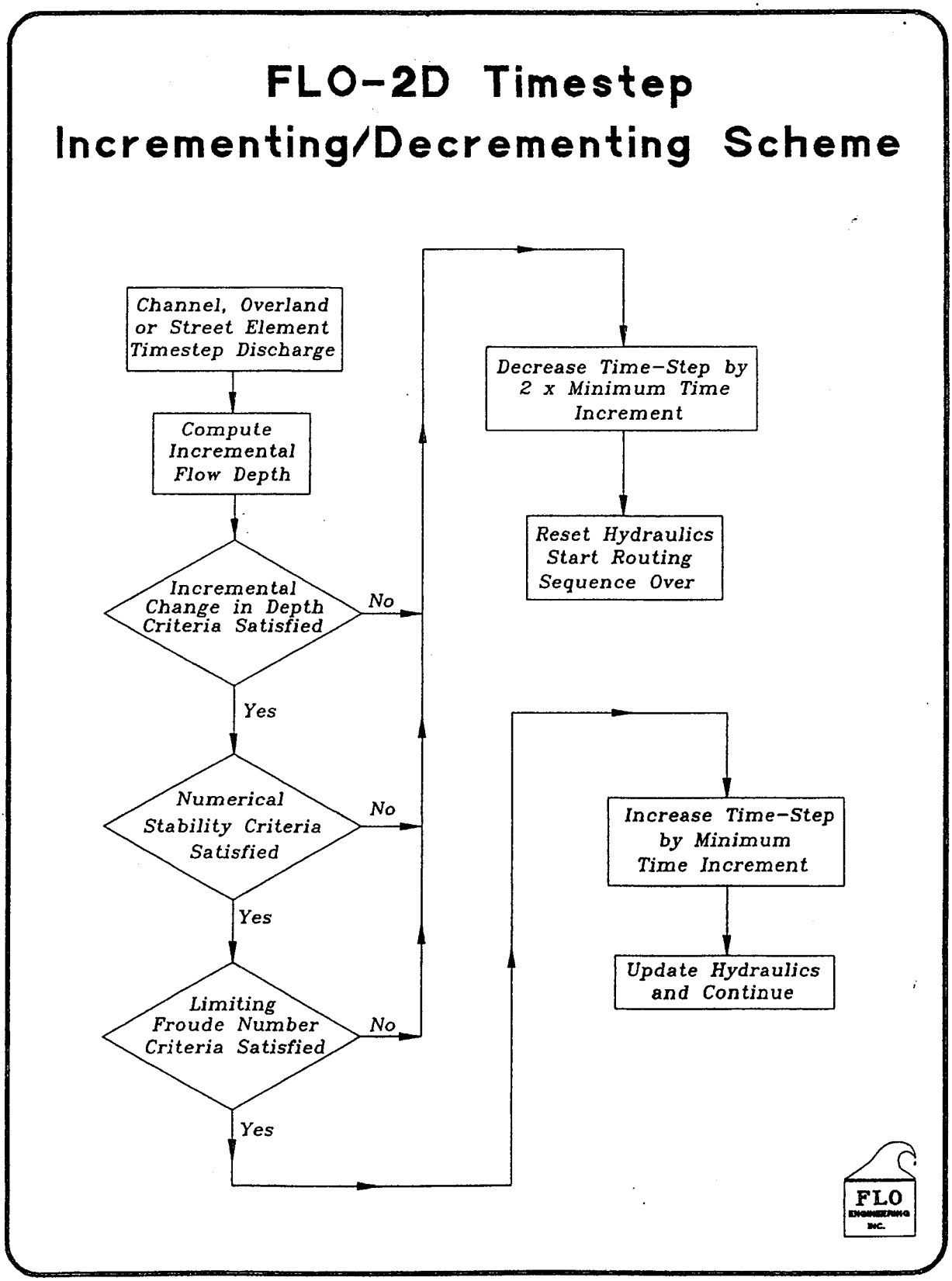

Figure 5. FLO-2D Stability Criteria Flow Chart

2.3 The Importance of Volume Conservation

Model calibration begins with a review of the simulated volume conservation. Volume conservation confirms that the millions of calculations during a flood simulation are being accurately performed. The inflow volume, outflow volume, change in storage and infiltration losses from the grid system are summed at the end of each time step and the volume conservation is computed. Volume conservation results are written to the output files or to the screen at user specified output time intervals. Volume conservation is an indicator of the accuracy of the flood simulation. Data errors, numerical instability, inappropriate or inconsistent simulation techniques will cause a loss of volume conservation. Forcing subcritical or supercritical flow through poorly assigned n-values or slope will effect the volume conservation. Volume conservation can be used to debug a model and discern whether model dysfunction occurred in the channel or floodplain components. Any simulation not conserving volume should be revised. It should be noted that volume conservation in any flood simulation is not exact. The user must decide on an acceptable level of error in the volume conservation, generally 0.001 percent or less.

APPENDIX F

Flow Depth Maps for Finger Rock Wash

APPENDIX G

HEC-6 Summary Output

```
**************************************************     ************************************
*  SCOUR AND DEPOSITION IN RIVERS AND RESERVOIRS  *     *  U.S. ARMY CORPS OF ENGINEERS    *
*       Version: 4.1.00 -  OCTOBER 1993           *     *  HYDROLOGIC ENGINEERING CENTER   *
*  INPUT FILE:  100Y.DAT                          *     *  609 SECOND STREET               *
*  OUTPUT FILE: 100Y.OUT                          *     *  DAVIS, CALIFORNIA 95616-4687    *
*  RUN DATE: 12 MAR 02    RUN TIME: 10:53:33      *     *  (916) 756-1104                  *
**************************************************     ************************************

                    X     X  XXXXXXX   XXXXX           XXXXX
                    X     X  X        X     X         X     X
                    X     X  X        X               X
                    XXXXXXX  XXXX     X        XXXXX  XXXXXX
                    X     X  X        X               X     X
                    X     X  X        X     X         X     X
                    X     X  XXXXXXX   XXXXX           XXXXX

         ******************************************************************
         *  MAXIMUM LIMITS FOR THIS VERSION ARE:                          *
         *       10  Stream Segments (Main Stem + Tributaries)            *
         *      500  Cross Sections                                       *
         *      200  Elevation/Station Points per Cross Section           *
         *       20  Grain Sizes                                          *
         *       10  Control Points                                       *
         ******************************************************************

T1      EL RIO ANTIGUO
T2      100YR FLOW
T3      2/26/02

N values...  Left   Channel   Right    Contraction    Expansion
           0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.     1.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
           0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.     2.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
           0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.     3.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
           0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.     4.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
           0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.     5.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
           0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.     6.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
           0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.     7.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
           0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.     8.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
```

```
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.     9.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    10.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    11.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    12.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    13.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0650       1.1000     0.7000

SECTION NO.    14.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0650       1.1000     0.7000

SECTION NO.    15.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0650       1.1000     0.7000

SECTION NO.    16.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0650       1.1000     0.7000

SECTION NO.    17.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0650       1.1000     0.7000

SECTION NO.    18.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0650       1.1000     0.7000

SECTION NO.    19.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0650       1.1000     0.7000

SECTION NO.    20.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0650       1.1000     0.7000

SECTION NO.    21.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
```

```
          0.0600   0.0300   0.0650       1.1000     0.7000

SECTION NO.    22.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0650       1.1000     0.7000

SECTION NO.    23.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0650       1.1000     0.7000

SECTION NO.    24.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0650       1.1000     0.7000

SECTION NO.    25.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0650       1.1000     0.7000

SECTION NO.    26.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0650   0.0300   0.0600       1.1000     0.7000

SECTION NO.    27.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0700   0.0300   0.0650       1.1000     0.7000

SECTION NO.    28.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0700   0.0300   0.0650       1.1000     0.7000

SECTION NO.    29.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0700   0.0300   0.0650       1.1000     0.7000

SECTION NO.    30.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0700   0.0300   0.0650       1.1000     0.7000

SECTION NO.    31.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0700   0.0300   0.0650       1.1000     0.7000

SECTION NO.    32.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0700   0.0300   0.0650       1.1000     0.7000

SECTION NO.    33.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0700   0.0300   0.0650       1.1000     0.7000

SECTION NO.    34.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
```

```
          0.0700   0.0300   0.0650       1.1000     0.7000

SECTION NO.    35.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0700   0.0300   0.0650       1.1000     0.7000

SECTION NO.    36.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0700   0.0300   0.0650       1.1000     0.7000

SECTION NO.    37.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0700   0.0300   0.0650       1.1000     0.7000

SECTION NO.    38.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0700   0.0300   0.0650       1.1000     0.7000

SECTION NO.    39.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0700   0.0300   0.0650       1.1000     0.7000

SECTION NO.    40.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0700   0.0300   0.0650       1.1000     0.7000

SECTION NO.    41.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0700   0.0300   0.0650       1.1000     0.7000

SECTION NO.    42.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0700   0.0300   0.0650       1.1000     0.7000

SECTION NO.    43.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0700   0.0300   0.0650       1.1000     0.7000

SECTION NO.    44.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    45.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    46.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    47.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
```

```
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    48.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    49.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    50.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    51.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    52.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    53.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    54.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    55.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    56.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    57.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    58.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    59.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    60.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
```

```
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    61.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    62.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    63.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    64.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    65.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    66.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    67.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    68.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    69.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    70.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    71.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    72.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    73.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
```

```
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    74.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

N values...  Left   Channel   Right    Contraction    Expansion
          0.0600   0.0300   0.0600       1.1000     0.7000

SECTION NO.    75.000
...DEPTH of the Bed Sediment Control Volume =   10.00 ft.

NO. OF CROSS SECTIONS IN STREAM SEGMENT= 75
NO. OF INPUT DATA MESSAGES =   0

TOTAL NO. OF CROSS SECTIONS IN THE NETWORK =  75
TOTAL NO. OF STREAM SEGMENTS IN THE NETWORK=   1
END OF GEOMETRIC DATA

==========================================================================================

T4
T5
T6
T7
T8

        EL RIO ANTIGUO
        100YR FLOW
        2/26/02

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
SEDIMENT PROPERITES AND PARAMETERS

       SPI     IBG    MNQ      SPGF      ACGR     NFALL    IBSHER
I1     50.       0      1     1.000    32.174         2         1
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 SANDS - BOULDERS ARE PRESENT

       MTC     IASA    LASA     SPGS       GSF      BSAE       PSI     UWDLB
        7        1      10     2.650     0.667     0.500    30.000    93.000

USING TRANSPORT CAPACITY RELATIONSHIP #  7, ACKERS-WHITE
GRAIN SIZES UTILIZED (mean diameter - mm)
-----------------------------------------------------------------------
    VERY FINE SAND....     0.088  |  VERY FINE GRAVEL..     2.828
    FINE SAND.........     0.177  |  FINE GRAVEL.......     5.657
    MEDIUM SAND.......     0.354  |  MEDIUM GRAVEL.....    11.314
    COARSE SAND.......     0.707  |  COARSE GRAVEL.....    22.627
    VERY COARSE SAND..     1.414  |  VERY COARSE GRAVEL    45.255
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

SEDIMENT LOAD TABLE FOR STREAM SEGMENT #   1
          LOAD BY GRAIN SIZE CLASS (tons/day)
-----------------------------------------------------------------------------------------
LQ  ****  | 1000.00    | 2000.00    | 5000.00    | 10000.0    | 20000.0    | 30000.0    |
          ------------ ------------ ------------ ------------ ------------ ------------
LF   VFS  |0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19|
LF    FS  | 654.072    | 1151.46    | 2039.98    |0.100000E-19|0.100000E-19|0.100000E-19|
LF    MS  | 454.326    | 1322.26    | 3726.57    | 7375.83    | 14105.6    | 18538.6    |
LF    CS  | 368.160    | 1096.37    | 3228.62    | 5531.87    | 8306.24    | 10120.3    |
LF   VCS  | 301.578    | 958.636    | 2875.24    | 4634.16    | 6285.80    | 7360.22    |
LF   VFG  | 117.498    | 446.261    | 1445.65    | 2256.42    | 2918.41    | 3312.10    |
LF    FG  | 58.7490    | 336.073    | 1268.96    | 2013.80    | 2619.08    | 2990.09    |
LF    MG  | 1.95830    | 176.301    | 899.517    | 1480.02    | 1945.61    | 2208.07    |
LF    CG  |0.100000E-19| 22.0376    | 562.198    | 970.504    | 1272.13    | 1518.05    |
LF   VCG  |0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19|0.100000E-19|
          ------------ ------------ ------------ ------------ ------------ ------------
   TOTAL  | 1956.34    | 5509.40    | 16046.7    | 24262.6    | 37452.9    | 46047.4    |
-----------------------------------------------------------------------------------------

REACH GEOMETRY FOR STREAM SEGMENT  1
-----------------------------------
CROSS        REACH    MOVABLE      INITIAL BED-ELEVATIONS       ACCUMULATED CHANNEL DISTANCE
 SECTION     LENGTH     BED     LEFT SIDE  THALWEG  RIGHT SIDE        FROM DOWNSTREAM
   NO.        (ft)     WIDTH       (ft)       (ft)      (ft)          (ft)       (miles)
-----------------------------------------------------------------------------------------
              0.000
   1.000              1401.200  2320.700  2305.900  2321.600        0.000        0.000
```

	418.900						
2.000		1454.500	2323.500	2308.300	2323.500	418.900	0.079
	426.300						
3.000		1020.500	2329.100	2309.200	2325.700	845.200	0.160
	474.600						
4.000		1228.300	2326.800	2310.800	2329.000	1319.800	0.250
	523.900						
5.000		1266.600	2329.300	2313.000	2329.300	1843.700	0.349
	571.900						
6.000		1087.300	2333.700	2315.200	2331.200	2415.600	0.458
	420.200						
7.000		1457.200	2336.700	2317.100	2331.200	2835.800	0.537
	509.800						
8.000		1455.600	2334.600	2318.300	2336.000	3345.600	0.634
	125.700						
9.000		865.000	2335.800	2318.900	2335.000	3471.300	0.657
	397.400						
10.000		1308.400	2336.300	2320.700	2339.000	3868.700	0.733
	460.900						
11.000		1261.300	2337.700	2322.400	2339.300	4329.600	0.820
	491.400						
12.000		1166.700	2339.100	2324.300	2348.500	4821.000	0.913
	501.200						
13.000		882.400	2342.500	2326.700	2345.400	5322.200	1.008
	502.000						
14.000		1164.500	2345.000	2328.400	2351.100	5824.200	1.103
	331.700						
15.000		1101.600	2344.200	2329.500	2352.000	6155.900	1.166
	420.300						
16.000		1098.900	2346.300	2330.700	2349.800	6576.200	1.245
	459.700						
17.000		1089.500	2347.300	2332.000	2346.100	7035.900	1.333
	453.300						
18.000		1044.200	2348.300	2332.900	2349.500	7489.200	1.418
	480.400						
19.000		941.500	2349.100	2335.400	2348.700	7969.600	1.509
	496.300						
20.000		1341.100	2350.300	2337.500	2352.100	8465.900	1.603
	514.000						
21.000		1371.400	2352.000	2339.100	2354.200	8979.900	1.701
	470.100						
22.000		1146.800	2355.500	2340.700	2357.900	9450.000	1.790
	495.800						
23.000		1209.100	2356.800	2342.400	2360.400	9945.800	1.884
	511.900						
24.000		1343.400	2358.700	2344.300	2368.100	10457.700	1.981
	475.700						
25.000		1130.800	2360.300	2345.900	2381.600	10933.400	2.071
	423.500						
26.000		1331.900	2361.300	2347.000	2388.900	11356.900	2.151
	308.800						
27.000		1054.500	2363.000	2347.900	2366.700	11665.700	2.209
	203.100						
28.000		1206.600	2362.900	2347.800	2374.600	11868.800	2.248
	494.900						
29.000		1221.100	2363.900	2350.100	2366.700	12363.700	2.342
	498.900						
30.000		1321.700	2363.400	2352.900	2366.400	12862.600	2.436
	499.300						
31.000		1088.100	2368.600	2354.600	2370.000	13361.900	2.531
	505.600						
32.000		1452.800	2366.800	2355.500	2368.300	13867.500	2.626
	501.500						
33.000		1746.000	2370.500	2356.200	2369.900	14369.000	2.721
	495.500						
34.000		3512.100	2374.300	2359.700	2372.300	14864.500	2.815
	496.300						
35.000		4119.800	2381.400	2361.300	2386.500	15360.800	2.909
	548.600						
36.000		4284.900	2386.300	2363.900	2388.900	15909.400	3.013
	496.500						
37.000		4029.900	2389.700	2364.700	2385.800	16405.900	3.107
	454.100						
38.000		3946.200	2394.200	2367.400	2378.600	16860.000	3.193
	458.300						
39.000		3980.300	2394.500	2368.400	2380.500	17318.300	3.280
	451.600						
40.000		2831.600	2389.400	2368.000	2381.700	17769.900	3.366

41.000	453.300	2597.800	2389.800	2369.800	2382.000	18223.200	3.451
42.000	330.300	1789.400	2390.500	2371.100	2383.800	18553.500	3.514
43.000	289.100	1178.800	2392.000	2372.500	2384.100	18842.600	3.569
44.000	498.600	1138.700	2394.800	2375.000	2389.400	19341.200	3.663
45.000	866.900	1839.900	2394.100	2378.500	2387.900	20208.100	3.827
46.000	497.200	1820.100	2394.100	2380.400	2392.500	20705.300	3.921
47.000	498.900	1594.500	2394.200	2381.900	2397.100	21204.200	4.016
48.000	499.700	1899.300	2396.700	2385.200	2395.900	21703.900	4.111
49.000	496.700	1880.900	2400.600	2386.800	2402.000	22200.600	4.205
50.000	497.500	1625.100	2400.900	2388.300	2417.600	22698.100	4.299
51.000	498.000	1473.400	2409.700	2390.500	2411.400	23196.100	4.393
52.000	495.300	1071.300	2396.900	2392.600	2415.600	23691.400	4.487
53.000	499.900	1220.600	2399.100	2396.200	2410.600	24191.300	4.582
54.000	499.700	1118.800	2405.000	2397.700	2410.200	24691.000	4.676
55.000	400.100	1397.200	2404.900	2399.000	2411.800	25091.100	4.752
56.000	400.000	1356.200	2406.900	2400.700	2408.900	25491.100	4.828
57.000	308.900	1054.300	2406.200	2401.700	2423.300	25800.000	4.886
58.000	391.100	1167.000	2417.900	2402.100	2412.300	26191.100	4.960
59.000	500.100	1259.200	2413.500	2403.900	2414.900	26691.200	5.055
60.000	499.900	900.900	2406.900	2406.000	2416.800	27191.100	5.150
61.000	500.100	1250.200	2422.200	2407.100	2418.400	27691.200	5.245
62.000	499.900	930.800	2417.100	2409.000	2421.400	28191.100	5.339
63.000	496.200	1093.800	2419.200	2412.000	2421.000	28687.300	5.433
64.000	498.600	1213.800	2423.600	2413.600	2421.800	29185.900	5.528
65.000	499.300	542.500	2425.400	2415.100	2425.300	29685.200	5.622
66.000	499.900	447.100	2427.200	2419.100	2427.700	30185.100	5.717
67.000	500.100	516.300	2431.300	2420.800	2430.600	30685.200	5.812
68.000	498.300	885.600	2436.500	2422.500	2441.800	31183.500	5.906
69.000	326.100	685.100	2425.500	2424.100	2450.000	31509.600	5.968
70.000	326.100	685.100	2426.500	2425.100	2451.000	31835.700	6.029
71.000	326.100	685.100	2427.500	2425.800	2452.000	32161.800	6.091
72.000	326.100	685.100	2428.500	2426.800	2453.000	32487.900	6.153
73.000	326.100	685.100	2429.500	2427.800	2454.000	32814.000	6.215
74.000	326.100	685.100	2430.500	2428.800	2455.000	33140.100	6.277
75.000	326.100	685.100	2431.500	2429.800	2456.000	33466.200	6.338

MATERIAL GRADATION

SECNO	SAE	DMAX (ft)	DXPI (ft)	XPI	TOTAL BED	BED MATERIAL FRACTIONS per grain size					
1.000	0.000	0.262	0.210	0.881	0.881	VF SAND	0.005	VC SAND	0.159	M GRVL	0.073
						F SAND	0.024	VF GRVL	0.105	C GRVL	0.035

						M	SAND	0.078	F	GRVL	0.096	VC	GRVL	0.131
						C	SAND	0.159						
2.000	0.000	0.262	0.210	0.881	0.881	VF	SAND	0.005	VC	SAND	0.159	M	GRVL	0.073
						F	SAND	0.024	VF	GRVL	0.105	C	GRVL	0.035
						M	SAND	0.078	F	GRVL	0.096	VC	GRVL	0.131
						C	SAND	0.159						
3.000	0.000	0.255	0.207	0.890	0.875	VF	SAND	0.005	VC	SAND	0.157	M	GRVL	0.072
						F	SAND	0.024	VF	GRVL	0.105	C	GRVL	0.036
						M	SAND	0.076	F	GRVL	0.096	VC	GRVL	0.148
						C	SAND	0.157						
4.000	0.000	0.247	0.203	0.900	0.884	VF	SAND	0.005	VC	SAND	0.154	M	GRVL	0.070
						F	SAND	0.024	VF	GRVL	0.105	C	GRVL	0.037
						M	SAND	0.075	F	GRVL	0.095	VC	GRVL	0.166
						C	SAND	0.154						
5.000	0.000	0.238	0.199	0.911	0.894	VF	SAND	0.005	VC	SAND	0.151	M	GRVL	0.068
						F	SAND	0.024	VF	GRVL	0.105	C	GRVL	0.038
						M	SAND	0.073	F	GRVL	0.094	VC	GRVL	0.186
						C	SAND	0.151						
6.000	0.000	0.228	0.194	0.923	0.904	VF	SAND	0.004	VC	SAND	0.147	M	GRVL	0.065
						F	SAND	0.024	VF	GRVL	0.105	C	GRVL	0.040
						M	SAND	0.071	F	GRVL	0.093	VC	GRVL	0.207
						C	SAND	0.148						
7.000	0.000	0.221	0.191	0.931	0.912	VF	SAND	0.004	VC	SAND	0.145	M	GRVL	0.064
						F	SAND	0.023	VF	GRVL	0.105	C	GRVL	0.041
						M	SAND	0.070	F	GRVL	0.092	VC	GRVL	0.223
						C	SAND	0.145						
8.000	0.000	0.212	0.187	0.942	0.922	VF	SAND	0.004	VC	SAND	0.141	M	GRVL	0.061
						F	SAND	0.023	VF	GRVL	0.106	C	GRVL	0.042
						M	SAND	0.068	F	GRVL	0.091	VC	GRVL	0.243
						C	SAND	0.142						
9.000	0.000	0.210	0.186	0.944	0.924	VF	SAND	0.004	VC	SAND	0.141	M	GRVL	0.061
						F	SAND	0.023	VF	GRVL	0.106	C	GRVL	0.042
						M	SAND	0.067	F	GRVL	0.091	VC	GRVL	0.248
						C	SAND	0.142						
10.000	0.000	0.203	0.182	0.953	0.932	VF	SAND	0.004	VC	SAND	0.138	M	GRVL	0.059
						F	SAND	0.023	VF	GRVL	0.106	C	GRVL	0.043
						M	SAND	0.066	F	GRVL	0.090	VC	GRVL	0.263
						C	SAND	0.139						
11.000	0.000	0.195	0.179	0.962	0.941	VF	SAND	0.004	VC	SAND	0.135	M	GRVL	0.057
						F	SAND	0.023	VF	GRVL	0.106	C	GRVL	0.044
						M	SAND	0.064	F	GRVL	0.089	VC	GRVL	0.280
						C	SAND	0.137						
12.000	0.000	0.187	0.175	0.972	0.950	VF	SAND	0.004	VC	SAND	0.132	M	GRVL	0.055
						F	SAND	0.023	VF	GRVL	0.106	C	GRVL	0.045
						M	SAND	0.063	F	GRVL	0.088	VC	GRVL	0.299
						C	SAND	0.134						
13.000	0.000	0.178	0.171	0.983	0.960	VF	SAND	0.004	VC	SAND	0.129	M	GRVL	0.053
						F	SAND	0.023	VF	GRVL	0.106	C	GRVL	0.046
						M	SAND	0.061	F	GRVL	0.087	VC	GRVL	0.318
						C	SAND	0.131						
14.000	0.000	0.170	0.167	0.993	0.969	VF	SAND	0.004	VC	SAND	0.126	M	GRVL	0.051
						F	SAND	0.023	VF	GRVL	0.106	C	GRVL	0.047
						M	SAND	0.059	F	GRVL	0.087	VC	GRVL	0.337
						C	SAND	0.128						
15.000	0.000	0.164	0.164	1.000	1.000	VF	SAND	0.004	VC	SAND	0.124	M	GRVL	0.050
						F	SAND	0.023	VF	GRVL	0.106	C	GRVL	0.048
						M	SAND	0.058	F	GRVL	0.086	VC	GRVL	0.350
						C	SAND	0.126						
16.000	0.000	0.158	0.158	1.000	0.976	VF	SAND	0.003	VC	SAND	0.132	M	GRVL	0.051
						F	SAND	0.023	VF	GRVL	0.109	C	GRVL	0.046
						M	SAND	0.064	F	GRVL	0.087	VC	GRVL	0.323
						C	SAND	0.137						

17.000	0.000	0.151	0.151	1.000	0.976	VF SAND	0.003	VC SAND	0.140	M GRVL	0.052
						F SAND	0.023	VF GRVL	0.111	C GRVL	0.044
						M SAND	0.070	F GRVL	0.089	VC GRVL	0.294
						C SAND	0.149				
18.000	0.000	0.144	0.144	1.000	0.977	VF SAND	0.003	VC SAND	0.149	M GRVL	0.054
						F SAND	0.023	VF GRVL	0.113	C GRVL	0.043
						M SAND	0.077	F GRVL	0.090	VC GRVL	0.265
						C SAND	0.161				
19.000	0.000	0.137	0.137	1.000	0.977	VF SAND	0.003	VC SAND	0.158	M GRVL	0.055
						F SAND	0.022	VF GRVL	0.115	C GRVL	0.041
						M SAND	0.083	F GRVL	0.092	VC GRVL	0.235
						C SAND	0.173				
20.000	0.000	0.130	0.130	1.000	0.977	VF SAND	0.002	VC SAND	0.167	M GRVL	0.057
						F SAND	0.022	VF GRVL	0.118	C GRVL	0.039
						M SAND	0.090	F GRVL	0.093	VC GRVL	0.203
						C SAND	0.186				
21.000	0.000	0.122	0.122	1.000	0.978	VF SAND	0.002	VC SAND	0.177	M GRVL	0.058
						F SAND	0.022	VF GRVL	0.120	C GRVL	0.037
						M SAND	0.097	F GRVL	0.095	VC GRVL	0.171
						C SAND	0.199				
22.000	0.000	0.115	0.115	1.000	0.978	VF SAND	0.002	VC SAND	0.185	M GRVL	0.059
						F SAND	0.022	VF GRVL	0.123	C GRVL	0.035
						M SAND	0.104	F GRVL	0.097	VC GRVL	0.141
						C SAND	0.211				
23.000	0.000	0.108	0.108	1.000	0.979	VF SAND	0.001	VC SAND	0.194	M GRVL	0.061
						F SAND	0.022	VF GRVL	0.125	C GRVL	0.033
						M SAND	0.111	F GRVL	0.098	VC GRVL	0.109
						C SAND	0.224				
24.000	0.000	0.100	0.100	1.000	0.979	VF SAND	0.001	VC SAND	0.204	M GRVL	0.062
						F SAND	0.022	VF GRVL	0.128	C GRVL	0.031
						M SAND	0.118	F GRVL	0.100	VC GRVL	0.077
						C SAND	0.237				
25.000	0.000	0.093	0.093	1.000	0.980	VF SAND	0.001	VC SAND	0.213	M GRVL	0.064
						F SAND	0.022	VF GRVL	0.130	C GRVL	0.030
						M SAND	0.125	F GRVL	0.101	VC GRVL	0.047
						C SAND	0.249				
26.000	0.000	0.087	0.087	1.000	0.980	VF SAND	0.000	VC SAND	0.221	M GRVL	0.065
						F SAND	0.021	VF GRVL	0.132	C GRVL	0.028
						M SAND	0.130	F GRVL	0.103	VC GRVL	0.020
						C SAND	0.260				
27.000	0.000	0.082	0.082	1.000	1.000	VF SAND	0.000	VC SAND	0.226	M GRVL	0.066
						F SAND	0.021	VF GRVL	0.134	C GRVL	0.027
						M SAND	0.135	F GRVL	0.104	VC GRVL	0.000
						C SAND	0.268				
28.000	0.000	0.082	0.082	1.000	0.980	VF SAND	0.000	VC SAND	0.227	M GRVL	0.066
						F SAND	0.022	VF GRVL	0.133	C GRVL	0.026
						M SAND	0.135	F GRVL	0.104	VC GRVL	0.000
						C SAND	0.267				
29.000	0.000	0.080	0.080	1.000	0.980	VF SAND	0.000	VC SAND	0.228	M GRVL	0.065
						F SAND	0.022	VF GRVL	0.133	C GRVL	0.026
						M SAND	0.137	F GRVL	0.104	VC GRVL	0.000
						C SAND	0.265				
30.000	0.000	0.079	0.079	1.000	0.980	VF SAND	0.000	VC SAND	0.230	M GRVL	0.064
						F SAND	0.023	VF GRVL	0.132	C GRVL	0.025
						M SAND	0.139	F GRVL	0.104	VC GRVL	0.000
						C SAND	0.264				
31.000	0.000	0.078	0.078	1.000	0.980	VF SAND	0.000	VC SAND	0.231	M GRVL	0.064
						F SAND	0.023	VF GRVL	0.131	C GRVL	0.024
						M SAND	0.141	F GRVL	0.103	VC GRVL	0.000
						C SAND	0.262				
32.000	0.000	0.077	0.077	1.000	0.980	VF SAND	0.000	VC SAND	0.233	M GRVL	0.063
						F SAND	0.024	VF GRVL	0.131	C GRVL	0.023
						M SAND	0.143	F GRVL	0.103	VC GRVL	0.000

						C SAND	0.261						
33.000	0.000	0.076	0.076	1.000	0.980	VF SAND	0.000	VC SAND	0.234	M GRVL	0.063		
						F SAND	0.024	VF GRVL	0.130	C GRVL	0.022		
						M SAND	0.145	F GRVL	0.103	VC GRVL	0.000		
						C SAND	0.259						
34.000	0.000	0.074	0.074	1.000	0.980	VF SAND	0.000	VC SAND	0.235	M GRVL	0.062		
						F SAND	0.025	VF GRVL	0.129	C GRVL	0.022		
						M SAND	0.147	F GRVL	0.103	VC GRVL	0.000		
						C SAND	0.257						
35.000	0.000	0.073	0.073	1.000	0.980	VF SAND	0.000	VC SAND	0.237	M GRVL	0.062		
						F SAND	0.025	VF GRVL	0.128	C GRVL	0.021		
						M SAND	0.148	F GRVL	0.103	VC GRVL	0.000		
						C SAND	0.256						
36.000	0.000	0.072	0.072	1.000	0.980	VF SAND	0.000	VC SAND	0.238	M GRVL	0.061		
						F SAND	0.026	VF GRVL	0.128	C GRVL	0.020		
						M SAND	0.150	F GRVL	0.103	VC GRVL	0.000		
						C SAND	0.254						
37.000	0.000	0.071	0.071	1.000	0.980	VF SAND	0.000	VC SAND	0.240	M GRVL	0.060		
						F SAND	0.026	VF GRVL	0.127	C GRVL	0.019		
						M SAND	0.152	F GRVL	0.103	VC GRVL	0.000		
						C SAND	0.252						
38.000	0.000	0.070	0.070	1.000	0.980	VF SAND	0.000	VC SAND	0.241	M GRVL	0.060		
						F SAND	0.027	VF GRVL	0.126	C GRVL	0.018		
						M SAND	0.154	F GRVL	0.103	VC GRVL	0.000		
						C SAND	0.251						
39.000	0.000	0.069	0.069	1.000	0.980	VF SAND	0.000	VC SAND	0.242	M GRVL	0.059		
						F SAND	0.027	VF GRVL	0.126	C GRVL	0.018		
						M SAND	0.156	F GRVL	0.103	VC GRVL	0.000		
						C SAND	0.250						
40.000	0.000	0.067	0.067	1.000	0.980	VF SAND	0.000	VC SAND	0.244	M GRVL	0.059		
						F SAND	0.028	VF GRVL	0.125	C GRVL	0.017		
						M SAND	0.157	F GRVL	0.103	VC GRVL	0.000		
						C SAND	0.248						
41.000	0.000	0.066	0.066	1.000	0.980	VF SAND	0.000	VC SAND	0.245	M GRVL	0.058		
						F SAND	0.028	VF GRVL	0.124	C GRVL	0.016		
						M SAND	0.159	F GRVL	0.103	VC GRVL	0.000		
						C SAND	0.247						
42.000	0.000	0.066	0.066	1.000	1.000	VF SAND	0.000	VC SAND	0.246	M GRVL	0.058		
						F SAND	0.028	VF GRVL	0.124	C GRVL	0.016		
						M SAND	0.160	F GRVL	0.103	VC GRVL	0.000		
						C SAND	0.246						
43.000	0.000	0.066	0.066	1.000	0.980	VF SAND	0.000	VC SAND	0.246	M GRVL	0.059		
						F SAND	0.028	VF GRVL	0.126	C GRVL	0.017		
						M SAND	0.156	F GRVL	0.107	VC GRVL	0.000		
						C SAND	0.242						
44.000	0.000	0.067	0.067	1.000	0.980	VF SAND	0.000	VC SAND	0.245	M GRVL	0.061		
						F SAND	0.027	VF GRVL	0.130	C GRVL	0.018		
						M SAND	0.150	F GRVL	0.113	VC GRVL	0.000		
						C SAND	0.235						
45.000	0.000	0.069	0.069	1.000	0.979	VF SAND	0.000	VC SAND	0.245	M GRVL	0.064		
						F SAND	0.026	VF GRVL	0.138	C GRVL	0.022		
						M SAND	0.138	F GRVL	0.125	VC GRVL	0.000		
						C SAND	0.222						
46.000	0.000	0.070	0.070	1.000	0.979	VF SAND	0.000	VC SAND	0.244	M GRVL	0.066		
						F SAND	0.025	VF GRVL	0.142	C GRVL	0.024		
						M SAND	0.131	F GRVL	0.131	VC GRVL	0.000		
						C SAND	0.215						
47.000	0.000	0.072	0.072	1.000	0.978	VF SAND	0.000	VC SAND	0.244	M GRVL	0.068		
						F SAND	0.025	VF GRVL	0.146	C GRVL	0.025		
						M SAND	0.125	F GRVL	0.138	VC GRVL	0.000		
						C SAND	0.208						
48.000	0.000	0.073	0.073	1.000	0.978	VF SAND	0.000	VC SAND	0.244	M GRVL	0.070		

						F	SAND	0.024	VF	GRVL	0.150	C	GRVL	0.027
						M	SAND	0.118	F	GRVL	0.144	VC	GRVL	0.000
						C	SAND	0.201						
49.000	0.000	0.074	0.074	1.000	0.978	VF	SAND	0.000	VC	SAND	0.243	M	GRVL	0.072
						F	SAND	0.023	VF	GRVL	0.154	C	GRVL	0.029
						M	SAND	0.111	F	GRVL	0.151	VC	GRVL	0.000
						C	SAND	0.194						
50.000	0.000	0.075	0.075	1.000	0.977	VF	SAND	0.000	VC	SAND	0.243	M	GRVL	0.074
						F	SAND	0.022	VF	GRVL	0.158	C	GRVL	0.031
						M	SAND	0.104	F	GRVL	0.157	VC	GRVL	0.000
						C	SAND	0.187						
51.000	0.000	0.076	0.076	1.000	0.977	VF	SAND	0.000	VC	SAND	0.243	M	GRVL	0.075
						F	SAND	0.022	VF	GRVL	0.162	C	GRVL	0.033
						M	SAND	0.098	F	GRVL	0.164	VC	GRVL	0.000
						C	SAND	0.180						
52.000	0.000	0.077	0.077	1.000	0.977	VF	SAND	0.000	VC	SAND	0.242	M	GRVL	0.077
						F	SAND	0.021	VF	GRVL	0.167	C	GRVL	0.035
						M	SAND	0.091	F	GRVL	0.170	VC	GRVL	0.000
						C	SAND	0.173						
53.000	0.000	0.078	0.078	1.000	0.976	VF	SAND	0.000	VC	SAND	0.242	M	GRVL	0.079
						F	SAND	0.020	VF	GRVL	0.171	C	GRVL	0.037
						M	SAND	0.084	F	GRVL	0.177	VC	GRVL	0.000
						C	SAND	0.166						
54.000	0.000	0.080	0.080	1.000	0.976	VF	SAND	0.000	VC	SAND	0.242	M	GRVL	0.081
						F	SAND	0.019	VF	GRVL	0.175	C	GRVL	0.038
						M	SAND	0.077	F	GRVL	0.183	VC	GRVL	0.000
						C	SAND	0.159						
55.000	0.000	0.080	0.080	1.000	0.976	VF	SAND	0.000	VC	SAND	0.242	M	GRVL	0.083
						F	SAND	0.019	VF	GRVL	0.178	C	GRVL	0.040
						M	SAND	0.072	F	GRVL	0.189	VC	GRVL	0.000
						C	SAND	0.154						
56.000	0.000	0.081	0.081	1.000	0.976	VF	SAND	0.000	VC	SAND	0.241	M	GRVL	0.084
						F	SAND	0.018	VF	GRVL	0.182	C	GRVL	0.041
						M	SAND	0.067	F	GRVL	0.194	VC	GRVL	0.000
						C	SAND	0.148						
57.000	0.000	0.082	0.082	1.000	1.000	VF	SAND	0.000	VC	SAND	0.241	M	GRVL	0.085
						F	SAND	0.018	VF	GRVL	0.184	C	GRVL	0.043
						M	SAND	0.063	F	GRVL	0.198	VC	GRVL	0.000
						C	SAND	0.144						
58.000	0.000	0.082	0.082	1.000	0.974	VF	SAND	0.001	VC	SAND	0.237	M	GRVL	0.088
						F	SAND	0.018	VF	GRVL	0.184	C	GRVL	0.047
						M	SAND	0.062	F	GRVL	0.195	VC	GRVL	0.000
						C	SAND	0.141						
59.000	0.000	0.082	0.082	1.000	0.973	VF	SAND	0.001	VC	SAND	0.233	M	GRVL	0.091
						F	SAND	0.018	VF	GRVL	0.185	C	GRVL	0.053
						M	SAND	0.062	F	GRVL	0.192	VC	GRVL	0.000
						C	SAND	0.138						
60.000	0.000	0.082	0.082	1.000	0.972	VF	SAND	0.002	VC	SAND	0.228	M	GRVL	0.095
						F	SAND	0.018	VF	GRVL	0.185	C	GRVL	0.059
						M	SAND	0.062	F	GRVL	0.188	VC	GRVL	0.000
						C	SAND	0.136						
61.000	0.000	0.082	0.082	1.000	0.970	VF	SAND	0.003	VC	SAND	0.223	M	GRVL	0.098
						F	SAND	0.017	VF	GRVL	0.185	C	GRVL	0.066
						M	SAND	0.061	F	GRVL	0.185	VC	GRVL	0.000
						C	SAND	0.133						
62.000	0.000	0.082	0.082	1.000	0.969	VF	SAND	0.003	VC	SAND	0.219	M	GRVL	0.101
						F	SAND	0.017	VF	GRVL	0.185	C	GRVL	0.072
						M	SAND	0.061	F	GRVL	0.181	VC	GRVL	0.000
						C	SAND	0.130						
63.000	0.000	0.082	0.082	1.000	0.968	VF	SAND	0.004	VC	SAND	0.214	M	GRVL	0.105
						F	SAND	0.017	VF	GRVL	0.186	C	GRVL	0.078
						M	SAND	0.060	F	GRVL	0.178	VC	GRVL	0.000
						C	SAND	0.127						

64.000	0.000	0.082	0.082	1.000	0.967	VF SAND	0.004	VC SAND	0.209	M GRVL	0.108
						F SAND	0.017	VF GRVL	0.186	C GRVL	0.084
						M SAND	0.060	F GRVL	0.174	VC GRVL	0.000
						C SAND	0.124				
65.000	0.000	0.082	0.082	1.000	0.965	VF SAND	0.005	VC SAND	0.205	M GRVL	0.111
						F SAND	0.017	VF GRVL	0.186	C GRVL	0.090
						M SAND	0.060	F GRVL	0.170	VC GRVL	0.000
						C SAND	0.121				
66.000	0.000	0.082	0.082	1.000	0.964	VF SAND	0.006	VC SAND	0.200	M GRVL	0.115
						F SAND	0.017	VF GRVL	0.186	C GRVL	0.096
						M SAND	0.059	F GRVL	0.167	VC GRVL	0.000
						C SAND	0.118				
67.000	0.000	0.082	0.082	1.000	0.963	VF SAND	0.006	VC SAND	0.195	M GRVL	0.118
						F SAND	0.017	VF GRVL	0.186	C GRVL	0.102
						M SAND	0.059	F GRVL	0.163	VC GRVL	0.000
						C SAND	0.115				
68.000	0.000	0.082	0.082	1.000	0.961	VF SAND	0.007	VC SAND	0.191	M GRVL	0.121
						F SAND	0.017	VF GRVL	0.187	C GRVL	0.108
						M SAND	0.059	F GRVL	0.160	VC GRVL	0.000
						C SAND	0.112				
69.000	0.000	0.082	0.082	1.000	1.000	VF SAND	0.007	VC SAND	0.188	M GRVL	0.124
						F SAND	0.017	VF GRVL	0.187	C GRVL	0.112
						M SAND	0.059	F GRVL	0.158	VC GRVL	0.000
						C SAND	0.110				
70.000	0.000	0.082	0.082	1.000	0.961	VF SAND	0.007	VC SAND	0.188	M GRVL	0.124
						F SAND	0.017	VF GRVL	0.187	C GRVL	0.112
						M SAND	0.059	F GRVL	0.158	VC GRVL	0.000
						C SAND	0.110				
71.000	0.000	0.082	0.082	1.000	0.961	VF SAND	0.007	VC SAND	0.188	M GRVL	0.124
						F SAND	0.017	VF GRVL	0.187	C GRVL	0.112
						M SAND	0.059	F GRVL	0.158	VC GRVL	0.000
						C SAND	0.110				
72.000	0.000	0.082	0.082	1.000	0.961	VF SAND	0.007	VC SAND	0.188	M GRVL	0.124
						F SAND	0.017	VF GRVL	0.187	C GRVL	0.112
						M SAND	0.059	F GRVL	0.158	VC GRVL	0.000
						C SAND	0.110				
73.000	0.000	0.082	0.082	1.000	0.961	VF SAND	0.007	VC SAND	0.188	M GRVL	0.124
						F SAND	0.017	VF GRVL	0.187	C GRVL	0.112
						M SAND	0.059	F GRVL	0.158	VC GRVL	0.000
						C SAND	0.110				
74.000	0.000	0.082	0.082	1.000	0.961	VF SAND	0.007	VC SAND	0.188	M GRVL	0.124
						F SAND	0.017	VF GRVL	0.187	C GRVL	0.112
						M SAND	0.059	F GRVL	0.158	VC GRVL	0.000
						C SAND	0.110				
75.000	0.000	0.082	0.082	1.000	1.000	VF SAND	0.007	VC SAND	0.188	M GRVL	0.124
						F SAND	0.017	VF GRVL	0.187	C GRVL	0.112
						M SAND	0.059	F GRVL	0.158	VC GRVL	0.000
						C SAND	0.110				

BED SEDIMENT CONTROL VOLUMES

STREAM SEGMENT # 1: EL RIO ANTIGUO

SECTION NUMBER	LENGTH (ft)	WIDTH (ft)	DEPTH (ft)	V O L U M E (cu.ft)	(cu.yd)
1.000	209.450	1418.967	10.000	0.297203E+07	110075.
2.000	422.600	1372.728	10.000	0.580115E+07	214857.
3.000	450.450	1125.445	10.000	0.506957E+07	187762.
4.000	499.250	1202.075	10.000	0.600136E+07	222273.
5.000	547.900	1229.304	10.000	0.673536E+07	249458.
6.000	496.050	1173.976	10.000	0.582351E+07	215685.
7.000	465.000	1401.197	10.000	0.651557E+07	241317.
8.000	317.750	1417.088	10.000	0.450280E+07	166770.
9.000	261.550	1024.591	10.000	0.267982E+07	99252.5
10.000	429.150	1231.537	10.000	0.528514E+07	195746.

11.000	476.150	1252.627	10.000	0.596438E+07	220903.
12.000	496.300	1134.460	10.000	0.563032E+07	208531.
13.000	501.600	976.800	10.000	0.489963E+07	181468.
14.000	416.850	1099.537	10.000	0.458342E+07	169756.
15.000	376.000	1110.345	10.000	0.417490E+07	154626.
16.000	440.000	1097.693	10.000	0.482985E+07	178883.
17.000	456.500	1083.581	10.000	0.494655E+07	183205.
18.000	466.850	1033.917	10.000	0.482684E+07	178772.
19.000	488.350	1026.022	10.000	0.501058E+07	185577.
20.000	505.150	1280.805	10.000	0.646999E+07	239629.
21.000	492.050	1330.361	10.000	0.654604E+07	242446.
22.000	482.950	1193.897	10.000	0.576593E+07	213553.
23.000	503.850	1221.624	10.000	0.615515E+07	227969.
24.000	493.800	1286.062	10.000	0.635057E+07	235206.
25.000	449.600	1199.861	10.000	0.539458E+07	199799.
26.000	366.150	1254.142	10.000	0.459204E+07	170076.
27.000	255.950	1130.395	10.000	0.289325E+07	107157.
28.000	349.000	1195.275	10.000	0.417151E+07	154500.
29.000	496.900	1235.527	10.000	0.613933E+07	227383.
30.000	499.100	1265.991	10.000	0.631856E+07	234021.
31.000	502.450	1187.954	10.000	0.596887E+07	221069.
32.000	503.550	1440.437	10.000	0.725332E+07	268641.
33.000	498.500	1989.418	10.000	0.991725E+07	367305.
34.000	495.900	3319.352	10.000	0.164607E+08	609654.
35.000	522.450	4052.480	10.000	0.211722E+08	784155.
36.000	522.550	4215.630	10.000	0.220288E+08	815881.
37.000	475.300	4060.968	10.000	0.193018E+08	714881.
38.000	456.200	3965.795	10.000	0.180920E+08	670073.
39.000	454.950	3784.535	10.000	0.172177E+08	637694.
40.000	452.450	2983.650	10.000	0.134995E+08	499982.
41.000	391.800	2529.299	10.000	0.990979E+07	367029.
42.000	309.700	1838.098	10.000	0.569259E+07	210837.
43.000	393.850	1245.040	10.000	0.490359E+07	181614.
44.000	682.750	1291.968	10.000	0.882091E+07	326701.
45.000	682.050	1688.954	10.000	0.115195E+08	426649.
46.000	498.050	1785.730	10.000	0.889383E+07	329401.
47.000	499.300	1682.911	10.000	0.840277E+07	311214.
48.000	498.200	1845.290	10.000	0.919323E+07	340490.
49.000	497.100	1841.297	10.000	0.915309E+07	339003.
50.000	497.750	1642.416	10.000	0.817513E+07	302782.
51.000	496.650	1431.918	10.000	0.711162E+07	263393.
52.000	497.600	1163.005	10.000	0.578711E+07	214338.
53.000	499.800	1178.748	10.000	0.589138E+07	218199.
54.000	449.900	1178.909	10.000	0.530391E+07	196441.
55.000	400.050	1343.962	10.000	0.537652E+07	199130.
56.000	354.450	1320.061	10.000	0.467896E+07	173295.
57.000	350.000	1119.697	10.000	0.391894E+07	145146.
58.000	445.600	1167.760	10.000	0.520354E+07	192724.
59.000	500.000	1184.126	10.000	0.592063E+07	219283.
60.000	500.000	1018.833	10.000	0.509417E+07	188673.
61.000	500.000	1138.749	10.000	0.569375E+07	210879.
62.000	498.050	1011.297	10.000	0.503676E+07	186547.
63.000	497.400	1086.747	10.000	0.540548E+07	200203.
64.000	498.950	1081.852	10.000	0.539790E+07	199922.
65.000	499.600	638.407	10.000	0.318948E+07	118129.
66.000	500.000	474.532	10.000	0.237266E+07	87876.4
67.000	499.200	566.185	10.000	0.282640E+07	104681.
68.000	412.200	784.757	10.000	0.323477E+07	119806.
69.000	326.100	718.517	10.000	0.234308E+07	86780.8
70.000	326.100	685.100	10.000	0.223411E+07	82744.9
71.000	326.100	685.100	10.000	0.223411E+07	82744.9
72.000	326.100	685.100	10.000	0.223411E+07	82744.9
73.000	326.100	685.100	10.000	0.223411E+07	82744.9
74.000	326.100	685.100	10.000	0.223411E+07	82744.9
75.000	163.050	685.100	10.000	0.111706E+07	41372.4

NO. OF INPUT DATA MESSAGES= 0
END OF SEDIMENT DATA

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D
IN COMPUTATIONS.

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TIME STEP # 30
* B 100YR FLOW

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46.000	0.01	2384.23	2380.41	4091.	8956.
45.000	-0.89	2381.97	2377.61	4091.	10268.
44.000	-0.81	2378.91	2374.19	4091.	9784.
43.000	-0.25	2376.94	2372.25	4091.	10460.
42.000	0.67	2375.91	2371.77	4091.	10325.
41.000	0.57	2374.78	2370.37	4091.	11083.
40.000	0.38	2373.11	2368.38	4091.	10851.
39.000	-0.84	2371.53	2367.56	4091.	11502.
38.000	-0.77	2370.02	2366.63	4091.	11691.
37.000	-0.76	2368.53	2363.94	4091.	11991.
36.000	-1.93	2366.68	2361.97	4091.	12403.
35.000	-2.07	2364.83	2359.23	4091.	11987.
34.000	-0.33	2363.29	2359.37	4091.	12403.
33.000	0.36	2361.48	2356.56	4091.	12149.
32.000	-0.27	2359.76	2355.23	4091.	12248.
31.000	-0.77	2358.15	2353.83	4091.	12052.
30.000	-0.51	2356.46	2352.39	4091.	12261.
29.000	-0.31	2354.77	2349.79	4091.	11703.
28.000	0.06	2353.03	2347.86	4091.	12311.
27.000	-0.06	2352.29	2347.84	4091.	12291.
26.000	-0.01	2351.18	2346.99	4091.	12141.
25.000	-0.23	2349.72	2345.67	4091.	12036.
24.000	-0.18	2348.25	2344.12	4091.	11820.
23.000	-0.05	2346.74	2342.35	4091.	11075.
22.000	0.11	2345.20	2340.81	4091.	11450.
21.000	0.46	2343.63	2339.56	4091.	11157.
20.000	-0.12	2341.73	2337.38	4091.	10589.
19.000	0.31	2339.84	2335.71	4091.	12116.
18.000	0.35	2338.07	2333.25	4091.	10333.
17.000	0.24	2336.19	2332.24	4091.	12651.
16.000	0.25	2334.68	2330.95	4091.	9451.
15.000	-0.26	2332.99	2329.24	4091.	14155.
14.000	-0.04	2331.83	2328.36	4091.	9714.
13.000	-0.12	2330.06	2326.58	4091.	13797.
12.000	0.05	2328.29	2324.35	4091.	11464.
11.000	0.45	2326.59	2322.85	4091.	11832.
10.000	0.49	2324.94	2321.19	4091.	11196.
9.000	0.75	2323.59	2319.65	4091.	11076.
8.000	0.80	2323.08	2319.10	4091.	10410.
7.000	-0.19	2320.82	2316.91	4091.	12039.
6.000	0.54	2319.14	2315.74	4091.	11966.
5.000	-0.12	2317.10	2312.88	4091.	10381.
4.000	-0.17	2315.05	2310.63	4091.	11322.
3.000	-0.26	2313.32	2308.94	4091.	10011.
2.000	0.21	2312.04	2308.51	4091.	10077.
1.000	0.77	2311.03	2306.67	4091.	9459.

$$END

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       0   DATA ERRORS DETECTED.

TOTAL NO. OF TIME STEPS READ =        30
TOTAL NO. OF WS PROFILES =            30
ITERATIONS IN EXNER EQ =          112500

COMPUTATIONS COMPLETED
RUN TIME =  0 HOURS,  0 MINUTES &  6.00 SECONDS
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