~~DRAFT~~ FINAL? yes

DESIGN ANALYSIS REPORT

FOR THE

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

UNSER DIVERSION

SEPTEMBER 1993

Easterling & Associates, Inc.

September 30, 1993

10131 Coors Rd., NW, Suite H-7
Albuquerque, New Mexico 87114
(505) 898-8021
FAX (505) 898-8501

Mr. Cliff Anderson
Albuquerque Metropolitan Arroyo
Flood Control Authority
2600 Prospect Avenue, NE
Albuquerque, NM 87107

Dear Cliff:

Transmitted with this letter is one draft copy of the Design Analysis Report for the Unser Diversion. Please review and comment on this report. I have also transmitted one copy of this report to Dan Hogan at City of Albuquerque Hydrology. I asked him to forward any comments he may have regarding the report to you.

To be consistent with the "existing condition" approach we are taking with the CLOMR submittal, you will find the focus of the report is on the initial design condition. This condition includes the watershed in its existing condition and no discharge from the Unser Diversion.

Please call me if you need additional information (898-8021).

Sincerely,

Vancel Fossinger

Vancel Fossinger
Staff Engineer

VSF/das
Job No. 3324.2

Enclosure

cc: Larry Blair, Albuquerque Metropolitan Arroyo Flood Control Authority
Ted Garrett, Garrett Group, Inc.

Easterling & Associates, Inc.

10131 Coors Rd., NW, Suite H-7
Albuquerque, New Mexico 87114
(505) 898-8021
FAX (505) 898-8501

September 30, 1993

Mr. Dan Hogan
Public Works Department
City of Albuquerque
P. O. Box 1293
Albuquerque, NM 87103

Dear Dan:

Transmitted with this letter for your review and comment is one draft copy of the Design Analysis Report for the Unser Diversion. Please forward your comments to Cliff Anderson at AMAFCA.

Sincerely,

Vancel Fossinger

Vancel Fossinger
Staff Engineer

VSF/das
Job No. 3324.2

Enclosure

cc: Larry Blair, Albuquerque Metropolitan Arroyo Flood Control Authority
Cliff Anderson, Albuquerque Metropolitan Arroyo Flood Control Authority
Ted Garrett, Garrett Group, Inc.

Easterling & Associates, Inc.

10131 Coors Rd., NW, Suite H-7
Albuquerque, New Mexico 87114
(505) 898-8021
FAX (505) 898-8501

September 30, 1993

Mr. Cliff Anderson
Albuquerque Metropolitan Arroyo
Flood Control Authority
2600 Prospect Avenue, NE
Albuquerque, NM 87107

Dear Cliff:

Transmitted with this letter is one draft copy of the Design Analysis Report for the Unser Diversion. Please review and comment on this report. I have also transmitted one copy of this report to Dan Hogan at City of Albuquerque Hydrology. I asked him to forward any comments he may have regarding the report to you.

To be consistent with the "existing condition" approach we are taking with the CLOMR submittal, you will find the focus of the report is on the initial design condition. This condition includes the watershed in its existing condition and no discharge from the Unser Diversion.

Please call me if you need additional information (898-8021).

Sincerely,

Vancel Fossinger

Vancel Fossinger
Staff Engineer

VSF/das
Job No. 3324.2

Enclosure

cc: Larry Blair, Albuquerque Metropolitan Arroyo Flood Control Authority
Ted Garrett, Garrett Group, Inc.

Easterling & Associates, Inc.

10131 Coors Rd., NW, Suite H-7
Albuquerque, New Mexico 87114
(505) 898-8021
FAX (505) 898-8501

September 30, 1993

Mr. Dan Hogan
Public Works Department
City of Albuquerque
P. O. Box 1293
Albuquerque, NM 87103

Dear Dan:

Transmitted with this letter for your review and comment is one draft copy of the Design Analysis Report for the Unser Diversion. Please forward your comments to Cliff Anderson at AMAFCA.

Sincerely,

Vancel Fossinger

Vancel Fossinger
Staff Engineer

VSF/das
Job No. 3324.2

Enclosure

cc: Larry Blair, Albuquerque Metropolitan Arroyo Flood Control Authority
Cliff Anderson, Albuquerque Metropolitan Arroyo Flood Control Authority
Ted Garrett, Garrett Group, Inc.

DRAFT

DESIGN ANALYSIS REPORT

FOR THE

ALBUQUERQUE METROPOLITAN ARROYO FLOOD CONTROL AUTHORITY

UNSER DIVERSION

SEPTEMBER 1993

PREPARED FOR:

SUNWEST BANK SPECIAL ASSETS DEPARTMENT AND THE BELL GROUP

PREPARED BY:

EASTERLING & ASSOCIATES, INC.
10131 COORS ROAD, N.W.
SUITE H-7
ALBUQUERQUE, NM 87114-4048
TELEPHONE (505) 898-8021

I, Charles M. Easterling, do hereby certify that this report was prepared by me or under my direction and that I ~~am a~~ duly registered Professional Engineer under the laws of the State of New Mexico.

Charles M. Easterling, P.E.
NMPE No. 6411

9-30-93

Date

CHARLES M. EASTERLING
NEW MEXICO
6411
REGISTERED PROFESSIONAL ENGINEER

TABLE OF CONTENTS

LIST OF APPENDICES

PLATES

DESIGN ANALYSIS REPORT
FOR THE
UNSER DIVERSION SYSTEM
SEPTEMBER 1993

PURPOSE

The purpose of this report is to demonstrate the adequacy of the proposed storm water diversion and retention facilities. Principal issues evaluated in this report include the following:

- Hydrology and Pond Routing
- Sediment Issues
- Emergency Spillways
- Storm Drain Pipe Class
- Outlet Structure Design

PROJECT DESCRIPTION

The proposed project consists of six excavated ponds, storm drain connections, minor collection and diversion dikes, and a storm drain outfall. The proposed ponds are to be located along the western boundary of the Atrisco Business Park, Unit 2 between the platted rights–of–way for Avalon Road and Daytona Road. Storm drains are proposed to connect the proposed ponds. A storm drain is proposed to be constructed from the lowest pond to the planned Tierra Bayita Storm Drain at Unser Boulevard to provide for future developed conditions in the watershed.

The project is expected to provide flood protection for the downstream area under a variety of watershed conditions. The expected watershed conditions include the following extremes and possibly several intermediate conditions.

- The design condition — The design condition assumes the watershed is in its existing, primarily undeveloped condition. In this condition, the project watershed is approximately 478 acres in size. This watershed, as shown on Plate 1, extends northwest from the project to the Ladera Diversion System. The project facilities are designed to intercept and retain all of the water and sediment runoff produced in the watershed in the design storm (100–year, 10–day). The focus of this report is on the design condition.

- Future fully developed condition — The developed condition watershed boundaries were identified in the West Bluff Drainage Plan Phase III (Reference 1). The watershed in the fully developed condition is expected to be much smaller than the existing one due to a proposed diversion project (The I–40 Interceptor), which is expected to be constructed along the north side of Interstate 40. OK

The intent of this design is to provide some flexibility for future drainage planning in the fully developed watershed. The project retention facilities were designed to be converted to detention and conveyance facilities to serve the watershed as it develops in the future. The basis for sizing storm drain outfalls and pond connections for this future developed condition was the AHYMO Modeling done for the Master Drainage Plan for the Atrisco Business Park (Reference 3).

The connection of the ponds together in series adds importance to good estimates of inflow timing. Because it is impossible at this time to predict how drainage will be treated and conveyed within the fully developed watershed, it is recommended that further system modeling be required as a part of future drainage planning in the watershed. Allowable discharge from the fully developed watershed should be based on the capacity of the system given a specific drainage plan for the watershed.

This constraint is consistent with the City of Albuquerque Drainage Ordinance Section 12, Paragraph G which states, "The City Engineer shall not approve any plan or report pertaining to proposed construction, platting or other development where the proposed activity or change in the land affected would result in downstream capacity being exceeded."

SYSTEM OPERATION

The following is an explanation of how the system is designed to function in the design condition watershed:

- Pond 6 is designed to retain all of the runoff which reaches it in the design storm. A 36″ storm drain will connect Pond 6 to downstream Pond 4 to provide for the future developed condition. In the event that Pond 6 receives more runoff than predicted, the additional volume will overtop the weir on the outlet structure and be passed through the 36″ storm drain to Pond 4.

- Pond 5 is designed to function primarily as a sedimentation basin to clean up flows from Mirehaven Arroyo "C" before they are conveyed via a 48″ storm drain to downstream Pond 4. Pond 5 is not expected to be required in the fully developed watershed so it was designed to be relatively small in size. Therefore, much of the flow that enters Pond 5 in the design storm will overtop the weir on the outlet structure and will be conveyed via the 48″ storm drain to Pond 4.

- Pond 4 is designed to function as a detention and retention pond for flows passed through Pond 5. It will not receive flow directly from the watershed. Runoff which exceeds the retention volume provided in Pond 4 will overtop the weir on the outlet structure and be conveyed to downstream Pond 3 via a 42″ diameter storm drain.

- Pond 3 is designed to function as a detention, retention and sedimentation pond for flows received directly from the watershed and flows from upstream ponds. The flow from the watershed will be collected and conveyed to the pond along an earthen berm. This berm will extend from the northern edge of the pond to the southern edge of Mirehaven Arroyo "C." Flows which exceed the retention volume in the pond will overtop the weir on the outlet structure and be conveyed through a 42″ storm drain to downstream Pond 2.

- Pond 2 is designed to function as a detention and retention pond for flows passed through Pond 4. This pond will retain the bulk of the flows conveyed to it. A small volume of the design flow will overtop the weir on the outlet structure and be conveyed downstream to Pond 1 via a 48″ storm drain.

- Pond 1 is designed to function as a retention pond for flow conveyed directly from the watershed as well as flows which pass through Pond 2. A 42″ diameter storm drain outfall is being constructed from this pond to the planned Tierra Bayita Storm Drain in Unser Boulevard to provide for the future developed condition.

Over 0.4 acre feet of storage volume is available in Pond 1 between the calculated design storm maximum water surface and the crest of the outlet weir. If a storm larger than the design storm occurs and the outlet weir is overtopped, the excess flow will enter the Unser Diversion Storm Drain and be conveyed to Unser Boulevard. If the Tierra Bayita Storm Drain has been completed in Unser Boulevard at the time of this occurence, the flow will outfall to the Tierra Bayita Storm Drain. If the Tierra Bayita Storm Drain is not in place, the flow would likely exit the Unser Diversion Storm Drain manhole located adjacent to Unser Boulevard and flow into Unser Boulevard.

If the excess flow is somehow prevented from entering the Unser Diversion Storm Drain, over 3 acre feet of additional storage volume is available between the crest of the emergency spillway and the crest of the outlet weir. If the emergency spillway is overtopped, flows will be released to a portion of the historic flow path from the watershed.

GENERAL OPERATION NOTES

If downstream outfalls become available before development occurs in the watershed, it may be desirable to convert the system from full retention to an extended detention system. This can be accomplished by relatively simple modifications to the pond outlet structures. ? What modification? For water quality purposes, it is recommended that the outflow rate from the system be kept very low and detention times long. The average discharge rate required from the system to drain it in 96 hours is approximately 2.75 cfs. Given this small outflow rate, design storm system operation will be nearly the same in the full retention or extended detention mode.

The runoff retained in each of the ponds will leave the ponds through evaporation and percolation through the natural soil lining the bottom and sides of the ponds. Reference 8 lists permeability of the soils in which the ponds will be constructed as 2″ to 20″ per hour. If the low estimate of 2″ per hour is assumed, Ponds 1 and 2 with the largest storage depths, will drain in less than two days.

It is expected that fine sediments collected in the ponds will reduce the natural permeability of the soils over time. But, due to the fact that the existing condition watershed does not generate runoff in the frequent events, and the watershed does not contain much road surface area (a source of oils and other soil sealing contaminants), it is not expected that the ponds will contain water for extended periods of time.

HYDROLOGY AND POND ROUTING

The AHYMO 392 hydrologic computer model was utilized to model runoff from the watershed, as well as perform stormwater routing through the proposed ponds. Modeling was done per the guidelines provided in the City of Albuquerque, Development Process Manual, Volume 2, Section 22.2, January 1993 Edition, City of Albuquerque Development Process Manual (COADPM).

Because the system is designed to function without an outfall in the initial condition, the 100–year 10–day storm was utilized as the design storm. Per the COADPM, the 10–day storm runoff is calculated by adding the runoff predicted for the 24–hour storm and the runoff which results from the rainfall falling on impervious areas between the first 24–hour period and the tenth day. Because the subject watershed has very little impervious area, runoff after the 24–hour storm is very limited. Due to this fact, flow rates from this extended runoff period were not considered important. Additional volume produced by this runoff was however utilized for proper sizing of the ponds. The 10–day storm was modeled per the following:

- The model was run using the 24–hour rainfall as the base storm.

- The volume of runoff generated on impervious areas between the 24–hour storm and the 10–day storm was calculated using the following equation:

  $V_{\triangle}$ = Impervious Area * (P_{10} days – P_{1440})/12.

- The additional volume was added to the inflow hydrographs of the ponds accepting runoff from the impervious areas. This runoff volume was added to the hydrographs after the peak of the storm had passed so that peak flow rates were not distorted.

Due to the fact that the existing condition watershed is mostly undeveloped, relatively high sediment content is expected in the inflow to the system. In order to model the effect of sediment content, sediment yields were predicted and pond inflow hydrographs were bulked accordingly. Further discussion of sediment issues is included in the next section.

Plate 1 of this report shows the existing condition watershed of the project, the subbasins utilized for modeling, and peak flow rates and volumes for various points in the system. Plate 1 also includes pond routing data.

Appendix "A" contains a print out of the AHYMO model input file and a summary table containing output data. A 3½″ computer disk located inside the back cover of this report contains the input, output, and summary table files for the model.

SEDIMENT ISSUES

Sediment is expected to impact the proposed system in the following ways:

- Create the need for periodic cleaning of the ponds to maintain capacity and infiltration.

- Add to inflow rates and volumes to be stored in the design storm.

- Potentially deposit in storm drain connections between ponds.

In order to evaluate the impact of sediment on the proposed system, a sediment analysis was performed to predict the following:

- Average annual sediment yield from the watershed.

- Sediment yield from the watershed in the design storm.

- Trap efficiency of ponds that directly receive water from the watershed and discharge outflow through a storm drain.

- Sediment transport capacity of storm drains expected to transport significant volumes of sediment.

The following text contains discussion of the methods used and the results of this analysis:

SEDIMENT YIELD

The delivery of sediment to the Unser Diversion System will be limited by the sediment transport capacity of the immediate upstream reaches of the conveyances to the

System. Based on this, sediment yield was estimated as the maximum transport capacity in the various conveyances based on the AHYMO simulated clear water runoff into the ponds. Sediment transport capacity consists of two major components. Sediment which is transported as bed load and sediment transported as wash load.

The method used to estimate transport capacity/sediment yield to the system included the following steps:

Step 1 — Estimate the Wash Load Sediment Concentration. Wash load was estimated using the Modified Universal Soil Loss Equation (MUSLE). The equation is:

$$Ys = \alpha \, (Qp * Vw)^{\beta} \;\; KLSCP$$

Where:

Ys = Event sediment yield in tons

α = A constant usually 95

Qp = Event peak flow rate in cfs

Vw = Event runoff volume in acre-feet

β = A constant usually 0.56

K = Soil erodibility factor

LS = Topographic factor

CP = Erosion control factor

Based on a recommendation from AMAFCA, a α coefficient of 300 was used in the equation instead of the usual 95. AMAFCA also recommended that the entire yield estimated by the MUSLE equation be considered as wash load for the purpose of calculating wash load concentrations.

"LS" Factor Values were calculated for each subbasin based on estimated average over land flow lengths and gradients. Appendix D contains a spreadsheet used in calculating "LS" values. An average "C" value of 0.26 was determined for the watershed based on field observation and the Soil Conservation Service generalized estimates (Reference 8) of 15 percent of (mostly grass) vegetative cover for soil types found in the watershed. Table 10 of the Wischmeir and Smith, 1978 was used to convert the percent of cover to the "C" value used.

Figure 1 of Appendix B shows the soil types in the watershed as identified in the soil survey of Bernalillo County and parts of Sandoval and Valencia Counties, New Mexico, (Reference 8). This figure also shows the location where soil samples were obtained by Easterling & Associates, Inc. (EAI) for sieve analysis by Vinyard and Associates. Appendix B also contains particle size distribution charts related to the samples. The soil types in the watershed are Pajarito, loamy fine sand, Bluepoint loamy fine sand, and Bluepoint – Kokan Association. SCS published values of the erodibility factor "K" for these soils is 0.17. This value appears reasonable in comparison with "K" factor estimates made by EAI for the collected soil samples, thus a "K" factor of 0.17 was used throughout the watershed.

The AHYMO Model of the watershed was run for the 2, 5, 10, 25, 50, and 100–year storms and the wash load concentration was estimated for individual subbasins, as well as overall drainage areas, contributing to analysis points. Appendix D contains copies of spreadsheets used to perform the MUSLE and wash load concentration calculations. Wash load concentrations at analysis points were calculated by first summing the calculated sediment yield and runoff volumes for the contributing areas. Then the wash load concentrations at the analysis points were calculated, as the P.P.M. of sediment weight to the weight of the water plus sediment, using the above mentioned sums. A summary of basin runoff values from the AHYMO Model and the calculated wash load concentrations for the modeled events is included on Plate 1 of this report.

Step 2 — Estimate Bed Load Transport. Bed load transport was calculated using an equation developed for use in the Albuquerque area by Resource Consultants and Engineers (RCE) under contract to AMAFCA. Appendix C contains a letter discussing the development and use of this equation.

A spreadsheet was developed by EAI to utilize this equation to calculate the sediment transport capacity for full storm events. Appendix E contains a copy of the sediment transport spreadsheets associated with this analysis.

The spreadsheet estimates total event transport capacity based on input of average flow rates and associated durations from the event hydrograph. Hydrographs were generated using the AHYMO Model. Flow characteristics required for the transport equation were calculated based on normal depth, given input of typical section characteristics. The wash load concentration required for the calculation is the value calculated in Step 1. This value was directly input into the spreadsheet and was assumed to be constant throughout the storm.

Defining a typical inflow conveyance section for Pond 1 and Pond 3 is difficult, as the primary existing conveyance mechanism within the watersheds that contribute to these ponds is sheet flow. Due to the relatively small impact that a high estimate of sediment yield at those two locations has on the overall system, it was assumed that the typical conveyance upstream of Ponds 1 and 3 is a trapezoidal channel with 3:1 side slopes, a 10′ bottom width, and a longitudinal slope similar to the slope of the upstream watershed. This assumption raises the calculated transport capacity/estimated sediment yields to the ponds above what it would be if a conveyance section more typical to the existing condition watershed was assumed. However, potential deposition of sediment near the inlets to the pond coupled with changes in flow patterns in the future may lead to more concentrated flows above these ponds. The assumption made in this analysis provides for this potential circumstance.

The D_{50} for this assumed channel is also difficult to determine. For the purpose of estimating potential sediment transport, it was assumed that an arroyo forming in the watershed will eventually have characteristics similar to the existing arroyos in the watershed. The average D_{50} for the two existing arroyos is approximately 0.59 mm. It was also assumed that in the early stages of arroyo formation, bed load will consist of finer material influenced by the gradation of the soil particles in the watershed which are larger than 0.074 mm. The average D_{50} of the watershed material larger than 0.074 mm is approximately 0.26 mm. The average of these two mean values is 0.42 mm. Conveniently, this is the lowest D_{50} value that the RCE transport equation is recommended for. Thus, a D_{50} of 0.42 mm was used to calculate sediment transport into Ponds 1 and 3 and transport in the earthen channel which discharges into Pond 6. The D_{50} values used to calculate transport capacity on Mirehaven Arroyos "B" and "C" were based on average gradation of bed material samples collected in the arroyos.

Step 3 — Estimate Total Sediment Yield. This was accomplished by summing the bed load and wash load volume calculated for individual time increments for a given event. The spreadsheet calculates the incremental bed load transport volume by multiplying the transport rate for a given flow by the input duration of the flow. Incremental wash load volumes are calculated by multiplying the volumetric wash load concentration by the product of the clear water flow rate and the incremental duration. The spreadsheet also sums the incremental transport volumes to calculate the total sediment transported/total sediment yield for the entire event.

The total sediment volume transported is reported for two unit weights of sediment. The 165 lbs/cf unit weight is assumed for sediment entrained in the flow and is used to compute bulking factors. The 100 lbs/cf unit weight is assumed for sediment deposits and is used for the determining volume of a pond which will be depleted by sediment deposition. The spreadsheet also reports the average bulking factor for the event and average total sediment concentration for the event.

SEDIMENT TRANSPORT/ YIELD SUMMARY

PROJECT: UNSER DIVERSION
DATE: 09/27/93 15:11

CONVEYANCE	LOCATION	WATERSHED AREA (ac.)	TOTAL SEDIMENT TRANSPORT (c.f. @ 100 lbs/cf) RETURN PERIOD						WEIGHTED AVERAGE ANNUAL
			2 YEAR	5 YEAR	10 YEAR	25 YEAR	50 YEAR	100 YEAR	
POND 1 WATERSHED	POND 1	97.2	0	34	880	4365	8604	14420	597.16
POND 3 WATERSHED	POND 3	69.2	0	171	1705	6182	11264	17437	848.395
MIREHAVEN ARROYO "C"	POND 5	211.0	327	941	4759	16539	29800	46176	2500.92
MIREHAVEN ARROYO "B".	POND 6	80.4	213	461	1458	4353	7628	12329	767.515
EARTHEN CHANNEL	POND 6	21.0	0	26	124	343	566	839	49.915
TOTAL		478.7	540	1633	8926	31782	57862	91201	4763.905

CONVEYANCE	LOCATION	WATERSHED AREA (ac.)	TOTAL SEDIMENT YIELD (tons per acre) RETURN PERIOD						WEIGHTED AVERAGE ANNUAL
			2 YEAR	5 YEAR	10 YEAR	25 YEAR	50 YEAR	100 YEAR	
POND 1 WATERSHED	POND 1	97.2	0.00	0.02	0.45	2.25	4.43	7.42	0.31
POND 3 WATERSHED	POND 3	69.2	0.00	0.12	1.23	4.47	8.14	12.60	0.61
MIREHAVEN ARROYO "C"	POND 5	211.0	0.08	0.22	1.13	3.92	7.06	10.94	0.59
MIREHAVEN ARROYO "B".	POND 6	80.4	0.13	0.29	0.91	2.71	4.75	7.67	0.48
EARTHEN CHANNEL	POND 6	21.0	0.00	0.06	0.30	0.82	1.35	2.00	0.12
TOTAL		478.7	0.06	0.17	0.93	3.32	6.04	9.53	0.50

CONVEYANCE	LOCATION	WATERSHED AREA (ac.)	TOTAL SEDIMENT YIELD (acre*ft per sq. mile @100 lbs/cf) RETURN PERIOD						WEIGHTED AVERAGE ANNUAL
			2 YEAR	5 YEAR	10 YEAR	25 YEAR	50 YEAR	100 YEAR	
POND 1 WATERSHED	POND 1	97.2	0.000	0.005	0.133	0.660	1.301	2.180	0.090
POND 3 WATERSHED	POND 3	69.2	0.000	0.036	0.362	1.313	2.393	3.704	0.180
MIREHAVEN ARROYO "C"	POND 5	211.0	0.023	0.066	0.331	1.152	2.075	3.215	0.174
MIREHAVEN ARROYO "B".	POND 6	80.4	0.039	0.084	0.267	0.796	1.394	2.254	0.140
EARTHEN CHANNEL	POND 6	21.0	0.000	0.018	0.087	0.240	0.396	0.587	0.035
TOTAL		478.7	0.017	0.050	0.274	0.975	1.776	2.799	0.146

CONVEYANCE	LOCATION	WATERSHED AREA (ac.)	AVERAGE HYDROGRAPH BULKING FACTOR RETURN PERIOD					
			2 YEAR	5 YEAR	10 YEAR	25 YEAR	50 YEAR	100 YEAR
POND 1 WATERSHED	POND 1	97.2	1	1.01	1.02	1.04	1.05	1.05
POND 3 WATERSHED	POND 3	69.2	1	1.02	1.04	1.06	1.08	1.08
MIREHAVEN ARROYO "C"	POND 5	211.0	1.01	1.02	1.03	1.05	1.06	1.07
MIREHAVEN ARROYO "B".	POND 6	80.4	1.01	1.02	1.02	1.03	1.04	1.05
EARTHEN CHANNEL	POND 6	21.0	1	1.01	1.01	1.01	1.01	1.01
		478.7						

TABLE 1

Table 1 is a summary of the estimated sediment yields based on the transport capacities of the upstream conveyance. The estimated yields have been reported several different ways to provide a basis of comparison to other sediment yield estimates in the local area. The estimated average annual yield presented was calculated using the yields calculated with the MUSLE for various events and equation 4.2 of the AMAFCA "Sediment and Erosion Design Guide" (Reference 7). The equation used is:

$$(Y_s)_m = 0.01(Y_s)_{100} + 0.01\left[\frac{(Y_s)_{100} + (Y_s)_{50}}{2}\right] + 0.02\left[\frac{(Y_s)_{50} + (Y_s)_{25}}{2}\right] + 0.06\left[\frac{(Y_s)_{25} + (Y_s)_{10}}{2}\right] + 0.1\left[\frac{(Y_s)_{10} + (Y_s)_{5}}{2}\right] + 0.3\left[\frac{(Y_s)_{5} + (Y_s)_{2}}{2}\right] + 0.5\left[\frac{(Y_s)_{2} + 0}{2}\right]$$

Where: $(Y_S)_M$ = Mean Annual Sediment Yield

$(Y_S)_n$ = Event Sediment Yield

The watershed wide average annual computed yield is 0.50 tons/acre or 0.146 ac–ft/mi^2. The watershed wide 100–year computed yield is 9.53 ton/acre or 2.8 ac-ft/mi^2.

DISCUSSION OF ESTIMATED SEDIMENT YIELD

The estimated average annual sediment yield computed here compares favorably with the 0.2 – 0.5 ac–ft/mi^2 annual soil erosion rates for the site indicated on the 1978 edition map titled "Soil Erosion Rates in New Mexico," published by the New Mexico Natural Resources

Department, Soil and Water Conservation Division. For another point of comparison, the PSIAC Method (PSIAC, 1968) was applied to the overall watershed. Appendix F contains the worksheets utilized in this analysis. The PSIAC method predicts an average annual yield of 0.44 ac–ft/mi^2 or 1.15 ton/acre. The PSIAC estimate is somewhat higher than the computed yield but is within the same range as the calculated yield.

A large factor contributing to the calculated average annual yield being low is the lack of significant runoff produced in the 5–year, 2–year and smaller storms in the existing condition watershed. Due to the moderately rapid to rapid permeability of the soils in the watershed, no runoff is produced in the existing condition watershed by the frequent storm events.

TRAP EFFICIENCY

Trap efficiency was estimated for Ponds 3 and 5 of the system for the 100–year storm. All other ponds either have no discharge in the design storm (Ponds 1 and 6) or accept only relatively clean flow from upstream ponds (Ponds 2 and 4). Trap efficiency in Ponds 3 and 5 is of interest as both of these ponds accept water directly from the watershed and will discharge flows through storm drains in the design event. If trap efficiency is not sufficient in these ponds, the downstream storm drains may have potential for clogging.

The procedure used is consistent with the procedure given in the AMAFCA Sediment and Erosion Design Guide. A spreadsheet was formulated to assist with trap efficiency calculations. Copies of the spreadsheets are contained in Appendix G. The AHYMO Model was used to generate inflow and outflow hydrographs based on inflow bulked for estimated sediment content for use in the calculations.

The following assumptions were made as a basis for the analysis:

- The inflow sediment would be made up of bed load consistent with the average gradation of the upstream conveyance and wash load consistent with the average gradation of soils in the watershed. The inflow volume of each for a given time step was taken from the upstream sediment transport analysis spreadsheet.

- All of the sediment content of water ponded below the sill of the outlet structure would be retained.

- The velocity through the pond is based on the effective flow area geometry indicated in the Sediment and Erosion Design Guide. Vertical depth of the effective flow area was assumed to be the depth between the water surface and the sill of the outlet. A third zone representing the full width of the pond was utilized to compute flow velocities in the area between full width expansion of the inflow and outflow effective areas. Flow rate in this third area was assumed to be the average of the inflow and outflow rates.

- The settling depth is the distance between the water surface and the sill of the outlet.

- The sediment has even vertical distribution within the settling zone at the inlet.

- A particle which has sufficient time to fall entirely through the settling depth will be trapped in the pond.

It should be noted that some of these assumptions are great simplifications of complex flow conditions through the ponds. These simplifications were made to provide a basis on which to make a reasonable trap efficiency estimate.

Input to the model consists of physical dimensions related to the pond, fine sediment concentration, inflow wash load and bed load gradation, fall velocities for given particle size ranges based on the fall velocity for the smallest particle in the range, incremental inflow and outflow rates, incremental bed load and wash load inflow volumes, and incremental peak stages.

Output data includes total volume of sediment retained and passed by size range and overall, overall and incremental trap efficiency, and incremental overall volumes retained.

The overall modeled trap efficiency of Pond 5 is 86 percent. The model indicates that of 27,983 cf of sediment inflow all but 3,954 cf of less than 0.18 mm particles will be retained. The volume of sediment passing will be transported in 8.7256 ac-ft of flow to Pond 4 according to the AHYMO model. The average volumetric sediment content of this flow will be approximately one percent.

The overall modeled trap efficiency of Pond 3 is 98 percent. The model indicates that of 10,569 cf of total sediment inflow all but 209 cf of less than 0.074 mm diameter particles will be retained. The volume of sediment passing will be transported in 6.4332 ac-ft of flow to Pond 2 according to the AHYMO Model. The average estimated volumetric sediment content of this flow is less than 0.1 percent.

SEDIMENT TRANSPORT THROUGH STORM DRAINS

The 48″ diameter storm drain between Pond 5 and Pond 4 was the only storm drain analyzed for potential sediment deposition problems. All other storm drain connections between ponds will either carry no flow in the 100–year storm in the system's initial operating mode or are not expected to transport enough sediment to present significant problems.

The estimated sediment content to be transported between Pond 5 and Pond 4 is not particularly high, but due to a backwater condition at the outlet of this storm drain during the receding limb of the hydrograph, it was thought a transport analysis was warranted.

An equation presented in Simons, Li, and Associates, "Engineering Analysis of Fluvial Systems," 1982 was utilized for the analysis. The equation is credited to Graf and Acaroglu, 1968. Appendix B contains a copy of a spreadsheet prepared to perform the calculations with this equation. The equation is:

$$Q_{MAX} = 21.44 * ds^{-1.02} * S^{2.52} * R^{1.52} * A$$

Where: Q_{MAX} = Max. Sediment Discharge in cfs

R = Hydraulic radius in feet

A = Flow area in sf

S = Slope in feet/feet

ds = Average particle size in feet

Flow conditions during eight time increments during the receding limb of the hydrograph were analyzed. Two average particle sizes were utilized. The smaller particle size was used for increments of the flow where the trap efficiency analysis indicated that all of the larger particles would be trapped in Pond 5. Both particle sizes used represent the upper size range of the sediment being discharged into the pipe from Pond 5.

The analysis indicates that there will not be significant problems with deposition in the pipe. Some deposition is indicated in the final two time steps analyzed. However, it seems unlikely that silt or clay particles which remain suspended throughout the rather slow journey across Pond 5 at the relatively low flow rates (27.5 and 13.02 cfs) will fall out in the pipe. Even if a small amount of sediment falls out in the low rates at the end of the storm flow, the material is fine enough that it should be quickly scoured by the next flow through the storm drain.

OUTLET DESIGN

The pond outlet structures are designed to function in the design condition as well as future conditions with some modifications.

The structures are planned with solid concrete weirs and grated tops. The structures will maintain a retention pool in each pond while allowing excess volumes to pass over the weir and into the storm drain outfalls.

In the future, as the ponds are converted from retention to detention facilities, holes can be cored through the face of the structures to allow the passage of water at lower elevations. Reinforcement bar spacing has been designed at 16″ vertical and 17″ horizontal to allow coring to occur without damage to the bars. Holes can be added in response to increased flows from the watershed as development occurs.

One concern related to outlet structures such as the ones proposed is the potential for them to float. The proposed outlet structures were designed to resist the buoyant force. Additional thickness was added to the bottom of the outlet structures to provide the required weight. Calculations of required bottom thickness are included in Appendix I.

EMERGENCY SPILLWAY CAPACITY

Emergency spillways armored with 1.5′ thick by 15′ wide soil–cement are planned for each of the proposed ponds. The inlets are sized to pass the estimated 100–year peak inflow rates at flow depths of 1′ or less. A generalized approach was taken in determining spillway lengths due to the fact that it is unknown exactly how flows will be routed to the system in the fully developed condition.

The flow rate per foot that can be passed over the spillway is approximately 3 cfs as calculated by the weir equation. $Q = CLh^{3/2}$.

$$3 * 1 * 1^{1.5} = 3 \text{ cfs}$$

Per AHYMO modeling of the watershed peak, 100–year inflow rates to Pond 3 will be less than 150 cfs. Peak flow rates into all other ponds are expected to be less than 300 cfs. Therefore, a spillway length of 50′ (150 ÷ 3) is proposed for Pond 3, and spillway lengths of 100′ (300 ÷ 3) are proposed for all other ponds.

PIPE AND BEDDING CLASS

Because the potential for piping around the storm drains exists, Class B bedding consisting of native granular materials is recommended for all storm drains included in the project. Sufficient care should be taken during construction to insure that the bedding is properly compacted below the spring line of the pipe.

Appendix "J" contains calculations performed to determine the required class of reinforced concrete pipe for the project. Class III pipe with Class "B" bedding is adequate for the 36″ and 42″ diameter storm drains. Class IV pipe with Class "B" bedding is required for the 48″ portion of the Unser Diversion Storm Drain.

CONCLUSIONS

- The Unser Diversion facilities are more than adequate to fully retain the estimated water and sediment runoff volume from the watershed in the existing condition 100–year storm. This is demonstrataed by the data presented in the pond data summary on Plate 1.

- A minimum of 2′ of freeboard will be maintained in each pond between the predicted 100–year water/high surface and the crest of the emergency spillways. This freeboard represents a significant amount of additional volume in the ponds as shown in the pond data summary on Plate 1.

- Emergency spillways are large enough to pass the estimated 100–year peak inflow rates at 1 foot or less flow depths.

- The ponds should be inspected annually and after large storms to assess the volume of sediment accumulation. Sediment volumes, which exceed the volume provided in the system for long term sediment storage, should be removed promptly in order to assure that sufficient volume is available to retain the flows from the 100–year storm.

- The system will require little maintenance before the watershed is developed due to the infrequent occurrence of runoff from the watershed.

- The specified pipe class and bedding is adequate for the design conditions of this project.

- The system is adaptable to a detention system to meet the future requirements in the watershed.

REFERENCES

1. Andrews, Asbury, and Roberts, Inc., "West Bluff Drainage Plan Phase III," January 1987.

2. ASCE Manuals and Reports on Engineering Practice No. 54, "Sedimentation Engineering," American Society of Civil Engineers, 1962.

3. Easterling & Associates, Inc., "Master Drainage Plan for the Atrisco Business Park," September 1993.

4. Ferguson, Bruce and Thomas, Debo, "On-Site Stormwater Management," Van Nostrand Reinhold, New York, 1990.

5. Pacific Southwest Interagency Committee (PSIAC), "Report on Factors Affecting Sediment Yield in the Pacific Southwest Areas," Water Management Subcommittee Sediment Task Force, 1968.

6. Resource Consultants and Engineers, Inc., "Borrega Diversion Sediment Issues Flood Plain Study for AMAFCA," Prepared for Bohannan–Huston, Inc., 1992.

7. Resource Consultants and Engineers, Inc., "Draft Sediment and Erosion Design Guide," prepared for Albuquerque Metropolitan Arroyo Flood Control Authority, 1992.

8. Soil Conservation Service, "Soil Survey of Bernalillo and Parts of Sandoval and Valencia Counties, New Mexico," 1977.

9. Wishmeier, Walter and Smith, Dwight, "Predicting Rainfall Erosion Losses — A Guide to Conservation Planning," U.S. Department of Agriculture, Agricultural Handbook No. 537, 1978.

APPENDIX A

AHYMO MODEL DATA

Table of Contents

Item Page

```
****************************************************************************
****************************************************************************
** FILE NAME: UD10010I.HMI(UNSER DIVERSION, STORM FREQUENCY, STORM DURATION,
** WATERSHED CONDITION)
** ANALYSIS OF THE UNSER DIVERSION SYSTEM IN THE INTERIN CONDITION IN WHICH THE
** WATERSHED IS IN THE EXISTING, MOSTLY UNDEVELOPED CONDITION
** 10 DAY STORM IS MODELED BY ADDING A HYDROGRAPH REPRESENTING THE ADDITIONAL
** VOLUME OF THE STORM WHICH OCCURS AFTER THE 24 HOUR BASE STORM
****************************************************************************
****************************************************************************
START                0.0 HOURS
**100 YEAR STORM
RAINFALL               TYPE=2  0.0  1.87  2.20  2.66    DT=0.0500
**NOTE: IF STORM IS CHANGED THE 1 TO 10 DAY VOLUME WHICH IS ADDED ABOVE
**PONDS 5 AND 6 SHOULD ALSO BE CHANGED ACCORDINGLY.
** 50 YEAR STORM
**RAINFALL             TYPE=2  0.0  1.70  1.98  2.39    DT=0.0500
** 25 YEAR STORM
**RAINFALL             TYPE=2  0.0  1.51  1.76  2.12    DT=0.0500
**  10 YEAR STORM
**RAINFALL             TYPE=2  0.0  1.25  1.47  1.77    DT=0.0500
**  5 YEAR STORM
**RAINFALL             TYPE=2  0.0  1.04  1.24  1.51    DT=0.0500
**  2 YEAR STORM
**RAINFALL             TYPE=2  0.0  0.74  0.95  1.15    DT=0.0500
****************************************************************************
*S BEGIN UNSER DIVERSION CHANNEL WATERSHED
****************************************************************************
** ANALYSIS ASSUMPTIONS: OFFSITE WATERSHED IN EXISTING CONDITON
** THE UNSER DIVERSION IS ASSUMED TO HAVE NO OUTFALL IN THE INTERIM CONDITION
** AN OUTFALL IS PLANNED FOR THE SYSTEM BUT MAY NOT BE IN PLACE WHEN THE SYSTEM
** IS PUT INTO OPERATION THEREFORE THE SYSTEM IS DESIGNED TO RETAIN THE 100 YR.
** 10 DAY STORM.
****************************************************************************
** BEGIN WATERSHED NORTH OF THE FUTURE PROPOSED INTERSTATE 40
** INTERCEPTOR CHANNEL
****************************************************************************
** COMPUTE  HYDROGRAPH BASIN 120.1 *******************************************
COMPUTE NM HYD        ID=1  HYDROGRAPH NO=120.1  DA=0.0259
                      %A=100.0  %B=0.0  %C=0.0  %D=0.0  TP=0.1333
                      MASS RAINFALL=-1
PRINT HYD             ID=1  CODE=1
** COMPUTE  HYDROGRAPH BASIN 120.2 *********************************************
COMPUTE NM HYD        ID=2  HYDROGRAPH NO=120.2 DA=0.0545
                      %A=100.0  %B=0.0  %C=0.0  %D=0.0  TP=0.193
                      MASS RAINFALL=-1
PRINT HYD             ID=2  CODE=1
** ADD HYDROGRAPHS FOR BASIN 120.1 AND BASIN 120.2
ADD HYD               ID=3  HYDROGRAPH NO=120.21 ID I=1  ID II=2
PRINT HYD             ID=3  CODE=1
** ROUTE FLOW DOWN MIREHAVEN ARROYO "B" TO THE NORTH SIDE OF I-40
COMPUTE RATING CURVE CID=1  VALLEY SECTION=1  NUMBER OF SEGMENTS=1
                      MINIMUM ELEV=100.0 FT  MAXIMUM ELEV=106.0 FT
                      CHANNEL SLOPE=0.0229  FLOOD PLAIN SLOPE=0.0256
                      N=0.035  DIST=47
                      DIST  ELEV   DIST   ELEV   DIST   ELEV   DIST   ELEV
```

```
                         0   106.0    20    105.0   30    100.0   40    100.0
                        45   105.0    47    106.0
COMPUTE TRAVEL TIME ID=4  REACH NO=1  VALLEY SECTIONS=1
                    LENGTH=1750 FT  SLOPE=0.0229
ROUTE               ID=4  HYDROGRAPH NO=120.22 INFLOW ID=3  DT=0.0
PRINT HYD           ID=4  CODE=1
** COMPUTE HYDROGRAPH FOR BASIN 120.3 *****************************************
COMPUTE NM HYD      ID=1  HYDROGRAPH NO=120.3  DA=0.0199
                    %A=100.0  %B=0.0  %C=0.0  %D=0.0  TP=0.1333
                    MASS RAINFALL=-1
PRINT HYD           ID=1  CODE=1
** ADD HYDROGRAPH FOR BASIN 120.3 TO ROUTED FLOW IN MIREHAVEN ARROYO "B" NORTH
** OF I-40
ADD HYD             ID=10  HYDROGRAPH NO=120.31 ID I=1  ID II=4
PRINT HYD           ID=10  CODE=1
** COMPUTE HYDROGRAPH FOR BASIN 130.1 *****************************************
COMPUTE NM HYD      ID=3  HYDROGRAPH NO=130.1   DA=0.0743
                    %A=100.0  %B=0.0  %C=0.0  %D=0.0  TP=0.237
                    MASS RAINFALL=-1
PRINT HYD           ID=3  CODE=1
** COMPUTE HYDROGRAPH FOR BASIN 130.2 *****************************************
COMPUTE NM HYD      ID=4  HYDROGRAPH NO=130.2  DA=0.0489
                    %A=100.0  %B=0.0  %C=0.0  %D=0.0  TP=0.1856
                    MASS RAINFALL=-1
PRINT HYD           ID=4  CODE=1
**COMPUTE HYDOGRAPH FOR BASIN 130.3 (SEGMENT OF NOLASCO STREET)****************
COMPUTE NM HYD      ID=5  HYDROGRAPH NO=130.3  DA=0.0047
                    %A=0.0  %B=0.0  %C=0.0  %D=100.0  TP=0.133333
                    MASS RAINFALL=-1
PRINT HYD           ID=5  CODE=1
** ADD BASINS 130.1 AND 130.2 HYDROGRAPHS**************************************
ADD HYD             ID=6  HYDROGRAPH NO=130.21 ID I=4  ID II=3
PRINT HYD           ID=6  CODE=1
** ADD BASIN 130.3 HYDROGRAPH TO BASIN 130.1 AND 130.2 COMBINED HYDRGRAPH *****
ADD HYD             ID=1  HYDROGRAPH NO=130.31 ID I=5  ID II=6
PRINT HYD           ID=1  CODE=1
** ROUTE FLOW FROM BASINS 130.1,130.2 AND 130.3 DOWN MIREHAVEN ARROYO "C" TO
** THE NORTH SIDE OF I-40 *****************************************************
COMPUTE RATING CURVE CID=2  VALLEY SECTION=1  NUMBER OF SEGMENTS=1
                    MINIMUM ELEV=100.0 FT  MAXIMUM ELEV=106.0 FT
                    CHANNEL SLOPE=0.0310  FLOOD PLAIN SLOPE=0.0310
                    N=0.035  DIST=47
                    DIST  ELEV    DIST   ELEV   DIST   ELEV   DIST   ELEV
                      0   106.0    20    105.0   30    100.0   40    100.0
                     45   105.0    47    106.0
COMPUTE TRAVEL TIME ID=11  REACH NO=2  VALLEY SECTIONS=1
                    LENGTH=1500 FT  SLOPE=0.0310
ROUTE               ID=11  HYDROGRAPH NO=130.32  INFLOW ID=1  DT=0.0
PRINT HYD           ID=11  CODE=1
**COMPUTE HYDROGRAPH FOR BASIN 130.4 ******************************************
COMPUTE NM HYD      ID=1  HYDROGRAPH NO=130.4  DA=0.0612
                    %A=100.0  %B=0.0  %C=0.0  %D=0.0  TP=0.1454
                    MASS RAINFALL=-1
PRINT HYD           ID=1  CODE=1
** ADD THE HYDOGRAPH FOR BASIN 130.4 TO MIREHAVEN ARROYO "C" NORTH OF I-40*****
ADD HYD             ID=12  HYDROGRAPH NO=130.41  ID I=1  ID II=11
PRINT HYD           ID=12  CODE=1
```

```
**COMPUTE HYDROGRAPH FOR BASIN 130.6 *******************************************
COMPUTE NM HYD       ID=11  HYDROGRAPH NO=130.6  DA=0.0710
                     %A=100.0  %B=0.0  %C=0.0  %D=0.0  TP=0.1902
                     MASS RAINFALL=-1
PRINT HYD            ID=11  CODE=1
********************************************************************************
** BEGIN  WATERSHED SOUTH OF FUTURE PROPOSED INTERSTATE 40
** INTERCEPTOR CHANNEL
********************************************************************************
**ROUTE THE FLOW FROM BASIN 130.6 THROUGH AN EXISTING 30" CULVERT UNDER I-40
COMPUTE RATING CURVE CID=1  VALLEY SECTION NO=1  CODE=-1  SLOPE=0.015
                     PIPE DIA=30  N=0.013
COMPUTE TRAVEL TIME ID=15  REACH=1  NUMBER OF VALLEY SECTIONS=1
                     LENGTH=237 FT  SLOPE=0.015
ROUTE                ID=15  HYDROGRAPH NO=130.61  INFLOW ID=11 DT=0.0
PRINT HYD            ID=15  CODE=1
** ROUTE FLOWS DOWN EXISTING INCISED TRAIL FROM THE SOUTH SIDE OF I-40 TO SOUTH
** SIDE OF BASIN 130.7********************************************************
COMPUTE RATING CURVE CID=4  VALLEY SECTION=1  NUMBER OF SEGMENTS=1
                     MINIMUM ELEV=100 FT  MAXIMUM ELEV=101.5 FT
                     CHANNEL SLOPE=0.025  FLOOD PLAIN SLOPE=0.025
                     N=0.035  DIST=16
                     DIST  ELEV    DIST   ELEV   DIST   ELEV   DIST   ELEV
                       0   101.5     4    100.0   12    100.0   16    101.5
COMPUTE TRAVEL TIME ID=11  REACH NO=2  VALLEY SECTIONS=1
                     LENGTH=550 FT  SLOPE=0.025
ROUTE                ID=11 HYDROGRAPH NO=130.62 INFLOW ID=15 DT=0.0
PRINT HYD            ID=11  CODE=1
** ROUTE FLOWS FROM BASIN 130.4 AND ABOVE THROUGH  BOX CULVERT UNDER I-40******
COMPUTE RATING CURVE CID=3  VALLEY SECTION=1  NUMBER OF SEGMENTS=1
                     MINIMUM ELEV=100 FT  MAXIMUM ELEV=112 FT
                     CHANNEL SLOPE=0.031  FLOOD PLAIN SLOPE=0.031
                     N=-0.015  DIST=20.1
                     DIST  ELEV    DIST   ELEV   DIST   ELEV   DIST   ELEV
                       0   108     0.10   100    10.1   100    10.15  108
                      11   108     11.1   100    20.0   100    20.1   108
COMPUTE TRAVEL TIME ID=1  REACH NO=3  VALLEY SECTIONS=1
                     LENGTH=350  FT  SLOPE=0.020
ROUTE                ID=1  HYDROGRAPH NO=130.42 INFLOW ID=12  DT=0.0
PRINT HYD            ID=1  CODE=1
** COMPUTE HYDROGRAPH FOR BASIN 130.5 (PORTION OF I-40)************************
COMPUTE NM HYD       ID=3  HYDROGRAPH NO=130.5  DA=0.0104
                     %A=51.0  %B=0.0  %C=0.0  %D=49.0  TP=0.133333
                     MASS RAINFALL=-1
PRINT HYD            ID=3  CODE=1
** ADD BASIN 130.5 HYDROGRAPH TO MIREHAVEN ARROYO "C" FLOW SOUTH OF I-40******
ADD HYD              ID=4  HYDROGRAPH NO=130.51 ID I=1  ID II=3

PRINT HYD            ID=4  CODE=1
** COMPUTE HYDROGRAPH FOR BASIN 130.7*******************************************
COMPUTE NM HYD       ID=1  HYDROGRAPH NO=130.70  DA=0.01696
                     %A=86.0  %B=12.0  %C=2.0  %D=0.0  TP=0.133333
                     MASS RAINFALL=-1
PRINT HYD            ID=1  CODE=1
** COMPUTE HYDROGRAPH FOR BASIN 130.9*******************************************
COMPUTE NM HYD       ID=2  HYDROGRAPH NO=130.90  DA=0.00954
                     %A=86.0  %B=12.0  %C=2.0  %D=0.0  TP=0.133333
```

```
                      MASS RAINFALL=-1
PRINT HYD             ID=2  CODE=1
** ADD BASIN 130.7 HYDROGRAPH TO BASIN 130.9 HYDROGRAPH********************
ADD HYD               ID=1  HYDROGRAPH NO=130.91 ID I=1  ID II=2
PRINT HYD             ID=1  CODE=1
** ROUTE FLOWS DOWN MIREHAVEN ARROYO "C" FROM THE SOUTH SIDE OF I-40 TO SOUTH
** BOUNDARY OF BASIN 130.9***********************************************
COMPUTE RATING CURVE CID=1  VALLEY SECTION=1  NUMBER OF SEGMENTS=1
                      MINIMUM ELEV=100 FT  MAXIMUM ELEV=106 FT
                      CHANNEL SLOPE=0.025  FLOOD PLAIN SLOPE=0.025
                      N=0.032  DIST=44
                      DIST  ELEV    DIST   ELEV   DIST   ELEV   DIST   ELEV
                        0   105.0     20   104.0   26    100.0   36    100.0
                       42   104.0     44   105.0
COMPUTE TRAVEL TIME ID=3  REACH NO=4  VALLEY SECTIONS=1
                      LENGTH=1000 FT  SLOPE=0.025
ROUTE                 ID=3  HYDROGRAPH NO=130.52 INFLOW ID=4  DT=0.0
PRINT HYD             ID=3  CODE=1
** ADD THE HYDROGRAPH FOR BASIN 130.7 TO THE MIREHAVEN ARROYO "C" FLOW********
ADD HYD               ID=4  HYDROGRAPH NO=130.72 ID I=1  ID II=3
PRINT HYD             ID=4  CODE=1
** ADD THE ROUTED FLOW IN THE INCISED TRAIL TO THE MIREHAVEN ARROYO "C" FLOW
** AT THE SOUTHERN BOUNDARY OF BASIN 130.7
ADD HYD               ID=2  HYDROGRAPH NO=130.73 ID I=4  ID II=11
PRINT HYD             ID=2  CODE=1
**COMPUTE HYDROGRAPH FOR BASIN 130.8******************************************
COMPUTE NM HYD        ID=1  HYDROGRAPH NO=130.8  DA=0.0327
                      %A=100.0  %B=0.0  %C=0.0  %D=0.0  TP=0.1410
                      MASS RAINFALL=-1
PRINT HYD             ID=1  CODE=1
** ROUTE FLOWS IN ARROYO FROM BASIN 130.7 TO POND No. 5 OF THE PROPOSED
** UNSER DIVERSION
COMPUTE RATING CURVE CID=5  VALLEY SECTION=1  NUMBER OF SEGMENTS=1
                      MINIMUM ELEV=100 FT  MAXIMUM ELEV=105 FT
                      CHANNEL SLOPE=0.023  FLOOD PLAIN SLOPE=0.023
                      N=0.032  DIST=42
                      DIST  ELEV    DIST   ELEV   DIST   ELEV   DIST   ELEV
                        0   105.0     20   104.0   24    100.0   36    100.0
                       40   104.0     42.0 105.0
COMPUTE TRAVEL TIME ID=3  REACH NO=5  VALLEY SECTIONS=1
                      LENGTH=1600 FT  SLOPE=0.023
ROUTE                 ID=3  HYDROGRAPH NO=130.74  INFLOW ID=2  DT=0.0
PRINT HYD             ID=3  CODE=1
** ADD HYDROGRAPH FOR BASIN 130.8 TO FLOW IN THE MIREHAVEN ARROYO "C" AT POND
** No. 5 OF THE PROPOSED UNSER DIVERSION
ADD HYD               ID=11  HYDROGRAPH NO=130.81 ID I=3  ID II=1
PRINT HYD             ID=11  CODE=1
******************************************************************************
**PICKUP MIREHAVEN ARROYO "B" FLOWS ON THE NORTH SIDE OF I-40
******************************************************************************
** ROUTE FLOWS IN MIREHAVEN ARROYO "B" FROM THE NORTH SIDE OF I-40 THROUGH
** 3x6x4' BOX CULVERT TO THE SOUTH SIDE OF I-40
COMPUTE RATING CURVE CID=6  VALLEY SECTION=1  NUMBER OF SEGMENTS=1
                      MINIMUM ELEV=100.0 FT  MAXIMUM ELEV=104FT
                      CHANNEL SLOPE=0.022 FLOOD PLAIN SLOPE=0.022
                      N=-0.013  DIST=20.1
                      DIST  ELEV    DIST   ELEV   DIST   ELEV   DIST   ELEV
```

```
                      0   104      0.1   100     6.0   100     6.1   104
                      7   104      7.1   100    13.0   100    13.1   104
                     14   104     14.1   100    20.0   100    20.1   104
COMPUTE TRAVEL TIME ID=3  REACH NO=6  VALLEY SECTIONS=1
                    LENGTH=306 FT  SLOPE=0.022
ROUTE               ID=3  HYDROGRAPH NO=120.32 INFLOW ID=10  DT=0.0
PRINT HYD           ID=3  CODE=1
** COMPUTE HYDROGRAPH BASIN 120.4 (A SEGMENT OF I-40)**************************
COMPUTE NM HYD      ID=1  HYDROGRAPH NO=120.4 DA=0.0091
                    %A=51.0  %B=0.0  %C=0.0  %D=49.0  TP=0.133333
                    MASS RAINFALL=-1
PRINT HYD           ID=1  CODE=1
** ADD HYDROGRAPH FOR BASIN 120.4 TO THE FLOW IN THE MIREHAVEN ARROYO "B"*****
ADD HYD             ID=2  HYDROGRAPH NO=120.41  ID I=3   ID II=1
PRINT HYD           ID=2  CODE=1
** ROUTE FLOWS IN MIREHAVEN ARROYO "B" TO POND No. 6 OF THE PROPOSED UNSER
** DIVERSION
COMPUTE RATING CURVE CID=6  VALLEY SECTION=1  NUMBER OF SEGMENTS=1
                    MINIMUM ELEV=100 FT  MAXIMUM ELEV=106 FT
                    CHANNEL SLOPE=0.023 FLOOD PLAIN SLOPE=0.023
                    N=0.030  DIST=34
                    DIST  ELEV    DIST   ELEV   DIST   ELEV   DIST   ELEV
                      0   106.0     2   105.0    12    100.0   22    100.0
                     32   105.0    34   106.0
COMPUTE TRAVEL TIME ID=1  REACH NO=7  VALLEY SECTIONS=1
                    LENGTH=1700 FT  SLOPE=0.023
ROUTE               ID=1  HYDROGRAPH NO=120.42 INFLOW ID=2  DT=0.0
PRINT HYD           ID=1  CODE=1
**COMPUTE HYDROGRAPH FOR BASIN 120.5 *****************************************
COMPUTE NM HYD      ID=2  HYDROGRAPH NO=120.5  DA=0.0162
                    %A=100.0  %B=0.0  %C=0.0  %D=0.0  TP=0.133333
                    MASS RAINFALL=-1
PRINT HYD           ID=2    CODE=1
** ADD HYDROGRAPH FOR BASIN 120.5 TO MIREHAVEN ARROYO "B" FLOW AT POND No. 6 OF
** THE PROPOSED UNSER DIVERSION PROJECT
ADD HYD             ID=3  HYDROGRAPH NO=120.51  ID I=2  ID II=1
PRINT HYD           ID=3  CODE=1
** BULK THE FLOW IN MIREHAVEN ARROYO "B" TO REFLECT THE AVERAGE BULKING FACTOR
** COMPUTED BY THE SEDIMENT TRANSPORT MODEL FOR THE IMEDIATE UPSTREAM REACH
DIVIDE HYD          ID=3  PER=-105    ID=15     HYD=120.52
                                       ID=16     HYD=120.53
PRINT HYD           ID=15  CODE=1
PRINT HYD           ID=16  CODE=1
**COMPUTE HYDROGRAPH FOR BASIN 120.6******************************************
COMPUTE NM HYD      ID=6  HYDROGRAPH NO=120.6  DA=0.0328
                    %A=98.0  %B=0.0  %C=0.0  %D=2.0  TP=0.133333
                    MASS RAINFALL=-1
PRINT HYD           ID=6    CODE=1
** BULK THE FLOW FROM BASIN 120.6 TO REFLECT THE AVERAGE BULKING FACTOR
** COMPUTED BY THE SEDIMENT TRANSPORT MODEL FOR THE EARTHEN CHANNEL FROM BASIN
** 120.6
DIVIDE HYD          ID=6  PER=-101    ID=17     HYD=120.61
                                       ID=16     HYD=120.62
PRINT HYD           ID=17  CODE=1
PRINT HYD           ID=16  CODE=1
** ADD HYDROGRAPH FOR BASIN 120.6 TO MIREHAVEN ARROYO "B" FLOW AT POND No. 6
** OF THE PROPOSED UNSER DIVERSION
```

```
ADD HYD             ID=18  HYDROGRAPH NO=120.63  ID I=15  ID II=17
PRINT HYD           ID=18  CODE=24
** STORE A HYDROGRAPH TO REPRESENT THE ADDITIONAL VOLUME OF FLOW WHICH IS
** DEVELOPED AFTER THE 24 HR STORM. THIS FLOW COMES FROM THE IMPERVIOUS AREAS
** ONLY. THE VOLUME CALCULATED PER SECTION 22.2 OF COA DPM IS AS FOLLOWS:
** 0.0045*640*(3.67-2.66)*.0833=0.242ac*ft
** THIS FLOW SHOULD BE ADDED TO THE HYDROGRAPH AFTER THE PEAK FLOW HAS PASSED
STORE HYD           ID=15  HYD=120.64   DT=1 HR     DA=.0001
                    FLOW RATES = 0  0  0  0  0  2.93  0
PRINT HYD           ID=15  CODE=24
MODIFY TIME         ID=15     DT=0.05 HR      CODE=3
PRINT HYD           ID=15  CODE=1
** ADD THE HYDROGRAPH REPRESENTING THE ADDITIONAL INFLOW VOLUME TO THE INFLOW
** TO UNSER DIVERSION POND No. 6
ADD HYD             ID=7  HYDROGRAPH NO=120.65  ID I=15  ID II=18
PRINT HYD           ID=7  CODE=1
*******************************************************************************
** BEGIN PROPOSED UNSER DIVERSION  APPROXIMENTLY 1000 LF NORTH OF LOS
** VOLCANES ROAD
*******************************************************************************
**ROUTE THE BULKED COMBINED FLOW FROM MIREHAVEN  ARROYO "B" AND BASIN 120.6
**THROUGH UNSER DIVERSION POND #6 LOCATED SOUTH OF DAYTONA ROAD
**IN THE INTERIM CONDITION THIS POND WILL RETAIN ALL OF THE FLOWS FROM THE
**CONTRIBUTING WATERSHED IN THE 100 YEAR 10 DAY STORM.
**A SMALL INSIGNIFICANT RATE OF OUTFLOW IS INPUT IN TO THE MODEL IN ORDER TO
**SATISFY THE INPUT DATA REQUIREMENTS OF THE MODEL
**.09 ACRE*FT OF VOLUME WHICH REPRESENTS 5 X THE ESTIMATED ANNUAL AVERAGE
**SEDIMENT YIELD IS OMITED  FROM THE STAGE STORAGE CURVE
ROUTE RESERVOIR     ID=5 HYDROGRAPH NO=120.66  INFLOW ID=7  CODE=24
                     OUTFLOW(cfs)    STORAGE(ac ft)    ELEV(ft)
                              0          0.0          70.0
                              0.01       0.1416       71.0
                              0.011      0.8272       72.0
                              0.012      1.7707       73.0
                              0.013      2.7859       74.0
                              0.014      3.8744       75.0
                              0.015      5.0362       76.0  TOP OF OUTLET STR
                             66.0        6.2749       77.0
                             91.4        7.4619       77.9  EMERGENCY SPILLWAY
                            100.0        7.5982       78.0
                            409.0        9.0118       79.0
PRINT HYD           ID=5  CODE=1
** BULK THE FLOW IN MIREHAVEN  ARROYO "C" TO REFLECT THE BULKING FACTOR
** COMPUTED BY THE SEDIMENT TRANSPORT MODEL FOR THE IMEDIATE UPSTREAM REACH
DIVIDE HYD          ID=11 PER=-107     ID=17       HYD=130.82
                                       ID=16       HYD=130.83
PRINT HYD           ID=17  CODE=1
PRINT HYD           ID=16  CODE=1
** STORE A HYDROGRAPH TO REPRESENT THE ADDITIONAL VOLUME OF FLOW WHICH IS
** DEVELOPED AFTER THE 6 HR STORM. THIS FLOW COMES FROM THE IMPERVIOUS AREAS
** ONLY. THE VOLUME CALCULATED PER SECTION 22.2 OF COA DPM IS AS FOLLOWS:
** 0.0090*640*(3.67-2.66)*.0833=0.4846ac*ft
** THIS FLOW SHOULD BE ADDED TO THE HYDROGRAPH AFTER THE PEAK FLOW HAS PASSED
STORE HYD           ID=15  HYD=130.84   DT=1 HR     DA=.0001
                    FLOW RATES = 0  0  0  0  0  5.87  0
PRINT HYD           ID=15  CODE=1
MODIFY TIME         ID=15     DT=0.05 HR      CODE=3
```

```
PRINT HYD            ID=15  CODE=1
** ADD THE HYDROGRAPH REPRESENTING THE ADDITIONAL INFLOW VOLUME TO THE INFLOW
** TO UNSER DIVERSION POND No. 5
ADD HYD              ID=7  HYDROGRAPH NO=130.85  ID I=15  ID II=17
PRINT HYD            ID=7  CODE=1
**ROUTE THE FLOW FROM MIREHAVEN ARROYO "C" THROUGH POND No. 5 OF THE UNSER
**DIVERSION. THIS POND IS INTENDED TO SERVE AS A SEDIMENTATION AND PARTIAL
**RETENTION POND. THE UPPER PORTION OF THE POND WILL BE USED FOR DETENTION
**OUTFLOW STRUCTURE IS AN 8' X 8' CONCRETE BOX SOLID TO 4.0' DEPTH
**FLOW IS CONTROLLED BY WEIR FLOW OVER THE TOP OF THE CONCRETE BOX TO 5.5'
** DEPTH. FLOWS => 5.5'ARE BASED ON ORIFICE CONTROL OF A 48" DIA OUTLET PIPE
** C=0.59  INVERT AT 59.0
**.29 ACRE*FT OF VOLUME WHICH REPRESENTS 5 X THE ESTIMATED ANNUAL AVERAGE
**SEDIMENT YIELD IS OMITED  FROM THE STAGE STORAGE CURVE
ROUTE RESERVOIR      ID=5 HYDROGRAPH NO=130.86  INFLOW ID=7  CODE=24
                     OUTFLOW(cfs)    STORAGE(ac ft)    ELEV(ft)
                              0.00          0.00          60.0
                              0.01          0.0204        61.0
                              0.011         0.3695        62.0
                              0.012         0.7585        63.0
                              0.013         1.1886        64.0 TOP OF OUTLET STR
                             23.3           1.4249        64.5
                             66.0           1.6611        65.0
                            121.3           1.8892        65.5
                            133.1           2.1173        66.0
                            145.7           2.7385        67.0
                            157.4           3.3458        68.0
                            165.6           3.8689        68.8 EMERGENCY SPILLWAY
                            190.1           4.0055        69.0
                            522.0           4.7259        70.0
PRINT HYD            ID=5  CODE=1
**ROUTE THE OUTFLOW FROM THE POND THROUGH A 48" DIA STORM DRAIN
**TO POND 4 ON THE SOUTH SIDE OF LOS VOLCANES
COMPUTE RATING CURVE CID=1  VALLEY SECTION NO=1  CODE=-1  SLOPE=0.026
                     PIPE DIA=48  N=0.013
COMPUTE TRAVEL TIME ID=11  REACH=1  NUMBER OF VALLEY SECTIONS=1
                     LENGTH=305 FT  SLOPE=0.026
ROUTE                ID=11 HYDROGRAPH NO=130.87  INFLOW ID=5  DT=0.0
PRINT HYD            ID=11 CODE=1
**ROUTE THE FLOW FROM THE STORM DRAIN
**THROUGH UNSER DIVERSION POND NO. 4  LOCATED SOUTH OF LOS VOLCANES ROAD
**IN THE INTERIM CONDITION THE LOWER PORTION OF THIS POND WILL BE USED FOR
**RETENTION. THE UPPER PORTION OF THE POND WILL BE USED FOR DETENTION
**OUTFLOW STRUCTURE IS AN 8' X 8' CONCRETE BOX SOLID TO ELEV 51.9
**FLOW IS CONTROLLED BY WEIR FLOW OVER THE CONCRETE STRUCTURE BETWEEN
**ELEV. 51.9 AND 53.0 FLOW IS THEN CONTROLLED BY THE ENTRANCE OF THE 42"
**DIA OUTLET PIPE
ROUTE RESERVOIR      ID=5 HYDROGRAPH NO=130.88  INFLOW ID=11  CODE=24
                     OUTFLOW(cfs)    STORAGE(ac ft)    ELEV(ft)
                              0             0.0           47.0
                              0.01          0.0823        48.0
                              0.011         0.5114        49.0
                              0.012         1.2988        50.0
                              0.013         2.2910        51.0
                              0.014         3.2577        51.9 TOP OF OUTLET STR
                              2.1           3.3651        52.0
                             30.7           3.9439        52.5
```

```
                         76.1           4.5226      53.0
                        111.1           5.7648      54.0
                        120.1           7.1829      55.1 EMERGENCY SPILLWAY
                        359.0           8.5077      56.0
PRINT HYD           ID=5  CODE=1
**ROUTE THE OUTFLOW FROM THE POND THROUGH A 42" DIA S.D. TO UNSER DIVERSION
**POND NO. 3
COMPUTE RATING CURVE CID=1  VALLEY SECTION NO=1  CODE=-1  SLOPE=0.013
                    PIPE DIA=42  N=0.013
COMPUTE TRAVEL TIME ID=10  REACH=1  NUMBER OF VALLEY SECTIONS=1
                    LENGTH=139FT  SLOPE=0.013
ROUTE               ID=10  HYDROGRAPH NO=130.89  INFLOW ID=5  DT=0.0
PRINT HYD           ID=10  CODE=1
** COMPUTE HYDROGRAPH FOR BASIN 140.1 ******************************************
COMPUTE NM HYD      ID=1  HYDROGRAPH NO=140.1 DA=0.0196
                    %A=74.0  %B=22.0  %C=4.0  %D=0.0  TP=0.133333
                    MASS RAINFALL=-1
PRINT HYD           ID=1  CODE=1
** ROUTE FLOWS FROM BASIN 140.1 DOWN EXISTING INSISED TRAIL FROM THE SOUTH SIDE
** OF BASIN 140.1 TO LOS VOLCANES ROAD *****************************************
COMPUTE RATING CURVE CID=4  VALLEY SECTION=1  NUMBER OF SEGMENTS=1
                    MINIMUM ELEV=100 FT  MAXIMUM ELEV=101.0 FT
                    CHANNEL SLOPE=0.026  FLOOD PLAIN SLOPE=0.026
                    N=0.035  DIST=16
                    DIST  ELEV    DIST   ELEV   DIST   ELEV   DIST   ELEV
                      0   101.0     4    100.0   12    100.0   16    101.0
COMPUTE TRAVEL TIME ID=12  REACH NO=2  VALLEY SECTIONS=1
                    LENGTH=1800 FT  SLOPE=0.026
ROUTE               ID=12 HYDROGRAPH NO=140.11 INFLOW ID=1 DT=0.0
PRINT HYD           ID=12  CODE=1
** ROUTE FLOWS FROM BASIN 140.1 ALONG THE DIVERSION DIKE TO A
** DETENTION AND SEDIMENTATION BASIN NORTH OF BLUEWATER ROAD
COMPUTE RATING CURVE CID=4  VALLEY SECTION=1  NUMBER OF SEGMENTS=1
                    MINIMUM ELEV=100 FT  MAXIMUM ELEV=101.0 FT
                    CHANNEL SLOPE=0.015  FLOOD PLAIN SLOPE=0.015
                    N=0.035  DIST=48
                    DIST  ELEV    DIST   ELEV   DIST   ELEV
                      0   101.0     3    100.0   48    101.0
COMPUTE TRAVEL TIME ID=15  REACH NO=2  VALLEY SECTIONS=1
                    LENGTH=660 FT  SLOPE=0.015
ROUTE               ID=15 HYDROGRAPH NO=140.12 INFLOW ID=12 DT=0.0
PRINT HYD           ID=15  CODE=1
** COMPUTE HYDROGRAPH FOR BASIN 140.2 ******************************************
COMPUTE NM HYD      ID=1  HYDROGRAPH NO=140.2 DA=0.0892
                    %A=92.0  %B=4.0  %C=4.0  %D=0.0  TP=0.133333
                    MASS RAINFALL=-1
PRINT HYD           ID=1  CODE=1
** ADD FLOWS FROM BASIN 140.2 TO THE ROUTED FLOW FROM BASIN 140.1
ADD HYD             ID=2  HYDROGRAPH NO=140.21  ID I=15  ID II=1
PRINT HYD           ID=2  CODE=1
** BULK THE COMBINED FLOW FROM BASINS 140.1 & 140.2 TO REFLECT THE ESTIMATED
** SEDIMENT YIELD FROM THE BASIN
DIVIDE HYD          ID=2 PER=-108     ID=17       HYD=140.22
                                      ID=16       HYD=140.23
PRINT HYD           ID=17  CODE=1
PRINT HYD           ID=16  CODE=1
** ADD THE BULKED FLOW FROM BASIN 140 TO THE ROUTED FLOW FROM UNSER DIVERSION
```

```
** POND NO.4.
ADD HYD             ID=2  HYDROGRAPH NO=140.24  ID I=17  ID II=10
PRINT HYD           ID=2  CODE=1
**ROUTE THE COMBINED FLOW THROUGH UNSER DIVERSION POND NO.3.
**IN THE INTERIM CONDITION THE LOWER PORTION OF THIS POND WILL BE USED FOR
**RETENTION. THE UPPER PORTION OF THE POND WILL BE USED FOR DETENTION
**ASSUME OUTFLOW STRUCTURE IS AN 8' X 8' CONCRETE BOX SOLID TO ELEVATION 47.5
**FLOW IS CONTROLLED BY WIER FLOW OVER THE TOP OF THE CONCRETE BOX TO
**ELEVATION 48.5. AT ELEVATIONS GREATER THAN 48.5 THE FLOW IS CONTROLLED
**BY ORIFICE CONTROL AT THE ENTRANCE TO THE 42" DIA. OUTLET PIPE.
**.10 ACRE*FT OF VOLUME WHICH REPRESENTS 5 X THE ESTIMATED ANNUAL AVERAGE
**SEDIMENT YIELD IS OMITED  FROM THE STAGE STORAGE CURVE
ROUTE RESERVOIR     ID=4 HYDROGRAPH NO=140.25  INFLOW ID=2  CODE=24
                    OUTFLOW(cfs)    STORAGE(ac ft)    ELEV(ft)
                             0           0.00          43.0
                          0.01           0.0688        44.0
                          0.011          0.4970        45.0
                          0.012          1.0426        46.0
                          0.013          1.6424        47.0
                          0.014          1.9702        47.5 TOP OF OUTLET STRUC
                         23.3            2.2979        48.0
                         66.0            2.6543        48.5
                         78.5            3.0106        49.0
                         85.3            3.7821        50.0
                         91.7            4.6138        51.0
                         93.2            4.7875        51.2 EMERGENCY SPILLWAY
                        194.2            5.5069        52.0
PRINT HYD           ID=4  CODE=1
**ROUTE THE OUTFLOW FROM THE POND THROUGH A 42" DIA STORM DRAIN UNDER BLUEWATER
**ROAD
COMPUTE RATING CURVE CID=1  VALLEY SECTION NO=1  CODE=-1  SLOPE=0.010
                    PIPE DIA=42  N=0.013
COMPUTE TRAVEL TIME ID=10  REACH=1  NUMBER OF VALLEY SECTIONS=1
                    LENGTH=168 FT  SLOPE=0.010
ROUTE               ID=10  HYDROGRAPH NO=140.26  INFLOW ID=4  DT=0.0
PRINT HYD           ID=10  CODE=1
**ROUTE THE OUTFLOW THROUGH UNSER DIVERSION POND NO. 2
**IN THE INTERIM CONDITION THE LOWER PORTION OF THIS POND WILL BE USED FOR
**RETENTION. THE UPPER PORTION OF THE POND WILL BE USED FOR DETENTION
**ASSUME OUTFLOW STRUCTURE IS AN 8' X 8' CONCRETE BOX SOLID TO ELEV 44.8
**FLOW IS CONTROLLED BY WEIR FLOW BETWEEN ELEV 44.8 AND 46.0  THEN IT IS
**CONTROLLED BY THE ENTRANCE OF THE 48" DIA OUTLET PIPE
ROUTE RESERVOIR     ID=5 HYDROGRAPH NO=140.27  INFLOW ID=10  CODE=24
                    OUTFLOW(cfs)    STORAGE(ac ft)    ELEV(ft)
                             0          0.0000        37.9
                          0.01          0.0003        38.0
                          0.011         0.1818        39.0
                          0.012         0.7343        40.0
                          0.013         1.5680        41.0
                          0.014         2.4956        42.0
                          0.015         3.5621        43.0
                          0.016         4.6788        44.0
                          0.017         5.8772        44.8 TOP OF OUTLET STR
                         38.6           6.5179        45.5
                         86.8           7.1586        46.0
                        169.3           8.5245        47.0
                        178.5           9.8262        47.9 EMERGENCY SPILLWAY
```

```
                        500.5       11.5100       49.0
PRINT HYD            ID=5  CODE=1
**ROUTE THE OUTFLOW FROM THE POND THROUGH A 48" DIA STORM DRAIN TO UNSER
**DIVERSION POND NO 1
COMPUTE RATING CURVE CID=1  VALLEY SECTION NO=1  CODE=-1  SLOPE=0.0125
                     PIPE DIA=48  N=0.013
COMPUTE TRAVEL TIME ID=10  REACH=1  NUMBER OF VALLEY SECTIONS=1
                     LENGTH=128 FT  SLOPE=0.0125
ROUTE                ID=10  HYDROGRAPH NO=130.28  INFLOW ID=5  DT=0.0
PRINT HYD            ID=10  CODE=1
** COMPUTE HYDROGRAPH FOR BASIN 150.1
COMPUTE NM HYD       ID=1  HYDROGRAPH NO=150.1 DA=0.1525
                     %A=96.0  %B=0.0  %C=4.0  %D=0.0  TP=0.2285
                     MASS RAINFALL=-1
PRINT HYD            ID=1  CODE=1
** BULK THE FLOW FROM BASIN 150.1 TO REFLECT THE ESTIMATED SEDIMENT YIELD
** FROM THE BASIN
DIVIDE HYD           ID=1 PER=-105      ID=17      HYD=150.11
                                        ID=16      HYD=150.12
PRINT HYD            ID=17  CODE=1
PRINT HYD            ID=16  CODE=1
** ADD THE OUTFLOW FROM POND 2 TO THE BULKED FLOW FROM BASIN 150.1
ADD HYD              ID=10  HYDROGRAPH NO=150.13 ID I=10  ID II=17
PRINT HYD            ID=10  CODE=1
**ROUTE THE FLOW THROUGH UNSER DIVERSION POND #1
**IN THE INTERIM CONDITION THIS POND WILL RETAIN ALL OF THE 100 YEAR 10 DAY
**FLOW THAT REACHES IT. OUTFLOW CURVE ABOVE OUTLET BASED ON WIER FLOW OVER THE
**TOP OF THE STRUCTURE AND ORIFICE CONTROL BY THE ENTRANCE OF THE 42" DIA
**OUTLET PIPE
**.07 ACRE*FT OF VOLUME WHICH REPRESENTS 5 X THE ESTIMATED ANNUAL AVERAGE
**SEDIMENT YIELD IS OMITED  FROM THE STAGE STORAGE CURVE
ROUTE RESERVOIR      ID=5 HYDROGRAPH NO=150.14  INFLOW ID=10  CODE=24
                     OUTFLOW(cfs)    STORAGE(ac ft)    ELEV(ft)
                          0              0.00          33.5
                          0.01           0.0001        34
                          0.011          0.2932        35
                          0.012          0.8646        36
                          0.013          1.5370        37
                          0.014          2.2720        38
                          0.015          3.0712        39
                          0.016          3.9358        40
                          0.017          4.8673        41 TOP OF OUTLET STR
                         66.0            5.8673        42
                        134.8            6.9372        43
                        142.2            7.9609        43.9 EMERGENCY SPILLWAY
                        460.0            9.2922        45
PRINT HYD            ID=5  CODE=1
**NOTE:UNDER EXISTING 100 YEAR 10 DAY STORM CONDITIONS NO OUT FLOW IS REQUIRED
**FROM THE UNSER DIVERSION PONDS. A 42" DIA.STORM DRAIN OUTFALL IS PLANNED TO
**BE CONSTRUCTED WITH THE UNSER DIVERSION PONDS TO SERVE THE SYSTEM AS THE
**WATERSHED DEVELOPS. IN THE FUTURE AS DOWNSTREAM DRAINAGE OUTFALLS ARE
**COMPLETED IT IS LIKELY THAT THE SYSTEM  SERVING THE EXISTING CONDITION
**WATERSHED WILL BE CONVERTED TO EXTENDED DETENTION. THIS WILL BE ACCOMPLISHED
**BY MODIFYING THE OUTLET STRUCTURES TO ALLOW VERY LOW RATES OF DISCHARGE TO
**OCCUR FROM THE INVERTS OF THE PONDS.
FINISH
```

AHYMO SUMMARY TABLE (AHYMO392) - AMAFCA VERSION OF HYMO - MARCH, 1992 RUN DATE (MON/DAY/YR) =09/10/1993

INPUT FILE = ud24100i.hmi USER NO.= D_HARRIS.S92

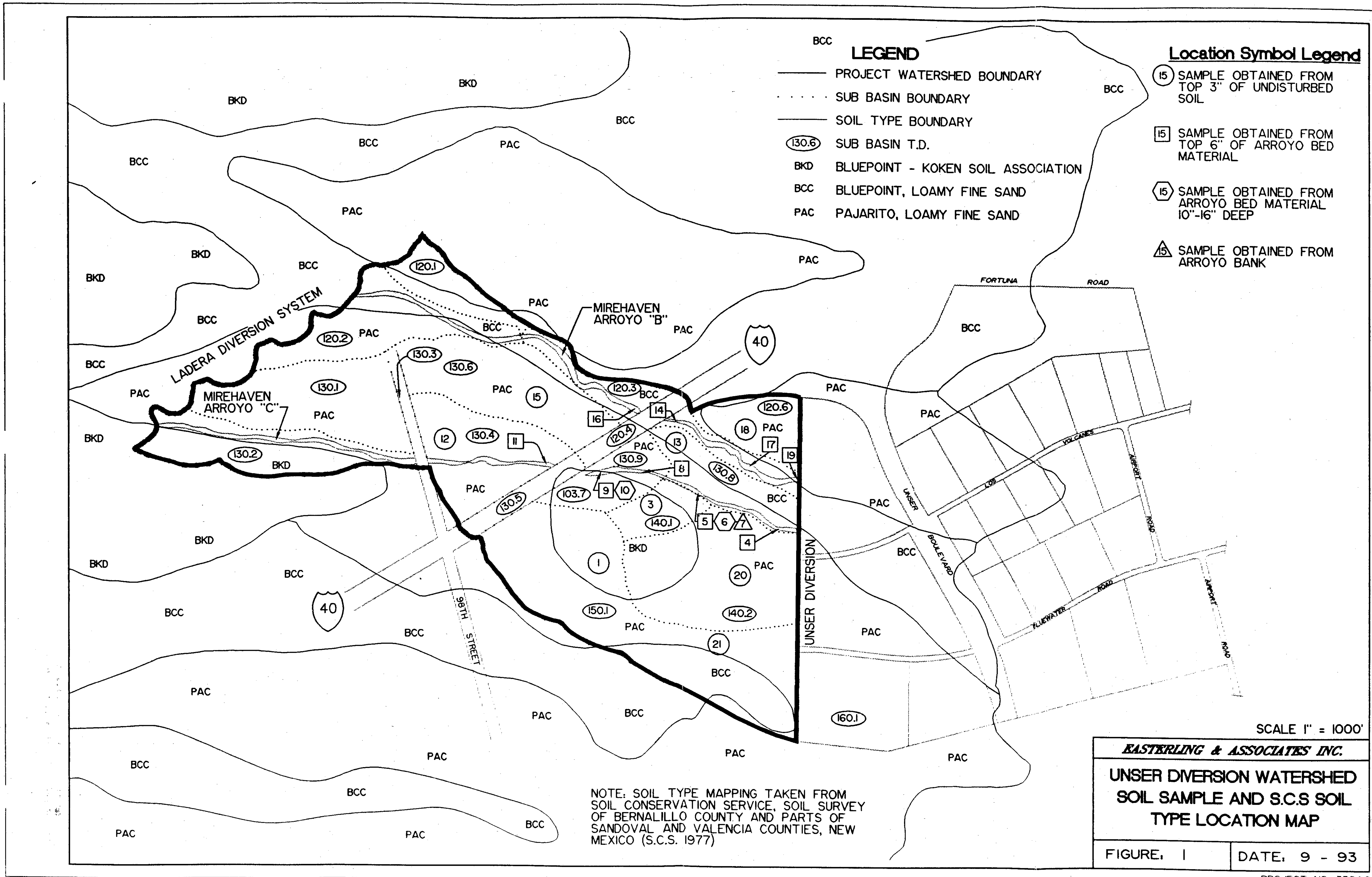
COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	PAGE = 1 NOTATION
START										TIME= .0
RAINFALL TYPE= 2										RAIN24= 2.66
*S BEGIN UNSER DIVERSION CHANNEL WATERSHED										
COMPUTE NM HYD	120.10	-	1	.02590	21.31	.607	.43936	1.500	1.286	PER IMP= .0
COMPUTE NM HYD	120.20	-	2	.05450	32.28	1.277	.43936	1.600	.925	PER IMP= .0
ADD HYD	120.21	1& 2	3	.08040	52.81	1.884	.43936	1.550	1.026	
ROUTE	120.22	3	4	.08040	44.95	1.884	.43937	1.650	.874	
COMPUTE NM HYD	120.30	-	1	.01990	16.38	.466	.43936	1.500	1.286	PER IMP= .0
ADD HYD	120.31	1& 4	10	.10030	57.56	2.350	.43936	1.600	.897	
COMPUTE NM HYD	130.10	-	3	.07430	36.76	1.741	.43936	1.600	.773	PER IMP= .0
COMPUTE NM HYD	130.20	-	4	.04890	30.09	1.146	.43936	1.550	.962	PER IMP= .0
COMPUTE NM HYD	130.30	-	5	.00470	12.93	.608	2.42724	1.500	4.298	PER IMP= 100.0
ADD HYD	130.21	4& 3	6	.12320	66.48	2.887	.43936	1.600	.843	
ADD HYD	130.31	5& 6	1	.12790	75.17	3.495	.51241	1.600	.918	
ROUTE	130.32	1	11	.12790	72.32	3.495	.51241	1.650	.884	
COMPUTE NM HYD	130.40	-	1	.06120	46.64	1.434	.43936	1.550	1.191	PER IMP= .0
ADD HYD	130.41	1&11	12	.18910	111.03	4.929	.48876	1.600	.917	
COMPUTE NM HYD	130.60	-	11	.07100	42.71	1.664	.43936	1.550	.940	PER IMP= .0
ROUTE	130.61	11	15	.07100	42.83	1.664	.43938	1.600	.943	
ROUTE	130.62	15	11	.07100	43.40	1.664	.43938	1.600	.955	
ROUTE	130.42	12	1	.18910	110.96	4.929	.48877	1.600	.917	
COMPUTE NM HYD	130.50	-	3	.01040	18.39	.784	1.41342	1.500	2.762	PER IMP= 49.0
ADD HYD	130.51	1& 3	4	.19950	123.89	5.713	.53697	1.600	.970	
COMPUTE NM HYD	130.70	-	1	.01696	15.02	.425	.46988	1.500	1.384	PER IMP= .0
COMPUTE NM HYD	130.90	-	2	.00954	8.45	.239	.46988	1.500	1.385	PER IMP= .0
ADD HYD	130.91	1& 2	1	.02650	23.48	.664	.46988	1.500	1.384	
ROUTE	130.52	4	3	.19950	123.01	5.713	.53697	1.600	.963	
ADD HYD	130.72	1& 3	4	.22600	141.78	6.377	.52910	1.600	.980	
ADD HYD	130.73	4&11	2	.29700	185.18	8.041	.50765	1.600	.974	
COMPUTE NM HYD	130.80	-	1	.03270	25.40	.766	.43936	1.550	1.214	PER IMP= .0
ROUTE	130.74	2	3	.29700	180.78	8.041	.50765	1.650	.951	
ADD HYD	130.81	3& 1	11	.32970	197.70	8.807	.50088	1.650	.937	
ROUTE	120.32	10	3	.10030	57.13	2.350	.43937	1.600	.890	
COMPUTE NM HYD	120.40	-	1	.00910	16.09	.686	1.41342	1.500	2.763	PER IMP= 49.0
ADD HYD	120.41	3& 1	2	.10940	68.44	3.036	.52038	1.600	.978	
ROUTE	120.42	2	1	.10940	63.84	3.036	.52039	1.650	.912	
COMPUTE NM HYD	120.50	-	2	.01620	13.33	.380	.43936	1.500	1.286	PER IMP= .0
ADD HYD	120.51	2& 1	3	.12560	71.98	3.416	.50993	1.650	.896	
DIVIDE HYD	120.52	3	15	.12560	75.58	3.587	.53543	1.650	.940	
	120.53	AND	16	.12560	3.60	.171	.02550	1.650	.045	
COMPUTE NM HYD	120.60	-	6	.03280	28.25	.838	.47912	1.500	1.346	PER IMP= 2.0
DIVIDE HYD	120.61	6	17	.03280	28.53	.846	.48390	1.500	1.359	
	120.62	AND	16	.03280	.28	.008	.00479	1.500	.013	
ADD HYD	120.63	15&17	18	.15840	93.65	4.433	.52476	1.600	.924	
STORE HYD	120.64	-	15	.00010	2.93	.242	45.40292	5.000	45.781	
MODIFY TIME	120.64	15	15	.00010	5.86	.242	45.39693	4.900	91.550	
ADD HYD	120.65	15&18	7	.15850	93.65	4.675	.55307	1.600	.923	
ROUTE RESERVOIR	120.66	7	5	.15850	.01	.034	.00406	24.400	.000	AC-FT= 4.64
DIVIDE HYD	130.82	11	17	.32970	211.53	9.424	.53594	1.650	1.002	
	130.83	AND	16	.32970	13.84	.617	.03506	1.650	.066	

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
STORE HYD	130.84	-	15	.00010	5.87	.485	90.96078	5.000	91.719	
MODIFY TIME	130.84	15	15	.00010	11.74	.485	90.94878	4.900	183.413	
ADD HYD	130.85	15&17	7	.32980	211.53	9.909	.56335	1.650	1.002	
ROUTE RESERVOIR	130.86	7	5	.32980	142.68	8.726	.49608	1.800	.676	AC-FT= 2.59
ROUTE	130.87	5	11	.32980	142.34	8.726	.49607	1.850	.674	
ROUTE RESERVOIR	130.88	11	5	.32980	75.56	5.468	.31088	2.100	.358	AC-FT= 4.51
ROUTE	130.89	5	10	.32980	78.05	5.468	.31088	2.100	.370	
COMPUTE NM HYD	140.10	-	1	.01960	18.50	.522	.49901	1.500	1.475	PER IMP= .0
ROUTE	140.11	1	12	.01960	17.17	.522	.49908	1.550	1.368	
ROUTE	140.12	12	15	.01960	17.47	.522	.49909	1.600	1.393	
COMPUTE NM HYD	140.20	-	1	.08920	78.50	2.196	.46166	1.500	1.375	PER IMP= .0
ADD HYD	140.21	15& 1	2	.10880	92.62	2.718	.46840	1.550	1.330	
DIVIDE HYD	140.22	2	17	.10880	100.03	2.935	.50587	1.550	1.437	
	140.23	AND	16	.10880	7.41	.217	.03747	1.550	.106	
ADD HYD	140.24	17&10	2	.43860	100.03	8.404	.35925	1.550	.356	
ROUTE RESERVOIR	140.25	2	4	.43860	68.61	6.433	.27502	2.250	.244	AC-FT= 2.72
ROUTE	140.26	4	10	.43860	68.47	6.433	.27502	2.250	.244	
ROUTE RESERVOIR	140.27	10	5	.43860	3.22	.557	.02380	5.650	.011	AC-FT= 5.93
ROUTE	130.28	5	10	.43860	3.23	.557	.02380	5.650	.011	
COMPUTE NM HYD	150.10	-	1	.15250	85.35	3.692	.45390	1.600	.874	PER IMP= .0
DIVIDE HYD	150.11	1	17	.15250	89.62	3.876	.47660	1.600	.918	
	150.12	AND	16	.15250	4.27	.185	.02270	1.600	.044	
ADD HYD	150.13	10&17	10	.59110	89.62	4.433	.14062	1.600	.237	
ROUTE RESERVOIR	150.14	10	5	.59110	.02	.038	.00122	29.950	.000	AC-FT= 4.39
FINISH										

APPENDIX B

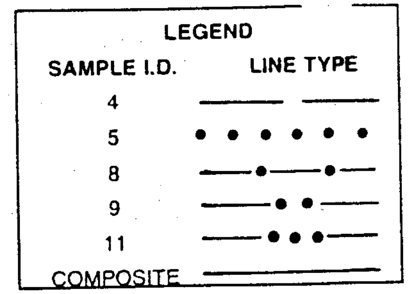
SOIL TEST DATA

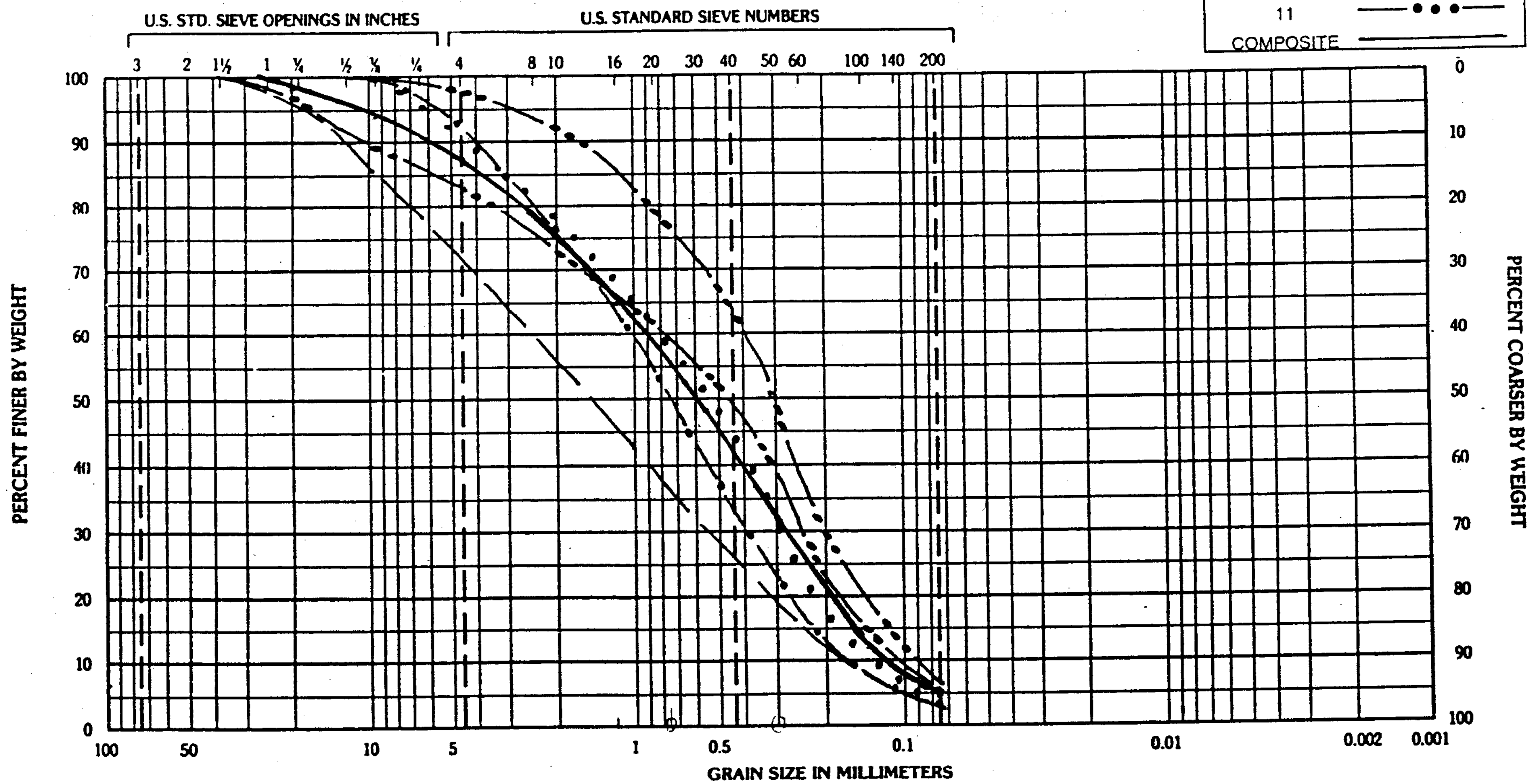
Table of Contents


LEGEND
PROJECT WATERSHED BOUNDARY
SUB BASIN BOUNDARY
SOIL TYPE BOUNDARY
130.6 SUB BASIN T.D.
BKD BLUEPOINT - KOKEN SOIL ASSOCIATION
BCC BLUEPOINT, LOAMY FINE SAND
PAC PAJARITO, LOAMY FINE SAND
Location Symbol Legend
15 SAMPLE OBTAINED FROM TOP 3" OF UNDISTURBED SOIL
15 SAMPLE OBTAINED FROM TOP 6" OF ARROYO BED MATERIAL
15 SAMPLE OBTAINED FROM ARROYO BED MATERIAL 10"-16" DEEP
15 SAMPLE OBTAINED FROM ARROYO BANK
LADERA DIVERSION SYSTEM
MIREHAVEN ARROYO "B"
MIREHAVEN ARROYO "C"
UNSER DIVERSION
98TH STREET
UNSER BOULEVARD
FORTUNA ROAD
LOS VOLCANES
AIRPORT ROAD
BLUEWATER ROAD
40
120.1
120.2
120.3
120.4
120.6
130.1
130.2
130.3
130.4
130.5
130.6
130.8
130.9
103.7
140.1
140.2
150.1
160.1
NOTE: SOIL TYPE MAPPING TAKEN FROM SOIL CONSERVATION SERVICE, SOIL SURVEY OF BERNALILLO COUNTY AND PARTS OF SANDOVAL AND VALENCIA COUNTIES, NEW MEXICO (S.C.S. 1977)
SCALE 1" = 1000'
EASTERLING & ASSOCIATES INC.
UNSER DIVERSION WATERSHED SOIL SAMPLE AND S.C.S SOIL TYPE LOCATION MAP
FIGURE: 1
DATE: 9 - 93
PROJECT NO. 3324.2

PARTICLE SIZE DISTRIBUTION CHART

SAMPLE DESCRIPTION: MIREHAVEN ARROYO "C"
TAKEN FROM TOP 6" OF BED MATERIAL



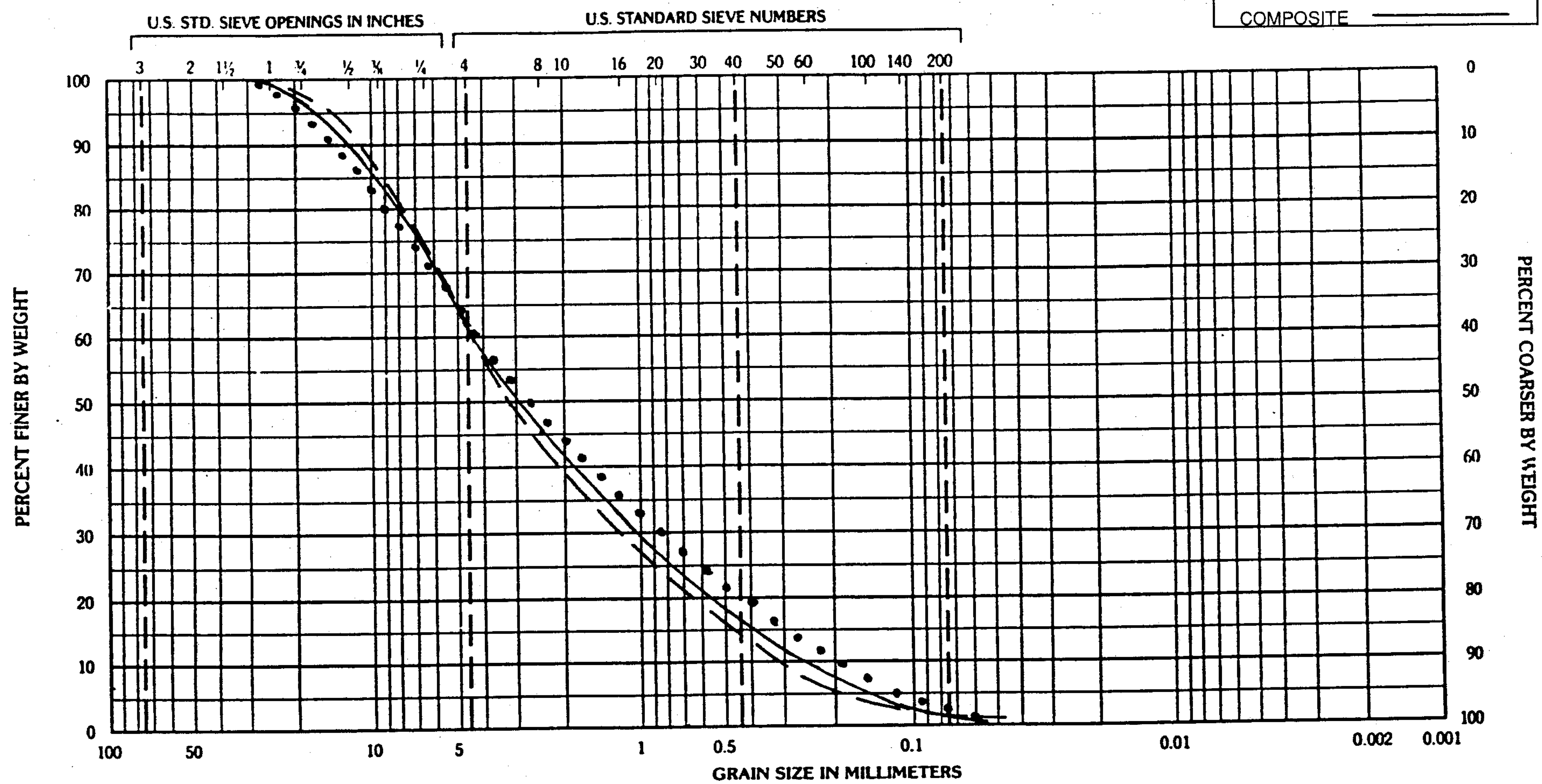


Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt or Clay

PARTICLE SIZE DISTRIBUTION CHART

SAMPLE DESCRIPTION: MIREHAVEN ARROYO "C" BED MATERIAL 10″ – 16″ DEEP

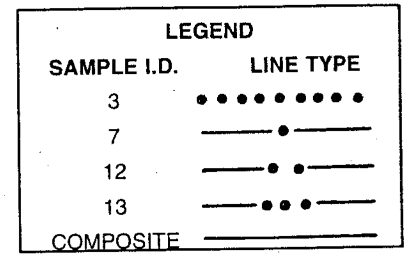
LEGEND	
SAMPLE I.D.	LINE TYPE
10	• • • • • •
6	— — —
COMPOSITE	————

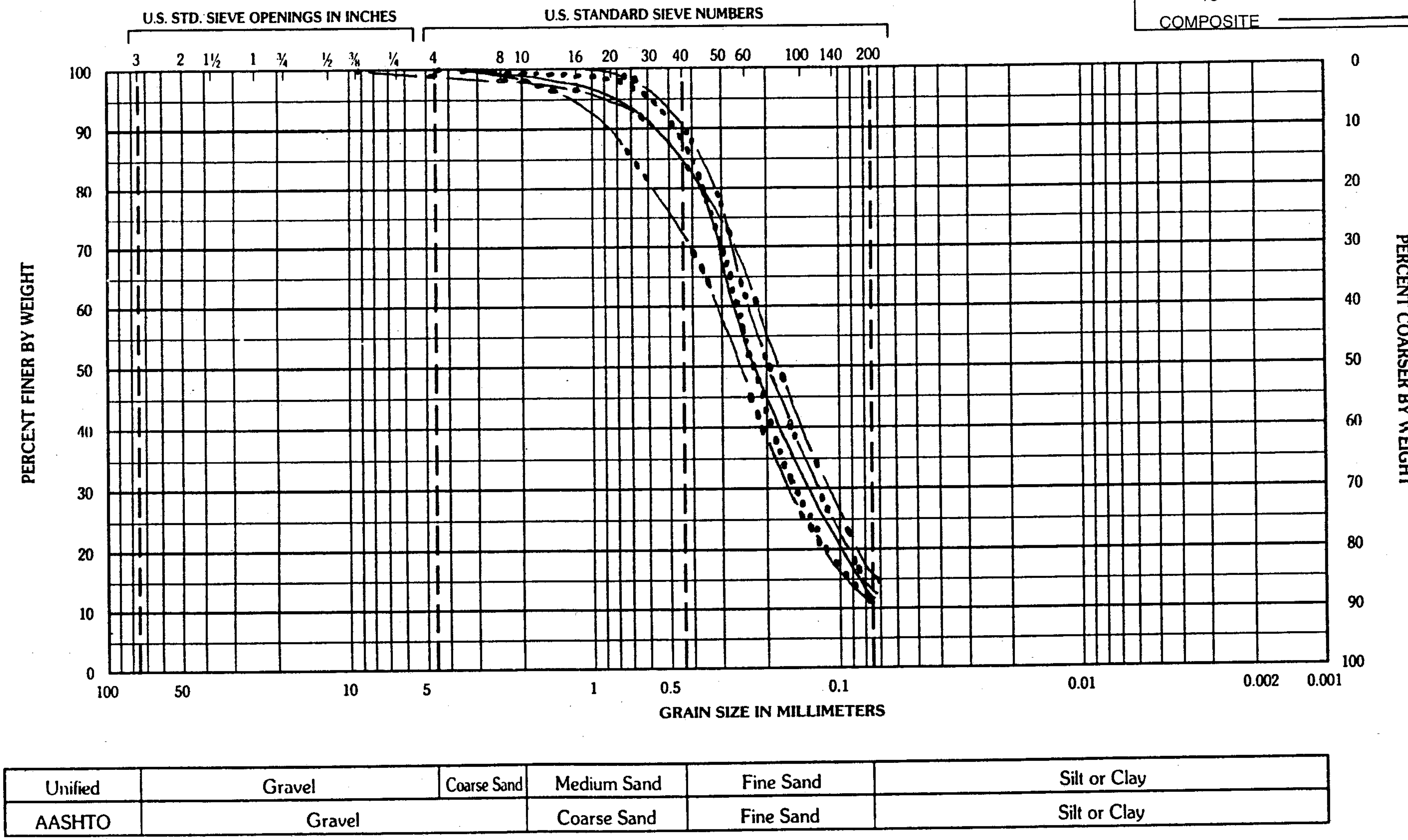


Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt or Clay

PARTICLE SIZE DISTRIBUTION CHART

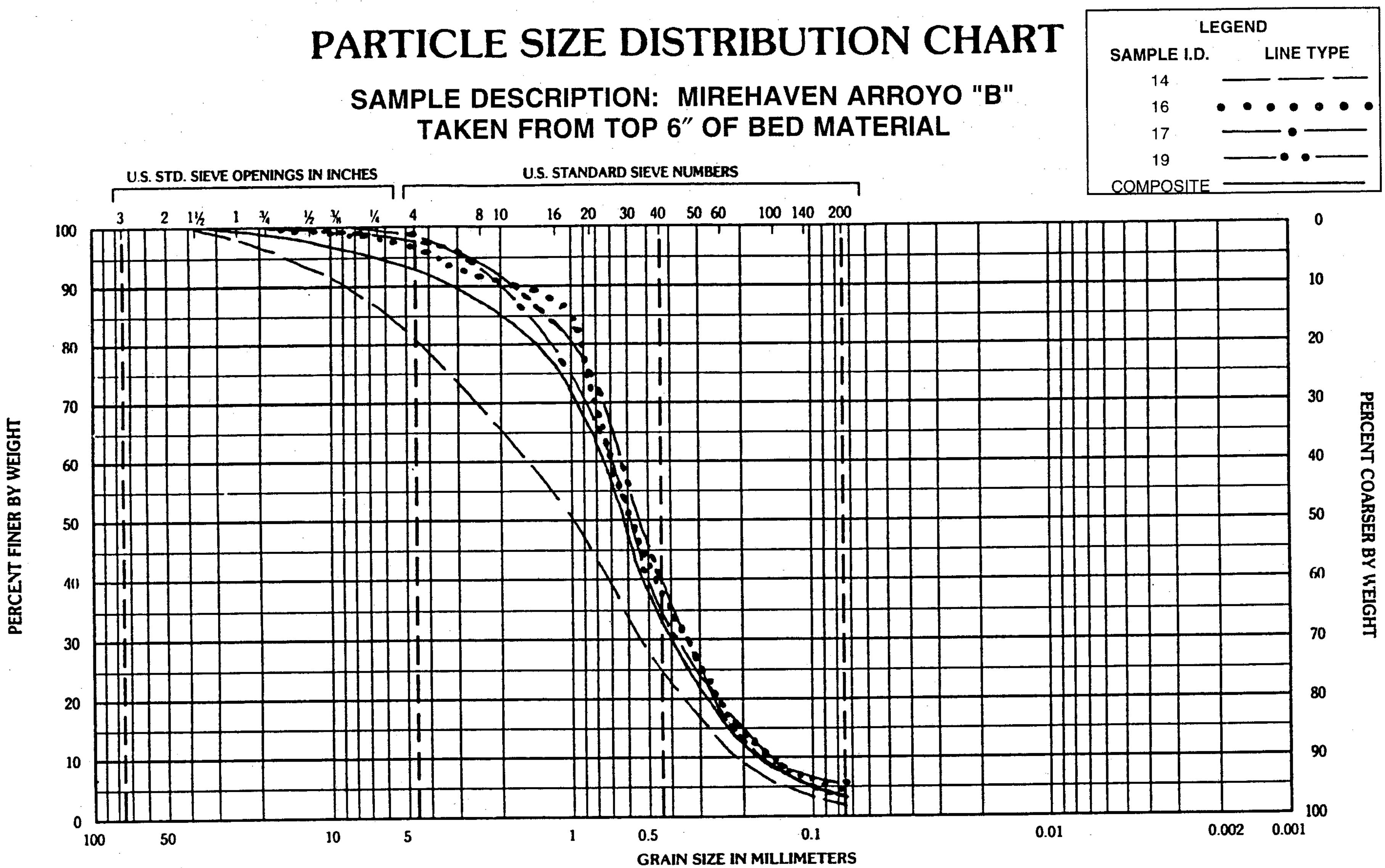
SAMPLE DESCRIPTION: MIREHAVEN ARROYO "C" WATERSHED, TOP 3″ OF UNDISTURBED SOIL





PARTICLE SIZE DISTRIBUTION CHART

SAMPLE DESCRIPTION: MIREHAVEN ARROYO "B"
TAKEN FROM TOP 6" OF BED MATERIAL



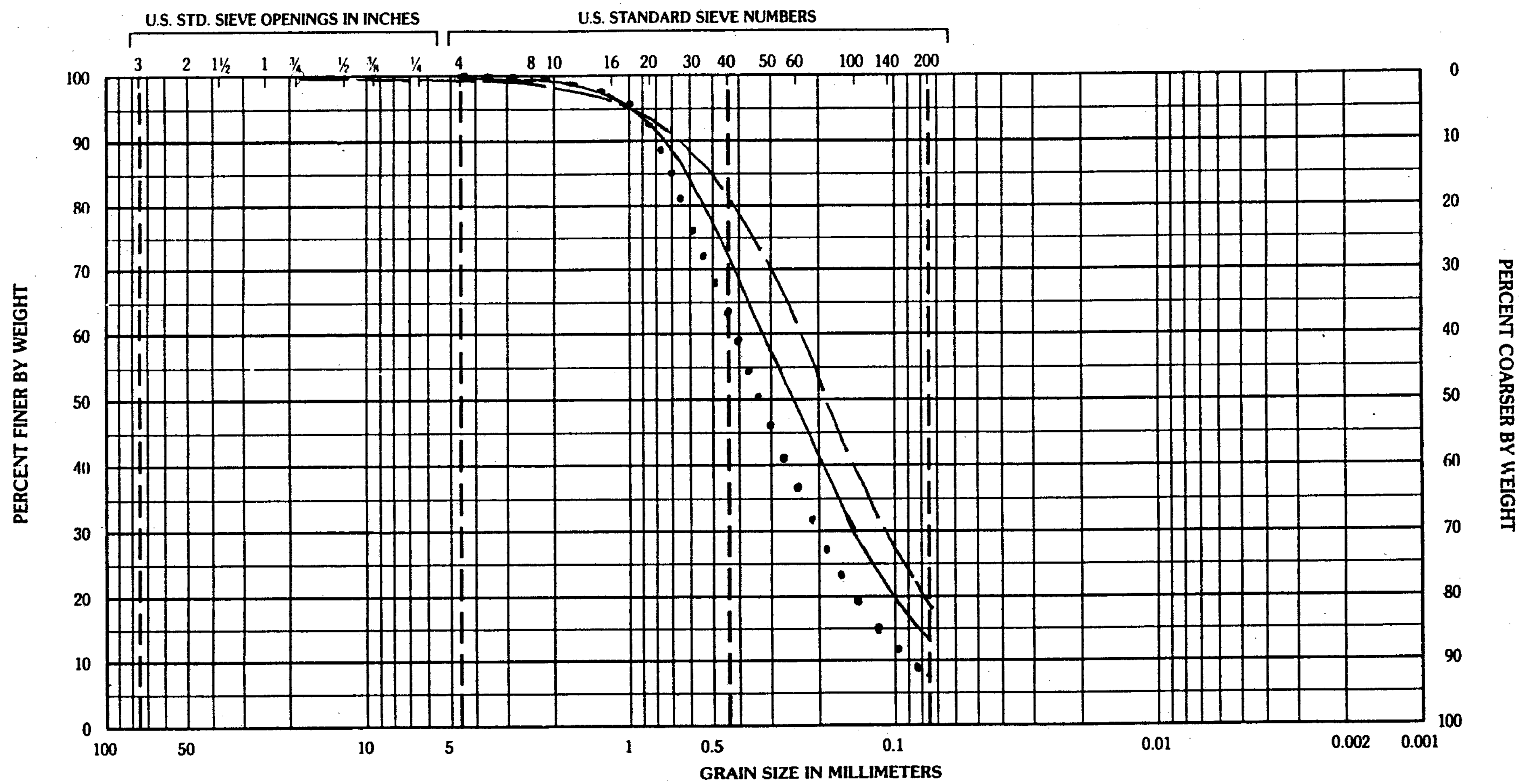
Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt or Clay

PARTICLE SIZE DISTRIBUTION CHART

SAMPLE DESCRIPTION: MIREHAVEN ARROYO "B" WATERSHED, TOP 3″ OF UNDISTURBED MATERIAL

LEGEND

SAMPLE I.D.	LINE TYPE
15	— —
18	• • • • • •
COMPOSITE	———



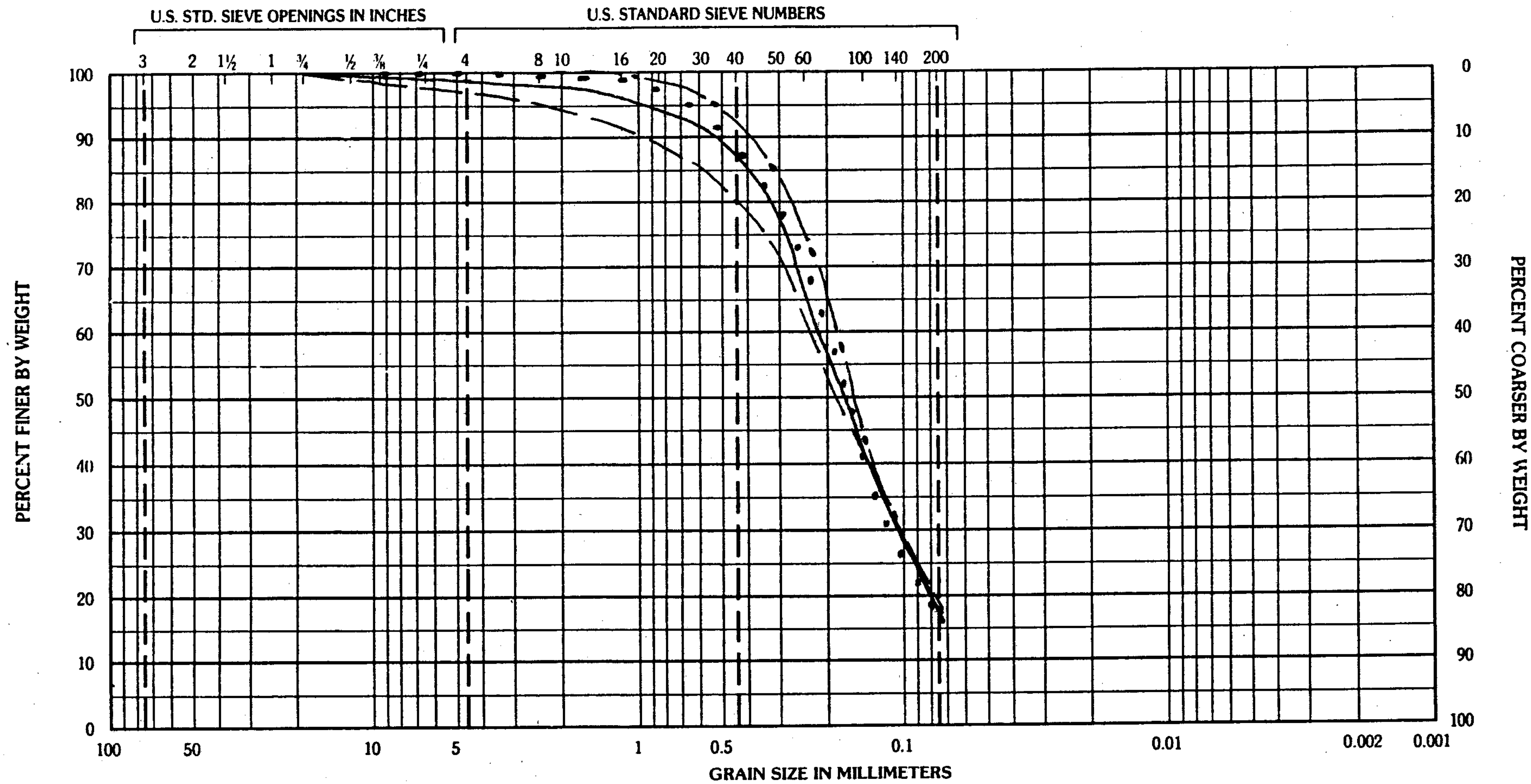
Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt or Clay

PARTICLE SIZE DISTRIBUTION CHART

SAMPLE DESCRIPTION: WATERSHED DISCHARGING TO PONDS 3 AND 1, TOP 3″ OF UNDISTURBED SOIL

LEGEND

SAMPLE I.D.	LINE TYPE
1	— — —
20	• • • • • •
21	——•——
COMPOSITE	————



Unified	Gravel	Coarse Sand	Medium Sand	Fine Sand	Silt or Clay
AASHTO	Gravel		Coarse Sand	Fine Sand	Silt or Clay

APPENDIX C

SEDIMENT TRANSPORT EQUATION DESCRIPTION AND CRITERIA

RCE RESOURCE CONSULTANTS & ENGINEERS, INC.
A KLH Engineering Group Company

April 29, 1993

Mr. Cliff Anderson
Albuquerque Metropolitan Arroyo
Flood Control Authority
2600 Prospect Avenue NE
Albuquerque, New Mexico 87107

Re: Preliminary Bed Material Transport Equation

Dear Cliff:

I am transmitting a preliminary bed material transport equation for use in the Albuquerque area. The equation has the form:

$$Q_s = aV^bD^c(1-C_f)^dW$$

where Q_s is the bed material transport capacity in cfs, V is the flow velocity in fps, D is the hydraulic depth in feet, W is the channel width in feet and C_f is the fine sediment (silt/clay) concentration in decimal fraction by weight (e.g., when the fine sediment concentration is 10,000 ppm, C_f=0.01). The coefficient (a) and exponents (b, c, and d) can be read from the enclosed plot for the median bed material size. As discussed below, this equation should only be applied for the median bed material size; it should not be applied by size fraction. For practical purposes, the transported gradation can be assumed to be the same as the bed material gradation. The equation was developed using the following procedures and assumptions:

1. Bed load was computed by size fraction using the Meyer-Peter, Muller bed-load equation as presented in the draft Erosion and Sediment Design Guide.

2. The suspended bed material load was computed using a procedure for high sand concentrations originally developed by Woo (1985) at Colorado State University and published in the ASCE Hydraulics Journal a few years ago. I provided a copy of the ASCE paper with my February 8,1993, submittal regarding a transport equation for North Domingo Baca Arroyo.

3. The suspended sediment computations were performed for the median bed material size only. This is not believed to be a serious limitation of the procedure since the gradation of the transported sediment, as evidenced by depositional features in the arroyos in the Albuquerque area, is very similar to the gradation of the parent material in other portions of the arroyo.

4. The bed layer thickness used to compute the reference bed layer concentration for the suspended sediment concentration profile was estimated based on the ratio of the shear velocity to the critical shear velocity for the median particle size, following Karim and Kennedy (1983). The result is limited to values between $2D_{50}$ and $2D_{84}$ of the bed material.

5. The viscosity of the fine sediment/water mixture and fall velocity of the transported particles are computed based on relationships that consider the effects of the fine sediment on the fluid characteristics.

3665 JFK Parkway, Building 2, Suite 300 • P.O. Box 270460 • Fort Collins, CO 80527
(303) 223-5556 • Denver Metro (303) 572-1806 • FAX (303) 223-5578
Fort Collins, CO • Davis, CA • Laramie, WY

6. To prevent unrealistically high bed material concentrations, an upper limit of 650,000 ppm is set on the reference bed layer concentration. This value is the approximate upper limit for mud flooding. Above this value, the water/sediment mixture is no longer a Newtonian fluid and the basic hydraulic and sediment transport assumptions no longer apply. Mud and debris flows occur at higher concentrations. Based on our field evidence, mud and debris flows have occurred in the past in steeper areas at the base of the Sandia front, but are of very limited extent and, probably are of limited time during the passage of any given hydrograph. The 650,000 ppm limitation is, therefore, believed to be reasonable for conditions where the analysis procedures in the Design Guide are applicable.

7. As described in Woo (1985) and Woo et al. (1988), the suspended sediment computations consider the effects of the high sediment concentration on the characteristics of the water/sediment mixture. It should be noted that the procedure converges to the clear-water suspended sediment concentration profile, as predicted by the Rouse equation (Rouse, 1937), at low suspended sediment concentrations. (The Rouse equation is the basis for the suspended sediment computation in the Einstein procedure.)

8. The following table summarizes the range of conditions for which the equation was developed:

	q(cfs/ft)	V(fps)	D(feet)	Slope	Fine Sediment Concentration (ppm)	Median Bed Material Size (mm)
Minimum	1	2.2	0.25	0.8%	0	0.42
Maximum	40	17.3	4.1	4%	50,000	3.00

The bed material concentration for the above conditions ranged from 1,900 to approximately 440,000 ppm.

As I am still evaluating the results of my computations, this relation should be considered preliminary. I do not, however, envision changes that will significantly change the bed material transport rates predicted by the equation. I intend to include the final version of this equation in the Design Guide.

Please call me if you have any questions or comments about the equation or the procedures used to develop it.

Sincerely,

RESOURCE CONSULTANTS & ENGINEERS, INC.

Robert A. Mussetter, Ph.D., P.E.
Vice President

RAM:bbv
Enclosure

\CORRES\ANDERSON.LTR

RCE

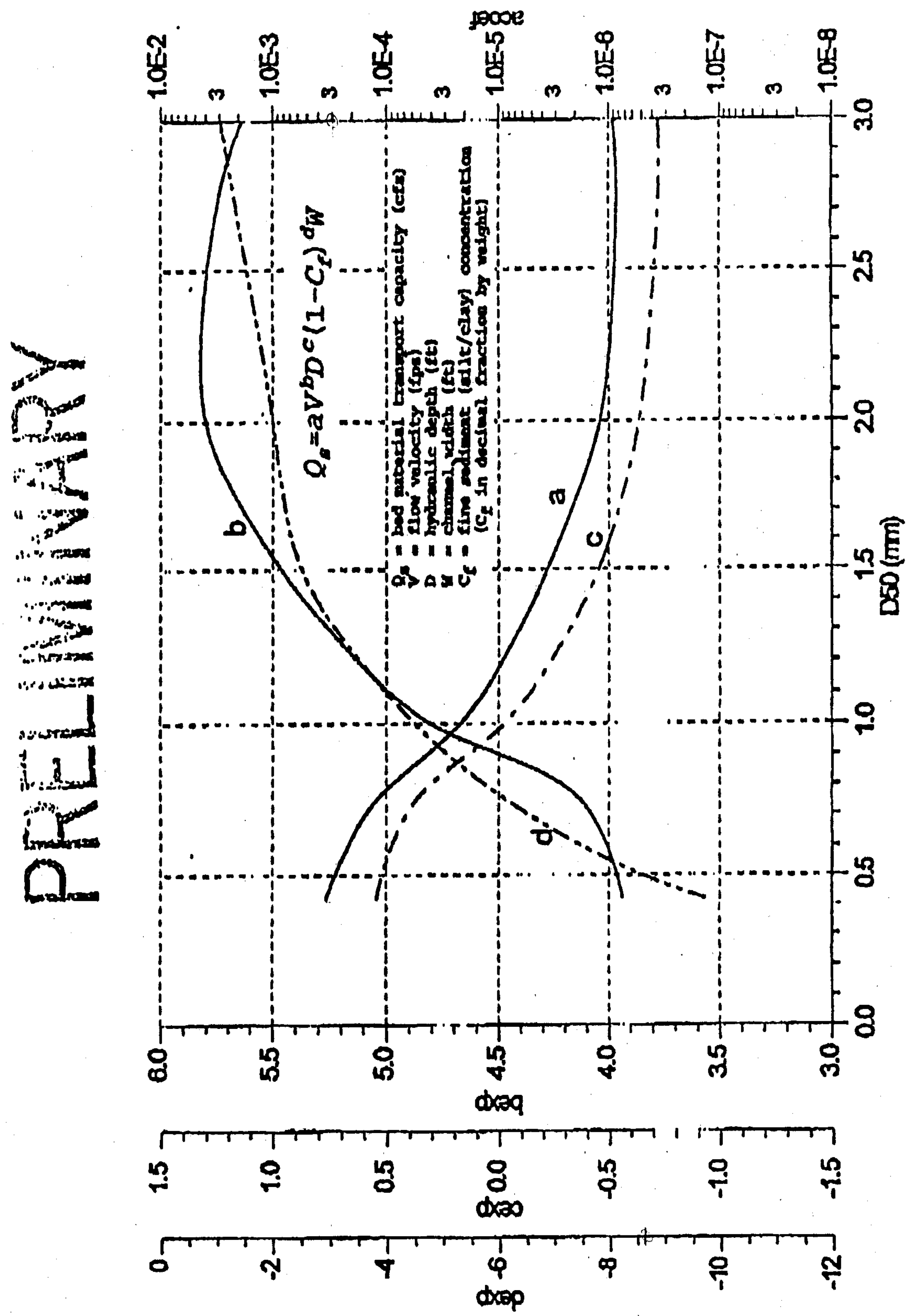
REFERENCES

Karim, F. and Kennedy, J.F., 1983. "Missouri River Computer-Based Predictors for Sediment Discharges and Friction Factors of Alluvial Streams," IHR Report No. 242, Iowa Institute of Hydraulic Research, University of Iowa.

Rouse, H., 1937a. "Modern Conceptions of the Mechanics of Fluid Turbulence," Transactions, ASCE, Vol. 102, Paper No. 1965, pp. 57-64.

Woo, H.S., 1985. "Sediment Transport in Hyperconcentrated Flows," Ph.D. Dissertation, Colorado State University, Fort Collins, Colorado.

Woo, H.S., Julien, P.Y., and Richardson, E.V., 1988. "Suspension of Large Concentrations of Sands," Journal of Hydraulic Engineering, Vol. 114, No. 8.


PRELIMINARY
$Q_s = aV^bD^c(1-C_f)^dW$
Q_s = bed material transport capacity (cfs)
V = flow velocity (fps)
D = hydraulic depth (ft)
W = channel width (ft)
C_f = fine sediment (silt/clay) concentration
(C_f in decimal fraction by weight)
a
b
c
d
acoef
1.0E-2
1.0E-3
1.0E-4
1.0E-5
1.0E-6
1.0E-7
1.0E-8
3
bexp
6.0
5.5
5.0
4.5
4.0
3.5
3.0
cexp
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
dexp
0
-2
-4
-6
-8
-10
-12
D50 (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0

C4

RCE

APPENDIX D

SEDIMENT WASH LOAD CALCULATIONS

Table of Contents

"L.S." VALUE CALCULATION
PROJECT:UNSER DIVERSION
DATE: 08/31/93

SUBBASIN I.D.	BASIN AREA (ac)	SUBAREA #1 "S" (ft / ft)	SUBAREA #1 "L" (ft)	SUBAREA #1 "m"	SUBAREA #1 "LS"	SUBAREA #1 % BASIN AREA	SUBAREA #2 "S" (ft / ft)	SUBAREA #2 "L" (ft)	SUBAREA #2 "m"	SUBAREA #2 "LS"	SUBAREA #2 % BASIN AREA	SUBAREA #3 "S" (ft / ft)	SUBAREA #3 "L" (ft)	SUBAREA #3 "m"	SUBAREA #3 "LS"	SUBAREA #3 % BASIN AREA	WEIGHTED LS
BASIN 120.1	16.58	0.029	400	0.3	0.41	100	0.000	0	0.3	0.00	0	0.000	0	0.3	0.00	0	0.41
BASIN 120.2	34.88	0.04	100	0.4	0.40	26	0.0345	400	0.4	0.59	74	0.000	0	0.3	0.00	0	0.54
BASIN 120.3	12.74	0.022	100	0.3	0.21	53	0.022	400	0.3	0.32	47	0.000	0	0.3	0.00	0	0.26
BASIN 120.4	5.82	0.100	40	0.5	0.87	100	0.000	0	0.3	0.00	0	0.000	0	0.3	0.00	0	0.87
BASIN 120.5	10.36	0.033	150	0.4	0.39	100	0.000	0	0.3	0.00	0	0.000	0	0.3	0.00	0	0.39
BASIN120.6	20.03	0.029	400	0.3	0.41	100	0.000	0	0.3	0.00	0	0.000	0	0.3	0.00	0	0.41
BASIN 130.1	47.55	0.038	400	0.4	0.65	100	0.000	0	0.3	0.00	0	0.000	0	0.3	0.00	0	0.65
BASIN 130.2	31.3	0.040	250	0.4	0.57	31	0.050	400	0.5	1.07	69	0.000	0	0.3	0.00	0	0.91
BASIN 130.3	3.01	0.020	15	0.3	0.11	100	0.000	0	0.3	0.00	0	0.000	0	0.3	0.00	0	0.11
BASIN 130.4	39.16	0.033	400	0.4	0.57	100	0.000	0	0.3	0.00	0	0.000	0	0.3	0.00	0	0.57
BASIN 130.5	6.66	0.100	40	0.5	0.87	100	0.000	0	0.3	0.00	0	0.000	0	0.3	0.00	0	0.87
BASIN 130.6	45.44	0.030	400	0.4	0.52	100	0.000	0	0.3	0.00	0	0.000	0	0.3	0.00	0	0.52
BASIN 130.7	10.85	0.100	400	0.5	2.74	100	0.000	0	0.3	0.00	0	0.000	0	0.3	0.00	0	2.74
BASIN 130.8	20.98	0.033	400	0.4	0.57	100	0.000	0	0.3	0.00	0	0.000	0	0.3	0.00	0	0.57
BASIN 130.9	6.11	0.024	400	0.3	0.35	100	0.000	0	0.3	0.00	0	0.000	0	0.3	0.00	0	0.35
BASIN 140.1	12.54	0.100	200	0.5	1.94	16	0.071	400	0.5	1.67	84	0.000	0	0.3	0.00	0	1.71
BASIN 140.2	56.63	0.200	200	0.5	5.93	4	0.071	400	0.5	1.68	34	0.027	400	0.3	0.39	62	1.05
BASIN 150.1	97.17	0.071	400	0.5	1.68	13	0.028	400	0.3	0.41	87	0.000	0	0.3	0.00	0	0.57
TOTAL	477.81																

$$LS = \left(\frac{\lambda}{72.6}\right)^{n} (0.65 + .0454S + .0065S^2)$$

λ = slope length (<400')
S = % Slope
n = .3 for S ≤ 3%
.4 3% <S < 5%
.5 S ≥ 5%

SEDIMENT YIELD CALCULATION
PROJECT: UNSER DIVERSION
WATERSHED POND #1
STORM:100 YEAR 24 HOUR
CALC DATE:09/18/93 10:25:55

SEDIMENT YIELD (Qs) = a*((V*Q)^b)*K*C*LS
SEDIMENT CONCENTRATION = WT. SDMNT / WT. OF MIXTURE
SEDIMENT MATERIAL ASSUMED UNIT WEIGHT = 165 LBS/CF

a = 300
b = 0.56

CONCENTRATION POINT OR SUBBASIN I.D.	AREA (ac)	EVENT RUNOFF VOLUME (ac ft)	EVENT PEAK FLOW (cfs)	% MATERIAL < 0.074	"K"	"C"	"LS"	SEDIMENT YIELD (tons)	SEDIMENT YIELD (tons/sm)	BULKING FACTOR (percent)	FINE SEDIMENT CONCENTRATION (ppm by wt.)	TOTAL SEDIMENT CONCENTRATION (ppm by wt.)
2 YEAR												
BASIN 150.1	97.17	0.00	0.0	20.00	0.17	0.26	0.40	0.00	0.00	0.0	0	0
5 YEAR												
BASIN 150.1	97.17	0.08	1.6	20.00	0.17	0.26	0.40	1.68	11.05	0.6	3,076	15,194
10 YEAR												
BASIN 150.1	97.17	0.70	14.2	20.00	0.17	0.26	0.40	19.22	126.61	0.8	4,025	19,806
25 YEAR												
BASIN 150.1	97.17	1.72	38.2	20.00	0.17	0.26	0.40	55.27	364.00	0.9	4,706	23,096
50 YEAR												
BASIN 150.1	97.17	2.63	59.4	20.00	0.17	0.26	0.40	89.76	591.22	0.9	4,998	24,498
100 YEAR												
BASIN 150.1	97.17	3.70	85.4	20.00	0.17	0.26	0.40	133.17	877.12	1.0	5,269	25,800

SEDIMENT YIELD CALCULATION
PROJECT: UNSER DIVERSION
WATERSHED POND #3
STORM: 2,5,& 10 YEAR 24 HOUR
CALC DATE:09/18/93 10:35:22

SEDIMENT YIELD (Qs) = a*((V*Q)^b)*K*C*LS
SEDIMENT CONCENTRATION = WT. SDMNT / WT. OF MIXTURE
SEDIMENT MATERIAL ASSUMED UNIT WEIGHT = 165 LBS/CF

a = 300
b = 0.56

CONCENTRATION POINT OR SUBBASIN I.D.	AREA (ac)	EVENT RUNOFF VOLUME (ac ft)	EVENT PEAK FLOW (cfs)	% MATERIAL < 0.074	"K"	"C"	"LS"	SEDIMENT YIELD (tons)	SEDIMENT YIELD (tons/sm)	BULKING FACTOR (percent)	FINE SEDIMENT CONCENTRATION (ppm by wt.)	TOTAL SEDIMENT CONCENTRATION (ppm by wt.)
2 YEAR												
BASIN 140.1	12.54	0.00	0.00	20.00	0.17	0.26	1.71	0.00	0.00	0.0	0	0
BASIN 140.2	56.63	0.00	0.0	20.00	0.17	0.26	1.05	0.00	0.00	0.0	0	0
TOTAL	69.17	0.00						0	0.00	0.0	0	0
5 YEAR												
BASIN 140.1	12.54	0.04	1.35	20.00	0.17	0.26	1.71	4.42	225.72	3.1	16,010	75,233
BASIN 140.2	56.63	0.09	3.3	20.00	0.17	0.26	1.05	7.01	79.19	2.2	11,327	54,179
TOTAL	69.17	0.13						11.4293	105.75	2.4	12,773	60,759
10 YEAR												
BASIN 140.1	12.54	0.13	4.7	20.00	0.17	0.26	1.71	17.21	878.22	3.7	19,107	88,751
BASIN 140.2	56.63	0.46	16.6	20.00	0.17	0.26	1.05	43.46	491.21	2.6	13,714	65,005
TOTAL	69.17	0.59						60.6725	561.38	2.9	14,907	70,343

SEDIMENT YIELD CALCULATION
PROJECT: UNSER DIVERSION
WATERSHED POND #3
STORM:25,50,&100 YEAR 24 HOUR
CALC DATE:09/18/93 10:30:04

SEDIMENT YIELD (Qs) = a*((V*Q)^b)*K*C*LS
SEDIMENT CONCENTRATION = WT. SDMNT / WT. OF MIXTURE
SEDIMENT MATERIAL ASSUMED UNIT WEIGHT = 165 LBS/CF

a = 300
b = 0.56

CONCENTRATION POINT OR SUBBASIN I.D.	AREA	EVENT RUNOFF VOLUME	EVENT PEAK FLOW	% MATERIAL < 0.074	"K"	"C"	"LS"	SEDIMENT YIELD	SEDIMENT YIELD	BULKING FACTOR	FINE SEDIMENT CONCENTRATION	TOTAL SEDIMENT CONCENTRATION
	(ac)	(ac ft)	(cfs)					(tons)	(tons/sm)	(percent)	(ppm by wt.)	(ppm by wt.)
25 YEAR												
BASIN 140.1	12.54	0.272	10.17	20.00	0.17	0.26	1.71	40.09	2,045.88	4.1	21,227	97,831
BASIN 140.2	56.63	1.08	39.9	20.00	0.17	0.26	1.05	114.82	1,297.63	2.9	15,348	72,302
TOTAL	69.17	1.36						154.906	1,433.28	3.2	16,533	77,538
50 YEAR												
BASIN 140.1	12.54	0.39	14.5	20.00	0.17	0.26	1.71	59.83	3,053.40	4.3	22,076	101,426
BASIN 140.2	56.63	1.62	59.1	20.00	0.17	0.26	1.05	179.12	2,024.34	3.1	16,011	75,236
TOTAL	69.17	2.01						238.95	2,210.90	3.3	17,194	80,436
100 YEAR												
BASIN 140.1	12.54	0.52	18.9	20.00	0.17	0.26	1.71	81.53	4,161.05	4.4	22,553	103,433
BASIN 140.2	56.63	2.20	79.6	20.00	0.17	0.26	1.05	251.19	2,838.80	3.2	16,525	77,500
TOTAL	69.17	2.72						332.72	3,078.51	3.4	17,683	82,573

SEDIMENT YIELD CALCULATION
PROJECT: UNSER DIVERSION
WATERSHED POND #5
STORM: 2 YEAR 24 HOUR
CALC DATE:08/31/93 12:33:13

SEDIMENT YIELD (Qs) = a*((V*Q)^b)*K*C*LS
SEDIMENT CONCENTRATION = WT. SDMNT / WT. OF MIXTURE
SEDIMENT MATERIAL ASSUMED UNIT WEIGHT = 165 LBS/CF

a = 300
b = 0.56

CONCENTRATION POINT OR SUBBASIN I.D.	AREA (ac)	EVENT RUNOFF VOLUME (ac ft)	EVENT PEAK FLOW (cfs)	% MATERIAL < 0.074	"K"	"C"	"LS"	SEDIMENT YIELD (tons)	SEDIMENT YIELD (tons/sm)	BULKING FACTOR (percent)	FINE SEDIMENT CONCENTRATION (ppm by wt.)	TOTAL SEDIMENT CONCENTRATION (ppm by wt.)
POINT #130.41												
N. OF I-40												
BASIN 130.1	47.55	0.00	0.0	20.00	0.17	0.26	0.65	0.00	0.00	0.0	0	0
BASIN 130.2	31.30	0.00	0.0	20.00	0.17	0.26	0.91	0.00	0.00	0.0	0	0
BASIN 130.3	3.01	0.22	5.1	20.00	0.17	0.26	0.11	1.56	330.78	0.2	1,040	5,176
BASIN 130.4	39.16	0.00	0.0	20.00	0.17	0.26	0.57	0.00	0.00	0.0	0	0
SUBTOTAL	121.02	0.22						1.56	8.23	0.2	1,040	5,176
POINT # 130.71												
BASIN 130.5	6.66	0.24	5.6	20.00	0.17	0.26	0.87	13.61	1,308.19	1.6	8,278	40,064
BASIN 130.6	45.44	0.00	0.0	20.00	0.17	0.26	0.52	0.00	0.00	0.0	0	0
BASIN 130.9	6.11	0.00	0.0	20.00	0.17	0.26	0.35	0.00	0.00	0.0	0	0
BASIN 130.7	10.85	0.00	0.0	20.00	0.17	0.26	2.74	0.00	0.00	0.0	0	0
SUBTOTAL	190.08	0.46						15.17	51.07	0.9	4,829	23,689
BASIN 130.8	20.93	0.00	0.0	20.00	0.17	0.26	0.57	0.00	0.00	0.0	0	0
TOTAL	211.01	0.46						15.17	46.01	0.9	4,829	23,689

SEDIMENT YIELD CALCULATION
PROJECT: UNSER DIVERSION
WATERSHED POND #5
STORM: 5 YEAR 24 HOUR
CALC DATE:08/31/93 12:27:02

SEDIMENT YIELD (Qs) = a*((V*Q)^b)*K*C*LS
SEDIMENT CONCENTRATION = WT. SDMNT / WT. OF MIXTURE
SEDIMENT MATERIAL ASSUMED UNIT WEIGHT = 165 LBS/CF

a = 300
b = 0.56

CONCENTRATION POINT OR SUBBASIN I.D.	AREA (ac)	EVENT RUNOFF VOLUME (ac ft)	EVENT PEAK FLOW (cfs)	% MATERIAL < 0.074	"K"	"C"	"LS"	SEDIMENT YIELD (tons)	SEDIMENT YIELD (tons/sm)	BULKING FACTOR (percent)	FINE SEDIMENT CONCENTRATION (ppm by wt.)	TOTAL SEDIMENT CONCENTRATION (ppm by wt.)
POINT #130.41												
N. OF I-40												
BASIN 130.1	47.55	0.04	0.8	20.00	0.17	0.26	0.65	1.25	16.88	0.9	4,593	22,549
BASIN 130.2	31.30	0.03	0.6	20.00	0.17	0.26	0.91	1.27	26.01	1.2	6,202	30,257
BASIN 130.3	3.01	0.31	7.2	20.00	0.17	0.26	0.11	2.29	486.20	0.2	1,084	5,398
BASIN 130.4	39.16	0.03	1.0	20.00	0.17	0.26	0.57	1.07	17.43	1.0	5,205	25,495
SUBTOTAL	121.02	0.41						5.88	31.09	0.4	2,106	10,442
POINT # 130.71												
BASIN 130.5	6.66	0.34	7.9	20.00	0.17	0.26	0.87	20.06	1,927.83	1.6	8,608	41,609
BASIN 130.6	45.44	0.04	0.9	20.00	0.17	0.26	0.52	1.07	15.09	0.7	3,927	19,333
BASIN 130.9	6.11	0.01	0.4	20.00	0.17	0.26	0.35	0.21	22.08	0.6	3,092	15,270
BASIN 130.7	10.85	0.02	0.7	20.00	0.17	0.26	2.74	3.33	196.28	4.6	23,899	109,068
SUBTOTAL	190.08	0.82						30.55	102.87	1.0	5,453	26,682
BASIN 130.8	20.93	0.02	0.6	20.00	0.17	0.26	0.57	0.61	18.68	0.8	4,475	21,981
TOTAL	211.01	0.84						31.16	94.52	1.0	5,430	26,571

SEDIMENT YIELD CALCULATION

PROJECT: UNSER DIVERSION
WATERSHED POND #5
STORM: 10 YEAR 24 HOUR
CALC DATE:08/31/93 12:20:38

SEDIMENT YIELD (Qs) = a*((V*Q)^b)*K*C*LS
SEDIMENT CONCENTRATION = WT. SDMNT / WT. OF MIXTURE
SEDIMENT MATERIAL ASSUMED UNIT WEIGHT = 165 LBS/CF

a = 300
b = 0.56

CONCENTRATION POINT OR SUBBASIN I.D.	AREA (ac)	EVENT RUNOFF VOLUME (ac ft)	EVENT PEAK FLOW (cfs)	% MATERIAL < 0.074	"K"	"C"	"LS"	SEDIMENT YIELD (tons)	SEDIMENT YIELD (tons/sm)	BULKING FACTOR (percent)	FINE SEDIMENT CONCENTRATION (ppm by wt.)	TOTAL SEDIMENT CONCENTRATION (ppm by wt.)
POINT #130.41												
N. OF I-40												
BASIN 130.1	47.55	0.33	6.6	20.00	0.17	0.26	0.65	13.33	179.39	1.1	5,908	28,860
BASIN 130.2	31.30	0.22	5.5	20.00	0.17	0.26	0.91	13.43	274.52	1.7	8,901	42,974
BASIN 130.3	3.01	0.37	8.7	20.00	0.17	0.26	0.11	2.81	596.86	0.2	1,115	5,551
BASIN 130.4	39.16	0.27	8.8	20.00	0.17	0.26	0.57	12.27	200.55	1.3	6,644	32,359
SUBTOTAL	121.02	1.19						41.83	221.23	1.0	5,147	25,214
POINT # 130.71												
BASIN 130.5	6.66	0.43	10.2	20.00	0.17	0.26	0.87	26.40	2,537.04	1.7	8,954	43,224
BASIN 130.6	45.44	0.31	7.8	20.00	0.17	0.26	0.52	11.31	159.23	1.0	5,338	26,132
BASIN 130.9	6.11	0.05	1.9	20.00	0.17	0.26	0.35	1.24	130.10	0.7	3,642	17,950
BASIN 130.7	10.85	0.09	3.4	20.00	0.17	0.26	2.74	18.72	1,104.20	5.8	29,700	132,730
SUBTOTAL	190.08	2.07						99.50	335.02	1.3	7,024	34,160
BASIN 130.8	20.93	0.14	4.9	20.00	0.17	0.26	0.57	6.12	187.14	1.2	6,392	31,163
TOTAL	211.01	2.21						105.62	320.35	1.3	6,984	33,971

SEDIMENT YIELD CALCULATION
PROJECT: UNSER DIVERSION
WATERSHED POND #5
STORM: 25 YEAR 24 HOUR
CALC DATE:09/03/93 13:27:22

SEDIMENT YIELD (Qs) = a*((V*Q)^b)*K*C*LS
SEDIMENT CONCENTRATION = WT. SDMNT / WT. OF MIXTURE
SEDIMENT MATERIAL ASSUMED UNIT WEIGHT = 165 LBS/CF

a = 300
b = 0.56

CONCENTRATION POINT OR SUBBASIN I.D.	AREA (ac)	EVENT RUNOFF VOLUME (ac ft)	EVENT PEAK FLOW (cfs)	% MATERIAL < 0.074	"K"	"C"	"LS"	SEDIMENT YIELD (tons)	SEDIMENT YIELD (tons/sm)	BULKING FACTOR (percent)	FINE SEDIMENT CONCENTRATION (ppm by wt.)	TOTAL SEDIMENT CONCENTRATION (ppm by wt.)
POINT #130.41												
N. OF I-40												
BASIN 130.1	47.55	0.84	17.5	20.00	0.17	0.26	0.65	38.83	522.62	1.3	6,756	32,893
BASIN 130.2	31.30	0.56	14.5	20.00	0.17	0.26	0.91	38.99	797.21	1.9	10,142	48,731
BASIN 130.3	3.01	0.46	10.6	20.00	0.17	0.26	0.11	3.54	753.12	0.2	1,132	5,634
BASIN 130.4	39.16	0.70	23.0	20.00	0.17	0.26	0.57	35.83	585.57	1.4	7,476	36,295
SUBTOTAL	121.02	2.56						117.19	619.74	1.3	6,691	32,585
POINT # 130.71												
BASIN 130.5	6.66	0.56	13.6	20.00	0.17	0.26	0.87	35.96	3,455.70	1.8	9,361	45,118
BASIN 130.6	45.44	0.81	20.6	20.00	0.17	0.26	0.52	33.35	469.68	1.1	6,022	29,402
BASIN 130.9	6.11	0.12	4.4	20.00	0.17	0.26	0.35	3.25	339.96	0.8	3,964	19,512
BASIN 130.7	10.85	0.22	7.9	20.00	0.17	0.26	2.74	49.51	2,920.60	6.3	32,058	142,072
SUBTOTAL	190.08	4.27						239.26	805.58	1.6	8,178	39,596
BASIN 130.8	20.93	0.37	12.7	20.00	0.17	0.26	0.57	17.98	549.73	1.4	7,100	34,518
TOTAL	211.01	4.64						257.23	780.20	1.5	8,092	39,193

SEDIMENT YIELD CALCULATION
PROJECT: UNSER DIVERSION
WATERSHED POND #5
STORM: 50 YEAR 24 HOUR
CALC DATE:09/18/93 10:36:40

SEDIMENT YIELD (Qs) = a*((V*Q)^b)*K*C*LS
SEDIMENT CONCENTRATION = WT. SDMNT / WT. OF MIXTURE
SEDIMENT MATERIAL ASSUMED UNIT WEIGHT = 165 LBS/CF

a = 300
b = 0.56

CONCENTRATION POINT OR SUBBASIN I.D.	AREA (ac)	EVENT RUNOFF VOLUME (ac ft)	EVENT PEAK FLOW (cfs)	% MATERIAL < 0.074	"K"	"C"	"LS"	SEDIMENT YIELD (tons)	SEDIMENT YIELD (tons/sm)	BULKING FACTOR (percent)	FINE SEDIMENT CONCENTRATION (ppm by wt.)	TOTAL SEDIMENT CONCENTRATION (ppm by wt.)
POINT #130.41												
N. OF I-40												
BASIN 130.1	47.55	1.29	27.0	20.00	0.17	0.26	0.65	62.98	847.72	1.4	7,134	34,679
BASIN 130.2	31.30	0.85	22.3	20.00	0.17	0.26	0.91	62.68	1,281.58	2.1	10,735	51,464
BASIN 130.3	3.01	0.52	11.9	20.00	0.17	0.26	0.11	4.05	860.63	0.2	1,144	5,695
BASIN 130.4	39.16	1.06	35.2	20.00	0.17	0.26	0.57	57.37	937.54	1.5	7,901	38,295
SUBTOTAL	121.02	3.72						187.07	989.32	1.4	7,346	35,682
POINT # 130.71												
BASIN 130.5	6.66	0.66	16.1	20.00	0.17	0.26	0.87	43.33	4,164.24	1.8	9,570	46,084
BASIN 130.6	45.44	1.23	31.7	20.00	0.17	0.26	0.52	53.64	755.49	1.2	6,377	31,090
BASIN 130.9	6.11	0.18	6.5	20.00	0.17	0.26	0.35	5.07	530.80	0.8	4,126	20,294
BASIN 130.7	10.85	0.32	11.6	20.00	0.17	0.26	2.74	75.73	4,467.09	6.6	33,655	148,308
SUBTOTAL	190.08	6.11						364.85	1,228.44	1.7	8,711	42,087
BASIN 130.8	20.93	0.57	19.4	20.00	0.17	0.26	0.57	29.03	887.74	1.4	7,440	36,123
TOTAL	211.01	6.68						393.88	1,194.64	1.6	8,602	41,581

SEDIMENT YIELD CALCULATION
PROJECT: UNSER DIVERSION
WATERSHED POND #5
STORM:100 YEAR 24 HOUR
CALC DATE:09/18/93 10:37:47

SEDIMENT YIELD (Qs) = a*((V*Q)^b)*K*C*LS
SEDIMENT CONCENTRATION = WT. SDMNT / WT. OF MIXTURE
SEDIMENT MATERIAL ASSUMED UNIT WEIGHT = 165 LBS/CF

a = 300
b = 0.56

CONCENTRATION POINT OR SUBBASIN I.D.	AREA (ac)	EVENT RUNOFF VOLUME (ac ft)	EVENT PEAK FLOW (cfs)	% MATERIAL < 0.074	"K"	"C"	"LS"	SEDIMENT YIELD (tons)	SEDIMENT YIELD (tons/sm)	BULKING FACTOR (percent)	FINE SEDIMENT CONCENTRATION (ppm by wt.)	TOTAL SEDIMENT CONCENTRATION (ppm by wt.)
POINT #130.41												
N. OF I-40												
BASIN 130.1	47.55	1.74	36.9	20.00	0.17	0.26	0.65	88.68	1,193.63	1.4	7,440	36,126
BASIN 130.2	31.30	1.15	30.3	20.00	0.17	0.26	0.91	87.97	1,798.75	2.1	11,170	53,462
BASIN 130.3	3.01	0.59	13.2	20.00	0.17	0.26	0.11	4.60	978.92	0.2	1,147	5,709
BASIN 130.4	39.16	1.43	47.3	20.00	0.17	0.26	0.57	80.18	1,310.38	1.6	8,161	39,515
SUBTOTAL	121.02	4.91						261.44	1,382.57	1.5	7,773	37,693
POINT # 130.71												
BASIN 130.5	6.66	0.76	18.6	20.00	0.17	0.26	0.87	50.76	4,877.96	1.9	9,746	46,901
BASIN 130.6	45.44	1.66	43.1	20.00	0.17	0.26	0.52	75.46	1,062.83	1.3	6,633	32,309
BASIN 130.9	6.11	0.24	8.6	20.00	0.17	0.26	0.35	6.95	728.49	0.8	4,246	20,877
BASIN 130.7	10.85	0.43	15.2	20.00	0.17	0.26	2.74	103.57	6,109.21	6.8	34,542	151,744
SUBTOTAL	190.08	8.00						498.18	1,677.38	1.7	9,082	43,818
BASIN 130.8	20.93	0.77	26.0	20.00	0.17	0.26	0.57	40.34	1,233.39	1.5	7,689	37,300
TOTAL	211.01	8.77						538.52	1,633.35	1.7	8,960	43,252

SEDIMENT YIELD CALCULATION
PROJECT: UNSER DIVERSION
WATERSHED POND #6
STORM:2 YEAR 24 HOUR
CALC DATE:08/31/93 17:48:55

SEDIMENT YIELD (Qs) = a*((V*Q)^b)*K*C*LS
SEDIMENT CONCENTRATION = WT. SDMNT / WT. OF MIXTURE
SEDIMENT MATERIAL ASSUMED UNIT WEIGHT = 165 LBS/CF

a = 300
b = 0.56

CONCENTRATION POINT OR SUBBASIN I.D.	AREA (ac)	EVENT RUNOFF VOLUME (ac ft)	EVENT PEAK FLOW (cfs)	% MATERIAL < 0.074	"K"	"C"	"LS"	SEDIMENT YIELD (tons)	SEDIMENT YIELD (tons/sm)	BULKING FACTOR (percent)	FINE SEDIMENT CONCENTRATION (ppm by wt.)	TOTAL SEDIMENT CONCENTRATION (ppm by wt.)
POINT #120.31												
N. OF I-40												
BASIN 120.1	16.58	0.00	0.0	20.00	0.17	0.26	0.41	0.00	0.00	0.0	0	0
BASIN 120.2	34.88	0.00	0.0	20.00	0.17	0.26	0.54	0.00	0.00	0.0	0	0
BASIN 120.3	12.73	0.00	0.0	20.00	0.17	0.26	0.26	0.00	0.00	0.0	0	0
SUBTOTAL	64.19	0.00						0.00	0.00	0.0	0	0
POINT # 120.51												
BASIN 120.4	5.82	0.21	4.9	20.00	0.17	0.26	0.87	11.66	1,281.68	1.5	8,101	39,235
BASIN 120.5	10.36	0.00	0.0	20.00	0.17	0.26	0.39	0.00	0.00	0.0	0	0
TOTAL	80.37	0.21						11.66	92.81	1.5	8,101	39,235
BASIN 120.6	20.03	0.00	0.0	20.00	0.17	0.26	0.41	0.00	0.00	0.0	0	0

SEDIMENT YIELD CALCULATION
PROJECT: UNSER DIVERSION
WATERSHED POND #6
STORM:5 YEAR 24 HOUR
CALC DATE:08/31/93 17:30:01

SEDIMENT YIELD (Qs) = a*((V*Q)^b)*K*C*LS
SEDIMENT CONCENTRATION = WT. SDMNT / WT. OF MIXTURE
SEDIMENT MATERIAL ASSUMED UNIT WEIGHT = 165 LBS/CF

a = 300
b = 0.56

CONCENTRATION POINT OR SUBBASIN I.D.	AREA (ac)	EVENT RUNOFF VOLUME (ac ft)	EVENT PEAK FLOW (cfs)	% MATERIAL < 0.074	"K"	"C"	"LS"	SEDIMENT YIELD (tons)	SEDIMENT YIELD (tons/sm)	BULKING FACTOR (percent)	FINE SEDIMENT CONCENTRATION (ppm by wt.)	TOTAL SEDIMENT CONCENTRATION (ppm by wt.)
POINT #120.31												
N. OF I-40												
BASIN 120.1	16.58	0.01	0.5	20.00	0.17	0.26	0.41	0.31	12.08	0.7	3,530	17,406
BASIN 120.2	34.88	0.03	0.7	20.00	0.17	0.26	0.54	0.78	14.29	0.8	4,078	20,061
BASIN 120.3	12.73	0.01	0.4	20.00	0.17	0.26	0.26	0.15	7.42	0.4	2,167	10,743
SUBTOTAL	64.19	0.05						1.24	12.36	0.7	3,564	17,570
POINT # 120.51												
BASIN 120.4	5.82	0.29	6.9	20.00	0.17	0.26	0.87	17.20	1,891.55	1.6	8,522	41,206
BASIN 120.5	10.36	0.01	0.3	20.00	0.17	0.26	0.39	0.17	10.69	0.6	3,174	15,671
TOTAL	80.37	0.35						18.61	148.23	1.5	7,689	37,299
BASIN 120.6	21.00	0.06	1.5	20.00	0.17	0.26	0.41	1.35	41.23	0.7	3,543	17,467

SEDIMENT YIELD CALCULATION
PROJECT: UNSER DIVERSION
WATERSHED POND #6
STORM:10 YEAR 24 HOUR
CALC DATE:08/31/93 17:04:20

SEDIMENT YIELD (Qs) = a*((V*Q)^b)*K*C*LS
SEDIMENT CONCENTRATION = WT. SDMNT / WT. OF MIXTURE
SEDIMENT MATERIAL ASSUMED UNIT WEIGHT = 165 LBS/CF

a = 300
b = 0.56

CONCENTRATION POINT OR SUBBASIN I.D.	AREA (ac)	EVENT RUNOFF VOLUME (ac ft)	EVENT PEAK FLOW (cfs)	% MATERIAL < 0.074	"K"	"C"	"LS"	SEDIMENT YIELD (tons)	SEDIMENT YIELD (tons/sm)	BULKING FACTOR (percent)	FINE SEDIMENT CONCENTRATION (ppm by wt.)	TOTAL SEDIMENT CONCENTRATION (ppm by wt.)
POINT #120.31												
N. OF I-40												
BASIN 120.1	16.58	0.11	4.1	20.00	0.17	0.26	0.41	3.54	136.70	0.9	4,551	22,346
BASIN 120.2	34.88	0.24	5.9	20.00	0.17	0.26	0.54	8.72	159.94	1.0	5,316	26,028
BASIN 120.3	12.73	0.09	3.1	20.00	0.17	0.26	0.26	1.67	84.19	0.5	2,793	13,809
SUBTOTAL	64.19	0.44						13.93	138.92	0.9	4,617	22,668
POINT # 120.51												
BASIN 120.4	5.82	0.37	9.0	20.00	0.17	0.26	0.87	22.69	2,495.45	1.7	8,850	42,737
BASIN 120.5	10.36	0.07	2.6	20.00	0.17	0.26	0.39	1.99	122.69	0.8	4,099	20,166
TOTAL	80.37	0.89						38.61	307.47	1.2	6,365	31,036
BASIN 120.6	21.00	0.19	5.9	20.00	0.17	0.26	0.41	5.73	174.67	0.9	4,538	22,287

SEDIMENT YIELD CALCULATION

PROJECT: UNSER DIVERSION
WATERSHED POND #6
STORM:25 YEAR 24 HOUR
CALC DATE:08/31/93 16:59:04

SEDIMENT YIELD (Qs) = a*((V*Q)^b)*K*C*LS
SEDIMENT CONCENTRATION = WT. SDMNT / WT. OF MIXTURE
SEDIMENT MATERIAL ASSUMED UNIT WEIGHT = 165 LBS/CF

a = 300
b = 0.56

CONCENTRATION POINT OR SUBBASIN I.D.	AREA	EVENT RUNOFF VOLUME	EVENT PEAK FLOW	% MATERIAL < 0.074	"K"	"C"	"LS"	SEDIMENT YIELD	SEDIMENT YIELD	BULKING FACTOR	FINE SEDIMENT CONCENTRATION	TOTAL SEDIMENT CONCENTRATION
	(ac)	(ac ft)	(cfs)					(tons)	(tons/sm)	(percent)	(ppm by wt.)	(ppm by wt.)
POINT #120.31												
N. OF I-40												
BASIN 120.1	16.58	0.29	10.6	20.00	0.17	0.26	0.41	10.26	395.99	1.0	5,109	25,031
BASIN 120.2	34.88	0.62	15.5	20.00	0.17	0.26	0.54	25.40	466.09	1.1	6,003	29,310
BASIN 120.3	12.73	0.23	8.1	20.00	0.17	0.26	0.26	4.84	243.51	0.6	3,144	15,525
SUBTOTAL	64.19	1.14						40.50	403.84	1.0	5,206	25,499
POINT # 120.51												
BASIN 120.4	5.82	0.49	11.9	20.00	0.17	0.26	0.87	30.80	3,387.06	1.8	9,221	44,467
BASIN 120.5	10.36	0.18	6.6	20.00	0.17	0.26	0.39	5.77	356.48	0.9	4,594	22,555
SUBTOTAL	80.37	1.81						77.08	613.77	1.2	6,228	30,381
BASIN 120.6	21.00	0.41	13.9	20.00	0.17	0.26	0.41	14.36	437.76	1.0	5,142	25,190

SEDIMENT YIELD CALCULATION

PROJECT: UNSER DIVERSION
WATERSHED POND #6
STORM:50 YEAR 24 HOUR
CALC DATE:08/31/93 16:54:51

SEDIMENT YIELD (Qs) = a*((V*Q)^b)*K*C*LS
SEDIMENT CONCENTRATION = WT. SDMNT / WT. OF MIXTURE
SEDIMENT MATERIAL ASSUMED UNIT WEIGHT = 165 LBS/CF

a = 300
b = 0.56

CONCENTRATION POINT OR SUBBASIN I.D.	AREA (ac)	EVENT RUNOFF VOLUME (ac ft)	EVENT PEAK FLOW (cfs)	% MATERIAL < 0.074	"K"	"C"	"LS"	SEDIMENT YIELD (tons)	SEDIMENT YIELD (tons/sm)	BULKING FACTOR (percent)	FINE SEDIMENT CONCENTRATION (ppm by wt.)	TOTAL SEDIMENT CONCENTRATION (ppm by wt.)
POINT #120.31												
N. OF I-40												
BASIN 120.1	16.58	0.45	16.1	20.00	0.17	0.26	0.41	16.43	634.32	1.0	5,369	26,280
BASIN 120.2	34.88	0.94	23.9	20.00	0.17	0.26	0.54	40.95	751.39	1.2	6,350	30,963
BASIN 120.3	12.73	0.34	12.4	20.00	0.17	0.26	0.26	7.75	389.83	0.6	3,306	16,315
SUBTOTAL	64.19	1.74						65.14	649.45	1.0	5,494	26,882
POINT # 120.51												
BASIN 120.4	5.82	0.58	14.1	20.00	0.17	0.26	0.87	37.31	4,102.64	1.8	9,442	45,491
BASIN 120.5	10.36	0.28	10.1	20.00	0.17	0.26	0.39	9.24	570.55	0.9	4,831	23,695
TOTAL	80.37	2.59						111.68	889.34	1.2	6,303	30,741
BASIN 120.6	21.00	0.60	20.6	20.60	0.17	0.26	0.41	22.22	677.25	1.0	5,573	26,486

SEDIMENT YIELD CALCULATION
PROJECT: UNSER DIVERSION
WATERSHED POND #6
STORM:100 YEAR 24 HOUR
CALC DATE:08/31/93 16:46:48

SEDIMENT YIELD (Qs) = a*((V*Q)^b)*K*C*LS
SEDIMENT CONCENTRATION = WT. SDMNT / WT. OF MIXTURE
SEDIMENT MATERIAL ASSUMED UNIT WEIGHT = 165 LBS/CF

a = 300
b = 0.56

CONCENTRATION POINT OR SUBBASIN I.D.	AREA (ac)	EVENT RUNOFF VOLUME (ac ft)	EVENT PEAK FLOW (cfs)	% MATERIAL < 0.074	"K"	"C"	"LS"	SEDIMENT YIELD (tons)	SEDIMENT YIELD (tons/sm)	BULKING FACTOR (percent)	FINE SEDIMENT CONCENTRATION (ppm by wt.)	TOTAL SEDIMENT CONCENTRATION (ppm by wt.)
POINT #120.31												
N. OF I-40												
BASIN 120.1	16.58	0.61	21.5	20.00	0.17	0.26	0.41	22.91	884.45	1.1	5,524	27,024
BASIN 120.2	34.88	1.28	32.5	20.00	0.17	0.26	0.54	57.63	1,057.52	1.3	6,598	32,141
BASIN 120.3	12.73	0.47	16.5	20.00	0.17	0.26	0.26	10.81	543.56	0.6	3,403	16,785
SUBTOTAL	64.19	2.35						91.36	910.89	1.1	5,688	27,810
POINT # 120.51												
BASIN 120.4	5.82	0.66	16.3	20.00	0.17	0.26	0.87	43.56	4,790.07	1.8	9,619	46,313
BASIN 120.5	10.36	0.38	13.5	20.00	0.17	0.26	0.39	12.87	795.34	0.9	4,974	24,385
TOTAL	80.37	3.39						147.79	1,176.91	1.2	6,377	31,090
BASIN 120.6	20.99	0.84	28.5	20.00	0.17	0.26	0.41	32.06	977.45	1.1	5,618	27,473

APPENDIX E

SEDIMENT TRANSPORT CALCULATIONS

Table of Contents

Do sheet for all years
Do for all reaches

SEDIMENT TRANSPORT WORKSHEET

5 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	03-Sep-93 02:56:10 PM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	POND 1 WATERSHED	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 1	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.42	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0250	"A" COEFFICIENT	0.0003
MANNING'S "n"	0.030	"B" EXPONENT	3.92
FINE SED. CONCENTRATION (ppm by wt.)	15,194	"C" EXPONENT	0.54
TOTAL CLEARWATER VOLUME (cf/storm)	3,485	"D" EXPONENT	-9.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./ sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.333	0.01	0.36	0.00	0.00	1.01	1.42
0.1	0.067	0.01	0.36	0.00	0.00	1.01	0.14
0.2	0.033	0.01	0.36	0.00	0.00	1.01	0.14
0.5	0.034	0.01	0.36	0.00	0.00	1.01	0.36
1.0	0.066	0.05	1.05	0.00	0.01	1.01	1.58
1.5	0.067	0.05	1.05	0.00	0.01	1.01	2.24
1.6	0.033	0.05	1.05	0.00	0.01	1.01	1.21
1.6	0.067	0.05	1.05	0.00	0.01	1.01	2.38
1.4	0.067	0.05	1.05	0.00	0.01	1.01	2.17
1.2	0.066	0.05	1.05	0.00	0.01	1.01	1.79
0.9	0.100	0.05	1.05	0.00	0.01	1.01	2.19
0.6	0.067	0.05	1.05	0.00	0.00	1.01	1.04
0.4	0.133	0.01	0.36	0.00	0.00	1.01	0.98
0.2	0.133	0.01	0.36	0.00	0.00	1.01	0.56
0.1	0.134	0.01	0.36	0.00	0.00	1.01	0.28
0.1	0.466	0.01	0.36	0.00	0.00	1.01	0.99
0.1	0.467	0.01	0.36	0.00	0.00	1.01	0.99
0.1	0.033	0.01	0.36	0.00	0.00	1.01	0.07
0.1	0.034	0.01	0.36	0.00	0.00	1.01	0.07
0.1	0.033	0.01	0.36	0.00	0.00	1.01	0.07

TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)	20.66
TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)	34.08
AVERAGE BULKING FACTOR	1.01
AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)	15,431.91

SEDIMENT TRANSPORT WORKSHEET

10 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	03-Sep-93 02:51:48 PM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	POND 1 WATERSHED	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 1	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.42	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0250	"A" COEFFICIENT	0.0003
MANNING'S "n"	0.030	"B" EXPONENT	3.92
FINE SED. CONCENTRATION (ppm by wt.)	19,806	"C" EXPONENT	0.54
TOTAL CLEARWATER VOLUME (cf/storm)	30,490	"D" EXPONENT	-9.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.333	0.01	0.36	0.00	0.00	1.01	1.86
0.1	0.034	0.01	0.36	0.00	0.00	1.01	0.09
0.1	0.033	0.01	0.36	0.00	0.00	1.01	0.09
3.0	0.067	0.10	1.65	0.01	0.02	1.01	7.23
8.7	0.066	0.25	2.96	0.12	0.07	1.02	44.22
12.8	0.067	0.30	3.31	0.21	0.10	1.02	73.23
14.1	0.033	0.35	3.64	0.32	0.11	1.03	51.36
13.8	0.067	0.30	3.31	0.21	0.10	1.02	75.07
12.3	0.067	0.30	3.31	0.21	0.09	1.02	72.40
10.2	0.066	0.25	2.96	0.12	0.08	1.02	47.03
7.9	0.100	0.20	2.57	0.06	0.06	1.02	43.72
5.9	0.067	0.20	2.57	0.06	0.04	1.02	25.71
4.3	0.133	0.15	2.14	0.03	0.03	1.01	28.05
2.8	0.133	0.10	1.65	0.01	0.02	1.01	13.80
1.8	0.134	0.10	1.65	0.01	0.01	1.01	10.22
1.1	0.466	0.05	1.05	0.00	0.01	1.01	15.53
0.6	0.734	0.05	1.05	0.00	0.00	1.01	14.40
0.4	0.200	0.01	0.36	0.00	0.00	1.01	1.93
0.2	1.200	0.01	0.36	0.00	0.00	1.01	6.61
0.1	0.366	0.01	0.36	0.00	0.00	1.01	1.01
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					533.56
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					880.38
		AVERAGE BULKING FACTOR					1.02
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					44,226.45

SEDIMENT TRANSPORT WORKSHEET

25 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	03-Sep-93 02:46:41 PM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	POND 1 WATERSHED	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 1	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.42	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0250	"A" COEFFICIENT	0.0003
MANNING'S "n"	0.030	"B" EXPONENT	3.92
FINE SED. CONCENTRATION (ppm by wt.)	23,096	"C" EXPONENT	0.54
TOTAL CLEARWATER VOLUME (cf/storm)	74,923	"D" EXPONENT	-9.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./ sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.333	0.01	0.36	0.00	0.00	1.01	2.17
0.1	0.034	0.01	0.36	0.00	0.00	1.01	0.11
1.2	0.033	0.05	1.05	0.00	0.01	1.01	1.33
9.9	0.067	0.25	2.96	0.12	0.09	1.02	51.12
24.8	0.066	0.45	4.23	0.70	0.22	1.04	218.05
35.1	0.067	0.55	4.77	1.24	0.31	1.04	374.14
38.1	0.033	0.60	5.02	1.59	0.34	1.05	228.79
36.5	0.067	0.60	5.02	1.59	0.33	1.05	461.07
31.9	0.067	0.55	4.77	1.24	0.28	1.05	367.36
26.0	0.066	0.50	4.51	0.94	0.23	1.05	279.19
19.6	0.100	0.40	3.94	0.50	0.17	1.03	241.04
14.4	0.067	0.35	3.64	0.34	0.13	1.03	111.87
10.3	0.133	0.25	2.96	0.12	0.09	1.02	103.40
6.4	0.133	0.20	2.57	0.06	0.06	1.02	57.79
4.2	0.134	0.15	2.14	0.03	0.04	1.02	30.92
2.8	0.466	0.10	1.65	0.01	0.02	1.01	54.08
1.4	0.734	0.05	1.05	0.00	0.01	1.01	35.38
0.8	0.200	0.05	1.05	0.00	0.01	1.01	5.47
0.5	1.200	0.01	0.36	0.00	0.00	1.01	17.37
0.2	0.966	0.01	0.36	0.00	0.00	1.01	4.67
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					2,645.32
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					4,364.77
		AVERAGE BULKING FACTOR					1.04
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					85,388.32

SEDIMENT TRANSPORT WORKSHEET

50 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	03-Sep-93 02:43:42 PM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	POND 1 WATERSHED	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAMOF POND 1	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.42	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0250	"A" COEFFICIENT	0.0003
MANNING'S "n"	0.030	"B" EXPONENT	3.92
FINE SED. CONCENTRATION (ppm by wt.)	24,498	"C" EXPONENT	0.54
TOTAL CLEARWATER VOLUME (cf/storm)	114,562	"D" EXPONENT	-9.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.333	0.01	0.36	0.00	0.00	1.01	2.30
0.3	0.034	0.01	0.36	0.00	0.00	1.01	0.35
2.5	0.033	0.10	1.65	0.01	0.02	1.01	3.74
16.2	0.067	0.35	3.64	0.34	0.15	1.03	118.91
39.0	0.066	0.60	5.02	1.61	0.37	1.05	469.69
54.7	0.067	0.75	5.71	3.01	0.52	1.06	851.60
59.4	0.033	0.80	5.93	3.61	0.56	1.07	495.23
56.6	0.067	0.75	5.71	3.01	0.54	1.06	855.94
49.1	0.067	0.70	5.49	2.48	0.47	1.06	711.17
39.7	0.066	0.60	5.02	1.61	0.38	1.05	471.38
29.6	0.100	0.50	4.51	0.96	0.28	1.04	445.15
21.6	0.067	0.40	3.94	0.50	0.20	1.03	170.33
15.3	0.133	0.35	3.64	0.34	0.14	1.03	231.97
9.4	0.133	0.25	2.96	0.13	0.09	1.02	102.64
6.2	0.134	0.20	2.57	0.06	0.06	1.02	59.44
4.2	0.466	0.15	2.14	0.03	0.04	1.02	111.27
2.1	0.734	0.10	1.65	0.01	0.02	1.01	73.23
1.1	0.200	0.05	1.05	0.00	0.01	1.01	7.82
0.6	1.200	0.05	1.05	0.00	0.01	1.01	26.46
0.2	1.166	0.01	0.36	0.00	0.00	1.01	5.99
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					5,214.63
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					8,604.13
		AVERAGE BULKING FACTOR					1.05
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					107,429.69

SEDIMENT TRANSPORT WORKSHEET

100 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	03-Sep-93 02:37:15 PM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	POND 1 WATERSHED	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 1	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.42	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0250	"A" COEFFICIENT	0.0003
MANNING'S "n"	0.030	"B" EXPONENT	3.92
FINE SED. CONCENTRATION (ppm by wt.)	25,800	"C" EXPONENT	0.54
TOTAL CLEARWATER VOLUME (cf/storm)	161,172	"D" EXPONENT	-9.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./ sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.333	0.01	0.36	0.00	0.00	1.01	2.43
0.9	0.034	0.05	1.05	0.00	0.01	1.01	1.15
4.9	0.033	0.15	2.14	0.03	0.05	1.02	9.07
23.7	0.067	0.45	4.23	0.72	0.24	1.04	229.60
54.0	0.066	0.75	5.71	3.05	0.54	1.07	853.08
75.1	0.067	0.90	6.34	5.06	0.75	1.08	1,401.94
81.4	0.033	0.95	6.54	5.88	0.81	1.08	794.68
77.4	0.067	0.90	6.34	5.06	0.77	1.08	1,407.60
66.8	0.067	0.85	6.14	4.32	0.67	1.07	1,203.44
53.7	0.066	0.75	5.71	3.05	0.54	1.07	852.37
39.8	0.100	0.60	5.02	1.63	0.40	1.05	729.17
28.7	0.067	0.50	4.51	0.97	0.29	1.04	302.60
20.1	0.133	0.40	3.94	0.51	0.20	1.04	339.34
12.1	0.133	0.30	3.31	0.22	0.12	1.03	162.65
8.1	0.134	0.25	2.96	0.13	0.08	1.03	100.49
5.5	0.466	0.20	2.57	0.07	0.05	1.02	201.74
2.7	0.734	0.10	1.65	0.01	0.03	1.01	92.20
1.4	0.200	0.05	1.05	0.00	0.01	1.01	10.38
0.8	1.200	0.05	1.05	0.00	0.01	1.01	36.38
0.2	1.266	0.01	0.36	0.00	0.00	1.01	9.14
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					8,739.46
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					14,420.11
		AVERAGE BULKING FACTOR					1.05
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					125,401.61

SEDIMENT TRANSPORT WORKSHEET

5 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	03-Sep-93 02:28:58 PM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	POND 3 WATERSHED	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 3	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.42	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0250	"A" COEFFICIENT	0.0003
MANNING'S "n"	0.030	"B" EXPONENT	3.92
FINE SED. CONCENTRATION (ppm by wt.)	60,759	"C" EXPONENT	0.54
TOTAL CLEARWATER VOLUME (cf/storm)	5,663	"D" EXPONENT	-9.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.400	0.01	0.36	0.00	0.00	1.02	6.19
0.6	0.033	0.05	1.05	0.00	0.01	1.03	1.90
1.7	0.034	0.05	1.05	0.00	0.04	1.03	5.24
2.7	0.033	0.10	1.65	0.01	0.07	1.03	9.16
3.2	0.033	0.10	1.65	0.01	0.08	1.03	10.61
3.1	0.067	0.10	1.65	0.01	0.07	1.03	20.66
2.6	0.033	0.10	1.65	0.01	0.06	1.03	8.72
2.0	0.067	0.10	1.65	0.01	0.05	1.03	14.18
1.2	0.067	0.05	1.05	0.00	0.03	1.03	7.38
0.6	0.066	0.05	1.05	0.00	0.01	1.03	3.79
0.4	0.100	0.01	0.36	0.00	0.01	1.02	3.08
0.3	0.067	0.01	0.36	0.00	0.01	1.02	1.47
0.2	0.133	0.01	0.36	0.00	0.00	1.02	2.34
0.2	0.133	0.01	0.36	0.00	0.00	1.02	2.34
0.2	0.134	0.01	0.36	0.00	0.00	1.02	1.77
0.1	0.400	0.01	0.36	0.00	0.00	1.02	3.53
0.1	0.033	0.01	0.36	0.00	0.00	1.02	0.29
0.1	0.033	0.01	0.36	0.00	0.00	1.02	0.29
0.1	0.034	0.01	0.36	0.00	0.00	1.02	0.30
0.1	0.033	0.01	0.36	0.00	0.00	1.02	0.29
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					103.54
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					170.85
		AVERAGE BULKING FACTOR					1.02
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					46,117.94

SEDIMENT TRANSPORT WORKSHEET

10 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	03-Sep-93 02:24:34 PM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	POND 3 WATERSHED	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 3	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.42	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	1	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0250	"A" COEFFICIENT	0.0003
MANNING'S "n"	0.030	"B" EXPONENT	3.92
FINE SED. CONCENTRATION (ppm by wt.)	70,343	"C" EXPONENT	0.54
TOTAL CLEARWATER VOLUME (cf/storm)	25,700	"D" EXPONENT	-9.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./ sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.367	0.01	0.36	0.00	0.00	1.03	7.07
0.5	0.033	0.01	0.36	0.00	0.01	1.03	1.53
3.5	0.033	0.15	2.17	0.04	0.10	1.04	17.21
9.3	0.034	0.25	3.02	0.22	0.26	1.05	58.69
14.5	0.066	0.35	3.74	0.60	0.41	1.07	239.75
15.3	0.067	0.35	3.74	0.60	0.44	1.07	248.90
12.8	0.033	0.30	3.39	0.37	0.37	1.06	87.93
9.9	0.067	0.25	3.02	0.22	0.28	1.05	119.78
6.8	0.067	0.20	2.61	0.11	0.19	1.04	72.75
4.6	0.066	0.15	2.17	0.04	0.13	1.04	41.88
2.9	0.100	0.10	1.67	0.01	0.08	1.03	34.42
1.9	0.067	0.10	1.67	0.01	0.05	1.04	15.83
1.4	0.133	0.05	1.06	0.00	0.04	1.03	19.84
1.1	0.133	0.05	1.06	0.00	0.03	1.03	15.06
0.8	0.134	0.05	1.06	0.00	0.02	1.03	11.73
0.5	0.466	0.01	0.36	0.00	0.01	1.03	23.97
0.2	0.734	0.01	0.36	0.00	0.01	1.03	15.11
0.1	0.100	0.01	0.36	0.00	0.00	1.03	1.03
0.1	0.033	0.01	0.36	0.00	0.00	1.03	0.34
0.1	0.033	0.01	0.36	0.00	0.00	1.03	0.34
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					1,033.16
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					1,704.72
		AVERAGE BULKING FACTOR					1.04
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					96,086.27

SEDIMENT TRANSPORT WORKSHEET

25 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	03-Sep-93 02:20:59 PM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	POND 3 WATERSHED	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 3	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.42	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0250	"A" COEFFICIENT	0.0003
MANNING'S "n"	0.030	"B" EXPONENT	3.92
FINE SED. CONCENTRATION (ppm by wt.)	77,538	"C" EXPONENT	0.54
TOTAL CLEARWATER VOLUME (cf/storm)	59,241	"D" EXPONENT	-9.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.367	0.01	0.36	0.00	0.00	1.03	7.85
2.9	0.033	0.10	1.65	0.01	0.09	1.04	12.51
12.3	0.033	0.30	3.31	0.37	0.39	1.06	90.00
25.3	0.034	0.45	4.23	1.20	0.80	1.08	245.21
35.8	0.066	0.60	5.02	2.73	1.14	1.11	919.50
36.2	0.067	0.60	5.02	2.73	1.15	1.11	936.11
29.8	0.033	0.50	4.51	1.63	0.94	1.09	305.28
22.7	0.067	0.45	4.23	1.20	0.72	1.08	462.93
15.2	0.067	0.35	3.64	0.58	0.48	1.07	255.75
10.2	0.066	0.25	2.96	0.21	0.32	1.05	127.70
6.4	0.100	0.20	2.57	0.11	0.20	1.05	111.98
4.1	0.067	0.15	2.14	0.05	0.13	1.04	42.06
3.2	0.133	0.10	1.65	0.01	0.10	1.04	54.96
2.5	0.133	0.10	1.65	0.01	0.08	1.04	43.57
1.9	0.134	0.10	1.65	0.01	0.06	1.04	34.72
1.1	0.466	0.05	1.05	0.00	0.03	1.03	61.14
0.4	0.734	0.01	0.36	0.00	0.01	1.03	29.36
0.1	0.200	0.01	0.36	0.00	0.00	1.03	2.29
0.1	0.200	0.01	0.36	0.00	0.00	1.03	2.29
0.1	0.133	0.01	0.36	0.00	0.00	1.03	1.52
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					3,746.72
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					6,182.09
		AVERAGE BULKING FACTOR					1.06
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					143,274.92

SEDIMENT TRANSPORT WORKSHEET

50 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	03-Sep-93 02:14:40 PM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	POND 3 WATERSHED	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 3	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.42	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0250	"A" COEFFICIENT	0.0003
MANNING'S "n"	0.030	"B" EXPONENT	3.92
FINE SED. CONCENTRATION (ppm by wt.)	80,436	"C" EXPONENT	0.54
TOTAL CLEARWATER VOLUME (cf/storm)	87,560	"D" EXPONENT	-9.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.333	0.01	0.36	0.00	0.00	1.03	7.97
1.0	0.034	0.05	1.05	0.00	0.03	1.03	4.03
6.9	0.033	0.20	2.57	0.11	0.23	1.05	40.28
30.0	0.067	0.50	4.51	1.68	0.99	1.09	642.55
53.6	0.066	0.75	5.71	5.28	1.77	1.13	1,674.23
53.5	0.067	0.75	5.71	5.28	1.77	1.13	1,699.20
44.0	0.033	0.65	5.26	3.53	1.45	1.11	592.04
33.4	0.067	0.55	4.77	2.20	1.10	1.10	796.18
22.2	0.067	0.45	4.23	1.24	0.73	1.09	475.18
14.7	0.066	0.35	3.64	0.60	0.49	1.07	256.84
9.1	0.100	0.25	2.96	0.22	0.30	1.06	187.48
5.9	0.067	0.20	2.57	0.11	0.19	1.05	74.22
4.7	0.133	0.15	2.14	0.05	0.15	1.04	96.14
3.6	0.133	0.15	2.14	0.05	0.12	1.05	78.76
2.7	0.134	0.10	1.65	0.01	0.09	1.04	49.60
1.6	0.466	0.05	1.05	0.00	0.05	1.03	91.28
0.6	0.734	0.05	1.05	0.00	0.02	1.04	52.20
0.2	0.200	0.01	0.36	0.00	0.00	1.03	3.57
0.1	0.200	0.01	0.36	0.00	0.00	1.03	2.38
0.1	0.233	0.01	0.36	0.00	0.00	1.03	2.78
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					6,826.92
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					11,264.41
		AVERAGE BULKING FACTOR					1.08
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					170,927.09

SEDIMENT TRANSPORT WORKSHEET

100 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	18-Sep-93 10:39:44 AM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	POND 3 WATERSHED	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 3	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.42	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0250	"A" COEFFICIENT	0.0003
MANNING'S "n"	0.030	"B" EXPONENT	3.92
FINE SED. CONCENTRATION (ppm by wt.)	85,573	"C" EXPONENT	0.54
TOTAL CLEARWATER VOLUME (cf/storm)	118,480	"D" EXPONENT	-9.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./ sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.333	0.01	0.36	0.00	0.00	1.04	8.53
2.4	0.034	0.10	1.65	0.01	0.08	1.04	11.92
12.2	0.033	0.30	3.31	0.40	0.43	1.07	98.61
42.5	0.067	0.65	5.26	3.73	1.50	1.12	1,260.68
71.7	0.066	0.85	6.14	7.89	2.53	1.15	2,475.11
70.8	0.067	0.85	6.14	7.89	2.50	1.15	2,505.37
58.4	0.033	0.75	5.71	5.57	2.06	1.13	906.20
44.4	0.067	0.65	5.26	3.73	1.57	1.12	1,276.86
29.5	0.067	0.50	4.51	1.77	1.04	1.10	677.45
19.4	0.066	0.40	3.94	0.93	0.68	1.08	382.78
12.0	0.100	0.30	3.31	0.40	0.42	1.07	296.29
7.9	0.067	0.20	2.57	0.12	0.28	1.05	96.03
6.2	0.133	0.20	2.57	0.12	0.22	1.05	161.88
4.7	0.133	0.15	2.14	0.05	0.16	1.05	102.51
3.5	0.134	0.15	2.14	0.05	0.12	1.05	83.69
2.1	0.466	0.10	1.65	0.01	0.07	1.04	145.66
0.7	0.734	0.05	1.05	0.00	0.02	1.04	65.11
0.2	0.200	0.01	0.36	0.00	0.01	1.04	5.09
0.2	0.200	0.01	0.36	0.00	0.01	1.04	3.82
0.1	0.333	0.01	0.36	0.00	0.00	1.04	4.25
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					10,567.86
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					17,436.97
		AVERAGE BULKING FACTOR					1.09
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					190,842.31

SEDIMENT TRANSPORT WORKSHEET

2 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	20-Sep-93 01:55:34 PM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	MIREHAVEN ARROYO C	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 5	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.60	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	12	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0260	"A" COEFFICIENT	0.00017
MANNING'S "n"	0.030	"B" EXPONENT	4
FINE SED. CONCENTRATION (ppm by wt.)	23,689	"C" EXPONENT	0.498
TOTAL CLEARWATER VOLUME (cf/storm)	20,030	"D" EXPONENT	-7.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./ sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.200	0.01	0.37	0.00	0.00	1.01	2.00
0.1	0.067	0.01	0.37	0.00	0.00	1.01	0.22
0.3	0.133	0.01	0.37	0.00	0.00	1.01	1.32
0.9	0.067	0.05	1.07	0.00	0.01	1.01	2.16
2.0	0.066	0.05	1.07	0.00	0.02	1.01	4.42
3.3	0.067	0.10	1.69	0.01	0.03	1.01	8.81
4.3	0.067	0.15	2.20	0.02	0.04	1.01	14.81
5.0	0.033	0.15	2.20	0.02	0.05	1.01	8.06
5.6	0.067	0.15	2.20	0.02	0.05	1.01	17.57
5.7	0.066	0.15	2.20	0.02	0.05	1.01	17.53
5.4	0.100	0.15	2.20	0.02	0.05	1.01	25.57
4.9	0.067	0.15	2.20	0.02	0.04	1.01	16.14
4.3	0.133	0.15	2.20	0.02	0.04	1.01	29.19
3.3	0.133	0.10	1.69	0.01	0.03	1.01	17.49
2.4	0.134	0.10	1.69	0.01	0.02	1.01	13.43
1.2	0.466	0.05	1.07	0.00	0.01	1.01	18.89
0.3	0.034	0.01	0.37	0.00	0.00	1.01	0.28
0.1	0.033	0.01	0.37	0.00	0.00	1.01	0.11
0.1	0.033	0.01	0.37	0.00	0.00	1.01	0.11
0.1	0.034	0.01	0.37	0.00	0.00	1.01	0.11
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					198.21
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					327.04
		AVERAGE BULKING FACTOR					1.01
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					25,498.93

SEDIMENT TRANSPORT WORKSHEET

5 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	20-Sep-93 01:54:34 PM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	MIREHAVEN ARROYO C	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 5	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.60	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	12	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0260	"A" COEFFICIENT	0.00017
MANNING'S "n"	0.030	"B" EXPONENT	4
FINE SED. CONCENTRATION (ppm by wt.)	26,571	"C" EXPONENT	0.498
TOTAL CLEARWATER VOLUME (cf/storm)	36,600	"D" EXPONENT	-7.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./ sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.200	0.01	0.37	0.00	0.00	1.01	2.25
0.1	0.067	0.01	0.37	0.00	0.00	1.01	0.25
0.4	0.133	0.01	0.37	0.00	0.00	1.01	1.73
1.5	0.067	0.05	1.07	0.00	0.02	1.01	3.91
3.7	0.066	0.10	1.69	0.01	0.04	1.01	10.59
6.4	0.067	0.15	2.20	0.02	0.07	1.01	21.34
8.4	0.067	0.20	2.64	0.05	0.09	1.02	33.83
9.6	0.033	0.20	2.64	0.05	0.10	1.02	18.13
10.4	0.067	0.25	3.04	0.11	0.11	1.02	51.54
10.5	0.066	0.25	3.04	0.11	0.11	1.02	51.02
10.0	0.100	0.25	3.04	0.11	0.10	1.02	75.26
9.1	0.067	0.20	2.64	0.05	0.09	1.02	35.69
7.9	0.133	0.20	2.64	0.05	0.08	1.02	64.69
6.1	0.133	0.15	2.20	0.02	0.06	1.01	40.87
4.4	0.134	0.15	2.20	0.02	0.05	1.02	32.73
2.3	0.466	0.10	1.69	0.01	0.02	1.01	49.71
0.6	0.734	0.01	0.37	0.00	0.01	1.01	14.98
0.2	0.666	0.01	0.37	0.00	0.00	1.01	3.72
0.1	1.067	0.01	0.37	0.00	0.00	1.01	3.97
0.1	14.598	0.01	0.37	0.00	0.00	1.01	54.38
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					570.58
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					941.46
		AVERAGE BULKING FACTOR					1.02
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					39,590.68

SEDIMENT TRANSPORT WORKSHEET

10 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	20-Sep-93 01:53:31 PM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	MIREHAVEN ARROYO C	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 5	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.60	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	12	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0260	"A" COEFFICIENT	0.00017
MANNING'S "n"	0.030	"B" EXPONENT	4
FINE SED. CONCENTRATION (ppm by wt.)	33,971	"C" EXPONENT	0.498
TOTAL CLEARWATER VOLUME (cf/storm)	96,260	"D" EXPONENT	-7.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.200	0.01	0.37	0.00	0.00	1.01	2.89
0.1	0.067	0.01	0.37	0.00	0.00	1.01	0.32
0.5	0.133	0.01	0.37	0.00	0.01	1.01	3.18
3.9	0.067	0.10	1.69	0.01	0.05	1.02	14.13
11.9	0.066	0.25	3.04	0.11	0.16	1.02	64.17
23.0	0.067	0.40	4.07	0.46	0.31	1.03	184.03
31.8	0.067	0.50	4.66	0.88	0.42	1.04	313.71
35.9	0.033	0.50	4.66	0.88	0.48	1.04	161.06
36.3	0.067	0.50	4.66	0.88	0.48	1.04	328.11
32.6	0.066	0.50	4.66	0.88	0.43	1.04	311.55
27.0	0.100	0.45	4.37	0.65	0.36	1.04	361.58
22.3	0.067	0.40	4.07	0.46	0.30	1.03	181.63
18.4	0.133	0.35	3.75	0.31	0.24	1.03	264.31
14.1	0.133	0.30	3.40	0.19	0.19	1.03	182.63
10.6	0.134	0.25	3.04	0.11	0.14	1.02	122.29
6.1	0.466	0.15	2.20	0.02	0.08	1.02	175.83
2.0	0.734	0.05	1.07	0.00	0.03	1.01	72.21
0.7	0.666	0.01	0.37	0.00	0.01	1.01	20.69
0.3	1.067	0.01	0.37	0.00	0.00	1.01	15.31
0.2	14.598	0.01	0.37	0.00	0.00	1.01	104.87
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					2,884.50
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					4,759.42
		AVERAGE BULKING FACTOR					1.03
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					73,418.80

SEDIMENT TRANSPORT WORKSHEET

25 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	20-Sep-93 01:52:31 PM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	MIREHAVEN ARROYO C	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 5	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.60	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	12	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0260	"A" COEFFICIENT	0.00017
MANNING'S "n"	0.030	"B" EXPONENT	4
FINE SED. CONCENTRATION (ppm by wt.)	39,193	"C" EXPONENT	0.498
TOTAL CLEARWATER VOLUME (cf/storm)	202,100	"D" EXPONENT	-7.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./ sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.200	0.01	0.37	0.00	0.00	1.02	3.35
0.1	0.100	0.01	0.37	0.00	0.00	1.02	0.56
1.6	0.100	0.05	1.07	0.00	0.02	1.02	8.89
10.6	0.067	0.25	3.04	0.12	0.16	1.03	67.70
34.0	0.066	0.50	4.66	0.92	0.52	1.04	341.76
67.0	0.067	0.75	5.92	2.93	1.03	1.06	955.51
88.5	0.067	0.90	6.58	4.90	1.36	1.07	1,509.54
91.4	0.033	0.90	6.58	4.90	1.41	1.07	748.81
84.4	0.067	0.85	6.37	4.17	1.30	1.06	1,319.49
72.0	0.066	0.80	6.15	3.52	1.11	1.06	1,099.01
56.3	0.100	0.70	5.69	2.41	0.87	1.06	1,179.49
43.1	0.067	0.60	5.19	1.55	0.66	1.05	534.10
32.5	0.133	0.50	4.66	0.92	0.50	1.04	678.00
22.8	0.133	0.40	4.07	0.48	0.35	1.04	395.94
17.1	0.134	0.30	3.40	0.20	0.26	1.03	224.57
10.6	0.466	0.25	3.04	0.12	0.16	1.03	469.58
4.2	0.734	0.15	2.20	0.02	0.06	1.02	234.47
1.5	0.666	0.05	1.07	0.00	0.02	1.02	55.48
0.6	1.067	0.01	0.37	0.00	0.01	1.02	35.50
0.2	14.598	0.01	0.37	0.00	0.00	1.02	162.06
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					10,023.82
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					16,539.31
		AVERAGE BULKING FACTOR					1.05
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					115,943.51

SEDIMENT TRANSPORT WORKSHEET

50 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	20-Sep-93 01:51:20 PM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	MIREHAVEN ARROYO C	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 5	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.60	W=CHANNEL WIDTH (ft)

		EXPONENTS / COEFFICIENTS	
BOTTOM WIDTH (ft)	12		
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0260	"A" COEFFICIENT	0.00017
MANNING'S "n"	0.030	"B" EXPONENT	4
FINE SED. CONCENTRATION (ppm by wt.)	41,581	"C" EXPONENT	0.498
TOTAL CLEARWATER VOLUME (cf/storm)	291,000	"D" EXPONENT	-7.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.200	0.01	0.37	0.00	0.00	1.02	3.56
0.3	0.133	0.01	0.37	0.00	0.00	1.02	1.96
3.0	0.067	0.10	1.69	0.01	0.05	1.02	13.40
17.8	0.067	0.35	3.75	0.33	0.29	1.03	149.06
57.8	0.066	0.70	5.69	2.46	0.95	1.06	808.18
109.4	0.067	1.00	6.99	6.69	1.79	1.08	2,045.86
137.1	0.033	1.15	7.57	9.85	2.24	1.09	1,436.93
137.9	0.067	1.15	7.57	9.85	2.26	1.09	2,920.37
125.0	0.067	1.10	7.38	8.71	2.05	1.09	2,595.42
104.7	0.066	0.95	6.79	5.80	1.71	1.07	1,785.51
80.5	0.100	0.85	6.37	4.25	1.32	1.07	2,004.43
60.2	0.067	0.70	5.69	2.46	0.99	1.06	829.90
44.5	0.133	0.60	5.19	1.58	0.73	1.05	1,105.40
30.0	0.133	0.45	4.37	0.69	0.49	1.04	563.75
21.5	0.134	0.40	4.07	0.49	0.35	1.04	404.12
13.7	0.466	0.30	3.40	0.21	0.22	1.03	723.38
5.8	0.734	0.15	2.20	0.03	0.09	1.02	317.82
2.1	0.666	0.05	1.07	0.00	0.03	1.02	82.47
0.8	1.067	0.05	1.07	0.00	0.01	1.02	53.52
0.3	14.598	0.01	0.37	0.00	0.00	1.02	215.37

TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)	18,060.42
TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)	29,799.69
AVERAGE BULKING FACTOR	1.06
AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)	140,974.40

SEDIMENT TRANSPORT WORKSHEET

100 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	20-Sep-93 01:49:39 PM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	MIREHAVEN ARROYO C	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 5	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.60	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	12	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0260	"A" COEFFICIENT	0.00017
MANNING'S "n"	0.030	"B" EXPONENT	4
FINE SED. CONCENTRATION (ppm by wt.)	43,252	"C" EXPONENT	0.498
TOTAL CLEARWATER VOLUME (cf/storm)	382,000	"D" EXPONENT	-7.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.200	0.01	0.37	0.00	0.00	1.02	3.71
0.3	0.133	0.01	0.37	0.00	0.01	1.02	2.45
6.3	0.067	0.15	2.20	0.03	0.11	1.02	32.11
24.7	0.050	0.40	4.07	0.49	0.42	1.04	164.28
94.6	0.100	0.90	6.58	5.05	1.61	1.07	2,400.14
172.3	0.050	1.30	8.10	13.97	2.94	1.10	3,044.26
195.2	0.050	1.40	8.45	17.11	3.33	1.10	3,678.65
189.8	0.050	1.35	8.28	15.49	3.24	1.10	3,371.43
170.0	0.050	1.30	8.10	13.97	2.90	1.10	3,037.35
135.3	0.100	1.15	7.57	9.98	2.31	1.09	4,423.64
95.7	0.100	0.90	6.58	5.05	1.63	1.07	2,406.90
72.6	0.050	0.80	6.15	3.63	1.24	1.07	876.29
57.0	0.100	0.70	5.69	2.49	0.97	1.06	1,245.24
41.3	0.100	0.55	4.93	1.25	0.70	1.05	701.88
28.4	0.200	0.45	4.37	0.70	0.48	1.04	848.84
16.0	0.500	0.30	3.40	0.21	0.27	1.03	868.65
8.1	0.350	0.20	2.64	0.06	0.14	1.02	250.84
4.5	0.500	0.15	2.20	0.03	0.08	1.02	184.36
1.8	1.583	0.05	1.07	0.00	0.03	1.02	174.96
0.3	14.598	0.01	0.37	0.00	0.01	1.02	269.24
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					27,985.24
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					46,175.65
		AVERAGE BULKING FACTOR					1.07
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					162,279.67

SEDIMENT TRANSPORT WORKSHEET

2 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	20-Sep-93 08:34:30 AM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	MIREHAVEN ARROYO B	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 6	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.57	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	2	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0230	"A" COEFFICIENT	0.00026
MANNING'S "n"	0.030	"B" EXPONENT	3.95
FINE SED. CONCENTRATION (ppm by wt.)	39,235	"C" EXPONENT	0.502
TOTAL CLEARWATER VOLUME (cf/storm)	9,130	"D" EXPONENT	-8.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./ sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.267	0.01	0.35	0.00	0.00	1.02	3.54
0.2	0.066	0.01	0.35	0.00	0.00	1.02	0.73
0.6	0.067	0.05	1.01	0.00	0.01	1.02	2.43
1.4	0.067	0.05	1.01	0.00	0.02	1.02	5.41
2.4	0.066	0.10	1.59	0.01	0.04	1.02	10.32
3.0	0.067	0.10	1.59	0.01	0.05	1.02	12.89
3.2	0.033	0.10	1.59	0.01	0.05	1.02	6.62
3.0	0.067	0.10	1.59	0.01	0.05	1.02	12.70
2.6	0.067	0.10	1.59	0.01	0.04	1.02	11.40
2.3	0.066	0.10	1.59	0.01	0.03	1.02	9.95
2.0	0.100	0.10	1.59	0.01	0.03	1.02	13.69
1.8	0.067	0.10	1.59	0.01	0.03	1.02	8.43
1.5	0.133	0.05	1.01	0.00	0.02	1.02	11.10
1.0	0.133	0.05	1.01	0.00	0.02	1.02	7.78
0.6	0.134	0.05	1.01	0.00	0.01	1.02	4.87
0.3	0.466	0.01	0.35	0.00	0.00	1.02	6.47
0.1	0.033	0.01	0.35	0.00	0.00	1.02	0.18
0.1	0.033	0.01	0.35	0.00	0.00	1.02	0.18
0.1	0.033	0.01	0.35	0.00	0.00	1.02	0.18
0.1	0.033	0.01	0.35	0.00	0.00	1.02	0.18
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					129.09
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					213.00
		AVERAGE BULKING FACTOR					1.01
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					36,039.12

SEDIMENT TRANSPORT WORKSHEET

5 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	18-Sep-93 10:44:33 AM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	MIREHAVEN ARROYO B	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 6	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.57	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	2	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0230	"A" COEFFICIENT	0.00026
MANNING'S "n"	0.030	"B" EXPONENT	3.95
FINE SED. CONCENTRATION (ppm by wt.)	37,299	"C" EXPONENT	0.502
TOTAL CLEARWATER VOLUME (cf/storm)	15,330	"D" EXPONENT	-8.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.267	0.01	0.35	0.00	0.00	1.01	3.36
0.3	0.066	0.01	0.35	0.00	0.00	1.01	0.87
0.8	0.067	0.05	1.01	0.00	0.01	1.02	3.02
2.0	0.067	0.10	1.59	0.01	0.03	1.02	8.76
3.7	0.066	0.15	2.07	0.02	0.05	1.02	18.51
4.9	0.067	0.15	2.07	0.02	0.07	1.02	23.02
5.2	0.033	0.15	2.07	0.02	0.08	1.02	11.86
5.0	0.067	0.15	2.07	0.02	0.07	1.02	23.37
4.6	0.067	0.15	2.07	0.02	0.07	1.02	21.96
4.1	0.066	0.15	2.07	0.02	0.06	1.02	20.07
3.7	0.100	0.15	2.07	0.02	0.05	1.02	28.31
3.3	0.067	0.15	2.07	0.02	0.05	1.02	17.55
2.7	0.133	0.10	1.59	0.01	0.04	1.02	22.29
1.9	0.133	0.10	1.59	0.01	0.03	1.02	16.69
1.2	0.134	0.05	1.01	0.00	0.02	1.02	8.86
0.6	0.466	0.05	1.01	0.00	0.01	1.02	14.88
0.2	0.200	0.01	0.35	0.00	0.00	1.01	1.58
0.1	1.200	0.01	0.35	0.00	0.00	1.01	6.34
0.1	5.266	0.01	0.35	0.00	0.00	1.01	27.82
0.1	0.067	0.01	0.35	0.00	0.00	1.01	0.35

TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)	279.51
TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)	461.19
AVERAGE BULKING FACTOR	1.02
AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)	45,994.01

SEDIMENT TRANSPORT WORKSHEET

10 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	18-Sep-93 10:45:39 AM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	MIREHAVEN ARROYO B	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 6	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.57	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	2	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0230	"A" COEFFICIENT	0.00026
MANNING'S "n"	0.030	"B" EXPONENT	3.95
FINE SED. CONCENTRATION (ppm by wt.)	31,036	"C" EXPONENT	0.502
TOTAL CLEARWATER VOLUME (cf/storm)	38,620	"D" EXPONENT	-8.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./ sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.267	0.01	0.35	0.00	0.00	1.01	2.78
0.1	0.066	0.01	0.35	0.00	0.00	1.01	0.29
0.8	0.067	0.05	1.01	0.00	0.01	1.01	2.52
3.5	0.067	0.15	2.07	0.02	0.04	1.02	15.66
7.4	0.066	0.20	2.49	0.06	0.09	1.02	34.32
10.4	0.067	0.30	3.22	0.19	0.13	1.03	75.56
11.9	0.033	0.30	3.22	0.19	0.14	1.03	39.37
12.4	0.067	0.30	3.22	0.19	0.15	1.03	81.24
12.2	0.067	0.30	3.22	0.19	0.15	1.03	80.66
11.5	0.066	0.30	3.22	0.19	0.14	1.03	77.59
10.7	0.100	0.30	3.22	0.19	0.13	1.03	113.86
9.7	0.067	0.25	2.87	0.11	0.12	1.02	54.38
8.1	0.133	0.25	2.87	0.11	0.10	1.03	98.69
6.0	0.133	0.20	2.49	0.06	0.07	1.02	61.05
4.1	0.134	0.15	2.07	0.02	0.05	1.02	35.11
2.2	0.466	0.10	1.59	0.01	0.03	1.02	54.85
0.7	0.200	0.05	1.01	0.00	0.01	1.01	6.22
0.2	1.200	0.01	0.35	0.00	0.00	1.01	10.47
0.1	8.866	0.01	0.35	0.00	0.00	1.01	38.74
0.1	0.067	0.01	0.35	0.00	0.00	1.01	0.29
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					883.66
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					1,458.04
		AVERAGE BULKING FACTOR					1.02
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					57,050.86

SEDIMENT TRANSPORT WORKSHEET

25 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	18-Sep-93 10:46:58 AM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	MIREHAVEN ARROYO B	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 6	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.57	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	2	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0230	"A" COEFFICIENT	0.00026
MANNING'S "n"	0.030	"B" EXPONENT	3.95
FINE SED. CONCENTRATION (ppm by wt.)	30,381	"C" EXPONENT	0.502
TOTAL CLEARWATER VOLUME (cf/storm)	78,830	"D" EXPONENT	-8.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.200	0.01	0.35	0.00	0.00	1.01	2.58
0.4	0.133	0.01	0.35	0.00	0.00	1.01	2.27
1.9	0.067	0.10	1.59	0.01	0.02	1.02	6.88
7.0	0.067	0.20	2.49	0.06	0.08	1.02	33.15
15.3	0.066	0.35	3.54	0.29	0.18	1.03	112.81
23.5	0.067	0.45	4.13	0.62	0.28	1.04	215.46
29.1	0.033	0.55	4.67	1.10	0.34	1.05	171.59
30.1	0.067	0.55	4.67	1.10	0.36	1.05	351.09
27.7	0.067	0.50	4.41	0.84	0.33	1.04	280.42
24.3	0.066	0.50	4.41	0.84	0.29	1.05	266.83
21.1	0.100	0.45	4.13	0.62	0.25	1.04	311.15
18.2	0.067	0.40	3.85	0.44	0.22	1.04	157.11
14.9	0.133	0.35	3.54	0.29	0.18	1.03	225.06
11.1	0.133	0.30	3.22	0.19	0.13	1.03	151.85
8.0	0.134	0.25	2.87	0.11	0.09	1.03	97.83
4.5	0.466	0.15	2.07	0.02	0.05	1.02	127.99
1.5	0.734	0.05	1.01	0.00	0.02	1.01	48.93
0.5	0.666	0.01	0.35	0.00	0.01	1.01	14.19
0.2	1.067	0.01	0.35	0.00	0.00	1.01	9.10
0.1	12.199	0.01	0.35	0.00	0.00	1.01	52.15
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					2,638.45
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					4,353.44
		AVERAGE BULKING FACTOR					1.03
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					81,306.88

SEDIMENT TRANSPORT WORKSHEET

50 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	18-Sep-93 10:47:43 AM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	MIREHAVEN ARROYO B	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 6	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.57	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	2	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0230	"A" COEFFICIENT	0.00026
MANNING'S "n"	0.030	"B" EXPONENT	3.95
FINE SED. CONCENTRATION (ppm by wt.)	30,741	"C" EXPONENT	0.502
TOTAL CLEARWATER VOLUME (cf/storm)	112,910	"D" EXPONENT	-8.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.200	0.01	0.35	0.00	0.00	1.01	2.61
0.1	0.133	0.01	0.35	0.00	0.00	1.01	0.58
2.3	0.067	0.10	1.59	0.01	0.03	1.01	8.11
10.1	0.067	0.25	2.87	0.11	0.12	1.02	55.34
23.3	0.066	0.45	4.13	0.62	0.28	1.04	212.80
38.2	0.067	0.65	5.16	1.78	0.46	1.06	539.72
47.9	0.033	0.70	5.39	2.20	0.57	1.06	329.16
48.3	0.067	0.70	5.39	2.20	0.58	1.06	669.45
42.9	0.067	0.65	5.16	1.78	0.51	1.05	553.15
35.4	0.066	0.60	4.92	1.42	0.42	1.05	437.31
28.6	0.100	0.55	4.67	1.10	0.34	1.05	520.37
23.5	0.067	0.45	4.13	0.62	0.28	1.04	216.75
18.8	0.133	0.40	3.85	0.44	0.22	1.04	316.96
13.9	0.133	0.35	3.54	0.30	0.17	1.03	221.09
10.3	0.134	0.30	3.22	0.19	0.12	1.03	149.43
6.0	0.466	0.20	2.49	0.06	0.07	1.02	212.49
2.1	0.734	0.10	1.59	0.01	0.02	1.02	82.51
0.7	0.666	0.05	1.01	0.00	0.01	1.01	20.53
0.3	1.067	0.01	0.35	0.00	0.00	1.01	11.51
0.1	14.598	0.01	0.35	0.00	0.00	1.01	63.17
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					4,623.03
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					7,628.00
		AVERAGE BULKING FACTOR					1.04
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					97,689.86

SEDIMENT TRANSPORT WORKSHEET

100 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	18-Sep-93 10:49:04 AM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	MIREHAVEN ARROYO B	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 6	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.57	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	2	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0230	"A" COEFFICIENT	0.00026
MANNING'S "n"	0.030	"B" EXPONENT	3.95
FINE SED. CONCENTRATION (ppm by wt.)	31,090	"C" EXPONENT	0.502
TOTAL CLEARWATER VOLUME (cf/storm)	147,780	"D" EXPONENT	-8.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.200	0.01	0.35	0.00	0.00	1.01	2.64
1.0	0.133	0.05	1.01	0.00	0.01	1.01	6.17
5.0	0.067	0.15	2.07	0.02	0.06	1.02	20.21
13.8	0.067	0.35	3.54	0.30	0.17	1.03	111.77
35.8	0.083	0.60	4.92	1.42	0.43	1.05	554.18
59.9	0.050	0.80	5.83	3.21	0.72	1.07	708.53
69.8	0.050	0.90	6.24	4.46	0.85	1.08	955.51
70.1	0.050	0.90	6.24	4.46	0.85	1.08	956.06
64.1	0.050	0.85	6.04	3.81	0.78	1.07	824.74
51.7	0.100	0.75	5.61	2.68	0.63	1.06	1,189.64
36.4	0.100	0.60	4.92	1.42	0.44	1.05	670.30
27.4	0.050	0.50	4.41	0.84	0.33	1.04	211.08
22.6	0.100	0.45	4.13	0.62	0.27	1.04	321.45
15.6	0.250	0.35	3.54	0.30	0.19	1.03	436.14
10.7	0.050	0.30	3.22	0.19	0.13	1.03	56.99
6.9	0.500	0.20	2.49	0.06	0.08	1.02	250.51
2.5	0.700	0.10	1.59	0.01	0.03	1.01	91.67
0.9	0.666	0.05	1.01	0.00	0.01	1.01	26.56
0.3	1.067	0.01	0.35	0.00	0.00	1.01	13.97
0.1	14.598	0.01	0.35	0.00	0.00	1.01	63.91
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					7,472.04
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					12,328.86
		AVERAGE BULKING FACTOR					1.05
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					117,930.36

SEDIMENT TRANSPORT WORKSHEET

5 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	18-Sep-93	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	EARTHEN CHANNEL	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 6	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.42	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0050	"A" COEFFICIENT	0.0003
MANNING'S "n"	0.030	"B" EXPONENT	3.92
FINE SED. CONCENTRATION (ppm by wt.)	17,467	"C" EXPONENT	0.54
TOTAL CLEARWATER VOLUME (cf/storm)	2,460	"D" EXPONENT	-9.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./ sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.300	0.01	0.16	0.00	0.00	1.01	1.57
0.3	0.067	0.05	0.47	0.00	0.00	1.01	0.41
0.5	0.033	0.05	0.47	0.00	0.00	1.01	0.36
0.9	0.067	0.10	0.74	0.00	0.01	1.01	1.53
1.4	0.033	0.10	0.74	0.00	0.01	1.01	1.15
1.3	0.100	0.10	0.74	0.00	0.01	1.01	3.25
1.1	0.033	0.10	0.74	0.00	0.01	1.01	0.87
0.9	0.067	0.10	0.74	0.00	0.01	1.01	1.45
0.7	0.067	0.05	0.47	0.00	0.00	1.01	1.06
0.6	0.066	0.05	0.47	0.00	0.00	1.01	0.89
0.4	0.100	0.05	0.47	0.00	0.00	1.01	0.98
0.3	0.067	0.05	0.47	0.00	0.00	1.01	0.49
0.2	0.200	0.01	0.16	0.00	0.00	1.01	0.97
0.1	0.033	0.01	0.16	0.00	0.00	1.01	0.08
0.1	0.033	0.01	0.16	0.00	0.00	1.01	0.08
0.1	0.034	0.01	0.16	0.00	0.00	1.01	0.08
0.1	0.033	0.01	0.16	0.00	0.00	1.01	0.08
0.1	0.033	0.01	0.16	0.00	0.00	1.01	0.08
0.1	0.034	0.01	0.16	0.00	0.00	1.01	0.08
0.1	0.033	0.01	0.16	0.00	0.00	1.01	0.08
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					15.56
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					25.67
		AVERAGE BULKING FACTOR					1.01
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					16,445.36

SEDIMENT TRANSPORT WORKSHEET

10 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	18-Sep-93 10:56:57 AM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	EARTHEN CHANNEL	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 6	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.42	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0050	"A" COEFFICIENT	0.0003
MANNING'S "n"	0.030	"B" EXPONENT	3.92
FINE SED. CONCENTRATION (ppm by wt.)	22,287	"C" EXPONENT	0.54
TOTAL CLEARWATER VOLUME (cf/storm)	8,050	"D" EXPONENT	-9.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.267	0.01	0.16	0.00	0.00	1.01	1.96
0.3	0.100	0.05	0.47	0.00	0.00	1.01	0.94
0.6	0.033	0.05	0.47	0.00	0.01	1.01	0.62
2.7	0.067	0.20	1.15	0.00	0.02	1.01	6.15
5.3	0.066	0.30	1.48	0.01	0.05	1.01	12.87
5.4	0.067	0.30	1.48	0.01	0.05	1.01	13.38
4.6	0.033	0.25	1.32	0.01	0.04	1.01	5.27
3.6	0.067	0.20	1.15	0.00	0.03	1.01	8.01
2.5	0.067	0.20	1.15	0.00	0.02	1.01	5.84
1.8	0.066	0.15	0.96	0.00	0.02	1.01	3.95
1.3	0.100	0.10	0.74	0.00	0.01	1.01	3.99
0.9	0.067	0.10	0.74	0.00	0.01	1.01	1.95
0.7	0.133	0.05	0.47	0.00	0.01	1.01	2.70
0.5	0.133	0.05	0.47	0.00	0.00	1.01	1.87
0.4	0.134	0.05	0.47	0.00	0.00	1.01	1.47
0.2	0.466	0.01	0.16	0.00	0.00	1.01	2.89
0.1	0.267	0.01	0.16	0.00	0.00	1.01	0.83
0.1	0.033	0.01	0.16	0.00	0.00	1.01	0.10
0.1	0.034	0.01	0.16	0.00	0.00	1.01	0.11
0.1	0.033	0.01	0.16	0.00	0.00	1.01	0.10
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					74.99
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					123.73
		AVERAGE BULKING FACTOR					1.01
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					24,040.00

SEDIMENT TRANSPORT WORKSHEET

25 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	18-Sep-93 10:57:57 AM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	EARTHEN CHANNEL	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 6	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.42	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0050	"A" COEFFICIENT	0.0003
MANNING'S "n"	0.030	"B" EXPONENT	3.92
FINE SED. CONCENTRATION (ppm by wt.)	25,190	"C" EXPONENT	0.54
TOTAL CLEARWATER VOLUME (cf/storm)	17,830	"D" EXPONENT	-9.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./ sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.267	0.01	0.16	0.00	0.00	1.01	2.23
0.4	0.100	0.05	0.47	0.00	0.00	1.01	1.24
1.6	0.033	0.15	0.96	0.00	0.02	1.01	1.99
7.0	0.067	0.35	1.63	0.01	0.07	1.01	19.87
12.6	0.066	0.50	2.02	0.04	0.12	1.01	38.95
12.6	0.067	0.50	2.02	0.04	0.12	1.01	39.42
10.3	0.033	0.45	1.89	0.03	0.10	1.01	15.53
8.0	0.067	0.40	1.76	0.02	0.08	1.01	23.90
5.5	0.067	0.30	1.48	0.01	0.05	1.01	15.17
3.9	0.066	0.25	1.32	0.01	0.04	1.01	10.20
2.6	0.100	0.20	1.15	0.00	0.02	1.01	9.95
1.7	0.067	0.15	0.96	0.00	0.02	1.01	4.28
1.3	0.133	0.10	0.74	0.00	0.01	1.01	6.23
1.0	0.133	0.10	0.74	0.00	0.01	1.01	4.60
0.7	0.134	0.05	0.47	0.00	0.01	1.01	3.31
0.4	0.466	0.05	0.47	0.00	0.00	1.01	6.61
0.2	0.734	0.01	0.16	0.00	0.00	1.01	3.87
0.1	0.033	0.01	0.16	0.00	0.00	1.01	0.12
0.1	0.033	0.01	0.16	0.00	0.00	1.01	0.12
0.1	0.034	0.01	0.16	0.00	0.00	1.01	0.12
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					207.70
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					342.70
		AVERAGE BULKING FACTOR					1.01
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					29,881.71

SEDIMENT TRANSPORT WORKSHEET

50 YEAR 24 HOUR STORM

Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	18-Sep-93 10:58:35 AM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	EARTHEN CHANNEL	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 6	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.42	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0050	"A" COEFFICIENT	0.0003
MANNING'S "n"	0.030	"B" EXPONENT	3.92
FINE SED. CONCENTRATION (ppm by wt.)	26,486	"C" EXPONENT	0.54
TOTAL CLEARWATER VOLUME (cf/storm)	26,160	"D" EXPONENT	-9.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.233	0.01	0.16	0.00	0.00	1.01	2.28
0.6	0.134	0.05	0.47	0.00	0.01	1.01	2.99
2.9	0.033	0.20	1.15	0.00	0.03	1.01	3.81
10.8	0.067	0.45	1.89	0.03	0.11	1.01	34.03
18.8	0.066	0.65	2.35	0.09	0.19	1.01	66.57
18.6	0.067	0.65	2.35	0.09	0.19	1.01	67.21
15.3	0.033	0.55	2.13	0.05	0.16	1.01	25.15
11.8	0.067	0.50	2.02	0.04	0.12	1.01	39.25
8.1	0.067	0.40	1.76	0.02	0.08	1.01	25.32
5.6	0.066	0.30	1.48	0.01	0.06	1.01	15.77
3.6	0.100	0.25	1.32	0.01	0.04	1.01	15.27
2.5	0.067	0.20	1.15	0.00	0.03	1.01	6.74
1.9	0.133	0.15	0.96	0.00	0.02	1.01	9.90
1.4	0.133	0.10	0.74	0.00	0.01	1.01	6.80
1.0	0.134	0.10	0.74	0.00	0.01	1.01	5.12
0.6	0.466	0.05	0.47	0.00	0.01	1.01	10.40
0.2	0.734	0.01	0.16	0.00	0.00	1.01	5.43
0.1	0.100	0.01	0.16	0.00	0.00	1.01	0.37
0.1	0.100	0.01	0.16	0.00	0.00	1.01	0.37
0.1	0.066	0.01	0.16	0.00	0.00	1.01	0.24
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					343.03
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					565.99
		AVERAGE BULKING FACTOR					1.01
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					33,510.82

SEDIMENT TRANSPORT WORKSHEET
100 YEAR 24 HOUR STORM
Qs=a(V^b)(D^c)((1-Cf)^d)W

DATA		VARIABLES
DATE OF CALCULATION	18-Sep-93 10:59:42 AM	Qs= BED MATERIAL TRANSPORT (cfs)
PROJECT NAME	UNSER DIVERSION	V=FLOW VELOCITY (fps)
CHANNEL NAME	EARTHEN CHANNEL	D=HYDRAULIC DEPTH (ft)
CHANNEL REACH	UPSTREAM OF POND 6	Cf=FINE SED. CONC. (ppm by wt)
BED MATERIAL D50 (mm)	0.42	W=CHANNEL WIDTH (ft)

BOTTOM WIDTH (ft)	10	**EXPONENTS / COEFFICIENTS**	
SIDE SLOPES (horz. ? / 1' vert.)	3	PER R.C.E. TABLE	
LONGITUDINAL SLOPE (ft./ft.)	0.0050	"A" COEFFICIENT	0.0003
MANNING'S "n"	0.030	"B" EXPONENT	3.92
FINE SED. CONCENTRATION (ppm by wt.)	27,473	"C" EXPONENT	0.54
TOTAL CLEARWATER VOLUME (cf/storm)	36,590	"D" EXPONENT	-9.5

CLEAR WATER FLOW RATE (cfs)	INCREMENTAL TIME (hrs)	DEPTH (ft.)	VELOCITY (ft./sec.)	BED MATERIAL TRANS. RATE (cfs.)	WASH LOAD TRANS. RATE (cfs.)	BULKING FACTOR	INCREMENT SED. VOL. (cf)
0.05	1.233	0.01	0.16	0.00	0.00	1.01	2.37
1.2	0.134	0.10	0.74	0.00	0.01	1.01	6.08
4.8	0.033	0.25	1.32	0.01	0.05	1.01	6.73
15.6	0.067	0.55	2.13	0.06	0.17	1.01	53.28
26.1	0.066	0.75	2.55	0.13	0.28	1.02	97.54
25.9	0.067	0.75	2.55	0.13	0.28	1.02	98.37
21.4	0.033	0.70	2.46	0.11	0.23	1.02	40.06
16.5	0.067	0.60	2.24	0.07	0.18	1.01	59.45
11.3	0.067	0.45	1.89	0.03	0.12	1.01	36.40
7.7	0.066	0.35	1.63	0.01	0.08	1.01	22.92
4.9	0.100	0.30	1.48	0.01	0.05	1.01	22.22
3.3	0.067	0.20	1.15	0.00	0.04	1.01	9.17
2.6	0.133	0.20	1.15	0.00	0.03	1.01	14.63
1.9	0.133	0.15	0.96	0.00	0.02	1.01	10.27
1.4	0.134	0.10	0.74	0.00	0.01	1.01	7.11
0.8	0.466	0.05	0.47	0.00	0.01	1.01	13.48
0.3	0.734	0.05	0.47	0.00	0.00	1.01	7.15
0.1	0.100	0.01	0.16	0.00	0.00	1.01	0.38
0.1	0.100	0.01	0.16	0.00	0.00	1.01	0.38
0.1	0.200	0.01	0.16	0.00	0.00	1.01	0.77
		TOTAL SEDIMENT TRANSPORTED (cf sediment solids @ 165 psf)					508.76
		TOTAL SEDIMENT TRANSPORTED (cf of sediment deposits @ 100 psf)					839.46
		AVERAGE BULKING FACTOR					1.01
		AVERAGE TOTAL SEDIMENT CONCENTRATION (ppm by wt)					35,462.59

APPENDIX F

PSIAC SEDIMENT YIELD ESTIMATE

UNSER DIVERSION Watershed ________ State Existing, Undeveloped Condition

________ Subwatershed Name ________

478 Acres

PSIAC – 1968

Date ________

SEDIMENT YIELD FACTOR RATING

SURFACE GEOLOGY (a)	SOILS (b)	CLIMATE (c)	RUNOFF (d)	TOPOGRAPHY (e)
(10) a. Marine shales and related mudstones and siltstones	(10) a. Fine textured; easily dispersed; saline-alkaline; high shrink-swell characteristics b. Single grain silts and fine sands	(10) a. Storms of several days' duration with short periods of intense rainfall b. Frequent intense convective storms c. Freeze-thaw occurrence	(10) a. High peak flows per unit area b. Large volume of flow per unit area	(20) a. Steep upland slopes (in excess of 30%) b. High relief; little or no floodplain development
(5) a. Rocks of medium hardness b. Moderately weathered c. Moderately fractured	(5) a. Medium textured soil b. Occasional rock fragments c. Caliche layers	(5) a. Storms of moderate duration and intensity b. Infrequent convective storms	(5) a. Moderate peak flows per unit area b. Moderate volume of flow per unit area	(10) a. Moderate upland slopes (less than 20%) b. Moderate fan or flood-plain development
(0) a. Massive, hard formations	(0) a. High percentage of rock fragments b. Aggregated clays c. High in organic matter	(0) a. Humid climate with rainfall of low intensity b. Precipitation in form of snow c. Arid climate, low intensity storms d. Arid climate; rare convective storms	(0) a. Low peak flows per unit area b. Low volume of runoff per unit area c. Rare runoff events	(0) a. Gentle upland slopes (less than 5%) b. Extensive alluvial plains
Factor value: 8	5	5	3	3

GROUND COVER (f)	LAND USE (g)	UPLAND EROSION (h)	CHANNEL EROSION AND SEDIMENT TRANSPORT (i)
(10) Ground cover does not exceed 20% a. Vegetation sparse; little or no litter b. No rock in surface soil	(10) a. More than 50% cultivated b. Almost all of area intensively grazed c. All of area recently burned	(25) a. More than 50% of the area characterized by rill and gully or landslide erosion	(25) a. Eroding banks continuously or at frequent intervals with large depths and long flow duration b. Active headcuts and degradation in tributary channels
(0) Cover not exceeding 40% a. Noticeable litter b. If trees present understory not well developed	(0) a. Less than 25% cultivated b. 50% or less recently logged c. Less than 50% intensively grazed d. Ordinary road and other construction	(10) a. About 25% of the area characterized by rill and gully or landslide erosion b. Wind erosion with deposition in stream channels	(10) a. Moderate flow depths, medium flow duration with occasionally eroding banks or bed
(–10) a. Area completely protected by vegetation, rock fragments, litter b. Little opportunity for rainfall to reach erodible material	(–10) a. No cultivation b. No recent logging c. Low intensity grazing	(0) a. No apparent signs of erosion	(0) a. Wide shallow channels with flat gradients and short flow duration b. Channels in massive rock, large boulders, or well vegetated c. Artificially controlled channels
Factor value: 10	0	5	8

Subtotal (a) – (g) 34 Subtotal (h) – (i) 13 TOTAL RATING – 47 = .44 ac.ft./sq. mi./yr.

(Instructions on reverse)

F1

SHEET 1 OF 2

GENERAL INSTRUCTIONS

District Office prepares one copy for District file.

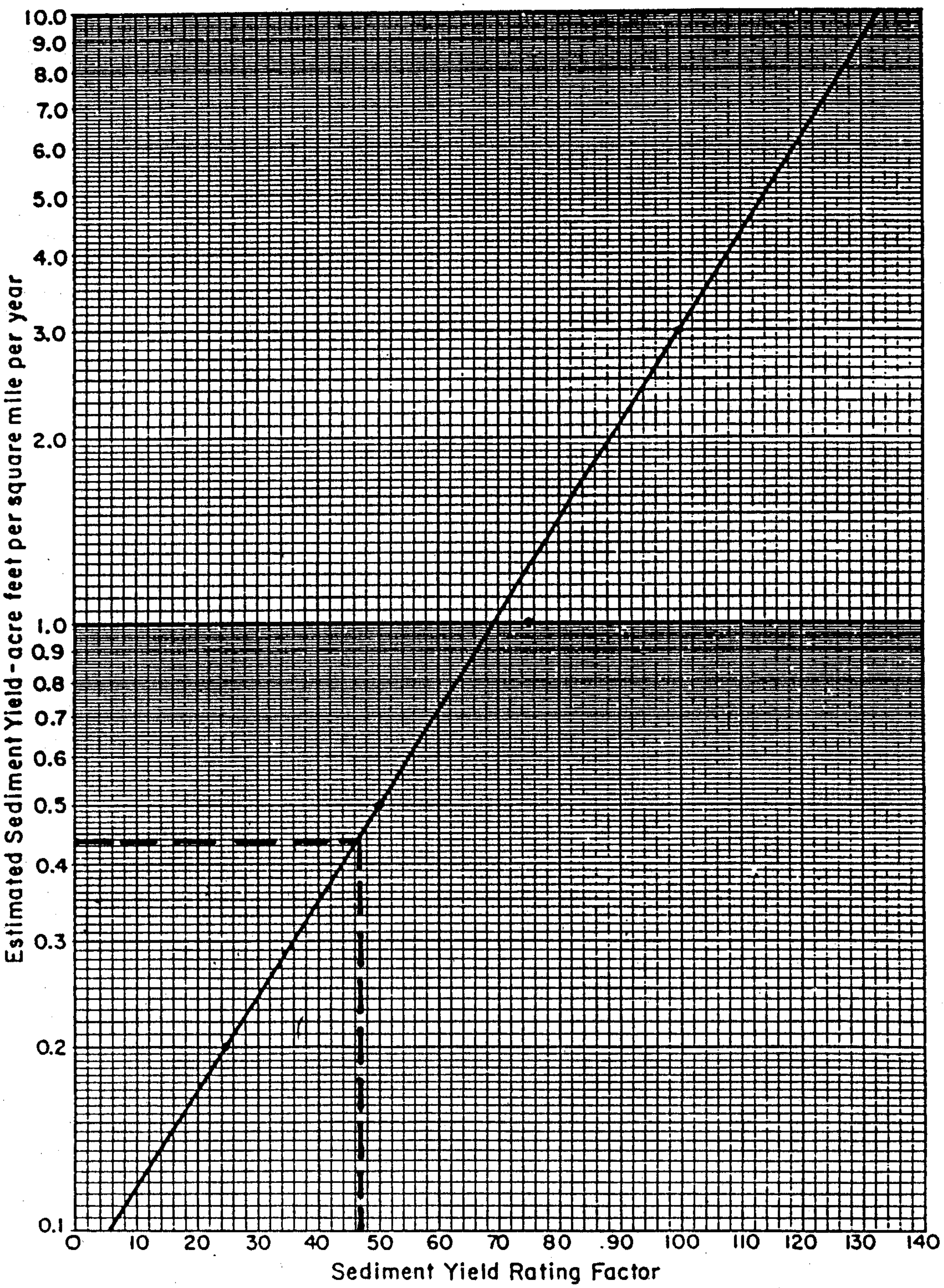
SPECIFIC INSTRUCTIONS

(Items not listed are self-explanatory)

Numbers indicate values assigned appropriate characteristics. Letters a, b, c, and d refer to independent characteristics to which full value may be assigned.

Interpolation between the sediment yield levels may be made. High values for columns (a) through (g) should correspond to high values for (h) and (i). If they do not, factors (a) through (g) should be reevaluated. If they do not correspond, then a special erosion condition exists.

Convert *Total Rating* to sediment yield by use of graph.



APPENDIX G

TRAP EFFICIENCY CALCULATIONS

Table of Contents

VANCE

POND TRAP EFFICIENCY

PROJECT NAME: UNSER DIVERSION
SEDIMENTATION BASIN: POND #5
STORM FREQUENCY: 100 YEAR
DATE & TIME OF CALC: 09/14/93 11:00:12

POND DATA	
BOTTOM OF POND ELEVATION:	60
MAXIMUM WATER SURFACE ELEVATION:	75.69
SIDE SLOPE RATIO TO ONE:	3
DISTANCE BETWEEN INLET & OUTLET:	140
WIDTH OF BOTTOM:	60
OUTLET ELEVATION:	64
ESTIMATED EFFECTIVE WIDTH @ INLET:	10
ESTIMATED EFFECTIVE WIDTH @ OUTLET:	8
FINE SEDIMENT CONCENTRTN (ppm by wt):	43252

SEDIMENT DATA

RANGE NUMBER	PARTICLE SIZE (SIZE)	FRACTIONAL BEDLOAD SIZE DISTRIBUTION	FRACTIONAL WASHLOAD SIZE DISTRIBUTION	AVG. CLEAR WATER FALL VELOCITY (fps)	AVG. ADJSTD FALL VELOCITY (fps)
1	2.00 >	0.250	0.02	0.50000	0.450655
2	0.42 TO 2.00	0.300	0.28	0.14000	0.126183
3	0.180 TO 0.42	0.270	0.30	0.06600	0.059486
4	0.074 TO 0.180	0.130	0.28	0.01100	0.009914
5	0.026 TO 0.074	0.050	0.06	0.00200	0.001803
6	< 0.026	0.000	0.06	0.00010	0.000090

SUMMARY TABLE

OVERALL TRAP EFFICIENCY (%): 86

SIZE RANGE	INFLOW VOLUME	VOLUME RETAINED	VOLUME PASSED
1	5442	5442	0
2	8260	8260	0
3	7758	7758	0
4	4651	2216	2435
5	1467	305	1162
6	405	48	357
TOTAL	27983	24030	3954

RESERVOIR ROUTING DATA

TIME	Q IN (cfs)	Q OUT (cfs)	STAGE ELEV. (ft.)	CUMLATIVE INFLOW VOLUME (ac.ft)	INCREMENT BEDLOAD VOLUME (cf)	INCREMENT WASHLOAD VOLUME (cf)	SETTLING DEPTH (ft)	W.S. TOP WIDTH (ft)	MAX. EFFECTIVE W.S. TOP WIDTH (ft)	AVERAGE VELOCITY ZONE # 1 (ft/sec)	ZONE #2 (ft/sec)	ZONE #3 (ft/sec)	TOTAL TRAVEL TIME (seconds)	FRACTION OF SEDIMENT RETAINED 1	2	3	4	5	6	INCREMENT VOLUME RETAINED (cf)	INCREMENT VOLUME PASSING (cf)	TRAP EFFICIENCY (percent)
1.20	0.50	0.00	60.07	0.000	0	4	< OUTLET	60.42	59.8	N.A.	N.A.	N.A.	N.A.	1.00	1.00	1.00	1.00	1.00	1.00	4	0	100
1.35	1.60	0.00	60.27	0.006	0	3	< OUTLET	61.62	59.8	N.A.	N.A.	N.A.	N.A.	1.00	1.00	1.00	1.00	1.00	1.00	3	0	100
1.40	12.90	0.00	61.04	0.036	6	26	< OUTLET	66.24	59.8	N.A.	N.A.	N.A.	N.A.	1.00	1.00	1.00	1.00	1.00	1.00	32	0	100
1.45	39.80	0.00	61.35	0.144	89	76	< OUTLET	68.1	59.8	N.A.	N.A.	N.A.	N.A.	1.00	1.00	1.00	1.00	1.00	1.00	164	0	100
1.50	91.00	0.00	62.12	0.415	1820	581	< OUTLET	72.72	59.8	N.A.	N.A.	N.A.	N.A.	1.00	1.00	1.00	1.00	1.00	1.00	2400	0	100
1.60	206.10	53.10	64.85	1.700	2515	529	0.85	89.1	59.8	9.0	3.891	NO ZONE #3	19.156	1.00	1.00	1.00	0.22	0.04	0.00	2492	552	82
1.65	211.50	130.80	65.90	2.563	3079	599	1.9	95.4	59.8	4.1	2.741	NO ZONE #3	36.674	1.00	1.00	1.00	0.19	0.03	0.00	3000	679	82
1.70	194.60	138.00	66.39	3.402	2789	583	2.39	98.34	59.8	3.0	2.204	NO ZONE #3	48.971	1.00	1.00	1.00	0.20	0.04	0.00	2750	622	82
1.75	169.20	141.50	66.67	4.154	2515	522	2.67	100.02	59.8	2.3	1.910	NO ZONE #3	61.381	1.00	1.00	1.00	0.23	0.04	0.00	2490	547	82
1.85	120.30	141.80	66.69	5.344	3593	830	2.69	100.14	59.8	1.7	1.693	NO ZONE #3	83.062	1.00	1.00	1.00	0.31	0.06	0.00	3671	752	83
1.95	84.40	135.50	66.19	6.183	1820	587	2.19	97.14	59.8	1.4	1.793	NO ZONE #3	93.084	1.00	1.00	1.00	0.42	0.08	0.00	2023	384	84
2.00	70.80	127.70	65.77	6.504	654	223	1.77	94.62	59.8	1.5	1.984	NO ZONE #3	88.815	1.00	1.00	1.00	0.50	0.09	0.00	748	129	85
2.10	43.60	57.20	64.90	7.198	895	350	0.9	89.4	59.8	1.8	1.723	NO ZONE #3	77.588	1.00	1.00	1.00	0.85	0.16	0.01	1137	108	91
2.20	32.00	40.70	64.70	7.508	448	253	0.7	88.2	59.8	1.7	1.521	NO ZONE #3	83.318	1.00	1.00	1.00	1.00	0.21	0.01	657	45	94
2.40	23.40	27.30	64.55	7.845	500	348	0.55	87.3	59.8	1.6	1.277	NO ZONE #3	91.515	1.00	1.00	1.00	1.00	0.30	0.01	795	53	94
2.90	11.60	8.85	64.30	8.462	377	491	0.3	85.8	59.8	1.4	0.813	NO ZONE #3	110.239	1.00	1.00	1.00	1.00	0.66	0.03	823	45	95
3.25	3.90	4.70	64.10	8.898	78	173	0.1	84.6	59.8	1.4	0.771	NO ZONE #3	111.298	1.00	1.00	1.00	1.00	1.00	0.10	242	9	96
3.75	3.00	3.60	64.08	8.955	46	138	0.08	84.48	59.8	1.4	0.697	NO ZONE #3	117.996	1.00	1.00	1.00	1.00	1.00	0.13	177	7	96
5.35	2.30	2.70	64.06	8.998	5	170	0.06	84.36	59.8	1.4	0.656	NO ZONE #3	118.545	1.00	1.00	1.00	1.00	1.00	0.18	167	8	95
19.90	7.10	5.30	64.11	9.113	0	269	0.11	84.66	59.8	2.4	1.091	NO ZONE #3	70.702	1.00	1.00	1.00	1.00	1.00	0.06	254	15	94
TOTAL					21229	6755														24030		

POND TRAP EFFICIENCY

PROJECT NAME: UNSER DIVERSION
SEDIMENTATION BASIN: POND #3
STORM FREQUENCY: 100 YEAR
DATE & TIME OF CALC: 09/14/93 11:01:41

POND DATA	
BOTTOM OF POND ELEVATION:	43
MAXIMUM WATER SURFACE ELEVATION:	48.6
SIDE SLOPE RATIO TO ONE:	3
DISTANCE BETWEEN INLET & OUTLET:	280
WIDTH OF BOTTOM:	70
OUTLET ELEVATION:	47.5
ESTIMATED EFFECTIVE WIDTH @ INLET:	10
ESTIMATED EFFECTIVE WIDTH @ OUTLET:	8
FINE SEDIMENT CONCENTRTN (ppm by wt):	85573

SEDIMENT DATA

RANGE NUMBER	PARTICLE SIZE SIZE	FRACTIONAL BEDLOAD SIZE DISTRIBUTION	FRACTIONAL WASHLOAD SIZE DISTRIBUTION	AVG. CLEAR WATER FALL VELOCITY (fps)	AVG. ADJSTD FALL VELOCITY (fps)
1	2.00 >	0.020	0.02	0.50000	0.405201
2	0.42 TO 2.00	0.110	0.11	0.14000	0.113456
3	0.180 TO 0.42	0.370	0.37	0.06600	0.053487
4	0.074 TO 0.180	0.330	0.33	0.01100	0.008914
5	0.026 TO 0.074	0.080	0.08	0.00200	0.001621
6	< 0.026	0.090	0.09	0.00010	0.000081

SUMMARY TABLE

OVERALL TRAP EFFICIENCY (%): 98

SIZE RANGE	INFLOW VOLUME	VOLUME RETAINED	VOLUME PASSED
1	211	211	0
2	1163	1163	0
3	3910	3910	0
4	3488	3488	0
5	845	811	34
6	951	777	174
TOTAL	10569	10360	209

RESERVOIR ROUTING DATA

TIME	Q IN (cfs)	Q OUT (cfs)	STAGE ELEV. (ft.)	CUMLATIVE INFLOW VOLUME (ac.ft)	INCREMENT BEDLOAD VOLUME (cf)	INCREMENT WASHLOAD VOLUME (cf)	SETTLING DEPTH (ft)	W.S. TOP WIDTH (ft)	MAX. EFFECTIVE W.S. TOP WIDTH (ft)	AVERAGE VELOCITY ZONE # 1 (ft/sec)	ZONE #2 (ft/sec)	ZONE #3 (ft/sec)	TOTAL TRAVEL TIME (seconds)	FRACTION OF SEDIMENT RETAINED 1	2	3	4	5	6	INCREMENT VOLUME RETAINED (cf)	TRAP EFFICIENCY (percent)
1.20	0.00	0.00	43.00	0.000	0	9	< OUTLET	70	70.0	N.A.	N.A.	N.A.	N.A.	1.00	1.00	1.00	1.00	1.00	1.00	9	100
1.35	2.30	0.00	43.07	0.005	2	10	< OUTLET	70.42	70.4	N.A.	N.A.	N.A.	N.A.	1.00	1.00	1.00	1.00	1.00	1.00	12	100
1.40	27.08	0.00	43.97	0.067	47	51	< OUTLET	75.82	75.8	N.A.	N.A.	N.A.	N.A.	1.00	1.00	1.00	1.00	1.00	1.00	99	100
1.45	67.80	0.00	44.46	0.265	899	362	< OUTLET	78.76	78.8	N.A.	N.A.	N.A.	N.A.	1.00	1.00	1.00	1.00	1.00	1.00	1261	100
1.55	100.00	0.00	45.93	1.004	1874	601	< OUTLET	87.58	87.6	N.A.	N.A.	N.A.	N.A.	1.00	1.00	1.00	1.00	1.00	1.00	2475	100
1.60	86.30	0.00	46.58	1.389	1902	603	< OUTLET	91.48	91.5	N.A.	N.A.	N.A.	N.A.	1.00	1.00	1.00	1.00	1.00	1.00	2505	100
1.65	67.10	0.00	47.10	1.706	661	245	< OUTLET	94.6	94.6	N.A.	N.A.	N.A.	N.A.	1.00	1.00	1.00	1.00	1.00	1.00	906	100
1.70	50.30	0.00	47.47	1.949	899	378	< OUTLET	96.82	96.8	N.A.	N.A.	N.A.	N.A.	1.00	1.00	1.00	1.00	1.00	1.00	1277	100
1.75	37.20	9.90	47.71	2.130	426	251	0.21	98.26	98.3	4.9	2.386	1.15	119.650	1.00	1.00	1.00	1.00	0.92	0.05	615	91
1.85	20.20	17.70	47.88	2.362	220	162	0.38	99.28	99.3	1.5	1.054	0.51	250.544	1.00	1.00	1.00	1.00	1.00	0.05	350	91
1.95	32.40	19.40	47.92	2.537	144	153	0.42	99.52	99.5	2.1	1.335	0.63	194.748	1.00	1.00	1.00	1.00	0.75	0.04	265	89
2.00	66.10	29.10	48.07	2.740	29	67	0.57	100.42	100.4	3.1	1.862	0.85	148.313	1.00	1.00	1.00	1.00	0.42	0.02	83	87
2.10	76.10	59.80	48.43	3.369	57	105	0.93	102.58	102.6	2.2	1.672	0.73	177.071	1.00	1.00	1.00	1.00	0.31	0.02	139	86
2.20	86.10	68.30	48.59	4.026	24	79	1.09	103.54	103.5	2.1	1.633	0.71	179.984	1.00	1.00	1.00	1.00	0.27	0.01	87	85
2.40	48.40	61.20	48.44	5.028	24	60	0.94	102.64	102.6	1.4	1.337	0.58	241.149	1.00	1.00	1.00	1.00	0.42	0.02	72	87
2.90	21.40	24.90	48.02	6.324	24	122	0.52	100.12	100.1	1.1	0.968	0.45	296.994	1.00	1.00	1.00	1.00	0.93	0.05	132	91
3.25	12.90	16.60	47.86	6.811	5	61	0.36	99.16	99.2	1.0	0.846	0.42	331.832	1.00	1.00	1.00	1.00	1.00	0.07	60	92
3.75	6.20	8.30	47.68	7.191	0	5	0.18	98.08	98.1	0.9	0.734	0.41	343.609	1.00	1.00	1.00	1.00	1.00	0.15	5	92
5.35	5.50	8.20	47.68	8.104	0	4	0.18	98.08	98.1	0.8	0.685	0.39	375.405	1.00	1.00	1.00	1.00	1.00	0.17	4	93
19.90	0.20	0.20	47.50	8.531	0	4	< OUTLET	97	97.0	N.A.	N.A.	N.A.	N.A.	1.00	1.00	1.00	1.00	1.00	1.00	5	100
TOTAL					7238	3331														10360	

APPENDIX H

STORM DRAIN SEDIMENT TRANSPORT

VANCE

SEDIMENT TRANSPORT THROUGH PIPE
48" DIAMETER STORM DRAIN BETWEEN PONDS 5 & 4

ENGINEERING ANALYSIS OF FLUVIAL SYSTEMS

Qmax=21.44 ds^-1.02*S^2.52*R^1.52*A
WHERE:
Qmax=MAX. SEDIMENT DISCHARGE IN VOLUME PER TIME
R=HYDRAULIC RADIUS
A=FLOW AREA
S=SLOPE
ds= AVERAGE PARTICLE SIZE

AVERAGE PARTICLE SIZE (mm)	0.074
AVERAGE PARTICLE SIZE (ft)	0.000243
PIPE DIAMETER (ft)	4.00
MANNINGS "n"	0.013

TIME	ENERGY SLOPE FT./FT.	DEPTH FT.	THETA DGR.	VELOCITY (fps)	CLEAR WATER DISCHARGE (cfs)	MAX SEDIMENT TRANSPORT CAPACITY (cfs)	INCREMENT SEDIMENT TRANSPORT CAPACITY (cf)	INCREMENT SEDIMENT FROM POND (cf)	SEDIMENT DEPOSITED IN PIPE (cf)
1.75	0.026	* 2.26	195.05	19.41	142.24	86.6105	31180	547	0
1.85	0.026	* 2.26	195.05	19.41	142.24	86.6105	31180	752	0
1.95	0.0156	** 2.60	214.92	15.74	136.07	31.3021	11269	384	0
2.00	0.0104	** 2.90	233.49	13.18	128.60	13.4711	4850	129	0
2.10	0.00267	** 3.20	253.74	6.75	72.75	0.4956	178	108	0

AVERAGE PARTICLE SIZE (mm)	0.026
AVERAGE PARTICLE SIZE (ft)	0.000085
PIPE DIAMETER (ft)	4
MANNINGS "n"	0.013

TIME	ENERGY SLOPE FT./FT.	DEPTH FT.	THETA DGR.	VELOCITY (fps)	CLEAR WATER DISCHARGE (cfs)	MAX SEDIMENT TRANSPORT CAPACITY (cfs)	INCREMENT SEDIMENT TRANSPORT CAPACITY (cf)	INCREMENT SEDIMENT FROM POND (cf)	SEDIMENT DEPOSITED IN PIPE (cf)
2.20	0.0013	** 3.10	246.73	4.70	49.13	0.2268	82	45	0
2.40	0.00052	** 2.80	227.16	2.93	27.50	0.0195	7	53	46
2.90	0.00016	** 2.50	208.96	1.58	13.02	0.0008	0	45	45

* Normal Depth
** Back Water Depth

APPENDIX I

POND OUTLET STRUCTURE DESIGN CALCULATIONS

OUTLET STRUCTURE BUOYANCY CALCULATIONS

Calculate Bottom Thickness Required to Resist Uplift Forces on Fully Submerged Structure

Design outlet structures for a minimum factor of safety of 1.2 to resist uplift from hydrostatic force.

OUTLET STRUCTURE DATA

Pond #	Outlet Pipe Dia.	Top of Weir Elev.	Outlet Pipe Inv. Elev.	Height Inv. to Top
1	42″	5141.0	5132.5	8.5′
2	48″	5144.5	5136.9	7.6′
3	42″	5147.5	5142.0	5.5′
4	42″	5151.9	5146.3	5.6′
5	48″	5164.0	5159.0	5.0′
6	36″	5176.0	5169.0	7.0′

Assume a worst case situation where the entire structure including the trash rack is submerged and the trash rack is completely plugged.

• Calculate net uplift from trash rack portion of the structure.

Total volume enclosed between the top of the rack and the top of the concrete structure:

$$V = (2.33 \div 6)\ \{7.75^2 + [(\{7.75 + 2.33\} \div 2)^2]\} + 2.75^2 = 65.72 \text{ CF}$$

Weight of the steel:

1¼″ Pipe:	83.0 LF	@ 3.2 LB/LF =	265.6 LB
½″ x 3″ Bar:	19.5 LF	@ 5.1 LB/FT =	99.5 LB
3″ x 5″ Angle:	31.0 LF	@ 8.2 LB/LF =	254.2 LB
3″ x 3″ Angle:	8.5 LF	@ 4.9 LB/LF =	41.7 LB
		Total Weight =	661.0 LB

Net submerged vertical force of the trash rack:

(65.7 x 62.4) - 661.0 = 3,440 lbs of uplift

- Calculate net uplift per vertical foot of concrete structure:

  Total volume enclosed: V = 8 x 8 x 1 = 64 cf

  Weight of the concrete: W = 29.3 x 0.67 x 150 = 2,944.7 lbs

- Net submerged vertical force per vertical ft.:

  (64 x 62.4) - 2,944.7 = 1,048.9 lbs/VF

- Calculate volume of submerged concrete required to resist 120 lbs of vertical force (100 LB of uplift plus factor of safety)

  120 ÷ (150 - 62.4) = 1.37 cf

- Calculate volume of concrete fill above pipe invert

  V = (6.67^2 x 0.5) ÷ 2 = 11.12 CF

- Calculate volume of concrete per vertical foot of floor

  V = 8 x 8 x 1 = 64 CF

FLOOR THICKNESS CALCULATION

T = [({(Ft + h [Fs]) ÷ 100} x 1.37) + Vc - 11.12] ÷ 64

T = Required floor thickness below outlet pipe invert
F_t = Net uplift force from trash rack volume
Fs′ = Net uplift force per vertical foot of concrete structure
Fs″ = Total net uplift force on the concrete structure
Vc = Volume of concrete displaced by pipe
h = Height of structure (pipe invert to top)

Pond #	h (ft)	Ft (lbs)	Fs′ (lbs)	Fs″ (lbs)	Total Net Uplift (lbs)	Vc (cf)	T (ft)
1	8.5	3,440	1,048.9	8,915.6	12,355.6	6.45	2.57
2	7.6	3,440	1,048.9	7,971.6	11,411.6	8.42	2.40
3	5.5	3,440	1,048.9	5,769.0	9,209.0	6.45	1.90
4	5.6	3,440	1,048.9	5,873.8	9,313.8	6.45	1.92
5	5.0	3,440	1,048.9	5,244.5	8,684.5	8.42	1.82
6	7.0	3,440	1,048.9	7,342.3	10,782.3	4.73	2.21

Easterling & Associates, Inc.
10131 Coors Rd., NW, Suite H-7
Albuquerque, New Mexico 87114
(505) 898-8021
FAX (505) 898-8501

Project Name Unser Diversion
Project No. ______ Date ______
Subject ______

By ______ Sheet 2 of ______

Check 42" dia Pipe   Bc = 4.3'

Max bury = 14'   H = 14 − 4.3 = 9.7'   Bd = 4.3 + 4.3(2)(1) = 12.9'

- From Table 24-A The design trench will be wider than the transition width Use the maximum Backfill load

Backfill load = 6034 lbs / lf

The above load it for 100 lbs / cf − Ajust the load for 120 lbs / cf material   6034 × 1.2 = 7240 lbs / lf

- From table 45 Live load = 370 lbs / lf
- D-load = D0.01 = $\frac{370 + 7240}{1.9 \times 3.5}$ = 1145 lbs / lf I.D.

1145 < 1350   Class III Pipe is O.K.

Check 48 dia Pipe   Bc = 4.83'

Max bury = 14'   H = 14 − 4.83 = 9.2   Bd = 4.83 + 4.83(2) = 14.5'

- From Table 24-A The design trench will be wider than the transition width. Use the maximum backfill load.

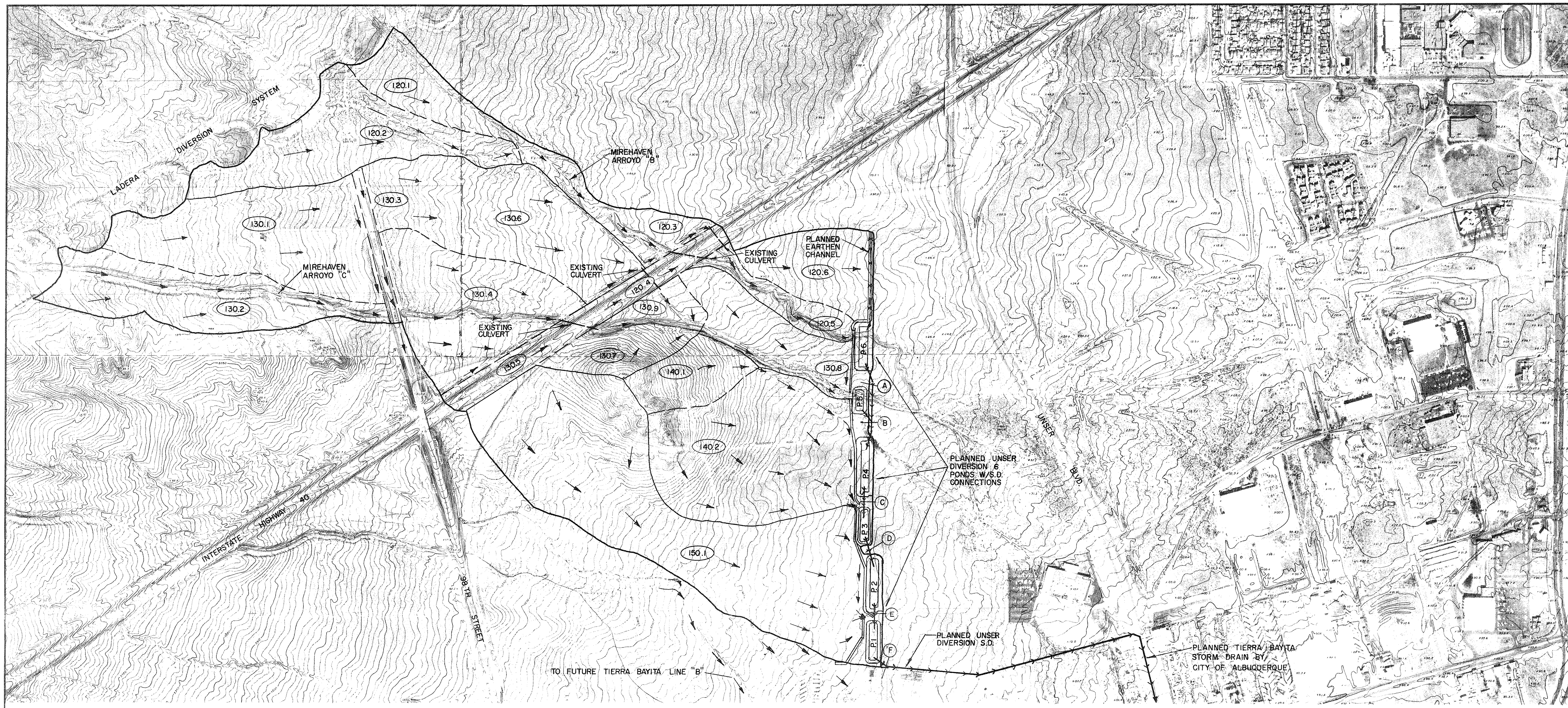
Backfill load = 10,328 lb / lf at 100 lbs / cf

Adjust for 120 lbs / cf material 10,328 × 120 = 12,394 lbs / LF

- From Table 45 Live Load = 410 lbs / lf
- D0.01 = $\frac{410 + 12,394}{1.9 \times 4.0}$ = 1,684 lbs / lf I.D. < 1350

From ASTM C76 For Class IV Pipe D0.01 = 2,000 lbs / lf ID.

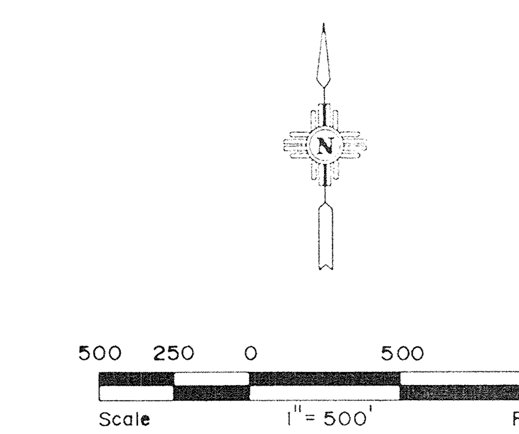
Class IV Pipe is required



LEGEND

PROJECT WATERSHED BOUNDARY	
DRAINAGE BASIN BOUNDARY	
DRAINAGE SUB-BASIN BOUNDARY	
PROPOSED POND	PX
PROPOSED STORM DRAIN	
DRAINAGE SUB-BASIN I.D.	XXX.X
ANALYSIS POINT	X

THIS BASE MAP WAS PRODUCED BY COMPOSITING THE CONTOURS GENERATED BY BOHANNAN-HUSTON, INC., ALBUQUERQUE, NEW MEXICO, FOR THE 1983 FEMA FLOODWAY MAPS AND 1991 RECTIFIED AERIAL PHOTOGRAPHY.



BASIN RUNOFF AND WASHLOAD CONCENTRATION SUMMARY

Basin/ Sub-Basin ID	Basin/ Sub-Basin Area (AC)		Storm Return Frequency (Years) 2	5	10	25	50	100
120.1	16.58	V	0	0.013	0.114	0.294	0.448	0.607
		Q_P	0	0.47	4.08	10.57	16.09	21.50
		C_W	0	17,406	22,346	25,031	26,280	27,024
120.2	34.88	V	0	0.028	0.240	0.619	0.943	1.277
		Q_P	0	0.68	5.92	15.50	23.87	32.45
		C_W	0	20,061	26,028	29,310	30,963	32,141
120.3	12.74	V	0	0.010	0.088	0.226	0.344	0.466
		Q_P	0	0.36	3.13	8.12	12.36	16.52
		C_W	0	10,743	13,809	15,525	16,315	16,785
120.4	5.82	V	0.210	0.294	0.374	0.487	0.576	0.664
		Q_P	4.85	6.93	8.95	11.86	14.12	16.25
		C_W	39,235	41,206	42,737	44,467	45,491	46,313
120.5	10.36	V	0	0.008	0.071	0.184	0.280	0.380
		Q_P	0	0.29	2.55	6.61	10.06	13.45
		C_W	0	15,671	20,166	22,555	23,695	24,385
Total @ Arroyo "B" Inlet to Pond 6	80.37	C_W	39,235	37,299	31,036	30,381	30,741	31,090
120.6 Flows directly to Pond 6 through earthen channel	20.03	V	0	0.056	0.185	0.409	0.601	0.8350
		Q_P	0	1.49	5.94	13.86	20.56	28.47
		C_W	0	17,467	22,287	25,190	26,486	27,473
130.1	47.55	V	0	0.038	0.327	0.844	1.286	1.741
		Q_P	0	0.76	6.60	17.46	27.03	36.94
		C_W	0	22,549	28,860	32,853	34,679	36,126
130.2	31.30	V	0	0.025	0.216	0.556	0.847	1.146
		Q_P	0	0.63	5.51	14.50	22.34	30.31
		C_W	0	30,257	42,974	48,731	51,464	53,462
130.3	3.01	V	0.221	0.307	0.372	0.457	0.523	0.586
		Q_P	5.12	7.22	8.71	10.56	11.92	13.15
		C_W	5,176	5,398	5,551	5,622	5,695	5,709
130.4	39.16	V	0	0.031	0.270	0.695	1.059	1.434
		Q_P	0	1.01	8.79	23.04	35.21	47.31
		C_W	0	25,495	32,359	36,295	38,295	39,515

BASIN RUNOFF AND WASHLOAD CONCENTRATION SUMMARY (Continued)

Basin/ Sub-Basin ID	Basin/ Sub-Basin Area (AC)		Storm Return Frequency (Years) 2	5	10	25	50	100
130.5	6.66	V	0.240	0.335	0.427	0.556	0.659	0.759
		Q_P	5.55	7.92	10.23	13.55	16.13	18.57
		C_W	40,064	41,609	46,224	45,118	46,084	46,901
130.6	45.44	V	0	0.036	0.313	0.807	1.229	1.663
		Q_P	0	0.90	7.84	20.62	31.74	43.13
		C_W	0	19,333	26,132	29,402	31,090	32,309
130.7	10.85	V	0	0.020	0.093	0.215	0.319	0.426
		Q_P	0	0.74	3.37	7.90	11.57	15.24
		C_W	0	109,068	132,730	142,072	148,308	151,744
130.8	20.98	V	0	0.017	0.144	0.372	0.566	0.766
		Q_P	0	0.56	4.86	12.69	19.36	25.97
		C_W	0	21,981	31,163	39,589	36,123	37,300
130.9	6.11	V	0	0.011	0.052	0.121	0.179	0.240
		Q_P	0	0.42	1.90	4.44	6.51	8.58
		C_W	0	15,270	17,950	19,609	20,294	20,877
Total @ Arroyo "C" Inlet to Pond 5	190.08	C_W	23,689	26,571	33,971	39,193	41,581	43,252
140.1	12.54	V	0	0.036	0.126	0.272	0.395	0.523
		Q_P	0	1.35	4.66	10.17	14.48	18.85
		C_W	0	75,233	88,751	97,831	101,426	103,433
140.2	56.63	V	0	0.090	0.455	1.084	1.615	2.2014
		Q_P	0	3.26	16.57	39.92	59.11	79.63
		C_W	0	54,179	65,005	72,302	75,236	77,500
Total @ Basin 140 Inlet to Pond 3	69.17	C_W	0	60,759	70,343	77,538	80,436	80,436
150.1 Flows directly to Pond 1	97.17	V	0	0.077	0.669	1.725	2.628	3.6995
		Q_P	0	1.62	14.24	38.17	59.44	85.38
		C_W	0	15,194	19,806	23,096	24,498	25,800

V = Estimated 24 hour clear water runoff volume from AHYMO model, Type 2 rainfall (ac-ft).

Q_P = Estimated 24 hour peak clear water flow rate from AHYMO model, Type 2 rainfall (cfs).

C_W = Estimated sediment concentration in runoff. Estimation with M.U.S.L.E. (PPM by weight).

POND DATA SUMMARY

WATERSHED CONDITION: EXISTING, MOSTLY UNDEVELOPED
STORM: 100-YEAR, 10-DAY

POND ID	POND BOTTOM ELEV. @ OUTLET	OUTLET STRUCTURE WIER ELEV.	EMERGENCY SPILLWAY ELEV.	MAXIMUM WATER SURFACE ELEV.	FREEBOARD TO EMERGENCY SPILLWAY (FT)	POND VOLUME BELOW OUTLET WEIR ELEV. (AC-FT)	POND VOLUME BELOW EMERGENCY SPILLWAY ELEV. (AC-FT)	FREQUENT STORM SEDIMENT STORAGE VOLUME (AC-FT)	TOTAL INFLOW VOLUME (AC-FT)	MAXIMUM VOLUME STORED 100-YEAR STORM (AC-FT)	INFLOW VOLUME FROM WATERSHED (AC-FT)	VOLUME RETAINED (AC-FT)	PEAK INFLOW RATE (CFS)	PEAK OUTFLOW RATE (CFS)
1	5133.5	5141.0	5143.9	5140.5	3.4	4.87	7.96	0.07	4.43	4.43	3.88	4.62	89.6	0.0
2	5137.9	5144.8	5147.9	5144.9	3.0	5.88	9.83	0.00	6.43	5.93	—	5.88	68.5	3.2
3	5143.0	5147.5	5151.2	5148.6	2.6	1.97	4.79	0.10	8.40	2.73	2.94	1.97	100.0	68.6
4	5147.0	5151.9	5155.1	5153.0	2.1	3.26	7.18	0.00	8.73	4.52	—	3.26	142.3	75.6
5	5160.0	5164.0	5168.8	5166.8	2.0	1.19	3.87	0.29	9.91	2.59	9.91	1.19	211.5	142.7
6	5170.0	5176.0	5177.9	5175.7	2.2	5.04	7.46	0.09	4.67	4.67	4.67	4.78	93.7	0.0
TOTAL							41.09				21.70	21.70		

NOTES:
1. POND ROUTING DATA FROM AHYMO VERSION 392 MODEL OUTPUT.
2. REPORTED POND VOLUMES EXCLUDE VOLUME PROVIDED FOR FREQUENT STORM SEDIMENT STORAGE.
3. INFLOW DATA INCLUDES CLEAR WATER AND SEDIMENT VOLUMES AND RATES.
4. FREQUENT STORM SEDIMENT STORAGE IS BASED ON 5 X THE ESTIMATED AVERAGE ANNUAL YIELD.

STORM DRAIN DATA SUMMARY

ANALYSIS POINT	PIPE DIAMETER (FT)	PIPE SLOPE (FT/FT)	FULL PIPE CAPACITY (CFS)	FULL PIPE VELOCITY (FPS)	¼ FULL PIPE CAPACITY (CFS)	¼ FULL PIPE VELOCITY (FPS)	PEAK FLOW RATE 100-YEAR (CFS)
A	36″	0.0270	109.6	15.5	15.0	10.9	0
B	48″	0.0260	231.6	18.4	31.7	12.9	142.7
C	42″	0.0130	114.7	11.9	15.7	8.4	75.6
D	42″	0.0100	100.6	10.5	13.9	7.4	68.6
E	48″	0.0125	160.6	12.8	22.0	9.0	3.2
F	42″	0.0165	129.2	13.4	17.7	9.4	0

NO.	REVISIONS	BY	DATE

DESIGN ANALYSIS FOR

ALBUQUERQUE METROPOLITAN FLOOD CONTROL AUTHORITY

UNSER DIVERSION

WATERSHED MAP, RUNOFF AND ROUTING DATA

EXISTING CONDITION

EASTERLING & ASSOCIATES, INC.
CONSULTING ENGINEERS
10131 COORS RD., NW SUITE H-7/8
ALBUQUERQUE, N.M. 87114
(505) 898-8021 FAX (505) 898-8501

Designed: VSF	Drawn: JMM	Checked: CME	PLATE 1
Job No: 3324.2	Date: 9-93		