PRELIMINARY DESIGN REPORT RWCD REACH 3

PRELIMINARY DESIGN REPORT

Roosevelt Water Conservation District Floodway

Reach 3

Williams-Chandler Watershed

Maricopa County, Arizona

October 1983

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
WEST NATIONAL TECHNICAL CENTER
Design Section
Portland, Oregon
April 10, 1983

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DESIGN REPORT

Job : RWCD Floodway Reach 3
Project : Williams-Chandler W.P.P.
Location : Maricopa County, Arizona
Authority: WF-08
Phase : Preliminary Design

Summary: Design of this project is being carried out by the WNTC Design Staff as requested by the Arizona State Conservationist (SCS-ENG-328 Dated 11/18/82). Requested completion date is January 1984.

A design package (design report, drawing, and specifications) for RWCD Floodway Reach 2 Extension was prepared by the WNTC Design Unit and submitted to the state in April 1983. This encompassed work from Sta 976+00 to Sta 981+00 originally intended for design and construction as part of Reach 3.

Work completed in this phase includes:

1. Hydraulic design and proportioning of the floodway channel, drop structure at Sta 857+00, and sediment basin at the junction with Queen Creek. (Grade, alignment, and design water surface elevations have been determined.)

2. Channel stability analysis and determination of extent of compacted earth lining.

3. Sediment analysis at the basin.

4. Preliminary structural design of the Drop at STA 857+00.

5. Preliminary location of side inlet drains.

6. Preliminary drawings including: Floodway Plan and Profile sheets, sediment basin layout, drop structure layout and sections.

Work to be completed in final design includes:

1. Final structural design of the Drop Structure at STA 857+00.

2. Design of side inlet drains.

3. Preparation of construction specifications.

4. Computation of quantities and preparation of engineers cost estimate.

Description of Job: Major features are:

1. An excavated earth floodway channel extending approximately 23,725 feet on centerline from the end of proposed reach 4 at Sta 740+00 to Sta 987+25 at the downstream end of the temporary entrance to Reach 2.

2. A type C drop structure at Station 857+00 with a weir length of 120 ft, drop of 5.5 ft, a weir notch 10 feet deep, and a basin length of 55 feet.

3. A 10 AF capacity sediment basin at the Queen Creek junction with a grouted rock trapezoidal side weir outlet to the RWCD floodway.

The channel grade and section have been modified from the revised work plan values: A bottom width of 200 feet with 3:1 side slopes is provided from STA 744+00 to STA 977+25. Channel grade is 0.0003 ft/ft for the length of Reach 3. A temporary loose rock rip rap entrance will transition from the existing channel at Sta 740+00 to STA 741+50. Channel bottom width at Sta 741+50 is 15 feet, matching the work plan channel width at that location. A transition from 150 ft to 200 ft bottom width will be provided between Sta 741+50 and STA 744+00. No lining is planned in this transition.

Extensive compacted earth lining will be required in Reach 3. A thickness of three feet will be used. This is consistent with the lining used in Reach 1 and Reach 2. The actual extent required will have to be verified during construction. The estimated extent, as determined from the geologic correlations and channel stability analysis, is 3150 feet of lining on side slopes only, 7400 feet on channel bottom only, and 4450 feet on both side slopes and bottom: a total of 15,000 feet requiring some lining.

The drop structure drop (F) has been increased from 4.0 feet to 5.5 feet and the weir length increased from 110 feet to 120 feet to meet hydraulic proportioning requirements.

Design Objective:

The floodway design objective is to safely and economically convey flood flows from the project area, thereby reducing flood water and sediment damage on irrigated cropland, rangeland, and urban land and the cultural features on these lands.

Basis for Design:

WORK PLAN
DESIGN REPORTS 1 AND 2
NEM
NHCP
NEH 5, 6 AND 11
TR 25, 63
DN #15, 19.
"SEDIMINTATION ENGINEERING," ASCE M&R No. 54
"DESIGN OF SEDIMENTATION BASINS," U.S. Transportation Research Board, June 1980

Location and Layout:

Channel - The channel alignment parallels and adjoins on the east the RWCD Irrigation Canal throughout Reach 3. This alignment follows an existing drainageway. The alignment was selected in planning and was retained, with minor changes in design.

Sediment Basin and Junction with Queen Creek - Two alternate alignments for the Queen Creek Channel were proposed in the pre-design phase by the state design staff. The "cutoff alignment" would include construction of a channel approximately 2,000 feet westerly from the bridge over Queen Creek at Higley Road to the RWCD Floodway. There is a total drop in elevation of approximately 18 feet from the Queen Creek invert at the Higley Road Bridge to the RWCD Floodway invert at Sta 757+44.

The other alternative studied was to retain the existing Queen Creek alignment and enter the floodway near the existing junction.

The latter was chosen. It provides entry of flood flows from Queen Creek, with minimum jeopardy to the RWCD Floodway, at least initial cost. The need for an additional major drop structure with the "cutoff" alignment is the significant cost difference between the two alternates. No detailed cost analysis was needed for the selection.

HYDROLOGY: Design flows were obtained from the final Williams-Chandler Watershed Supplemental Watershed Plan No. 2 (June 1978) and work titled "Hydrology Studies" by R. M. Bartels and R. P. McArthur (November 1976), and "Update of Hydrology Studies" by R. P. McArthur (May 1977).

Design flows (100 yr) in the floodway are 6900 cfs from Sta 740+00 to Sta 842+35 and 8100 cfs from Sta 842+35 to Sta 977+25. These values are predicated on installation of structures within the lower Queen Creek Watershed to provide 100 yr level of control. The Supplemental Watershed plan notes that until 100 yr protection is provided on Queen Creek the RWCD Floodway downstream of the confluence with Queen Creek will experience flows exceeding planned capacity once every 30 years on average.

Since publication of the work plan supplement the USBR has constructed Sonoqui Dike on Queen Creek as part of the Central Arizona Project. The primary purpose of the dike is for protection of the Salt-Gila Aqueduct. This dike parallels the upstream (East) side of the Salt-Gila Aqueduct on an alignment approximately the same as for a proposed Queen Creek F.R.S.

A design value for flow in the Lower Queen Creek Channel was obtained by approximating the effect of the Sonoqui Dike. The Dike will contain the 100-yr runoff, according to approximate calculations. Maximum discharge to Queen Creek through the 4-barrel, 72-inch diameter, conduit outlet was computed at 1400 cfs. Peak discharge in Queen Creek at the RWCD floodway from the area below the dike is approximately 1900 cfs (p. 419 of "Hydrology Studies"). The combined 3300 cfs was used for design of the sediment basin and associated structures. This flow is considerably lower than the 8200 cfs value obtained without considering the effect of the Sonoqui Dike (from "Revised Hydrology Studies") and yet is a conservative value given current conditions.

Hydraulic Design: As noted above, the floodway section is trapezoidal with 3:1 side slopes and 200 ft bottom width throughout Reach 3, transitioning at the upstream end (Sta 741+50) to a 150 ft bottom width. The work plan called for a 250 ft. bottom width from Sta 767+25 to the lower end of Reach 3 at Sta 977+25 and beyond to Sta 1124+97 in Reach 2. The channel was reduced to a 200 ft bottom width in Reach 2. A 200 ft. bottom width was also selected for Reach 3 as meeting constraints of cost, flow depth and channel stability. ~~The~~ The work plan called for a 150 ft. bottom width channel from STA 740+00 to Sta 765+00. Again, a 200 ft bottom width chnnel was selected in design.

Hydraulic proportioning of the Straight Drop Structure at Sta 857+00, in accordance with the model study data of St. Anthony Falls TP No. 15 "Straight Drop Spillway Stilling Basin" and NEH Section 11, "Drop Spillways" requires, that h/F be a maximum of 1.43. The drop (F) of 5.5 ft and weir length (L) of 120 ft. provide an h/F of 1.45. The work plan F=4.0 and L=110 leads to an h/F>2.0. The weir crest was raised to EL 1296.22 and the upstream channel grade was modified to 0.0003 ft/ft from the crest at Sta 857+00 to the temporary transition at Sta 741+50. Economy is obtained with the higher invert elevation and reduced channel excavation required.

Channel stability was assessed by tractive power procedures in accordance with TR-25. This is as was done in design of Reaches 1 and 2. Soils encountered in the geologic investigation were categorized into 27 stratigraphic units. During planning these units were aggregated into 15 groups (A through O) for stability analysis.

Soil groups found in Reach 3 are C, G, I, J, M, and K. All testing data, including that for samples taken outside Reach 3, were assessed and a representative unconfined compressive strength was determined for each of the above groups. Soils in groups G and K were determined to have insufficient resistance to the actual tractive power for reasonable channel sections with the design flows. Soils in these groups found in Reach 3 are of units 15, 20, 24 and 23. The extent of these units were noted on the geologic plan and profile sheets. The areas where these soils occur within 2 ft below the proposed channel invert or in a 1 foot or thicker layer within 7 feet above the floodway invert were delineated. A 3 foot compacted earth lining of fine grained material will be required on the invert and side slopes in these respective areas. The actual extent of lining required will need to be verified by the Project Engineer and staff during construction and adjusted as necessary.

Hydraulic design of the side drain inlets will be carried out in the final design phase. Cross slope away from the floodway centerline will be provided to reduce rilling of the channel side slopes. Side inlet drains will be required on the west side of the west maintenance berm to carry surface runoff into the floodway.

Sediment Basin - The quantity of sediment delivered to the RWCD Floodway during a 100 year event is 18,865 tons as indicated in "Bedload Transport Analysis" (April 17, 1975), for RWCD Floodway. This is equivalent to 10.2 acre-feet (with a density of 85pcf). The work plan notes that sediment from large contributing areas will be deposited in the floodway or a contributing drainageway. The basin in this case is designed in accordance with procedures

and principles found in ASCS M&R No. 54 and USTRB "Design of Sediment Basins" to retain over 95% of the bedload transported to the 100 year event. Removal of sediment will be required following large events or accumulation due to successive smaller events to maintain design capacity.

Three alternate sediment basin outlet structures were considered: 1. trapezoidal side weir to the floodway; 2. Type C drop; and 3. straight inlet, chute, and SAF. The side weir configuration was selected as most economical.

Side slopes of 6:1 were selected to provide vehicle access across the spillway. The weir crest elevation and weir length were selected such that backwater at design flow will not submerge the inlet channel and that adequate storage is provided between the weir crest and the basin invert. The basin invert is at EL 1297.7, allowing drainage to the floodway.

The sediment basin inlet channel includes a grouted rock drop to the basin invert (F=4.3 feet), a trapezoidal earth chnnel with 3:1 sideslopes and 40 foot bottom width. The upstream end will match the existing Queen Creek Channel at Sta 20+00. The outlet is constricted to a 30 foot bottom width to provide sufficient backwater effect so that velocity in the lower channel will not be increased over existing conditions.

It should be noted that flow depth in the lower Queen Creek Channel above the area of work under this project will be near bankfull at design flow. Any overbank flow would follow the east side of basin and floodway dikes and enter the RWCD Floodway between the drop at Sta 857+00 and the Chandler Heights Road Bridge. Higher flows could cross Chandler Heights Road and enter the floodway downstream. Work outside this project would be needed to provide capacity with adequate freeboard to carry a flow of 3300 cfs in the lower Queen Creek Channel immediately above Sta 20+00.

Flow through the basin outlet weir enters the RWCD Floodway at a right angle. This configuration was selected as being more economical than a layout which would direct flow more in a downstream direction. The grouted rock apron below the side weir will be recessed 1 foot below the channel invert to promote occurrence of a hydraulic jump and energy dissipation with varying tailwater levels in the RWCD Floodway. Some local scour and deposition adjacent to the rock and grouted rock apron is expected due to eddying and local areas of high and low velocity flow. Extent of riprap protection needed will be determined in final design.

Momentum analysis was used to determine the effect of the side weir flow on depth of flow in the floodway upstream. The controlling case, with flow of 4800 cfs in the floodway upstream of the weir and a flow of 3300 cfs in the side weir results in an upstream depth of 8.5 feet. This depth is 0.1 ft greater than normal depth in the channel upstream. An R/C conduit drain outlet similar to that installed in the Hunt Highway diversion debris basin in the Reach 2 extension will be included in the final design.

Structural Design:

The preliminary structural design of the Type C Drop at Sta 857+00 was made using the TR63 "Structural Design of Straight Drop Spillways" computer program. Parameters used include a moist unit soil weight of 133 pcf, a saturated unit soil weight of 137 pcf, "at-rest" lateral earth pressure coefficient of 0.68, and a passive lateral earth pressure coefficient of 2.5. A factor of safety against flotation of 1.1 was used to obtain a successful run. A positive means of limiting or resisting uplift forces will be addressed in final design.

The decision whether to articulate the structure will be made during final design. The weir length of 120 ft results in a structure at about the maximum size normally used for monolithic construction.

Concrete quantity for the preliminary design, excluding wing or headwalls, is 780 cubic yards.

Recommendations regarding the configuration of straight drop spillways based on Model Investigation of the South Fork Tillatoba Creek Drop were presented in letter from the National Design Unit dated July 1, 1983. These include use of curved inlet wing walls to improve distribution of flow over the structure width by reducing contraction of flow and the omission of outlet wing walls where a rock riprap-lined outlet basin is used. These recommendations were incorporated into this design.

Drawings: Details of maintenance roads, ramps, side inlet drains will be included on separate detail sheets in the final drawings. For economy in drafting while retaining clarity, the floodway centerline is shown on the plan view of the plexod profile sheets without dike layout details. The details and the typical channel sections will appear, as noted above, on separate sheets.

David D. Hockaday
Submitted

Leland M. Sarle
Recommended

Donald E. Walker
Approved

10-6-83
Date

United States
Department of
Agriculture

Soil
Conservation
Service

West National Technical Center
511 N. W. Broadway, Room 514
Portland, Oregon 97209

210-13 Williams Chandler WPPA

Subject: ENG - Schedules - Status of Design,
RWCD, Reach #3, Arizona
Floodway

Date: August 11, 1983

To: Ralph Arrington, State Conservation Engineer,
SCS, Phoenix, Arizona

File Code:

Preliminary design work for the subject job is nearing completion. We intend to forward preliminary drawings to your office by October 1, 1983. We are continuing to schedule completion of final drawings, specifications and material quantities by January 1984.

Paul Monville confirmed that the parcel needed for construction of the sediment basin and junction at Queen Creek is planned for purchase by the district. The preliminary drawings will show all planned structure layouts so that adequacy of land rights can be verified during preliminary design review.

Work remaining to be completed in the final design phase will be final structural design and detailing, final drawings, construction specifications, and material quantities.

JACK C. STEVENSON
Head, Engineering Staff

cc:
Verne Bathurst, State Conservationist,
SCS, Phoenix, Arizona
Donald E. Wallin, Head, Design Unit,
Engineering, WNTC

for DEW

DThackeray:bb

DEW
11/22/82

TO: Lee Saele
JMT
11/22/82

United States Department of Agriculture

Soil Conservation Service

Room 3008-Federal Building
230 North First Avenue
Phoenix, Arizona 85025

Subject: 210-13 Williams Chandler WPP, AZ
RWCD Floodway Reach 3

Date: November 18, 1982

To: Charles Lemon, Director, WNTC

We are transmitting a SCS Form-328, Request for Design Section Services, for the design and preparation of construction drawings and specifications for the subject project. Supplemental Geological Investigation and Soils Mechanics Laboratory Testing data is being prepared and will be transmitted for your use upon completion.

Verne M. Bathurst
State Conservationist

Attachments

cc; Jack Stevenson, Head, Engineering Staff
Don Wallin, Head, Design Section

DUPLICATE

SCS-ENG-328
REV. 3-74

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

REQUEST FOR SERVICES OF DESIGN SECTION

ENGINEERING AND WATERSHED PLANNING UNIT

FROM		DATE: November 18, 1982
STATE: Arizona	COUNTY OR SCD: Maricopa	REQUESTED DELIVERY DATE: January ~~1983~~ 1984
JOB NAME: RWCD Floodway Reach 3		
BUDGET DESIGNATION: WP 08		ESTIMATED CONSTRUCTION COST: $3,000,000

SIGNATURE: Ralph M Arnoglin
(STATE CONSERVATION ENGINEER)

1. LIST OF MATERIAL SUBMITTED

a. 20 - E size Mylar Construction Drawings - in tube ✓

b. 2 - Survey Mylars - in tube ✓

c. 3 - Survey Field Books ✓

d. 1 - Folder with Survey Printouts and Contact Photos - 1 box ✓

e. Hydrology Studies - Bartels 1 box ✓

f. Update of Hydrology Studies - McArthur - 1 box ✓

g. Soil Survey Eastern Maricopa and Northern Pimal Co's - box ✓

h. 5- Blue line sheets 24" x 36" "Right of Way Plans" - Reach Three (in tube) ✓

2. DESCRIPTION OF SERVICES REQUIRED

Design and preparation of construction drawings and specifications for approximately 4 miles of earth channel including a junction structure with the lower Queen Creek Channel a sediment basin and a drop structure.

JOB NUMBER

DATE CHECK PRINTS SENT TO FIELD	DATE CHECK PRINTS RETURNED
DATE FINAL DESIGN COMPLETED	DATE FINAL PRINTS SENT

United States Department of Agriculture

Soil Conservation Service

ENG

Room 3008-Federal Building
230 North First Avenue
Phoenix, Arizona 85025

Subject: 210-13-ENG-Williams-Chandler WPP AZ
RWCD Floodway Reach 3

Date: February 17, 1982

To: Charles Lemon, Director WNTC, Portland, Or.

File Code:

We are sending the following material for the design of the project as agreed between our staff members during a design conference in Phoenix during the week of January 31, 1983.

1. Mailing Tube

   13 sheets blueline ozalid prints of the Lower Queen Creek channel topography
   2 sheets geologic correlation maps
   1 set as-built drawings, Chandler Heights Road Bridge
   1 set as-built drawings, Queen Creek Road Bridge

2. Box

   rec'd 2/24/83 [illegible] 1 set cross section cards

3. Envelope

   received 2/24/83 [illegible]
   1 set construction plans - Lower Queen Creek Emergency Watershed Protection 216 Project, Reaches 1 and 2
   1 set correspondence to date
   1 set exerpts, Lower Queen Creek Geology
   1 RDS User Manual
   1 sheet correlation legend

The following items are not available and will be submitted when received.

1 Sonoqui culvert and overchute design calculations (Salt-Gila Aqueduct Reach 3 - dike)
2. Final spoils location maps.

Dean F. Fisher

Verne M. Bathurst
State Conservationist

Attachments

cc: Jack Stevenson, Head, Engineering Staff, Portland
Donald Wallin, Head, Design Section, Portland

United States
Department of
Agriculture

Soil
Conservation
Service

Room 3008 Federal Building
230 North First Avenue
Phoenix, AZ 85025

Subject: 210-13 Williams Chandler WPP, AZ
RWCD Floodway Reach

Date: June 2, 1983

To: Jack Stevenson, Head, Engineering Staff
WNTC Portland, Oregon

File Code:

We are sending you the following material for your use in the preparation of the final design.

1 copy RWCD Floodway - Channel Right-of-Way and Spoil Disposal Areas - 3 sheets

1 copy RWCD Floodway Right-of-Way Maps for Reaches 3, 4 and 5 showing location of the spoils areas - 9 sheets.

1 copy Soils Logs for Chandler Hts. bridge.

Ralph M. Arrington
State Conservation Engineer

Attachments

cc: Don Wallin

United States Department of Agriculture

Soil Conservation Service

Room 3008 Federal Building
230 North First Avenue
Phoenix, Arizona 85025

LMF Watkins — Send a report to Ralph!

Dave - lets prepare a schedule and send with WSP this wk. 8/2

Subject: 330 OP MGMT- Status Design Phase RWCD #3

Date: July 28, 1983

To: Jack Stevenson, Head, Engineering WNTC Portland

File Code:

We request a status report and current project completion data for the design of RWCD Reach 3, Williams Chandler W.P.P.

Ralph M. Arrington

Ralph M.Arrington
State Conservation Engineer

cc: Verne M. Bathurst, STC

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Dane

SCS-AS-30
7-79

MEMORANDUM OF TELEPHONE CONVERSATION

SUBJECT: RWCD - R 3 DATE: 8/3/83

FROM: SAELE
LOCATION: WNTC

TO: Arlington
LOCATION: Az

Information given:

Schedule:

1. Preliminary design by End of Sept.
2. Final design by Jan. 1, 84.
3. We will send memo confirming

Needed info. for scheduling review time etc.

Land rights at junction of Queen Creek and RWCD (Triangular shaped section).

Ralph is sure that flood control district has purchased.

We will check with Paul Monville before sending letter outlining needs.

Reply or commitment(s) made:

United States
Department of
Agriculture

Soil
Conservation
Service

Room 3008 Federal Building
230 North First Avenue
Phoenix, Arizona 85025

INV 9/20 9/19/83
~~Jim Curtis~~
File

September 15, 1983

Mr. D.E. Sagramoso, P.E.
Chief Engineer & General Manager
Flood Control District of Maricopa County
3335 West Durango Street
Phoenix, Arizona 85009

Dear Dan:

Your letter of July 29, 1983 requested that a determination be made of SCS responsibilities regarding relocation of an irrigation tailwater recovery sump on RWCD Flooday Reach 3.

It is SCS policy, as stated in the National Watershed Manual (NWM), that:

> The alteration, modification, or reconstruction of irrigation facilities made necessary by project works of improvement are Public Law 566 Construction Costs (NWM 501.30). This includes changes of existing telephone, power, gas, water and sewer lines or other utilities required by changes to existing irrigation facilities (NWM 506.45). Also included are the costs of engineering services for the changes to the irrigation facilities.

The following items shown on the revised drawings prepared by Grainer Engineering are Public Law 566 costs:

1. Relocation of the sump.

2. Relocation of the 350 hp pump and associated features (Station 934+54).

3. Relocation of the powerline, poles and transformer that provides power to the 350 hp pump.

4. Relocation of the 75 hp pump and associated features (Station 947+13.9).

5. Relocation of the powerline, poles and transformer that provides power to the 75 hp pump.

The revised drawings show two valves 15 feet left of centerline at Station 963+17 and Station 963+30. Further information is needed as to the purpose of these valves before we can decide if these are irrigation facilities.

Sid Brase has informed us that a meeting with the San Tan Irrigation

September 15,1983

D. E. Sagramoso

District has been scheduled for October 4, 1983. We can discuss specifics about relocation of these facilities at that time. We may also want to discuss whether it would be better to reorganize the irrigation system and eliminate the tailwater sump instead of relocating these facilities.

I hope that this clarifies SCS policy regarding changes to irrigation facilities in Public Law 566 projects. Please call if you have further questions.

Sincerely,

Verne M. Bathurst
State Conservationist

cc: John Weaver, Acting ASTC (WR)
Bill Osterquist, SAO
Ralph Arrington, SCE
Bill Payne, Acting SDE
Joe Knisley,AC,Tucson
Lee Saele, Engineering, WNTC, Portland

COMPUTATION SHEET

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA
PROJECT: RWCD FLOODWAY REACH 3
BY: D. Thadaney
DATE: 5/10/83
CHECKED BY
DATE
JOB NO.
SHEET

PROBLEM: SUMMARIZE DESIGN FLOWS AND ENTRY POINTS

ANALYSIS: 1. FLOW DISTRIBUTIONS FROM "UPDATE OF HYDROLOGY STUDIES RESULTING FROM WRTSC REVIEWS" BY R.P. McARTHUR, MAY 1977, ARE DISCUSSED IN A SECTION TITLED "IMPACT OF FLOOD FLOWS AT THE CONFLUENCE OF QUEEN CREEK - SONOQUI WASH - RWCD FLOODWAY". SOME OBSERVATIONS:

CONTRIBUTIONS FROM QUEEN CREEK - SONOQUI WASH:

FREQUENCY % CHANCE	PORTION ENTERING ABOVE CHANDLER HTS RD BRIDGE	PORTION ENTERING BELOW CHANDLER HTS. RD. BRIDGE
1	5100	3700
2	3950	1700
3.3*	3300	1600
4	3100	1600

* CORRESPONDS TO FLOWS AT WHICH RWCD FILL REACH DESIGN CAPACITY. DESIGN CAPACITY OF RWCD IS BASED ON ASSUMPTION THAT QUEEN CREEK FLOWS ARE CONTROLLED TO THE LEVELS CONTEMPLATED IN WATERSHED STUDIES. THESE INCLUDED AN FRS CONSTRUCTED AT THE LOCATION WHERE THE USBR HAS SINCE CONSTRUCTED THE SONOQUI DIKE.

COMPUTATION SHEET
SCS ENG-523A Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

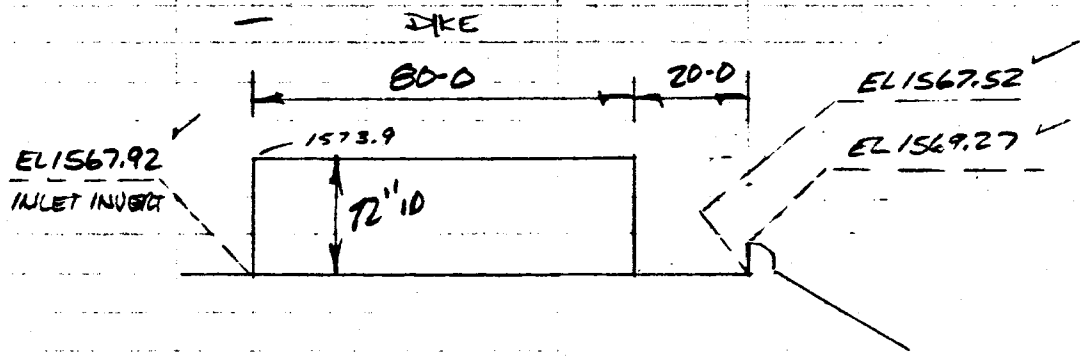
ST. ARIZONA
D. Thackeray DATE 5/17/83
PROJECT ROOD FLOODWAY REACH 3
CHECKED BY [illegible] DATE 5/18/83 JOB NO.
SHEET 1

PROBLEM: MAKE AN ESTIMATE OF THE OUTFLOW FROM THE USBR SONOQUI DIKE AT THE QUEEN CREEK OVERSHOOT.
MAKE AN ESTIMATE OF THE STORAGE CAPACITY AND COMPARE TO THE R.O. VOLUME FOR THE 100 YR EVENT.
DEVELOP A STAGE-DISCHARGE CURVE FOR THE OUTLET STRUCTURE.

ANALYSIS: 1. USE DATA FROM CAP SALT-GILA AQUEDUCT REACH 3 DRAWINGS VOL 2 OF 2.

2. THE OUTLET THROUGH THE DIKE CONSISTS OF 4-72 IN. DIA. CONDUITS. AS BUILT, THESE HAVE ABOUT A 1/4D "EYEBROW" RESTRICTING THE ORIFICE ENTRANCE.

— INLET INVERT IS AT EL 1567.92.



— CHECK ALSO THE OVERSHOOT CAPACITY.

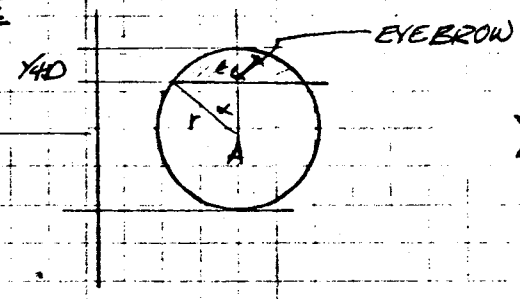
COMPUTATION SHEET

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA
PROJECT: RWCD FLOODWAY REACH 3
BY: D. Thackeray DATE: 5/17/83 CHECKED BY: [illegible] DATE: 5/18 JOB NO
SUBJECT
SHEET 2

1. STAGE DISCHARGE:

ORIFICE:



D = 72" = 6 FT
R = 3 FT.

$A = \frac{\pi D^2}{4}$ − SEGMENT AREA

$= 28.27433 - 5.53$

$A = 22.75 \text{ FT}^2$

$r - r\cos\alpha = e$

$\cos\alpha = \frac{r-e}{r}$

$\alpha = \cos^{-1}\left(\frac{r-e}{r}\right)$

SEGMENT AREA = $r^2\left(\alpha - \frac{\sin 2\alpha}{2}\right)$
α in rad.

FOR R = 3; D = 1.5:

$\alpha = \cos^{-1}(0.5) = 60°$

$SA = 9(1.0472 - 0.43301)$

$SA = 5.53 \text{ FT}^2$

$Q = CA\sqrt{2gh}$, USE $C = 0.60$, $Q = 109.54\,h^{1/2}$

WSEL	H	Q_{1BBL}	Q_{4BBL}
1574	3.08	192	768
1576	5.08	247	988
1578	7.08	291	1164
1580	9.08	330	1320
1582	11.08	365	1460
1584	13.08	396	1584
1585	14.08	411	1644

COMPUTATION SHEET

SCS-ENG-523A Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA | PROJECT RWCD FLOODWAY REACH 3

BY D. THACKERAY | DATE 5/17/83 | CHECKED BY JM | DATE 5/18 | JOB NO.

SUBJECT

SHEET 3

ORIFICE MAY BE SUBMERGED BY TW FROM BAFFLE CHUTE CREST. CHECK SUBMERGENCE AT Q = 1644 CFS =

$$Q = CLH^{3/2}$$

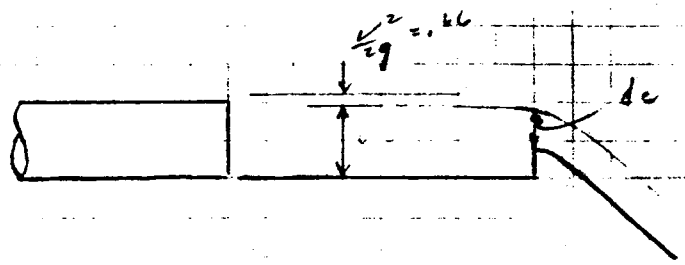
$$H = (Q/CL)^{2/3} = \left(1644/3.1(37.67)\right)^{2/3}$$

$$\underline{H = 5.83 \text{ FT}}$$

$$EL = 5.8 + 1569.27 = 1575.1$$

H THEN FOR ORIFICE:

US EL	H	Q_1	Q_4
1576	0.90	104	416
78	2.90	187	746
80	4.90	242	970
82	6.90	288	1151
84	8.90	327	1307
85	9.90	345	1379



COMPUTATION SHEET

SCS-ENG-501A Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA | PROJECT: RWCD FLOODWAY REACH 3

BY: D. Thackeray | DATE: 5/17/83 | CHECKED BY | DATE | JOB NO.

SUBJECT | SHEET 4 OF

CONDUIT: USE MANNINGS EQN:

$$H = K_e\left(\frac{V_e^2}{2g}\right) + (K_p L + 1)\frac{V_p^2}{2g}$$

$$K_p = \frac{5087 n^2}{d_s^{4/3}}$$

$$= \frac{5087(0.010)^2}{6^{4/3}}$$

$$K_p = 0.04666 \checkmark$$

$$K_e = 0.5$$

$$V_e^2 = \left(\frac{A_p}{A_e}\right)^2 V_p^2$$

$\therefore$

$$K_e\left(\frac{A_p}{A_e}\right)^2 \frac{V_p^2}{2g} = K_e\left(\frac{V_e^2}{2g}\right) \checkmark$$

$A_p = 28.27$

$A_e = 22.75$

$(A_p/A_e)^2 = 1.544 \checkmark$

$$H = \left(1.544(0.5) + 0.04666(80) + 1\right)\frac{V_p^2}{2g}$$

$$= (0.772 + 3.732 + 1)\, V_p^2/64.4 = \frac{5.50}{64.4} V_p^2$$

$$H = 0.08548\, V_p^2 \checkmark = 0.08548\,(Q/A_p)^2 \checkmark$$

$$Q = \left(11.699 H (A_p)^2\right)^{1/2} = 3.42(28.27)^2 H^{1/2} \;?$$

$Q = \cancel{2735}\ 96.7\, H^{1/2}$ < ORIFICE CAPACITY

>> ORIFICE CAPACITY

$Q_{max} \simeq 1360 \pm$

COMPUTATION SHEET
SCS-ENG-523A Rev 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA PROJECT RWCD FLOODWAY REACH 3
BY D. THACKERAY DATE 5/17/83 CHECKED BY JMN DATE 5/18/83 JOB NO.
SUBJECT SHEET 5

CHECK MAX CAP @ OVERSHOOT:

ORIFICE: A = 28.27 FT²

INV. EL: EL 1561.32

DIKE TOP: EL 1575.00

$H = 1575 - (1561.32 + 3) = \underline{10.68}$

$Q = CA\sqrt{2gh}$

$= 0.60(28.27)(64.4(10.68))^{1/2}$

$\underline{Q = 445 \text{ CFS}}/\text{BBL} \times 4 = \underline{1780 \text{ CFS}}$

>> ORIF CONTROL

ACTUAL DIKE EL ≈ 1573.5

THEN $H = 73.5 - (61.3 + 3.0) = 9.2$

$Q = 4(0.6)(28.27)(64.4(9.2))^{1/2} = 1652$ CFS

STILL > DIKE OUTLET CONDUIT Q.

COMPUTATION SHEET
SCS-ENG-5234 Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA | PROJECT RWCD FLOODWAY REACH 3
BY D. MACKERAY | DATE 5/17/83 | CHECKED BY [illegible] | DATE 5/18 | JOB NO.
SUBJECT | SHEET 6

DRAINAGE AREAS

p. 358 OF HYDROL STUDIES

TR20 WATERSHED NUMBER	DRAINAGE AREA
47	15.9
420	4.7
446	16.6
453	3.9
439	7.9
441	9.0
450	6.0
455	13.9
458	8.3
430	2.6
Σ	88.8 MI²

[# 465 CONTRIBUTES AN ADDITIONAL 16.5 MI² GENERALLY BELOW CHANDLER HTS RD]

QUEEN CR @ WHITLOW

HREP P442

DA 144 MI² ✓

Q. CR BETWEEN WHITLOW & SONOQUI

APPROX (FROM SONOQUI DIKE DWGS 344-330-1916)

PLANIM.	0
	0667
	13501
	2027
$\bar{D}$	6.8 IN²

SCALE 1" = 4 MI

1" = 16 MI²

= 108 MI²

TOTAL ABOVE SONOQUI DIKE = 250 MI² ✓

COMPUTATION SHEET
SCS-ENG-220A Rev 9-69

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ARIZONA
PROJECT RWCD FLOODWAY REACH 3
D. Thackeray 5/18/83 CHECKED BY MH DATE 5/18 JOB NO
SUBJECT
SHEET 7 OF

DRAINAGE AREAS

TR20 RUN, SECTION 181, OR P 419 OF THE HYDROLOGY STUDIES SHOWS A PEAK Q OF 1910 CFS CONTRIBUTED BY QUEEN CREEK INCLUDING (SUB AREA #465 OF # 358 OF THE HYDROL. REPORT).

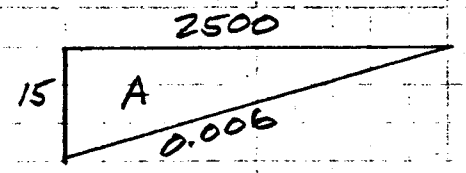
COMPUTATION SHEET
SCS-ENG-523A Rev. 9-69

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA | PROJECT: RUCO FLOODWAY REACH 3
BY: D. Thackeray | DATE: 5/17/83 | CHECKED BY: [illegible] | DATE: 5/23 | JOB NO.
SUBJECT | SHEET 0 OF

ESTIMATE STORAGE VOL BEHIND SONO QUI DIKE:

- AVE NATURAL GROUND ON ℄ DIKE ~ 1570.0
- NO QUAD SHEETS ARE AVAILABLE HERE.
- AVE FALL LINE SLOPE IS LIKELY NO FLATTER THAN 15 FT/2500 FT = 0.006
- LENGTH ≈ 470+00 − 150+00 = 32000 FT
- APPROX. VOL:



$A = 15(2500)/2 = 18{,}750\ ft^2$

$V_{APPROX} = 32{,}000 \times 18750 = 600\ EG\ ft^3$

$= \frac{600\ EG}{43560\ ft^3/A\text{-}F}$

$= 13\,774\ AF$

IF DA = 250 MI²

STORAGE U/A = $\frac{14000\ AF\ (12\text{-}IN/FT)}{250\ MI^2\ (640\ A/MI^2)} = 1.05\ A\text{-}IN$

COMPUTATION SHEET
SCS-ENG-5074 Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA
PROJECT: RWCD FLOODWAY RESEARCH
BY: D. THACKERAY DATE: 5/17/83
CHECKED BY: LMT DATE: 5/23
JOB NO.
SUBJECT
SHEET 9

RO. VOLUME

P584 of Hydrology studies indicates w/o project the 100yr R.O. from Rincon Cr.

— Sonoqui System is the net change in RO to the RWCD Floodway between XSEC 155 AND XSEC 182

SEC	R.O CFS-HRS	AF
182	184,423	
155	63,804	
Δ	120,619	10051 AF

COMPUTATION SHEET
SCS ENG-523A Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA
PROJECT: RWCD FLOODWAY REACH 3
BY: D. Thackery
DATE: 5/17/83
CHECKED BY: [illegible]
DATE: 5/23
JOB NO.
SUBJECT
SHEET 10

100YR R.O. VOLUME

RPM
1/26/76
P570
HYDROL
STUDIES

COMPARE W/ ~~66~~ STRUCTURES

STRUCT	ΔA (MI²)	RCN	STORAGE (IN)	1% 24HR RAIN (IN)	RO (IN)
POWERLINE	49.9	64 75	1.51"	3.2	0.56 1.09
VINEYARD	57.8	64 75	1.33"	3.05	0.49 0.99
RITTENHOUSE	57.3	64 75	1.42	2.85	0.40 0.86

COMPUTATION SHEET
SCS-ENG-5224 Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA
PROJECT: RWCD FLOODWAY REACH 3
BY: D. THACKERAY
DATE: 5/18/83
CHECKED BY: LHK
DATE: 5/23
JOB NO.
SUBJECT
SHEET 4

CONCLUSIONS:

1. THE DECISION TO DESIGN THE RWCD FLOODWAY WITH THE ASSUMPTION THAT THE QUEEN CR. DRAINAGE WILL BE PROTECTED TO 100YR LEVEL WAS MADE DURING PLANNING AND AGREED TO BY ALL PARTIES.

2. THE USBR HAS SINCE CONSTRUCTED THE SONOQUI DIKE ON THE QUEEN CR DRAINAGE AT APPROXIMATELY THE SITE OF A PROPOSED SCS FRS.
   VERY ROUGH CALCULATIONS SHOW THAT FREEBOARD CAPACITY OF THE SONOQUI DIKE IS SLIGHTLY GREATER THAN THE 100YR-24HR RO. FOR THE WATERSHED. THIS DOES NOT INCLUDE ANY STORAGE AT THE DAM NEAR WHITION RANCH (ON Q. CR. ABOVE SONOQUI DIKE).

3. THE 4-72" CULVERT OUTLETS AT THE SONOQUI DIKE DISCHARGE APPROXIMATELY 1400 CFS INTO QUEEN CR WITH WATER LEVEL AT EL 1565 (TOP OF SONOQUI DIKE).

4. THE ROUTED MAX Q IN Q. CR. AT THE RWCD FLOODWAY FOR THE AREA BETWEEN THE SONOQUI DIKE AND THE RWCD FLOODWAY IS 910 CFS.

5. A PEAK FLOW OF 3300 CFS IN QUEEN CR IS THE UPPER LIMIT FOR DESIGN OF ITS JUNCTION WITH THE RWCD FLOODWAY.

With an SCS project on Queen Creek the protection would be 100 yr. without an SCS project the protection aspect was 33 yr.
LHK

ARIZONA RIVER REACH III

D. Thackeray 4/18/83

CHANNEL STABILITY ANALYSIS

SHEET 1 8

PROBLEM: MAKE A PRELIMINARY CHECK OF CHANNEL STABILITY USING TRACTIVE STRESS PROCEDURES

ANALYSIS: 1. USE Q = 8700 CFS (, 8100 & 6900)

2. USE B = 200; Z = 3; S = 0.0003

3. COMPUTE MAX. TRACTIVE POWER USING TR-25.

4. COMPUTE ALLOWABLE TRACTIVE POWER (S-LINE VALUES) USING FIG 6-15, P 6-32, TR-25 FOR THE SOIL TEST VALUES (UNCONFINED COMPRESSIVE STRENGTH) OBTAINED FOR REACH III. CHECK ALSO FOR WORK DONE ON REACHES I & II.

5. CORRELATE TEST VALUES AND ALLOWABLE TRACTIVE POWER TO THE STRATIGRAPHIC UNITS IDENTIFIED IN THE REACH III GEOL. REPORT.

ARIZONA RWCO REACH 3

D. Thackeray 4/21/83

CHANNEL STABILITY ANALYSIS

PROBLEM: NEED TO COMPUTE REF. TRACTIVE STRESS.

ANALYSIS: 1. EQUATIONS:

(P. 6-18, EQ. 6-9) $\tau = \gamma_w R_t S_e$

2. PROCEDURE:

(P. 6-28)

a. Determine S_e & V

b. Find ρ & ν, given Temp (Fig. 6-11)

c. Compute $\nu^3/g\nu S_e$

d. Compute $V/(gR_s S_e)^{1/2}$

e. Find $V/\sqrt{\tau/\rho}$, given values from ⓒ & ⓓ

f. Find τ, given $V/\sqrt{\tau/\rho}$, V and ρ

$$\tau = \frac{V^2\rho}{(V/\sqrt{\tau/\rho})^2}$$

g. USING FIG 6-12 AND FIG 6-13 DETERMINE τ_B AND τ_S GIVEN D/d.

P 6-24

$k_s = d_{65}$ ft.

STATE ARIZONA PROJECT RINCO REACH 3
BY D. Thackeray DATE 5/4/83 CHECKED BY DATE JOB NO.
CHANNEL STABILITY ANALYSIS SHEET 3 8

REFERENCE TRACTIVE FORCE: $D_{65} = 0.1\,mm$
$= 0.0039\,in$
$= 0.000328\,ft$

USE SAME PARAM. AS ABOVE!

$$\frac{V^2}{g k_s S_o} = 5.97 \times 10^8$$

$$\frac{V}{\sqrt{g k_s S_o}} = \frac{3.86}{\sqrt{32.16(0.000328)(0.0002)}} = 2170$$

$$V/\sqrt{\tau/\rho} = 24$$

$$\tau = \frac{V^2 \rho}{(V/\sqrt{\tau/\rho})^2} = \frac{3.86^2(1.935)}{24^2} = \underline{0.050\ psf}$$

— $b/y = 200/9.2 \approx 22$, beyond the range of fig. 6-13 and 6-12 of TR-25.

— use values for max $b/d (\approx 8)$; $z = 3$:

$\tau_s/\tau = 1.15$, $\underline{\tau_s = 0.058\ psf}$

$\tau_b/\tau = 1.3$, $\underline{\tau_b = 0.065\ psf}$

TRACTIVE POWER

$$\tau_b V = 0.065(3.86) = 0.25\ lb/ft \cdot sec^2$$

CHECK ALLOWABLE TRACTIVE STRESS FOR THE COARSE GRAINED SOILS:

THESE ARE GROUP K (UNIT 20, 22, 23):

TEST VALUES:

STA	UNIT	D_{75}	D_{25}
889+25	22	15 mm	0.59 in
827+00	23	16 mm	0.63 in

ALLOWABLE TRACTIVE STRESS PER P.6-18, TR-25:
USE $D_{25} = 0.5$ in

$\tau_{lb} = 0.4(D_{25}) = 0.4(0.5) = \underline{0.20 \text{ psf}}$

$\tau_{lb} = 0.4 K D_{25} = 0.4(0.78)(0.5) = \underline{0.16 \text{ psf}}$

(Fig 6-8, $\phi_{RT} = 30°$, $K = 0.78$)

TR25 P6-12

APPROXIMATE ACTUAL TRACTIVE STRESS

FOR: $D_{75} = 0.75$ in $d = 9.2$ ft
$n = 0.027$
$S_e = 0.0003$

FIND $n_t = \dfrac{D_{75}^{1/6}}{39} = \dfrac{(0.75)^{1/6}}{39} = 0.95$

$S_t = \left(\dfrac{n_t}{n}\right)^2 S_e = \left(\dfrac{0.95}{0.027}\right)^2 (0.0003) = 0.37$

$\tau_{oo} = \gamma_w d S_t = 62.4(9.2)(0.37) = 212$ psf

FIG 6-3, 6-4

$\tau_b/\tau_o \simeq 1.0$; $\tau_s/\tau_{oo} \simeq 0.8$

$\underline{\tau_b = 212 \text{ psf} ; \tau_s = 170 \text{ psf}} >> \tau_{all}$

ACTUAL TRACTIVE STRESS:

AS A PRELIMINARY ESTIMATE DETERMINE ACTUAL TRACTIVE STRESS FOR:

$T = 75°F$ USE $k_s = 0.02$ in
$b = 200$
$z = 3$
$Q = 8100$
$S_e = S = 0.0003$
$n = 0.027$

By Manning's EQN: $d_n = 9.2$ FT $b/d = 21.7$
$V = 3.86$ FT/S $A = 2094$; $P = 258$; $R = 8.1$

Fig 6-11, p 6-24:
$\nu = 1.0 \times 10^{-5}$ ft/sec
$\rho = 1.935$ lb $\cdot \left(\frac{sec}{ft^2}\right)^2$

$$\frac{V^3}{g\nu S_e} = \frac{3.86^3}{32.16(1.0\times10^{-5})(0.0003)} = 5.97\times10^8$$

$$\frac{V}{\sqrt{g k_s S_e}} = \frac{3.86}{\sqrt{32.16(0.02/12)(0.0003)}} = 962.60$$

FIG 6-9, p.6-22:

$V/\sqrt{\tau/\rho} = 25.2$

$$\tau = \frac{V^2\rho}{(V/\sqrt{\tau/\rho})^2} = \frac{3.86^2(1.935)}{(25.2)^2} = \underline{0.045}$$

CHECK RESULTS:

EQN 6-10 $$\frac{V}{\sqrt{g R_t S_e}} = 5.75 \log\left(12.27 \frac{R_t x}{R_s}\right)$$

$$R_t = \frac{\tau}{\gamma_w S_e} = \frac{0.045}{62.4(0.0003)} = 2.4$$

$$\frac{V}{\sqrt{g R_t S_e}} = \frac{3.86}{\sqrt{62.4(2.4)(0.0003)}} = 18.21$$

$$\sigma = \frac{11.6 \nu}{\sqrt{g R_t S_e}} = \frac{11.6(10^{-5})}{\sqrt{32.16(2.4)(0.0003)}} = 7.623 \times 10^{-4}$$

$$R_s/\sigma = \frac{0.02/12}{7.623 \times 10^{-4}} = 2.186$$

FIG 4 TP1026 FIND $x = 1.4$

$$5.75 \log\left(12.27 \frac{R_t(x)}{R_s}\right) = 5.75 \log\left(\frac{12.27(2.4)(1.4)}{0.02/12}\right)$$

$$= 25.2$$

COMPUTATION SHEET

ARIZONA — ROAD REACH 3

D. Maderey — 5/6/83 — CHECKED BY — DATE — JOB NO.

ALLOWABLE TRACTIVE STRESS — SHEET 7 8

CHECK ALLOWABLE TRACTIVE STRESS FOR $D_{50} = 0.1$ MM:

– (THIS CONSERVATIVELY INCLUDES ALL FINE GRAINED SOILS FOUND IN THE INVESTIGATION)

FOR LOW CONTENT FINE SED (1000-2000 PPM)

FIND $\tau_{cr} = 0.05$ PSF.

CHANNEL STABILITY

1962 HYDRAULICS SEMINAR, PORTLAND

"BOREL PRACTICE", R.H. BOITE,

- RULE OF THUMB TRACTIVE FORCE WDS = 0.7 PSF STORM FLOW ON DRY BED CH. FINE GR. SOIL
  - WDS = 0.2 PSF SMALL CONTINUOUS FLOW OCC. LGE FLOW
  - WDS = 0.075 PSF FOR CONTINUOUSLY WET CHANNELS SUCH AS IRRIGATION CANALS.

CHOW, "OPEN CHANNEL HYDRAULICS"

- USER DATA RELATING VOIDS RATIO TO ALLOWABLE TRACTIVE STRESS FOR COHESIVE SOILS P. 174 FIG 7-11
- PI MAY BE USED AS A ROUGH INDEX OF SCOUR RESISTANCE WITH PI = 7 BEING TAKEN AS A CRITICAL VALUE, WITH SCOUR OCCURING FOR MODERATE STRESSES BELOW THIS VALUE.

STABLE EARTH CHANNELS, COURSE REF., SCS 1979

- $\tau_c = 0.0024(PI)^{0.84}$ [SHERRON & BEASLEY FIG 15a, p III-27]
- SEE FIG 12 p III-22

LAB TEST DATA PER SUMMARY FROM SMC 8/16/82

STATION	LAB#	FIELD #	LOCATION	DEPTH	LL	PI	U.C.	STRENGTH	STRATIG	CORREL	MISC ~~[illegible]~~ MM	γ_d g/cc	γ_d pcf
											d60 d65 d75		
880+50	BZN 1044	2440	180'RT? UND.	8'	NP		SM	360	17?		0.6 1.0 1.5	161	100.5
806+00	1045	2443.1	140'RT? UND.	4	23	3	ML	170	24		0.05 0.055 0.065	1.31	81.7
	1046	2443.2	UND.	6	NP		ML	1640	24?		0.06 0.08 0.11	1.40	87.4
	1047	2443.3	UND.	6	23	-	ML	1570	24?		0.05 0.07 0.09	1.34	83.6
750+00	1048	2447.1	100'RT UND	4	23	7	SC-SM	1050	25/27		0.09 0.15 0.2	1.59	99.2
	1049	2447.2	UND.	5	21	4	SC-SM	1050	27		0.09 0.14 0.19	1.63	101.7
902+00	1050	2484.1	120'RT UND	4.5	25	5	CL-ML	850	17		0.06 0.09 0.20	1.46	91.1
	1051	2484.2		4.5	29	10	CL	410	17		0.06 0.10 0.30	1.47	91.7

[FIELD CLASS SC]

RUSCO RETHALS
AREA OF 4/83
SOIL TESTING
DATA SUMMARY
SH 1/5

STATION	LAB#	FIELD #	LOCATION	DEPTH	LL	PI	U.C.	STRENGTH	STRATIG	CORREL	~~ALLOW~~ MISC
1011+00	740038	1	D_{50} D_{60} D_{15} 0.085, 0.18, 0.25 SAMPLE UND	6-7	22	6	SC-SM	43			DISP γ_d = 99.8
1011+00	740039	2	0.25, 0.51, 1.0 UND	6-6.7	30	13	SC	92	2		DISP γ_d = 96.2
1280+00	740040	2408.1	0.044 0.075 0.04 UND	8-8.2	36	12	CL-ML	122	3?		γ_d = 80.7
1280+00	740041	2408.2	<< 0.005 DIST	11-12	67	39	CH		7		
1050+00	740042	2417.1	0.15, 0.30, 0.55 UND	3-3.7	NP		SM-1	122	14		γ_d = 106.6
1050+00	740043	2417.2	0.09, 0.18, 0.35 UND	12-12.7	26	9	SC		14		γ_d = 113
1245+00	740044	2422.2	0.005 0.022 0.005 UND	4-4.2	45	26	CL-2		2		
1400+00	740045	2432.1	0.03 0.06 1.0 UND	4-4.2	37	20	CL-2	202	2		γ_d = 81.6
964+20	740046	2434.1	0.18 0.35 0.7 UND	5-5.7	25	8	SC	454	14		γ_d = 109.6
964+20	740047	2434.2	0.02 0.045 0.8 DIST	8-9	26	10	SC		17		γ_d = 101.2
945+20	740048	2436.1	0.05 1.1 1.6 UND	3-3.7	28	10	CL-1		17		
889+25	740049	2439.1	0.7 3.5 15.0 DIST	14-15	NP		SM-1		22		

KNUCO REPORTS
AREA OT 4/83
SH 2/5

STATION	LAB #	FIELD #	LOCATION	DEPTH	LL	PI	U.C.	STRENGTH	STRATIG	CORREL	~~ALLOW~~ MISC
827+00	740050	2442.1	D50 D65 D15 SAMPLE 2.5 8.0 16.0 DIST	7-10	NP				23		
716+25	740051	2444A.1	0.02 0.03 0.04 UND	6-6.7	29	7	a-ML	57	24'		γ_d=75.9
708+75	740052	2450.1	0.16 0.25 0.40 UND	2-2.7	34	16	SC	544	30'		γ_d=99.5
708+75	740053	2450 A1	0.025 0.04 0.06 UND	2-2.7	27	8	a-1	0	28		γ_d=85.2
695+00	740054	2451.1	0.04 0.065 1.1 DIST	3-6	29	11	a-1		?		
695+00	740055	2451.2	0.05 0.075 1.1 DIST	7.5-9	NP		ML		30?		
695+00	740056	2451.3	1.5 8.0 15.0 DIST	11.5-13	NP		GM		29?		
651+00	740057	2454A.1	0.007 0.03 0.072 DIST	2-3	40	17	a-2		27?		
723+00	740058	2456A.1	0.02 0.048 0.08 UND	3.5-3.7	26	9	a-1	792	29?		γ_d=102.7
623+00	740059	2456.2	0.007 0.03 0.05 UND	5-5.7	46	21	a-2		27?		
609+00	740060	2457.1	0.02 0.035 0.06 UND	5-5.2	28	5	ML	159	31		γ_d=88.7
609+00	740061	2457.2	0.03 0.05 0.08 UND	7.5-7.7	29	11	a-1	129	31?		γ_d=91.2

PACIFIC BEACH
PAGE 2 OF 4 & 3
SH 3/5

STATION	LAB #	FIELD #	LOCATION	DEPTH	LL	PI	U.C.	STRENGTH	STRATIG	CORREL	~~ALLOW~~ MISC.	
584+25	740062	2458.1	D50 D65 D75 0.35 1.0 1.5 UND	2-2.7	28	3	SM-1		27			γ_d = 93.7
560+25	740063	2460.1	0.02 0.04 0.07 DIST	1-2	26	10	CL-1		31?			
560+25	740064	2460.2	0.065 0.08 1.5 DIST	6-7	NP		ML		32?			
560+25	740065	2460.3	0.9 1.8 3.0 DIST	7-10	NP		SM-1		32?			
547+00	740066	2461.1	2.1 6.0 11.0 DIST.	13-17	NP				33?			
534+50	740067	2462.1	0.07 0.13 0.20 UND	5-5.7	28	10	CL-1		31/32?			γ_d 102.9
520+00	740068	2463.1	0.04 0.09 0.14 DIST	6-9	35	17	CL-2	820 psf	33			γ_d 101.9 (107.3 MAX)

KNOLL REACH 3
PREP DT 4/83
SH 4/5

STATION	LAB#	FIELD #	LOCATION OTHER	DEPTH	LL	PI	U.C.	STRENGTH	STRATIG	CORREL	MISC ~~[illegible]~~	Yd
1452+00	730502	402.1	D_{50} D_{85} D_{95} mm 0.017;0.030;0.097 UNDIST.	4-5'	33	9	ML	DS 280 psf	1			89.6 pcf
1330+00	730510	2404.1	0.009;0.029;0.057 UNDIST.	2-6'	29	9	CL-1	DS 720	2			101.9
1330+00	730511	2404.2	0.0051;0.011;0.0175 UNDIST.	4-5	47	16	ML	DS 396	2			86
1330+00	730512	2404.3	UNDIST.	3-9	37	7	ML	DS 288	— 2/3			86.5
1202+00	730513	2410.1	UNDIST.	10-12	NP		ML	DS 288	— 2			86.2
1117+21	730514	2413.1	0.14 0.5 1.0 DIST	13-15	37	10	SM-2	UNCONF. COMP. 331	— 14✓			108.9 remolded DLSBA
1226+00	730521	2420.3	0.44;1.5;2.0	2-6	31	9	SC	(35C)	2			121.8 "
1416+00	730528	2431.1	UND	6-8	81	41	MH	TRIAXIAL 863	—			85.8
1400+00	740045	—	0.03;0.06;0.1 UND.	4-4.2		20	CL-2	202	2			—

RNCC REACH 3 — ARIZ OT 4/83
SH 5/5

COMPUTATION SHEET

SCS-ENG-121 Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA
PROJECT: RWCD REACH 3
BY: D.T.
DATE: 5/9/83
CHECKED BY
DATE
JOB NO.
SUBJECT: CHANNEL HYDRAULICS FOR STABILITY ANALYSIS
SHEET 1 of 5

HYDRAULICS:

b	250.00	
z	3.00	***
n	.027	
s	.0003	
Q	8100.00	
d	8.13	***
A	2231.20	***
V	3.63	***
d	9.00	
Q	9628.73	***
A	2493.00	***
V	3.86	***
Q	11527.18	***
d	10.00	
A	2800.00	***
V	4.12	***
d	11.00	
Q	13571.80	***
A	3113.00	***
V	4.36	***
d	12.00	
Q	15760.76	***
A	3432.00	***
V	4.59	***

b=	250.00	***
d=	8.13	***
A	2230.79	***
P	301.42	***
R=	7.40	***
d=	5.00	***
	2493.00	***
	306.92	***
R=	8.12	***
d=	10.00	***
	2800.00	***
	313.25	***
R=	8.94	***
d=	11.00	***
	3113.00	***
	319.57	***
R=	9.74	***
d=	12.00	***
	3432.00	***
	325.89	***
R=	10.53	***

COMPUTATION SHEET

SCS ENG-223A Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA | PROJECT: RWCD FLOODWAY RENCH 3

BY: D.T. | DATE: 5/9/83 | CHECKED BY | DATE | JOB NO.

SUBJECT: CHANNEL HYDRAULICS FOR STABILITY ANALYSIS | SHEET 2 | 5

HYDRAULICS:

b = 250
s = 0.00021

d	7.40	***
A	2014.28	***
P	296.80	***
R	6.79	***
d	8.00	***
A	2192.00	***
P	300.60	***
R	7.29	***
d	9.00	***
A	2493.00	***
P	306.92	***
R	8.12	***
d	10.00	***
A	2800.00	***
P	313.25	***
R	8.94	***

b = 250
S = 0.0002

Q	6900.00	
DEPTH	250.00	
	3.00	
	.027	
S	~~.00021~~ 0.0003	
d	7.40	***
A	2014.03	***
V	3.43	***
d	8.00	
Q	7878.83	***
A	2192.00	***
V	3.59	***
d	9.00	
Q	9628.73	***
A	2493.00	***
V	3.86	***
d	10.00	
Q	11527.18	***
A	2800.00	***
V	4.12	***

COMPUTATION SHEET

SCS-ENG-5224 Rev 9-69

U S DEPARTMENT OF A

SOIL CONSERVATION SE

STATE ARIZONA | PROJECT RWCD FLOODWAY REACH 3

BY D.T. | DATE 5/9/83 | CHECKED BY | DATE | JOB NO

SUBJECT CHANNEL HYDRAULICS FOR STABILITY ANALYSIS | SHEET 3 OF 5

HYDRAULICS:

b=	200.00	
z	3.00	
n	.027	
S	~~[illegible]~~ 0.0003	
Q	6900.00	
d	8.39	***
A	1889.68	***
V	3.65	***
d	9.00	
Q	7779.72	***
A	2043.00	***
V	3.81	***
d	10.00	
Q	9325.86	***
A	2300.00	***
V	4.05	***

b	200.00	***
d	8.39	***
A	1889.18	***
P	253.06	***
R	7.47	***
d	9.00	***
A	2043.00	***
P	256.92	***
R	7.95	***
d	10.00	***
A	2300.00	***
P	263.25	***
R	8.74	***

COMPUTATION SHEET

SCS-ENG-503 Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA | PROJECT: RANCO REACH 3

BY: D.T. | DATE: 5/9/03 | CHECKED BY | DATE | JOB NO

SUBJECT: CHANNEL HYDRAULICS FOR STABILITY ANALYSIS | SHEET 4 5

HYDRAULICS:

b	200.00	
z	3.00	
n	.027	
S	.0003	
Q	8100.00	
d	9.21	***
A	2097.52	***
V	3.86	***
d	10.00	
Q	9325.86	***
A	2300.00	***
V	4.05	***
d	11.00	
Q	10994.69	***
A	2563.00	***
V	4.29	***
d	12.00	
Q	12785.26	***
A	2832.00	***
V	4.51	***

b	200.00	***
d	9.21	***
A	2096.47	***
P	258.25	***
R	8.12	***
d	10.00	***
A	2300.00	***
P	263.25	***
R	8.74	***
d	11.00	***
A	2563.00	***
P	269.57	***
R	9.51	***
d	12.00	***
A	2832.00	***
P	275.89	***
R	10.26	***

COMPUTATION SHEET

SCS-ENG-234 Rev. 9-69

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA | PROJECT: RWCD FLOODWAY REACH 3

BY: D. Mackey | DATE: 5/10/83 | CHECKED BY | DATE | JOB NO

CHANNEL HYDRAULICS FOR STABILITY ANALYSIS | SHEET 5 5

b=250
S= 0.00021

```
     3.00000
   250.00000  ***
     0.02700  ***
     0.00021  ***

  6900.00000

     8.21782  ***

  2257.05270  ***
        3.06  ***

        9.00
     8055.98  ***
        3.23  ***

       10.00
     9644.33  ***
        3.44  ***

    11354.99  ***
       11.00
        3.65  ***

       12.00
    13186.40  ***
        3.84  ***
```

b=200
S=0.00021

```
     0.00021  ***
     0.02700  ***
   200.00000  ***
     3.00000  ***
Q=6900
λ    9.31108  ***
A 2122.30450  ***
V    3.25118  ***

d   10.00000  ***
Q 7602.57316  ***
V    3.39242  ***

d   11.00000
Q 9198.81758  ***
V    3.58908  ***

d   12.00000
Q 10696.91882  ***
V    3.77716  ***

d   13.00000
Q 12296.35850  ***
V    3.95763  ***
```

COMPUTATION SHEET

SCS ENG-ECS-A Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA PROJECT: RWCD FLOODWAY REACH 3

BY: D.T. DATE: 5/26/83 CHECKED BY DATE JOB NO.

SUBJECT: CHANNEL HYDRAULICS FOR STABILITY ANALYSIS SHEET 1 1

Q = 6900
n = 0.027
z = 3

s	b	d	V
0.00021	150	10.86	3.48
	200	9.31	3.25
0.0003	150	9.81	3.92
	200	8.39	3.65
0.0005	150	8.47	4.64
	200	7.23	4.31
0.0007	150	7.69	5.19
	200	6.55	4.80
0.00097	150	6.99	5.77
	200	5.95	5.32

ARIZONA
D. Thackeray 4/21/83

RUCD REACH 3

CHANNEL STABILITY
TRACTIVE STRESS/POWER
SUMMARY
SH 1/5

$T = 75°F$, $\nu = 1.0 \times 10^{-5}$ ft²/s, $\rho = 1.935$
$k_s = 0.000328$ ft (0.1mm)

* τ_b/τ for $\frac{b}{d} = 8$, MAX VALUE SHOWN ON FIG 6-13 OF TR-25

STATION	Q	d	V	S_e	V^3/gVS_e	$V/(gk_sS_e)^{1/2}$	$V/\sqrt{\tau/\rho}$	τ	b/d	τ_b/τ *	τ_s/τ	τ_b	τ_s	$\tau_b V$
b=250	8100	8.13	3.63	0.0003	4.96E8	2.04E3	28.1	0.033	30.8	1.3	1.15	0.043		0.156
	9629	9.00	3.86	0.0003	5.96	2.17	28.4	0.036	27.8			0.047		0.181
	11527	10.00	4.12	0.0003	7.25	2.32	28.8	0.041	25.0			0.053		0.220
	13571	11.00	4.36	0.0003	8.59	2.45	29.1	0.045	22.7			0.059		0.255
	15761	12.00	4.59	0.0003	1.00E9	2.58	29.3	0.049	20.8			0.064		0.292
b=200	8100	9.21	3.86	0.0003	5.96E8	2.17E3	28.4	0.036	21.7			0.047		0.181
	9326	10.00	4.05	0.0003	6.89	2.28	28.7	0.040	20.0			0.052		0.211
	10995	11.00	4.29	0.0003	8.18	2.41	29.1	0.044	18.2			0.057		0.245
	12785	12.00	4.51	0.0003	9.51	2.54	29.3	0.048	16.7			0.062		0.281
b=250	6900	7.40	3.43	0.0003	4.18E8	1930	27.7	0.030	33.8			0.039		0.132
	7879	8.00	3.59	0.0003	4.80E8	2020	28.0	0.032	31.3			0.041		0.148
	9629	9.00	3.86	0.0003	5.96E8	2170	28.3	0.036	27.8			0.047		0.181
	11527	10.00	4.12	0.0003	7.25E8	2320	28.8	0.040	25.0			0.051		0.212
b=200	6900	8.39	3.65	0.0003	5.04E8	2050	28.2	0.032	23.8			0.042		0.154
	7790	9.00	3.81	0.0003	5.73	2140	28.3	0.035	22.2			0.046		0.174
	9325	10.00	4.05	0.0003	6.89	2280	28.7	0.039	20.0			0.0501		0.203

ARIZONA
D. Williams
4/21/83
RWCD REACH 3
CHANNEL STABILITY
TRACTIVE STRESS/POWER
SUMMARY
SH 2/5

$T = 75°F$, $\nu = 1.0 \times 10^{-5}$ ft/s $\rho = 1.935$

$k_s = 0.00328$ ft (1.0 mm)

*τ_b/τ for $b/d = 8$, MAX VALUE SHOWN ON FIG 6-13 OF TR 25

STATION	Q	d	V	S_e	V^3/gVS_e	$V/(gR_S S_e)^{1/2}$	$V/\sqrt{\tau/\rho}$	τ	b/d	τ_b/τ*	τ_s/τ	τ_b	τ_s	$\tau_b V$
b=250	8100	8.13	3.63	0.0003	4.96E8	6.45E2	23.2	0.047	30.8	1.3		0.060		0.216
	9629	9.00	3.86	0.0003	5.96E8	6.86	23.3	0.053				0.069		0.266
	11527	10.00	4.12	0.0003	7.25	7.32	23.6	0.059				0.077		0.316
	13571	11.00	4.36	0.0003	8.59	7.75	23.7	0.065				0.085		0.371
	15761	12.00	4.59	0.0003	1.00E9	8.16	24.0	0.071				0.092		0.422
b=200	8100	9.21	3.86	0.0003	5.96E8	6.86E2	23.3	0.053				0.069		0.266
	9326	10.00	4.05	0.0003	6.89	7.20	23.5	0.057				0.075		0.303
	10995	11.00	4.29	0.0003	8.18	7.63	23.7	0.063				0.082		0.354
	12785	12.00	4.51	0.0003	9.51	8.02	24.1	0.068				0.088		0.397
b=250	6900	7.40	3.43	0.0003	4.18E8	610	22.9	0.043				0.056		0.194
	7879	8.00	3.59	0.0003	4.80	638	23.0	0.047				0.061		0.220
	9629	9.00	3.86	0.0003	5.96	686	23.3	0.053				0.069		0.266
	11527	10.00	4.12	0.0003	7.25	732	23.5	0.059				0.077		0.319
b=200	6900	8.39	3.65	0.0003	5.04E8	649	23.1	0.048				0.063		0.229
	7780	9.00	3.81	0.0003	5.73	677	23.2	0.052				0.068		0.258
	9325	10.00	4.05	0.0003	6.89	720	23.5	0.057				0.075		0.303

ARIZONA
D. Mackaney 4/21/83

RWCD REACH 3

CHANNEL STABILITY
TRACTIVE STRESS/POWER
SUMMARY
SH 3/5

$n = 0.027$
$z = 3$
$k_s = 0.00328$ ft (1.0mm)

$T = 75°$
$\nu = 1.0 \times 10^{-5}$ ft/s; $\rho = 1.935$

$\tau_b/\tau = 1.3$

STATION	Q	d	V	Se	$V^2/gVSe$	$V/(gR_S S_e)^{1/2}$	$V/\sqrt{\tau/\rho}$	τ	b/d	τ_b/τ	τ_s/τ	τ_b	τ_s	$\sqrt{\tau_b}$
	8100	5.6	6.67	0.00649	5.60 E8	506	22.0	0.178	—	1.3	—	0.231	—	1.542
		6.0	6.19	0.001305	5.65 E8	528	22.2	0.150				0.196		1.211
		6.5	5.68	0.000994	5.73 E8	555	22.4	0.124				0.162		0.919
		7.0	5.24	0.000772	5.80 E8	581	22.6	0.104				0.135		0.709
		7.5	4.85	0.000610	5.82 E8	605	22.8	0.088				0.114		0.552
		8.0	4.52	0.000490	5.86 E8	629	22.9	0.075				0.098		0.443
		8.5	4.23	0.000398	5.91 E8	653	23.1	0.065				0.084		0.375
		9.0	3.96	0.000327	5.91 E8	674	23.3	0.056				0.073		0.288
		9.5	3.73	0.000272	5.93 E8	696	23.3	0.050				0.064		0.240

ARIZONA
D. Wahlberg
4/21/83

EWCD REACH 3

CHANNEL STABILITY
TRACTIVE STRESS/POWER
SUMMARY
SH 4/5

$T = 75°F$, $\nu = 1.0 \times 10^{-5}$ ft/s, $\rho = 1.935$

$R_s = 0.00328$ ft (1.0mm)

STATION	Q	d	V	Se	$V^3/gVSe$	$V/(gR_sSe)^{1/2}$	$V/\sqrt{\tau/\rho}$	τ	b/d	τ_b/τ	τ_s/τ	τ_b	$\tau_b V$
b=250	6900	8.22	3.06	0.00021	4.24E8	650	23.2	0.034		1.3		0.044	0.134
	8056	9.00	3.23	0.00021	4.99	686	23.3	0.037				0.048	0.156
	9644	10.00	3.44	0.00021	6.03	731	23.5	0.041				0.054	0.185
	11355	11.00	3.65	0.00021	7.20	776	23.8	0.046				0.059	0.216
	13186	12.00	3.84	0.00021	8.38	816	24.0	0.050				0.064	0.247
b=200	6900	9.31	3.25	0.00021	5.08E8	691	23.2	0.038				0.049	0.160
	7802	10.00	3.39	0.00021	5.77	720	23.5	0.040				0.052	0.177
	9199	11.00	3.59	0.00021	6.85	763	23.7	0.044				0.058	0.207
	10697	12.00	3.78	0.00021	8.00	803	24.0	0.048				0.062	0.236
	12296	13.00	3.96	0.00021	9.19	841	24.2	0.052				0.067	0.267
$R_s = 0.00328$ (0.1mm)													
b=250	6900	8.22	3.06	0.00021	424E8	2060	27.8	0.023				0.030	0.093
	11355	11.00	3.65	0.00021	7.20	2450	28.8	0.031				0.040	0.147
b=200	6900	9.31	3.25	0.00021	5.08	2180	28.0	0.026				0.034	0.110
	10697	12.0	3.78	0.00021	8.00	2540	29.0	0.033				0.043	0.162

ARIZONA
D. Thornberry
4/21/83
RWCD REACH 3
CHANNEL STABILITY
TRACTIVE STRESS/POWER
SUMMARY
SH 5/5

$T = 75°F$, $\nu = 1.0 \times 10^{-5}$, $\rho = 1.935$
$R_s = 0.00328$ (1.0mm)

Use $\frac{\tau_b}{\tau} = 1.3$ & $\frac{\tau_b}{\tau} = 1.0$

STATION	Q	d	V	S_e	V^2/gVS_e	$V/(gR_sS_e)^{1/2}$	$V/\sqrt{\tau/\rho}$	τ	b/d	τ_b/τ	τ_s/τ	τ_b	τ_s	$\tau_b V$
b=150'	6900	6.99	5.77	0.00097	6.16E3	570	22.5	0.127	21.5	1.3 (1.0	–	0.165 0.127	–	0.955 0.733)
b=200'	6900	5.95	5.32	0.00097	4.83E3	526	22.2	0.111		1.3 (1.0	–	0.144 0.111		0.769 0.591)

COMPUTATION SHEET

SCS-ENG-527A Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZ
PROJECT: RWCD R3
BY: D.T. DATE: 9/22
CHECKED BY: LMS DATE: 9/26/83
JOB NO.
SUBJECT
SHEET 1 2

PROBLEM: REVIEW GEOLOGIC CORRELATIONS SHOWN ON PLAN AND PROFILE SHEETS AND REDEFINE EXTENT OF LINING REQUIRED.

ANALYSIS: 1. THE CHANNEL STABILITY ANALYSIS SHOWS THAT GEOLOGIC UNITS 15, 24, 20, 22, 23 HAVE INSUFFICIENT RESISTANCE TO MAX. TRACTIVE STRESSES. REMOVAL AND REPLACEMENT WITH SUITABLE COMPACTED MATERIAL WILL BE REQUIRED.

2. A 3FT. LINING WILL BE USED.

3. THE LINING MAY BE INSTALLED:
— ON SIDE SLOPES ONLY
— ON BOTTOM ONLY
— ON BOTH

4. THE ANTICIPATED EXTENT OF LINING REQUIRED WILL BE SHOWN ON THE PLAN AND PROFILE SHEETS: FIELD ADJUSTMENT WILL BE NECESSARY.

5. LINING ON SIDE SLOPES WILL BE SHOWN TO BE REQUIRED WHERE:
- ANY OF THE ABOVE UNITS ARE SHOWN ON THE GEOL. CORREL. BETWEEN THE PLANNED INVERT AND 7 FT ABOVE THE INVERT IN A LAYER GREATER THAN 1 FT VERTICAL THICKNESS.

6. LINING ON THE BOTTOM WILL BE SHOWN AS REQUIRED WHERE:
- ANY OF THE ABOVE UNITS ARE SHOWN (ON THE GEOL. CORREL.) BETWEEN THE INVERT AND 1.5 FT. BELOW THE INVERT, WHERE THE EXTENT OF THE UNIT IS LESS THAN 2.0 FT VERTICAL THICKNESS.

COMPUTATION SHEET

SCS-ENG-DESIGN-REV. 9-69

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZ.		PROJECT RUXCO R3		
BY D.T.	DATE 9/22	CHECKED BY LMS	DATE 9/26/83	JOB NO.
SUBJECT				SHEET 2 OF 2

AND WHERE:

- ANY OF THE ABOVE UNITS APPEAR WITHIN 2.0 FT OF THE INVERT WHERE THE EXTENT OF THE UNITS IS GREATER THAN 2.0 FT.

COMPUTATION SHEET

SCS-ENG-5224 Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA | PROJECT: RUCD REACH 3

BY: D. Thackeray | DATE: 4/26/83 | CHECKED BY | DATE | JOB NO

SUBJECT: CHANNEL STABILITY ANALYSIS | SHEET 1

6

PROBLEM: DETERMINE ALLOWABLE TRACTIVE POWER FOR THE CORRELATED SOIL GROUPS FOUND IN REACH 3

ANALYSIS:

1. SOIL GROUPS FOUND:

GROUP	STRATIG. UNITS
C	5, 13, 14, 19, 25, 26, 30
→ G	15, 24
I	17, 31, 32
J	18 - SILTSTONE
→ K	20, 22, 23
M	27

2. SUMMARIZE TEST VALUES

3. DETERMINE ALLOWABLE TRACTIVE POWER

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

COMPUTATION SHEET

PROJECT: ARIZONA D. Thornton
CHECKED BY: RWCD
DATE: 4/26/83
SHEET: 2 OF 6
JOB NO.

CHANN. STAB. ANL

GROUP	UNIT	STATION	LAB #	D	PI	U.C	γ_d	STRENGTH	OTHER		
									D_{65} mm	D_{85} in	e in place
I	17?	880+50	82W1044	8	NP	SM	100.5	360	1.0	0.039	0.60
[YELLOW]	17	902+00	82W1050	4.5	5	CL-ML	91.1	850	0.09		
	17	902+00	82W1051	4.5	10	CL	91.7	410	0.10	0.0039	0.84
M	27	750+00	82W1049	5	4	SC-SM	101.7	1050	0.14	0.0051	0.66
[PURPLE]											

COMPUTATION SHEET
SCS ENGINEERING NO. 0-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA
BY: D. Thackeray
SUBJECT:

DATE: 4/27/83
CHAN. STAB. AVAL

PROJECT: PALO RICHE
CHECKED BY:
DATE:

JOB NO.

SHEET 3 OF 6

$^{*}\sigma_3 = 2.7$

GROUP	UNIT	STATION	LAB #	D	PI	U.C.	γ_d	STRENGTH	OTHER		
									D_{65} mm		C_{imp} loss
C [ORANGE]	14	1050+00	740042	3-3.7	NP	SM-1	106.6 ow	122	0.30	d_{65} = 0.32 MM = 0.0126 in	0.58
		964+20	740046	5-5.7	8	SC	109.6	454	0.35		0.54
		1117+21	730514	13-15	10	SM-2	108.9 RS	331 UC TRIAX	0.50		0.55
	25/27	750+00	82W1048	4	7	SC-SM	99.2	1050	0.15		0.70
	30	708+75	740052	2-2.7	16	SC	99.5	544	0.25		0.69
DISPERS. 25.5%											
G	24	796+25	740051	6-6.7	7	CL-ML	75.9	57	0.03	d_{65} = 0.05875 MM = 0.00231 in.	122
[GREEN STRIPE]	24	806+00	82W1045	4	3	ML	81.7	170	0.055		1.06
	24?	806+00	82W1046	6	NP	ML	87.4	1640	0.08		0.93
	24?	806+00	82W1047	6	—	ML	83.6	1570	0.07		1.02

ARIZONA
D. Thackery 4/20/83 RWCD REACH 3
SUMMARY OF WORK PLAN CHANNEL STABILITY ANALYSIS

FROM SUMMARY OF WORK PLAN STABILITY DESIGN
BURTON 7/23/74

GROUP	CORRELATED STRATIGRAPHIC UNITS	D_{75} (in)	ϕ_R	UCS psf	REM	TR25-p632 All, TRACT. POWER lb/ft-s
A	1, 3	0.0018		281		0.42
B	2, 12, 33	0.0031		350		0.75
C	5, 13, 14, 19, 25, 26, 30	0.0397	30°	200		0.18
D	6	0.0142			Non C	
E	8			122	CH	0.052
* F	9, 11	0.37	31		Non C	
— G	15, 24	0.0079		50		0
H	16	0.0276	30	254		0.34
I	17, 31, 32	0.0354	30	140		0.075
J	18 - SILTSTONE				Siltstone	
- * K	20, 22, 23	0.5512	34			0
L	21					
M	27	0.0154		554		2.35
N	28	0.0026			CL-1	
O	29	0.0031		790	CL-1	5.9

* COARSE GRAINED

4

6

CALCULATION SHEET

ARIZONA — PROJECT: ROUGH REACH 3

D. Thackeray — DATE: 5/6/83 — CHECKED BY — DATE — JOB NO

CHANNEL STAB. ANAL — SHEET 5 6

BASED ON AVAILABLE TEST DATA AND PREVIOUS ANALYSES THESE PRELIMINARY ALLOWABLE VALUES ARE SELECTED:

GROUP	DESIGN V.C.	ALL TRACT. POWER	All τ
C	350	0.75	—
G	50	—	
I	350	0.75	—
M	350	0.75	—
K	—	—	0.20
J	>350	—	

COMPUTATION SHEET

SCS-ENG-5234 Rev 5-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA | PROJECT: RUXLO RESACH 3

BY: D. Thackeray | DATE: 5/6/83 | CHECKED BY | DATE | JOB NO.

CHANN. STABILITY ANALYSIS | SHEET 6 6

— FOR PRELIMINARY DESIGN —

CONCLUSIONS:

1. NO COMPACTED EARTH LINING WILL BE REQUIRED FOR GROUP C, I, & M AND J SOILS

2. COMPACTED EARTH LINING WILL BE REQUIRED FOR GROUP G AND GROUP K SOILS.
(GR ▨) (PINK ▭)

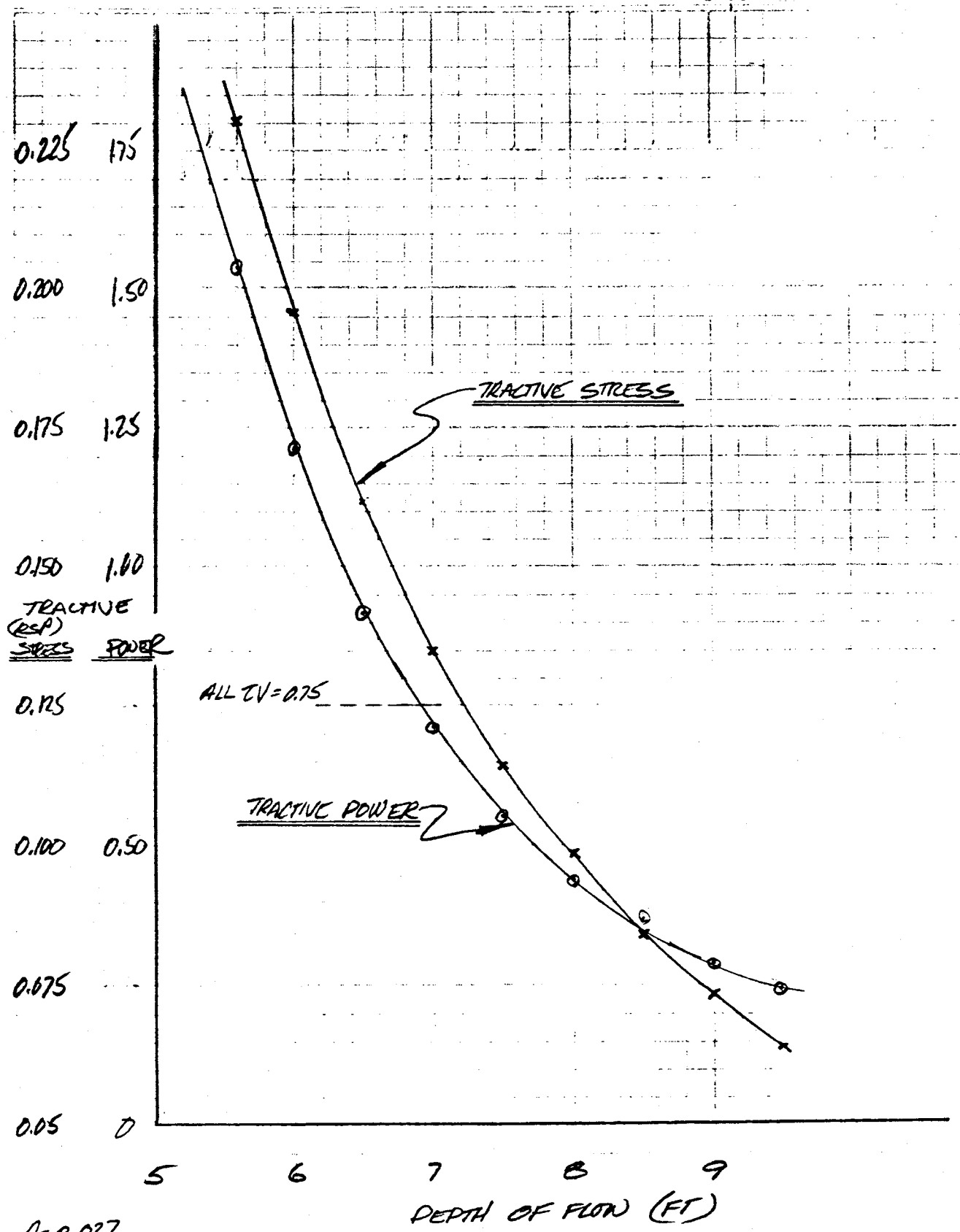
UNITS 15, 24, 20, 22, 23

COMPUTATION SHEET

ARIZONA — RIVER FLOODWAY REACH 3

D. THACKERAY 6/14/83

SHEET 1



n = 0.027
b = 200; z = 3; Q = 8100

COMPUTATION SHEET

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ARIZONA — RWCD FLOODWAY REACH 3

BY DT — DATE 3/9/83 — CHECKED BY — DATE — JOB NO

CHANNEL BOTTOM WIDTH — SHEET 1 — 6

PROBLEM: - THE WORK PLAN DESIGN SHOWS A B = 250, Z = 3 CHANNEL FROM THE COUNTY LINE TO STATION 767+25 (EXCEPTING THE TRANSITIONS)

- THE CHANNEL WIDTH WAS REDUCED FROM b = 250' TO 200' IN THE UPPER PORTION OF RWCD REACH 2 IN ORDER TO REDUCE ROW NEEDED.

- CONSIDER REDUCING B TO 200' IN REACH 3;

CHECK:
- COST SAVINGS (CONSTRUCTION COST)
- CHANNEL STABILITY
- FLOW DEPTH

SOLUTION:

1. COST SAVINGS:

- MAKE A ROUGH EST. OF CHANGE IN CHANNEL EXCAVATION + EARTHFILL QUANTITIES.
- USE REACH 2 COSTS:
  CH EXC. $0.77/cy
  FILL $0.60/cy

- DEPTHS:

Q	b	d	Total d = 1.2d
8100	250	8.13	9.75
8100	200	9.21	11.00
6900	250	7.40	9.0
6900	200	8.37	10.0

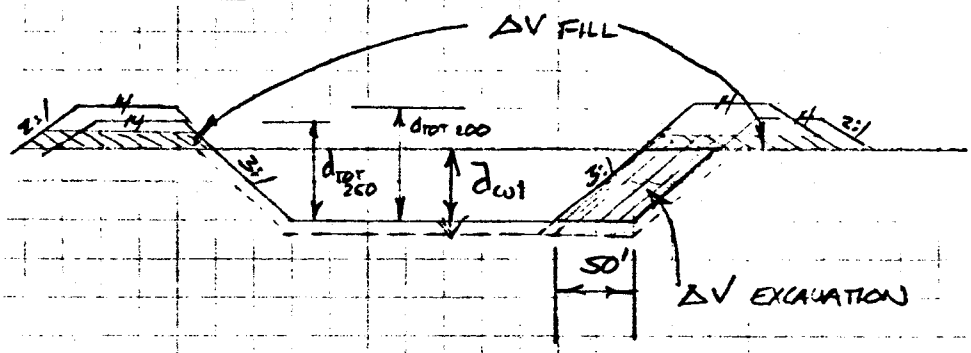
COMPUTATION SHEET

STATE ARIZONA | PROJECT RWCD REACH 3

BY D. Thackeray | DATE 5/10/83 | CHECKED BY | DATE | JOB NO

SUBJ CHANNEL BOTTOM WIDTH | SHEET 2 6

VOLUMES:



$$\Delta V_{EXCAV} = \frac{d_{cut} \times 50}{27} \text{ cy/ft} = 1.852\, d_{cut} \text{ cy/ft}$$

$$\Delta V_{FILL} = \frac{\left(\left(d_{TOT\,200} - d_{cut} - \left(\frac{d_{TOT\,200} - d_{TOT\,250}}{2}\right)\right) 5(2) + 14\right)\left(d_{T\,200} - d_{T\,250}\right)}{27}$$

Q	$d_{TOT\,200}$	$d_{TOT\,250}$	$d_{TOT\,200} - d_{TOT\,250}$	$\frac{d_{TOT\,200} - d_{TOT\,250}}{2}$
8100	11.00	9.75	1.25	0.625
6900	10.00	9.00	1.00	0.500

8100

$$\Delta V_{FILL} = \left(\left(11 - 0.625 - d_{cut}\right)10 + 28\right) 1.25$$

$$= \frac{\left(10.475 - d_{cut}\right) 12.5 + 35}{27} \text{ cy/ft}$$

6900

$$\Delta V_{FILL} = \frac{\left(\left(10 - 0.5 - d_{cut}\right)10 + 28\right) 1}{27} = \frac{\left(\left(9.5 - d_{cut}\right)10 + 28\right)}{27} \text{ cy/f}$$

ENG-5124 Re 9-69

SOIL CONSERVATION SERVICE

STATE: ARIZONA

PROJECT: RWCD FLOODWAY REACH 3

BY: D. Thacharay

DATE: 5/10/83

CHECKED BY

DATE

JOB NO

SHEET 1 1

PROBLEM: COMPUTE WSP FOR DESIGN Q_{100} FROM REACH 2 STA 976+00 STA 857+50

GIVEN: $Q = 8100$ cfs
$b = 200$
$Z = 2$
$n = 0.027$
$S = 0.0003$

ANALYSIS: 1. n value: documented in Reach 1 & Reach 2 design reports.

2. Initial depth: p. 41/283 REACH 2 COMPS:

STA 980+00 WSP DEPTH = 9.3 ft.
— w/sec. = 9.4 ft —

REACH 2 EXT: p 21/210

STA 980+16.3 WSP DEPTH = 9.41 ft

CONCLUSION: START COMPUTATION AT d = 9.3 ft. AT STA 980+00

COMPUTATION SHEET

STATE ARIZONA

PROJECT RWCD REACH 3

D.T. 7/19/83

CHECKED BY DATE JOB NO.

DGP COMPS

SHEET 1 4

* * PWSP * *

SUB 45
STA.=858+45.00
Q=8,100.00 CFS
BW=200.00 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.70 FT
WS-EL.=1,300.00 FT
EGL-EL.=1,300.25 FT
D=9.300 FT
V=3.822 F/S
DC=3.754 FT
VC=10.214 F/S
FR=0.245

SUB 35
STA.=858+35.00
Q=8,100.00 CFS
BW=192.22 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.70 FT
WS-EL.=1,299.99 FT
EGL-EL.=1,300.26 FT
EGL-S=0.0004360 F/F
D=9.284 FT
V=3.964 F/S
DC=3.849 FT
VC=10.327 F/S
FR=0.255

SUB 25
STA.=858+25.00
Q=8,100.00 CFS
BW=184.44 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.71 FT
WS-EL.=1,299.97 FT
EGL-EL.=1,300.26 FT
EGL-S=0.0004741 F/F
D=9.267 FT
V=4.118 F/S
DC=3.951 FT
VC=10.444 F/S
FR=0.266

SUB 40
STA.=858+40.00
Q=8,100.00 CFS
BW=196.12 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.70 FT
WS-EL.=1,299.99 FT
EGL-EL.=1,300.25 FT
EGL-S=0.0004187 F/F
D=9.292 FT
V=3.992 F/S
DC=3.801 FT
VC=10.270 F/S
FR=0.250

SUB 30
STA.=858+30.00
Q=8,100.00 CFS
BW=188.34 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.70 FT
WS-EL.=1,299.98 FT
EGL-EL.=1,300.26 FT
EGL-S=0.0004545 F/F
D=9.276 FT
V=4.040 F/S
DC=3.899 FT
VC=10.384 F/S
FR=0.260

SUB 20
STA.=858+20.00
Q=8,100.00 CFS
BW=180.56 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.71 FT
WS-EL.=1,299.96 FT
EGL-EL.=1,300.27 FT
EGL-S=0.0004950 F/F
D=9.257 FT
V=4.200 F/S
DC=4.004 FT
VC=10.504 F/S
FR=0.272

COMPUTATION SHEET

STD-ENG-223A Rev. 9-69

U.S. DEPARTMENT OF ...
SOIL CONSERVATION SERVICE

ARIZONA

D.T.

7/19/83

RWCD REACH 3

CHECKED BY DATE JOB NO

SUBJECT

SHEET 2 4

SUB 8+15
STA.=85~~7+95~~.00
Q=8,100.00 CFS
BW=176.67 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.71 FT
WS-EL.=1,299.96 FT
EGL-EL.=1,300.27 FT
EGL-S=0.0005173 F/F
D=9.247 FT
V=4.285 F/S
DC=4.060 FT
VC=10.566 F/S
FR=0.278

SUB 8+05
STA.=85~~7+85~~.00
Q=8,100.00 CFS
BW=168.89 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.71 FT
WS-EL.=1,299.94 FT
EGL-EL.=1,300.28 FT
EGL-S=0.0005670 F/F
D=9.225 FT
V=4.467 F/S
DC=4.176 FT
VC=10.693 F/S
FR=0.290

SUB 8+95
STA.=85~~7+75~~.00
Q=8,100.00 CFS
BW=161.11 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.72 FT
WS-EL.=1,299.92 FT
EGL-EL.=1,300.29 FT
EGL-S=0.0006243 F/F
D=9.201 FT
V=4.665 F/S
DC=4.300 FT
VC=10.825 F/S
FR=0.304

SUB 8+10
STA.=85~~7+90~~.00
Q=8,100.00 CFS
BW=172.78 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.71 FT
WS-EL.=1,299.95 FT
EGL-EL.=1,300.27 FT
EGL-S=0.0005413 F/F
D=9.237 FT
V=4.374 F/S
DC=4.117 FT
VC=10.629 F/S
FR=0.284

SUB 8+00
STA.=85~~7+80~~.00
Q=8,100.00 CFS
BW=165.00 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.71 FT
WS-EL.=1,299.93 FT
EGL-EL.=1,300.28 FT
EGL-S=0.0005946 F/F
D=9.213 FT
V=4.564 F/S
DC=4.237 FT
VC=10.758 F/S
FR=0.297

SUB 90
STA.=85~~7+70~~.00
Q=8,100.00 CFS
BW=157.22 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.72 FT
WS-EL.=1,299.91 FT
EGL-EL.=1,300.30 FT
EGL-S=0.0006562 F/F
D=9.187 FT
V=4.771 F/S
DC=4.366 FT
VC=10.894 F/S
FR=0.312

COMPUTATION SHEET

SCS-ENG-513A Rev. 9-69

ARIZONA

D.T.

7/19/83

PROJECT RWCD Reach 3

CHECKED BY DATE

SHEET 3

4

SUB 95
STA.=857+~~65~~.00
Q=8,100.00 CFS
BW=153.33 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.72 FT
WS-EL.=1,299.90 FT
EGL-EL.=1,300.30 F
EGL-S=0.0006909 F/
D=9.173 FT
V=4.883 F/S
DC=4.434 FT
VC=10.963 F/S
FR=0.320

SUB 75
STA.=857+~~85~~.00
Q=8,100.00 CFS
BW=145.56 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.73 FT
WS-EL.=1,299.87 FT
EGL-EL.=1,300.31 FT
EGL-S=0.0007691 F/F
D=9.140 FT
V=5.123 F/S
DC=4.578 FT
VC=11.107 F/S
FR=0.337

SUB 65
STA.=857+~~95~~.00
Q=8,100.00 CFS
BW=137.78 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.73 FT
WS-EL.=1,299.83 FT
EGL-EL.=1,300.33 FT
EGL-S=0.0008621 F/F
D=9.102 FT
V=5.390 F/S
DC=4.734 FT
VC=11.258 F/S
FR=0.356

SUB 80
STA.=857+~~00~~.00
Q=8,100.00 CFS
BW=149.44 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.72 FT
WS-EL.=1,299.88 FT
EGL-EL.=1,300.31 F
EGL-S=0.0007284 F/
D=9.157 FT
V=5.000 F/S
DC=4.505 FT
VC=11.035 F/S
FR=0.328

SUB 70
STA.=857+~~80~~.00
Q=8,100.00 CFS
BW=141.67 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.73 FT
WS-EL.=1,299.85 FT
EGL-EL.=1,300.32 FT
EGL-S=0.0008135 F/F
D=9.122 FT
V=5.253 F/S
DC=4.654 FT
VC=11.182 F/S
FR=0.347

SUB 60
STA.=857+~~90~~.00
Q=8,100.00 CFS
BW=133.89 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.73 FT
WS-EL.=1,299.81 FT
EGL-EL.=1,300.33 FT
EGL-S=0.0009153 F/F
D=9.081 FT
V=5.536 F/S
DC=4.817 FT
VC=11.335 F/S
FR=0.367

COMPUTATION SHEET

SCS-ENG-5276 Rev. 9-59

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA | PROJECT RWCD REACH 3

D.T. 7/19/83 | CHECKED BY | DATE | JOB NO.

SUBJECT | SHEET 4 4

SUB 5
STA.=857+35.00
Q=8,100.00 CFS
BW=130.00 FT
Z=3.00:1
N=0.032
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.73 FT
WS-EL.=1,299.79 FT
EGL-EL.=1,300.34 FT
EGL-S=0.0009739 F/F
D=9.058 FT
V=5.690 F/S
DC=4.904 FT
VC=11.415 F/S
FR=0.378

COMPUTATION SHEET

STD. ENG. 5034 Rev. 9-59

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA | PROJECT: RWCD REACH 3

BY: D.T | DATE: 7/6/83 | CHECKED BY | DATE | JOB NO.

SUBJECT: WATER SURFACE PROFILE COMPUTATIONS – RWCD FW1 | SHEET

"PWSP"
– HAM PROG.
– STD. STEP PRISMATIC CHANNELS
BY W.A.S

* * PWSP * *

SUB
STA.=863+00.00
Q=6,100.00 CFS
BW=200.00 FT
Z=3.00:1
N=0.027
Scb=0.0003 F/F
a=1.000
k=0.000
CB-EL.=1,290.56 FT
WS-EL.=1,299.76 FT
EGL-EL.=1,299.99 FT
D=9.200 FT
V=3.868 F/S
DC=3.639 FT
VC=10.555 F/S
FR=0.238

SUB
STA.=862+00.00
CB-EL.=1,290.59 FT
WS-EL.=1,299.79 FT
EGL-EL.=1,300.02 FT
EGL-S=0.0003032 F/F
D=9.200 FT
V=3.868 F/S
DC=3.639 FT
VC=10.555 F/S
FR=0.238

SUB
STA.=861+50.00
CB-EL.=1,290.61 FT
WS-EL.=1,299.81 FT
EGL-EL.=1,300.04 FT
EGL-S=0.0003032 F/F
D=9.201 FT
V=3.868 F/S
DC=3.639 FT
VC=10.555 F/S
FR=0.238

SUB
STA.=861+20.00
Q=6,100.00 CFS
BW=200.00 FT
Z=3.00:1
N=0.035
Scb=0.0003 F/F
a=1.000
k=0.100
CB-EL.=1,290.61 FT
WS-EL.=1,299.82 FT
EGL-EL.=1,300.05 FT
EGL-S=0.0004060 F/F
D=9.204 FT
V=3.866 F/S
DC=3.639 FT
VC=10.555 F/S
FR=0.238

SUB
STA.=861+00.00
CB-EL.=1,290.62 FT
WS-EL.=1,299.83 FT
EGL-EL.=1,300.06 FT
EGL-S=0.0005084 F/F
D=9.208 FT
V=3.864 F/S
DC=3.639 FT
VC=10.555 F/S
FR=0.238

COMPUTATION SHEET

SCS-ENG-523A Rev 9-69

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STA ARIZONA | FROM RWCD REACH 3

D. THACKERAY | DATE 7/6/83 | CHECKED BY | DATE | JOB NO.

SUBJECT | SHEET

* * PWSP * *

SUB
STA.=860+30.00
Q=8,100.00 CFS
BW=200.00 FT
Z=2.50:1
N=0.035
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.62 FT
WS-EL.=1,299.82 FT
EGL-EL.=1,300.09 FT
D=9.201 FT
V=3.948 F/S
DC=3.766 FT
VC=10.271 F/S
FR=0.253

SUB
STA.=860+80.00
Q=8,100.00 CFS
BW=200.00 FT
Z=2.00:1
N=0.035
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.62 FT
WS-EL.=1,299.82 FT
EGL-EL.=1,300.09 FT
EGL-S=0.0005281 F/F
D=9.193 FT
V=4.035 F/S
DC=3.778 FT
VC=10.330 F/S
FR=0.256

SUB
STA.=860+90.00
Q=8,100.00 CFS
BW=200.00 FT
Z=2.00:1
N=0.035
Scb=0.0003 F/F
a=1.100
k=0.100
CB-EL.=1,290.62 FT
WS-EL.=1,299.82 FT
EGL-EL.=1,300.09 FT
EGL-S=0.0005352 F/F
D=9.193 FT
V=4.035 F/S
DC=3.778 FT
VC=10.330 F/S
FR=0.256

SUB
STA.=860+50.00
CB-EL.=1,290.63 FT
WS-EL.=1,299.83 FT
EGL-EL.=1,300.11 FT
EGL-S=0.0005345 F/F
D=9.200 FT
V=4.031 F/S
DC=3.778 FT
VC=10.330 F/S
FR=0.256

COMPUTATION SHEET

SCS-ENG-503A Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA | PROJECT RWCD REACH 3

BY D.T. | DATE 7/6/83 | CHECKED BY | DATE | JOB NO.

SUBJECT | SHEET

SUB
STA.=860+50.00
CB-EL.=1,290.63 FT
WS-EL.=1,299.83 FT
EGL-EL.=1,300.11 FT
EGL-S=0.0005337 F/F
D=9.200 FT
V=4.031 F/S
DC=3.778 FT
VC=10.330 F/S
FR=0.256

SUB
STA.=860+00.00
CB-EL.=1,290.65 FT
WS-EL.=1,299.86 FT
EGL-EL.=1,300.14 FT
EGL-S=0.0005325 F/F
D=9.213 FT
V=4.025 F/S
DC=3.778 FT
VC=10.330 F/S
FR=0.255

SUB
STA.=857+50.00
CB-EL.=1,290.72 FT
WS-EL.=1,300.00 FT
EGL-EL.=1,300.27 FT
EGL-S=0.0005254 F/F
D=9.274 FT
V=3.997 F/S
DC=3.778 FT
VC=10.330 F/S
FR=0.253

COMPUTATION SHEET
SCS-ENG-573A Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA PROJECT RUND BEACH 3
BY D.T. DATE 7/7/83 CHECKED BY DATE JOB NO.
SUBJECT SHEET

* * PWSP * *

SUB
STA.=856+65.00
Q=8,100.00 CFS
BW=200.00 FT
Z=3.00:1
N=0.035
Scb=0.0003 F/F
a=1.000
k=0.000
CB-EL.=1,296.28 FT
WS-EL.=1,305.39 FT
EGL-EL.=1,305.63 FT
D=9.110 FT
V=3.911 F/S
DC=3.639 FT
VC=10.555 F/S
FR=0.242

SUB
STA.=856+40.00
CB-EL.=1,296.29 FT
WS-EL.=1,305.40 FT
EGL-EL.=1,305.64 FT
EGL-S=0.0005264 F/F
D=9.116 FT
V=3.908 F/S
DC=3.639 FT
VC=10.555 F/S
FR=0.241

SUB
STA.=856+35.00
Q=8,100.00 CFS
BW=200.00 FT
Z=3.00:1
N=0.027
Scb=0.0003 F/F
a=1.000
k=0.000
CB-EL.=1,296.29 FT
WS-EL.=1,305.41 FT
EGL-EL.=1,305.64 FT
EGL-S=0.0004194 F/F
D=9.117 FT
V=3.908 F/S
DC=3.639 FT
VC=10.555 F/S
FR=0.241

SUB
STA.=856+00.00
CB-EL.=1,296.30 FT
WS-EL.=1,305.42 FT
EGL-EL.=1,305.65 FT
EGL-S=0.0003123 F/F
D=9.117 FT
V=3.908 F/S
DC=3.639 FT
VC=10.555 F/S
FR=0.241

COMPUTATION SHEET

SCS-ENG-523A Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA | PROJECT: RWCD REACH 3

BY: D.T. | DATE: 7/7/83 | CHECKED BY | DATE | JOB NO.

SUBJECT | SHEET

SUB
STA.=850+00.00
CB-EL.=1,296.48 FT
WS-EL.=1,305.60 FT
EGL-EL.=1,305.84 FT
EGL-S=0.0003123 F/F
D=9.125 FT
V=3.904 F/S
DC=3.639 FT
VC=10.555 F/S
FR=0.241

SUB
STA.=844+00.00
CB-EL.=1,296.66 FT
WS-EL.=1,305.79 FT
EGL-EL.=1,306.03 FT
EGL-S=0.0003115 F/F
D=9.132 FT
V=3.901 F/S
DC=3.639 FT
VC=10.555 F/S
FR=0.241

SUB
STA.=843+50.00
CB-EL.=1,296.67 FT
WS-EL.=1,305.81 FT
EGL-EL.=1,306.04 FT
EGL-S=0.0003110 F/F
D=9.133 FT
V=3.900 F/S
DC=3.639 FT
VC=10.555 F/S
FR=0.241

SUB
STA.=843+00.00
Q=6,900.00 CFS
BW=200.00 FT
Z=3.00:1
N=0.027
Scb=0.0003 F/F
a=1.000
k=0.000
CB-EL.=1,296.69 FT
WS-EL.=1,305.89 FT
EGL-EL.=1,306.06 FT
EGL-S=0.0002656 F/F
D=9.199 FT
V=3.296 F/S
DC=3.276 FT
VC=10.038 F/S
FR=0.203

SUB
STA.=842+50.00
CB-EL.=1,296.70 FT
WS-EL.=1,305.90 FT
EGL-EL.=1,306.07 FT
EGL-S=0.0002203 F/F
D=9.194 FT
V=3.298 F/S
DC=3.276 FT
VC=10.038 F/S
FR=0.203

SUB
STA.=842+00.00
CB-EL.=1,296.72 FT
WS-EL.=1,305.91 FT
EGL-EL.=1,306.08 FT
EGL-S=0.0002207 F/F
D=9.190 FT
V=3.299 F/S
DC=3.276 FT
VC=10.038 F/S
FR=0.203

RWCD FLOODWAY
REACH 3
CHANNEL HYDRAULICS
WSP
DT 10/03

1/3

***** [illegible] SURFACE PROFILE *****

JOB:
BY:
DATE:

Q= 8,100.00 [illegible] 027 B= 200.00 Z= 3.00 S= 0.000300
Dc= 3.640 Vc=10.5[illegible] Sc=0.007069 Normal Depth= 9.228
ALPHA=1.00 K=[illegible]

No.	Station	Inv-El	WS-El	D	V	He	Sf	F
1	977+25.00	1287.13	1296.43	9.300	3.82	9.527	0.000292	0.234
2	948+00.00	1288.01	1297.29	9.279	3.83	9.507	0.000294	0.235
3	943+00.00	1288.16	1297.43	9.276	3.83	9.504	0.000295	0.235
4	941+00.00	1288.22	1297.49	9.275	3.83	9.503	0.000295	0.235
5	936+00.00	1288.37	1297.64	9.272	3.83	9.501	0.000295	0.235
6	926+00.00	1288.67	1297.94	9.268	3.84	9.496	0.000296	0.235
7	917+00.00	1288.94	1298.20	9.264	3.84	9.492	0.000296	0.235
8	870+00.00	1290.35	1299.60	9.248	3.85	9.478	0.000298	0.236
9	867+00.00	1290.44	1299.69	9.248	3.85	9.477	0.000298	0.236
10	862+50.00	1290.57	1299.82	9.247	3.85	9.476	0.000298	0.236
11	860+00.00	1290.65	1299.89	9.246	3.85	9.476	0.000298	0.236
12	858+45.00	1290.69	1299.94	9.246	3.85	9.476	0.000298	0.236

ENTER NEXT STATION

****** WATER SURFACE PROFILE ******

JOB:
BY:
DATE:

Q= 8,100.00 N= 0.035 B= 200.00 Z= 3.00 S= 0.000300
Dc= 3.640 Vc=10.55 Sc=0.011878 Normal Depth= 10.728
ALPHA=1.00 K=0.00

No.	Station	Inv-El	WS-El	D	V	He	Sf	F
1	858+45.00	1290.69	1299.94	9.246	3.85	9.476	0.000501	0.236
	ALPHA=1.00		K=0.10					
2	858+25.00	1290.70	1299.95	9.250	3.84	9.480	0.000500	0.236
	Q= 8,100.00		N= 0.035	B= 190.00	Z= 3.00		S= 0.000300	
3	858+15.00	1290.70	1299.93	9.232	4.03	9.484	0.000555	0.248
	Q= 8,100.00		N= 0.035	B= 180.00	Z= 3.00		S= 0.000300	
4	858+05.00	1290.70	1299.91	9.211	4.24	9.490	0.000619	0.262
	Q= 8,100.00		N= 0.035	B= 170.00	Z= 3.00		S= 0.000300	
5	857+95.00	1290.71	1299.89	9.187	4.46	9.496	0.000695	0.277
	Q= 8,100.00		N= 0.035	B= 160.00	Z= 3.00		S= 0.000300	
6	857+85.00	1290.71	1299.87	9.159	4.72	9.505	0.000787	0.294
	Q= 8,100.00		N= 0.035	B= 150.00	Z= 3.00		S= 0.000300	
7	857+75.00	1290.71	1299.84	9.125	5.00	9.514	0.000899	0.314
	Q= 8,100.00		N= 0.035	B= 140.00	Z= 3.00		S= 0.000300	
8	857+65.00	1290.71	1299.80	9.085	5.33	9.526	0.001038	0.336

RUNCO FLOODWAY
REACH 3
CHANNEL HYDRAULICS
WSP
DT 10/83

43

****** WATER SURFACE PROFILE ******

JOB:
BY:
DATE:

Q= 8,100.00 N= 0.035 B= 130.00 Z= 3.00 S= 0.000300
Dc= 4.758 Vc=11.80 Sc=0.011089 Normal Depth= 13.397
ALPHA=1.00 K=0.10

No.	Station	Inv-El	WS-El	D	V	He	Sf	F
	Q= 8,100.00		N= 0.035	B= 130.00	Z= 3.00		S= 0.000300	
9	857+55.00	1290.72	1299.75	9.035	5.71	9.541	0.001212	0.362
10	857+55.00	1290.72	1299.75	9.035	5.71	9.541	0.001212	0.362

ENTER NEXT STATION

RWCD FLOODWAY
REACH 3
CHANNEL HYDRAULICS
WSP
DT 10/83

3/3

ARIZONA PROJECT RWCD REACH 3
D.T. CHECKED BY 8/5/03 DATE JOB NO
HYDRAULIC DESIGN SHEET

HYDRAULIC JUMP:

TAILWATER (APPROXIMATE BY NORMAL DEPTH IN RWCD LESS 0.3 FT)

S = 0.0003
B = 200
Z = 3
n = 0.027

Q	d
3300	5.45
4800	6.80
6900	8.41
8100	9.23

DEPTH AT DROP BY WEIR FORMULA:

L = 120
C = 3.1

Q (cfs)	H FT	DEPTH AT STA 843 FROM WSP
3300	4.3	4.7
4800	5.5	5.9
6900	7.0	7.3
8100	7.8	8.1

****** WATER SURFACE PROFILE ******

JOB:
BY:
DATE:

Q= 3,300.00 N= 0.027 B= 200.00 Z= 3.00 S= 0.000300
Dc= 2.017 Vc= 7.94 Sc=0.008519 Normal Depth= 5.451
ALPHA=1.00 K=0.00

No.	Station	Inv-El	WS-El	D	V	He	Sf	F
1	856+70.00	1296.23	1300.53	4.300	3.60	4.502	0.000669	0.315
2	856+00.00	1296.25	1300.58	4.328	3.58	4.527	0.000654	0.312
3	855+00.00	1296.28	1300.65	4.366	3.55	4.562	0.000635	0.308
4	854+00.00	1296.31	1300.71	4.402	3.52	4.594	0.000618	0.304
5	853+00.00	1296.34	1300.78	4.436	3.49	4.625	0.000602	0.301
6	852+00.00	1296.37	1300.84	4.469	3.46	4.655	0.000587	0.297
7	851+00.00	1296.40	1300.90	4.500	3.44	4.683	0.000574	0.294
8	850+00.00	1296.43	1300.96	4.529	3.41	4.710	0.000562	0.291
9	849+00.00	1296.46	1301.02	4.557	3.39	4.735	0.000550	0.289
10	848+00.00	1296.49	1301.07	4.583	3.37	4.760	0.000539	0.286
11	847+00.00	1296.52	1301.13	4.609	3.35	4.783	0.000529	0.284
12	846+00.00	1296.55	1301.18	4.633	3.33	4.805	0.000520	0.281
13	845+00.00	1296.58	1301.24	4.657	3.31	4.827	0.000511	0.279
14	844+00.00	1296.61	1301.29	4.679	3.30	4.848	0.000503	0.277
15	843+00.00	1296.64	1301.34	4.701	3.28	4.868	0.000495	0.275
16	842+00.00	1296.67	1301.39	4.721	3.26	4.887	0.000488	0.273
17	841+00.00	1296.70	1301.44	4.741	3.25	4.905	0.000481	0.272
18	840+00.00	1296.73	1301.49	4.761	3.24	4.923	0.000474	0.270

ENTER NEXT STATION

RWD FLOODWAY R3
DT 8/8/83
WSP U.S. FROM
DEAPr
1/4

****** WATER SURFACE PROFILE ******

JOB:
BY:
DATE:

Q= 4,800.00 N= 0.027 B= 200.00 Z= 3.00 S= 0.000300
Dc= 2.582 Vc= 8.95 Sc=0.007874 Normal Depth= 6.796
ALPHA=1.00 K=0.00

No.	Station	Inv-El	WS-El	D	V	He	Sf	F
1	856+70.00	1296.23	1301.73	5.500	4.03	5.752	0.000616	0.314
2	856+00.00	1296.25	1301.78	5.524	4.01	5.774	0.000607	0.312
3	855+00.00	1296.28	1301.84	5.557	3.99	5.804	0.000594	0.309
4	854+00.00	1296.31	1301.90	5.589	3.96	5.833	0.000583	0.307
5	853+00.00	1296.34	1301.96	5.620	3.94	5.861	0.000572	0.304
6	852+00.00	1296.37	1302.02	5.649	3.92	5.887	0.000562	0.302
7	851+00.00	1296.40	1302.08	5.678	3.90	5.913	0.000553	0.299
8	850+00.00	1296.43	1302.14	5.705	3.88	5.938	0.000544	0.297
9	849+00.00	1296.46	1302.19	5.731	3.86	5.962	0.000535	0.295
10	848+00.00	1296.49	1302.25	5.756	3.84	5.985	0.000527	0.293
11	847+00.00	1296.52	1302.30	5.781	3.82	6.008	0.000520	0.291
12	846+00.00	1296.55	1302.36	5.805	3.80	6.029	0.000513	0.289
13	845+00.00	1296.58	1302.41	5.827	3.79	6.050	0.000506	0.287
14	844+00.00	1296.61	1302.46	5.849	3.77	6.070	0.000500	0.286
15	843+00.00	1296.64	1302.51	5.871	3.76	6.090	0.000493	0.284
16	842+00.00	1296.67	1302.56	5.892	3.74	6.109	0.000488	0.283
17	8+10.00	1321.69	1329.81	8.121	2.63	8.229	0.000163	0.172

ENTER NEXT STATION

KWD KW KB
8/8/82
2/4

****** WATER SURFACE PROFILE ******

JOB:
BY:
DATE:

Q= 6,900.00 N= 0.027 B= 200.00 Z= 3.00 S= 0.000300
Dc= 3.277 Vc=10.03 Sc=0.007305 Normal Depth= 8.405
ALPHA=1.00 K=0.00

No.	Station	Inv-El	WS-El	D	V	He	Sf	F
1	856+70.00	1296.23	1303.23	7.000	4.46	7.309	0.000561	0.311
2	856+00.00	1296.25	1303.27	7.020	4.45	7.327	0.000555	0.310
3	854+00.00	1296.31	1303.39	7.075	4.41	7.377	0.000541	0.306
4	853+00.00	1296.34	1303.44	7.101	4.39	7.400	0.000534	0.304
5	852+00.00	1296.37	1303.50	7.126	4.37	7.423	0.000527	0.302
6	852+00.00	1296.37	1303.50	7.126	4.37	7.423	0.000527	0.302
7	851+00.00	1296.40	1303.55	7.151	4.36	7.446	0.000521	0.301
8	850+00.00	1296.43	1303.61	7.175	4.34	7.468	0.000515	0.299
9	849+00.00	1296.46	1303.66	7.198	4.33	7.489	0.000510	0.298
10	848+00.00	1296.49	1303.71	7.221	4.31	7.509	0.000504	0.296
11	847+00.00	1296.52	1303.76	7.243	4.30	7.530	0.000499	0.295
12	846+00.00	1296.55	1303.82	7.265	4.28	7.549	0.000494	0.293
13	845+00.00	1296.58	1303.87	7.285	4.27	7.568	0.000489	0.292
14	844+00.00	1296.61	1303.92	7.306	4.26	7.587	0.000484	0.291
15	843+00.00	1296.64	1303.97	7.326	4.24	7.605	0.000480	0.290
16	842+00.00	1296.67	1304.02	7.345	4.23	7.623	0.000476	0.288
17	841+00.00	1296.70	1304.07	7.364	4.22	7.640	0.000471	0.287
18	841+00.00	1296.70	1304.07	7.364	4.22	7.640	0.000471	0.287

ENTER NEXT STATION

EXCD FW 1 REV
8/8/83
3/4

COMPUTATION SHEET

SCS-ENG-103 Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA
PROJECT: RWCD REACH 3
BY: D. Thackeray
DATE: 5/10/83
CHECKED BY:
DATE:
JOB NO.:
SHEET 3 of 6

CHANNEL BOTTOM WIDTH

	STATION	l	d_{wr}	ΔV^{cu}_{EXC} cy/ft	ΔV^{cu}_{EXC} cy	ΔV^{cu}_{FILL} cy/ft	ΔV^{cu}_{FILL} cy
	976+00	2700	11	20.4	55,000	—	—
L	949+00	800	14	25.9	20 740	—	—
	941+00	500	11	20.4	10 185	—	—
L	936+00	1000	14	25.9	25 926	—	—
	926+00	900	11	20.4	18 333	—	—
L	917+00	2600	12.5	23.2	60 185	—	—
	891+00	2100	10	18.5	38 890	1.52	3184
L	870+00	1250	11	20.4	25 463	—	—
	857+50	370	X	—	—	—	—
	853+80						
	853+80	580	9	16.7	9667	1.22	709
	848+00	6000	11	20.4	122222	—	—
L	788+00	1400	13	24.1	33703	—	—
	774+00	2400	17	31.5	75 555	—	—
L	750+00	1000	15	27.8	27 778	—	—
	740+00						

ΣV_{EXC} = 423,647 cy × \$0.77/cy = \$326,208.00

ΣV_{FILL} = 3893 cy × \$0.60/cy = \$2336.00

Σ \$328,543.00

APPROX SAVINGS ≈ \$330,000.00

COMPUTATION SHEET

SCS-ENG-523A Rev 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA | PROJECT: RUCO REACH 3

BY: D. Thackeray | DATE: 5/10/83 | CHECKED BY | DATE | JOB NO.

SUBJECT: CHANNEL BOTTOM WIDTH | SHEET 4 6

EARTH LINING SAVINGS:

$$V/ft = \frac{50' \times 3'}{27} = 5.56 \text{ cy/ft}$$

LENGTH:

800
1000
2600
1250
1400
1000
8050 ft

VOL: 8050 × 5.56 = 44,722 cy

COST: × $0.60/cy

$26,833

TOTAL

OTHER	$328,543
E.L.	26,833
TOTAL	$355,376

→ APPROX $350,000.00

COMPUTATION SHEET

SCS-ENG-523A Rev 9-69

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA | PROJECT RWCD REACH 3

BY D. Thackeray | DATE 5/10/83 | CHECKED BY | DATE | JOB NO.

SUBJECT CHANNEL BOTTOM WIDTH | SHEET 5 6

CHANNEL STABILITY:

Q = 8100 cfs (STA 853+80 to 976+00):

b	$\tau_{b\,Ref}$	τ_{bV}
250	0.060	0.216
200	0.069	0.266

K_s = 0.00328 ft (1.0mm)

τ_b % inc	τ_{bV} % inc
15%	23%

DISCUSSION:

TR25 p. 6-26

- allowable tractive stress for the 0.1mm d50 material is 0.05 psf (assuming low content fine sediment. This chart also assumes non-cohesive material.

- An unconfined compressive strength of 350 psf is being used for the native channel material that will not be replaced with a compacted earth lining. The maximum non-erosive tractive power from TR25: Fig 6-45 corresponding to $q_u/2$ = 350 psf is 0.750 lb/ft-sec.

- Permissible tractive forces for canals in cohesive materials (lean clayey soils) with void ratio e = 0.85 is 0.085 psf. (Chow p 174, Fig 7-11)

- Rule of thumb cited as BuRec practice for channels with only occasional inundation: γds = 0.2 PSF.
  FOR 200 FT γds = 62.4(9.21) 0.0003 = 0.172 PSF
  FOR 250 FT γds = 62.4(8.13) 0.0003 = 0.152 PSF

COMPUTATION SHEET

SCS-ENG-523A Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA PROJECT RWCD REACH 3

BY D. Nadeau DATE 5/10/83 CHECKED BY DATE JOB NO

SUBJECT CHANNEL BOTTOM WIDTH SHEET 6 6

SUMMARY & CONCLUSIONS:

1. Neither the 200 ft or 250 ft bottom width channel will meet tractive stress criteria.

2. Both will meet the tractive power criteria.

3. Other references (Bur, Chow) indicate both the 250' and 200' channels to be non erosive.

4. The Reach 2 channel above the drop chute was constructed with a 200' bottom width. This reach has the same channel slope (0.0003) and Q_{100}=8200cfs.

CONCLUSION:

5. The channel width may reasonably be reduced to b=200ft in reach 3 without significantly reducing its stability against erosion.

COMPUTATION SHEET
SCS-ENG-503A Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZ | PROJECT: RANCO R3
BY: D.T. | DATE: 8/17/83 | CHECKED BY | DATE | JOB NO
SUBJECT: DIP-RAP | SHEET 1 2

PROBLEM: DESIGN RIP RAP IN SED. BASIN INLET CHANNEL

ANALYSIS: 1. GROUT 30' FROM CREST UPSTREAM.

2. Vd 30' U.S. FROM CREST FOR Q = 3200 CFS
≈ 10 FT/S
USE 10 FT/S AS DESIGN V FOR ROCK R.P.

SOLUTION: 1. ROCKSIZE FOR V = 10 FT/S:

USACE HYDRAULIC DES. CHART 712-1:

LOW TURBULENCE, γ_s = 165 PCF:
D_{50} = 0.65 FT

HIGH TURBULENCE, γ_s = 165 PCF
D_{50} = 1.25 FT

USE D_{50} = 0.65 FT

2. GRADATION: (FROM WEST STATES ENGR. MTG. 4/83)

% PASSING	RATIO TO D_{50} LOW	RATIO TO D_{50} HIGH	SIZE LOW	SIZE HIGH	USE	
100	2	3	1.30	1.95	1.25	2.0
75	1.5	2.35	0.98	1.53	1.00	1.5
50	1.0	1.7	0.65	1.11	0.65	1.0
15	0.35	0.90	0.23	0.59	0.25	0.6

DESIGN
D_{100} 16 - 24"
D_{75} 12 - 18"
D_{50} 8 - 12"
D_{15} 3 - 8"
D_5 0 - 3"

COMPUTATION SHEET

SCS-ENG-523A Rev 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZ. PROJECT RWCD R.3.

BY O.T. DATE 8/17/83 CHECKED BY DATE JOB NO.

SUBJECT RIP-RAP SHEET 2 OF 2

3. FILTER/BEDDING:

A FILTER/BEDDING ARE - APPROVED FOR USE IN WASH - STATE FOR FINE GRAINED SOILS:

% PASSING	SIZE
100	2" - 4"
75	3/4" - 1 3/4"
50	1/4" - 1/2"
15	#20 - #8

SOME BASE SOILS IN THE VICINITY OF THE BASIN NEARLY MATCH THIS RIP-RAP GRADATION.

COMPUTATION SHEET
SCS-ENG-523A Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE AZ | PROJECT ROCD R3
BY DT | DATE 8/31/83 | CHECKED BY | DATE | JOB NO.
SUBJECT HYDRAULIC DESIGN: ROCK RIP-RAP | SHEET 1 OF 2

RIP RAP UNDER CHANDLER HTS BRIDGE:

- VELOCITY AT DESIGN Q = 8100 CFS WILL BE < 5 FT/S.
- A SPHERICAL D_{50} < 0.5 FT IS REQUIRED PER CORPS OF ENGRS. DES. CHART 712 FOR HIGH TURBULENCE CONDITIONS.
- PROVIDE ROCK RIP RAP PROTECTION ALONG BANKS UNDER THE CHANDLER HTS. RD. BRIDGE AND ADJACENT TO THE BRIDGE PIERS.
- USE SAME GRADATION AS FOR ROCK RIP RAP ASSOCIATED WITH THE SEDIMENT BASIN IF POSSIBLE

CHECK HRB REPORT 108 PROCEDURE:

$Q = 8100$ CFS
$b = 200$ FT
$z = 3$
$d = 9.0$ FT

FIND $S_e = 0.000327$
$V = 3.96$ FT/S

$P = 225.08$
$A = 2043$ FT^2
$R = 9.08$

$$\text{BASIC } d_{50} = \left[\frac{118 Q d (S_e)^{13/6} (R)}{P}\right]^{0.4}$$

$$= \left(\frac{118(8100)(0.000327)^{13/6}(9.08)}{225.08}\right)^{0.4}$$

$$= \underline{0.07 \text{ FT}}$$

COMPUTATION SHEET

STS-ENG-523A Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: AZ | PROJECT: RWCD R3.

BY: D.T. | DATE: 8/31/83 | CHECKED BY | DATE | JOB NO.

SUBJECT | SHEET 2 2

TRY WITH $d_{50} = 8\,in = 0.67\,ft$

$$n = 0.0395\, d_{50}^{1/6}$$
$$= 0.0395\,(0.67)^{1/6}$$
$$= 0.037$$

FOR $Q = 3100$ $\quad b = 200,\ z = 3,\ n = 0.037$
$d = 9$

FIND $S_a = 0.000614$

$$\text{BASIC } d_{50} = \left(\frac{118\,(3100)\,9\,(0.000614)^{13/6}\,(9.08)}{225.08}\right)^{0.4}$$
$$= 0.27\,ft$$

<u>CORRECTION FACTORS:</u>

$K_{SG} = 1$

$K_A = (\tau_0/\bar{\tau})_{max} = 1.5$

$$K_S = \frac{K_{recc}}{K_{act}}$$

$$K = \sqrt{1 - \left(\frac{\sin\phi}{\sin\theta}\right)^2}$$

recc: $\theta = 32.1$, $\phi = 18$

$K_{recc} = 0.814$
$K_{act} = 0.871$

actual: $\theta = 39$, $\phi = 18$

$K_S = 0.934$

$$d_{50} = 1.5\,(0.934)\,(0.27) = \underline{0.378\,ft}$$

COMPUTATION SHEET

U S DEPARTMENT OF ...

SOIL CONTROL ...

STATE ARIZONA PROJECT RWCD REACH 3

BY D.T DATE 8/15/83 CHECKED BY DATE JOB NO.

INCREASED TRACTIVE STRESS/POWER IN CURVES SHEET 1 OF 1

PROBLEM: DETERMINE INCREASE IN TRACTIVE STRESS IN CURVES.

ANALYSIS: 1. USE TR 25 P 6-16 FIG 6-5

SOLUTION:

	CURVE	STA.	& RADIUS	R_{IN}/b	τ_{CURV}/τ_{ST}	R_O/B	τ_O/τ_{ST}
Q=6900	#1	764+15.49	965.10	4.3	1.65	5.3	1.52
	#2	798+69.30	716.81	3.1	1.83	4.1	1.69
	#3	809+67.60	724.27	3.1	1.83	4.1	1.69
Q=8100	#4	APPROX 866+02.63	1145.92	5.2	1.58	6.2	1.41
	#5	900+26.25	1145.92	5.2	1.58	6.2	1.41

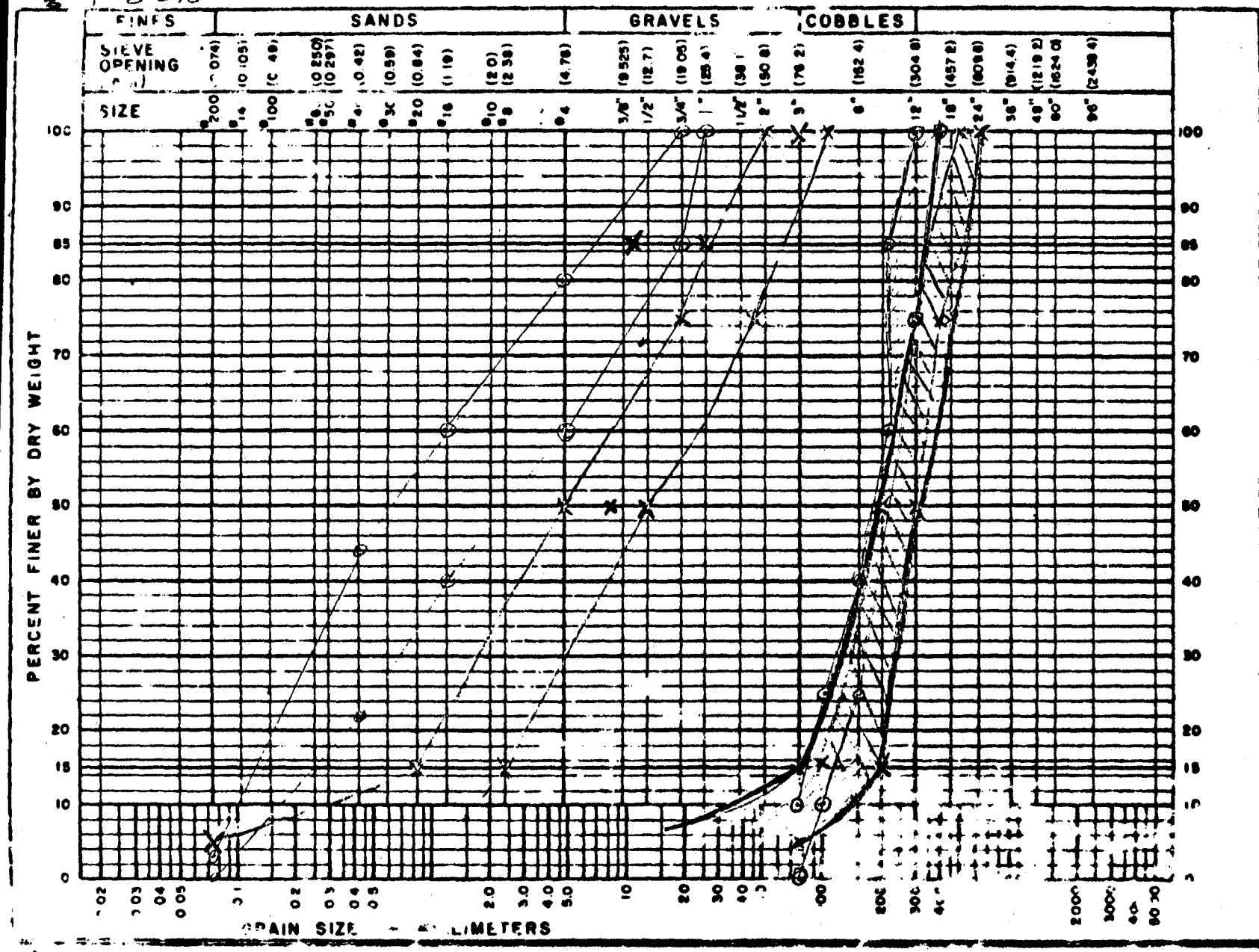
CHECK TRACTIVE POWER:

CURVE	STD. $\tau_b V$	CURVE INS	CURVE OUTS	ALLOW
#1	0.154	0.25	0.23	0.75
#2 & #3	0.154	0.28	0.26	0.75
#4 & #5	0.181	0.29	0.26	0.75

→ OK NO RR NEEDED AT CURVES.

SIZE	% PASSING
RDCD R2	
15"	100
12	95
9	60
6	25
4	10 - 25
3	0 - 10

of WASHINGTON STANDARD RIP-RAP
AND BEDDING/FILTER FOR V≤10 FT/S



U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

RIPRAP, FILTER OR BEDDING MATERIALS

DESIGNED AT Winter

BY DT

PROJECT and STATE RDCD R3

REMARKS

COMPUTATION SHEET

SCS-ENG-523A Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZ | PROJECT: RWCD R3

BY: D.T. | DATE: 9/22 | CHECKED BY | DATE | JOB NO.

SUBJECT: ESTIMATED EXTENT OF CHANNEL LINING | SHEET | OF

SUMMARY:

	STATION	LINING	
	740 +00	N	1300
	753	S	450
	757 +50	SB	850
	766	S	2200
	788	SB	2200
822+50	810	B	1250
	~~845~~	N	~~750~~ 1300
830	860	B	250
	862+50	SB	450
	867	B	300
	870	N	2100
	891	B	2600
	917	N	900
	926	B	1000
	936	S	500
	941	SB	200
	943	B	500
	948	N	2925
	977+25		

TOTALS

N:	S:	B:	SB:
1300	450	1250	850
1500	2200	~~500~~ 250	2200
2100	500	~~300~~ 2600	750
900		1000	450
2925		500	200
8725	3150	7400	4450

Σ 23725

****** WATER SURFACE PROFILE ******

JOB:
BY:
DATE:

Q= 8,100.00 N= 0.027 B= 200.00 Z= 3.00 S= 0.000300
Dc= 3.640 Vc=10.55 Sc=0.007069 Normal Depth= 9.228
ALPHA=1.00 K=0.00

No.	Station	Inv-El	WS-El	D	V	He	Sf	F
1	856+70.00	1296.23	1304.03	7.800	4.65	8.136	0.000534	0.308
2	856+00.00	1296.25	1304.07	7.818	4.64	8.152	0.000530	0.307
3	855+00.00	1296.28	1304.12	7.843	4.62	8.174	0.000524	0.306
4	854+00.00	1296.31	1304.18	7.867	4.60	8.197	0.000518	0.304
5	853+00.00	1296.34	1304.23	7.891	4.59	8.218	0.000513	0.303
6	852+00.00	1296.37	1304.29	7.914	4.57	8.239	0.000508	0.301
7	851+00.00	1296.40	1304.34	7.937	4.56	8.260	0.000503	0.300
8	850+00.00	1296.43	1304.39	7.959	4.55	8.280	0.000498	0.299
9	849+00.00	1296.46	1304.44	7.980	4.53	8.299	0.000494	0.297
10	848+00.00	1296.49	1304.49	8.001	4.52	8.319	0.000489	0.296
11	847+00.00	1296.52	1304.54	8.022	4.51	8.337	0.000485	0.295
12	846+00.00	1296.55	1304.59	8.042	4.49	8.356	0.000481	0.294
13	845+00.00	1296.58	1304.64	8.062	4.48	8.373	0.000477	0.293
14	844+00.00	1296.61	1304.69	8.081	4.47	8.391	0.000473	0.292
15	843+00.00	1296.64	1304.74	8.099	4.46	8.408	0.000469	0.291
16	842+00.00	1296.67	1304.79	8.118	4.45	8.425	0.000466	0.290
17	841+00.00	1296.70	1304.84	8.136	4.44	8.441	0.000462	0.289
18	840+00.00	1296.73	1304.88	8.153	4.43	8.457	0.000459	0.288

ENTER NEXT STATION

KAUF INT 7 KS
8/8/03
4/4

COMPUTATION SHEET
SCS-ENG-5234 Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA
FROM: RWCD R3
BY: DT
DATE: 9/9/83
CHECKED BY
DATE
JOB NO.
SUBJECT
SHEET

PROBLEM: NEED WSP COMPUTATION FOR RWCD CHANNEL U.S. FROM SEDIMENT BASIN OUTLET AT STA 842+35

ANALYSIS:

1. Q = 6900 CFS

2. DEPTH AT STA 842+00 FROM MOMENTUM ANALYSIS (SEE 8/15/83 COMPS)

CASE I: FOR MAX. DEPTH d = 8.5
CASE II: FOR MAX VELOCITY d = 8.3

	b	z	S	n
3. STA 842+00	200	3	0.0003	0.027
Inv. elev. = 1296.67				
744+00				
TRANSITION				
741+50	150	3	0.0003	0.027

5. BRIDGE: QUEEN CR. RD ℄ CROSSES RWCD ℄ AT STA 745+28.37.

30

744+98.37
+ 60

745+58.37

COMPUTATION SHEET

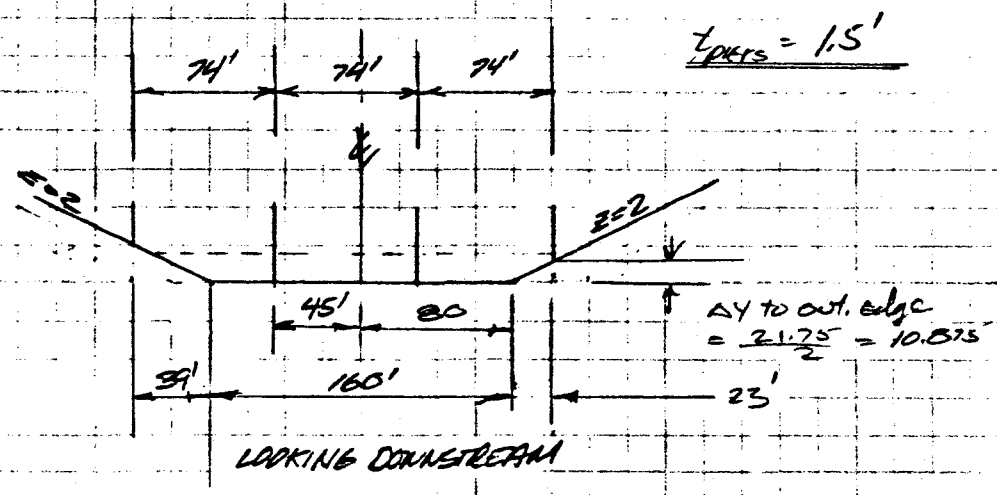
STATE ARIZONA PROJECT RWCD REACH 3

D. THACKERAY 6/10/83 CHECKED BY DATE JOB NO.

BRIDGE PIER MOM. ANAL. SHEET 1 5

VOID

DETERMINE BRIDGE PIER MOM LOSS @ CHANGE HTS RD:



USE DEPTH OF FLOW DS = 9.10 FT

USE $A_0 = 2td = 3d + 4$ (two pier widths)

$M_0 = 2td^2/2 = 1.5d^2$

$M_1 = \bar{y}A_1 = \frac{d(T+2b)}{3(T+b)} A_1$ $\quad b = 160$, $T = b + 2zd = 160 + 4d$

$$\bar{y} = \frac{d(160+4d+320)}{3(160+4d+160)}$$

$$= \frac{d(480+4d)}{960+12d}$$

$$= \frac{4d(120+d)}{12(80+d)}$$

$$= \frac{d(120+d)}{3(80+d)}$$

FWS
DES
SRDS
6-13a

COMPUTATION SHEET

SCS-ENG 5234 Rev 9-69

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA PROJECT: RUCO REACH 3

BY: D. THACKERAY DATE: 6/10/83 CHECKED BY DATE JOB NO.

SUBJECT SHEET 2 5

$$A = bd + 2d^2 = d(160 + 2d)$$
$$= 2d(80 + d)$$

$$M_1 = \frac{d(120+d)}{3\cancel{(80+d)}} \; 2d\cancel{(80+d)}$$

$$M_1 = \frac{2d^2(120+d)}{3}$$

$$I = M_1 - M_0 + \overbrace{\frac{Q^2(A_1 - A_0)}{gA_1^2}}^{X_1}$$

$$II = M_1 - M_0 + \overbrace{\frac{Q^2}{g(A_1 - A_0)}}^{X_2}$$

$$III = M_1 - M_0 + \overbrace{\frac{Q^2}{gA_1}}^{X_3}$$

~~PROGRAM~~: GIVEN d, Q

FIND:

A_1
M_1
A_0
M_0
I
II
III

COMPUTATION SHEET
SCS-ENG-SOIL-R-1-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA
PROJECT: RWCD REACH 3
BY: D. THACKERAY
DATE: 6/10/83
CHECKED BY
DATE
JOB NO.
SUBJECT
SHEET 3 5

HP 99 PROG

d > I, II, III Q
A B

* SORE DATA

lbl A < PRT SP / PRT X
STO 1
(* COMPUTE A1)
↑
↑
80
+
×
2
×
STO 2
(* COMPUTE M1)
RCL 1
x^2
RCL 1
12
+
×
6
÷
STO 3
(* COMPUTE A0)
RCL 1
3
×
STO 4
(* COMPUTE M0)
RCL 1
×
2
÷
STO 5

(* M1 - M0)
RCL 3
=
−
STO 6
(G²/g)
RCL 0
x^2
32.2
÷
STO 7
(* I *)
RCL 2
RCL 4
= < STO 8
RCL 2
x^2
÷
RCL 7
×
RCL 6
+
PRT X
(* II *)
RCL 7
RCL 8
÷
RCL 6
+
PRT X

(* III *)
RCL 7
RCL 2
÷
RCL 6
+
PRT X
RTN
GTO A

REG	
0	Q
1	d
2	A1
3	M1
4	A0
5	M0
6	M1 - M0
7	G²/g
8	A1 - A0
9	
A	
B	
C	
D	

COMPUTATION SHEET

SCS-ENG-503A Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA | PROJECT: RWCD REACH 3

BY: THACKERAY | DATE: 6/13/03 | CHECKED BY | DATE | JOB NO.

SUBJECT | SHEET 4 5

CHECK FOR D=2

$A_1 = bd + zd^2 = 160(2) + 2(4) = 328$

$\bar{Y} = 0.992$

$M_1 = 325.33$

$A_0 = 3(2) = 6$

$M_0 = 6$

$I = (325.33 - 6) + \left(\frac{8100^2}{32.2}\right)\frac{(328-6)}{328^2}$

$= (319.33) + (2.038E6)\frac{(322)}{1.076\ E5}$

$= 319.33 + 6098.49$

$I = 6417.82$

$II = 319.33 + \frac{(2.038\ E6)}{322}$

$II = 6647.21$

$III = 319.33 + \frac{(2.038\ E6)}{328}$

$III = 6531.457$

COMPUTATION SHEET

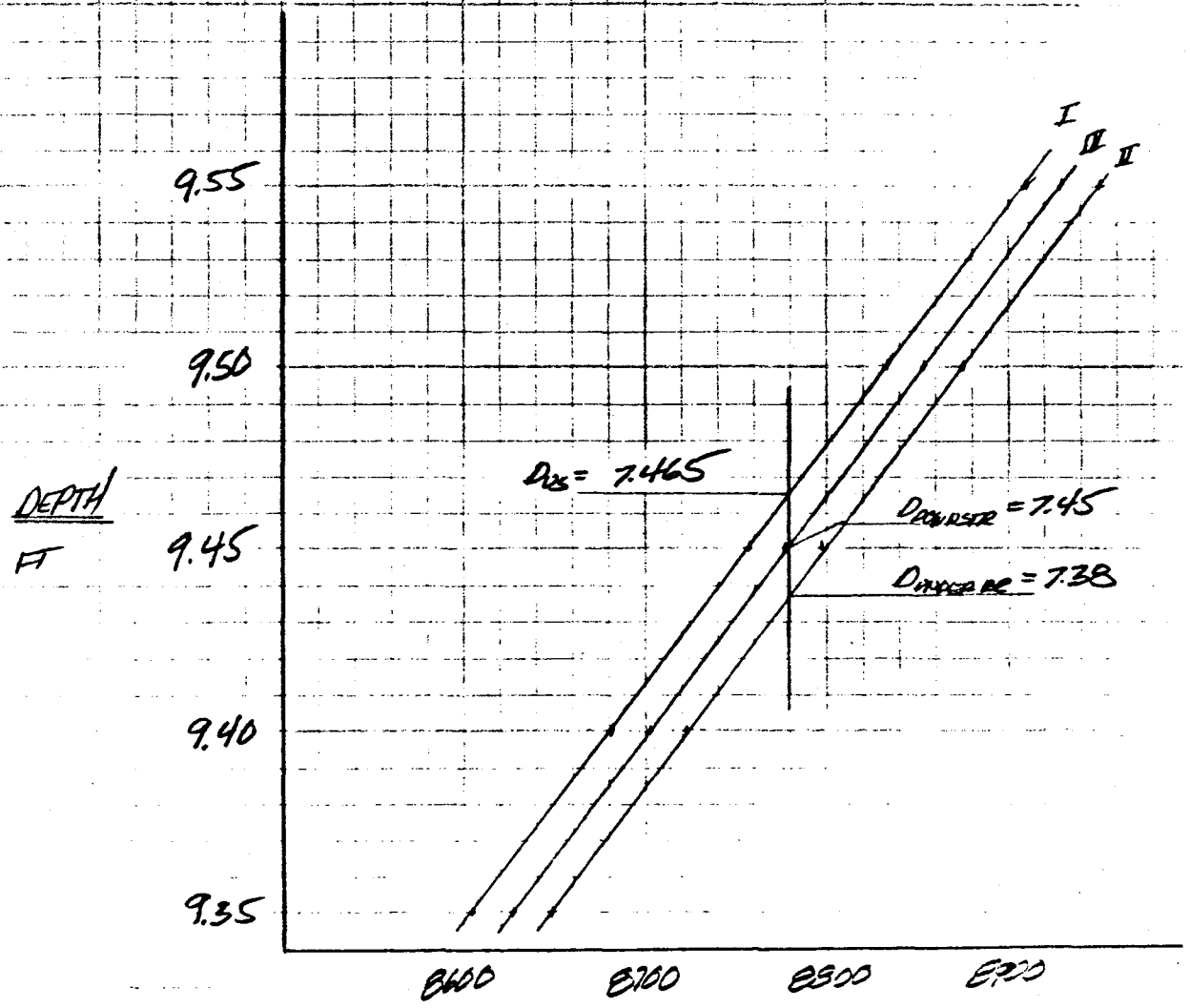
SCS-ENG-FORM 9-69

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA | PROJECT RWCD REACH 3

BY THALKERAM | DATE 6/13/83 | CHECKED BY | DATE | JOB NO.

SUBJECT BRIDGE PIER MOM. LOSS | SHEET 5 5



MOM-F

****** WATER SURFACE PROFILE ******

JOB: RWCD REACH 3,ARIZONA.
BY: EB ALDERMAN
DATE: 9/9/83

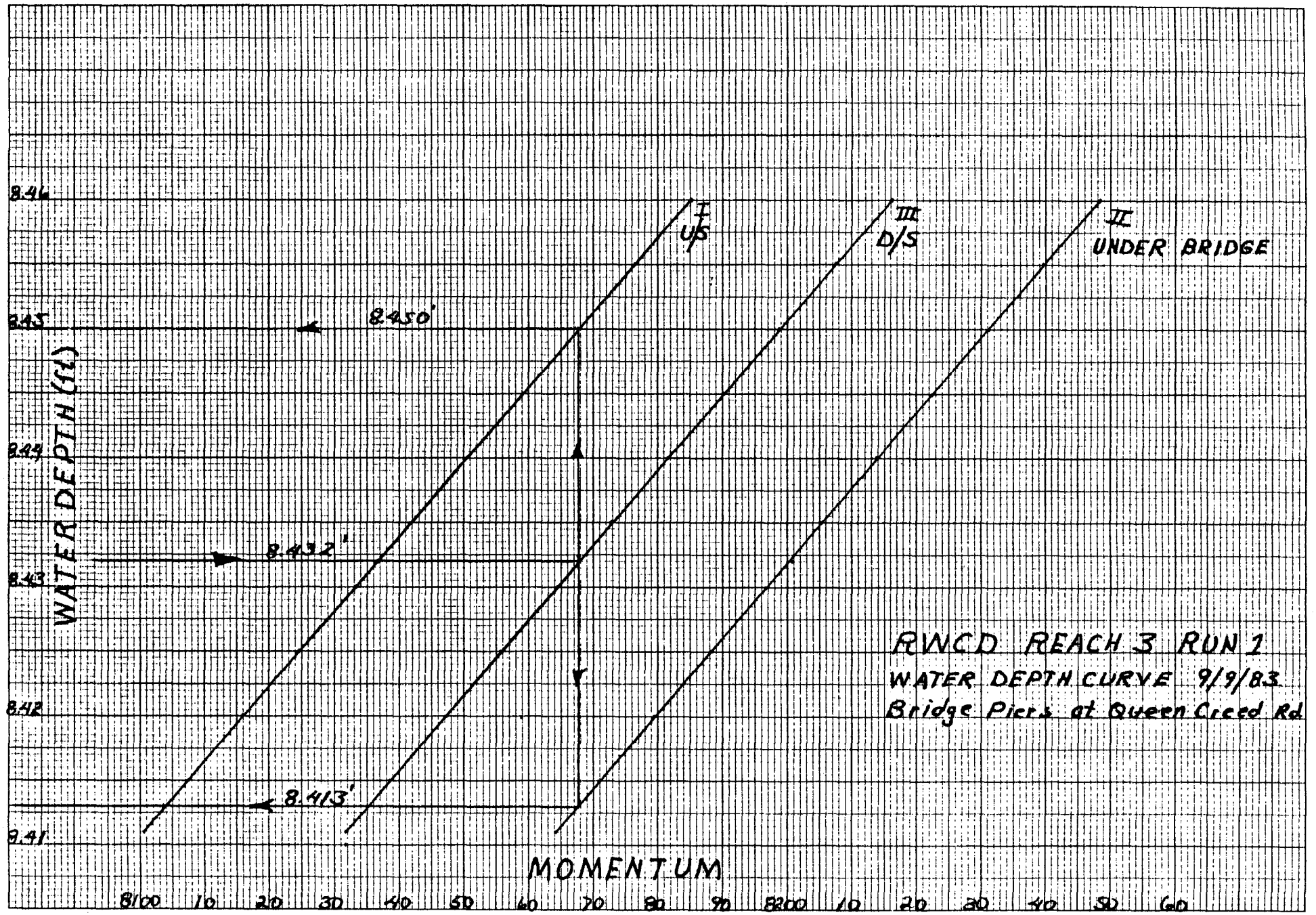
Q= 6,900.00 N= 0.027 B= 200.00 Z= 3.00 S= 0.000300
Dc= 3.277 Vc=10.03 Sc=0.007305 Normal Depth= 8.405
ALPHA=1.00 K=0.00

No.	Station	Inv-El	WS-El	D	V	He	Sf	F
1	842+00.00	1296.67	1305.17	8.500	3.60	8.701	0.000289	0.230
2	841+00.00	1296.70	1305.20	8.499	3.60	8.700	0.000289	0.230
3	840+00.00	1296.73	1305.23	8.498	3.60	8.699	0.000289	0.230
4	838+00.00	1296.79	1305.29	8.495	3.60	8.697	0.000289	0.230
5	835+00.00	1296.88	1305.37	8.492	3.60	8.694	0.000290	0.230
6	830+00.00	1297.03	1305.52	8.487	3.61	8.689	0.000290	0.230
7	825+00.00	1297.18	1305.66	8.482	3.61	8.684	0.000291	0.230
8	820+00.00	1297.33	1305.81	8.477	3.61	8.679	0.000291	0.231
9	810+00.00	1297.63	1306.10	8.468	3.61	8.671	0.000292	0.231
10	800+00.00	1297.93	1306.39	8.461	3.62	8.664	0.000293	0.231
11	775+00.00	1298.68	1307.13	8.445	3.63	8.650	0.000295	0.232
12	750+00.00	1299.43	1307.86	8.434	3.63	8.639	0.000296	0.232
13	~~744+98.37~~ 745+58.87	1299.58	1308.01 1307.96	8.432	3.63	8.637	0.000297	0.232

ENTER NEXT STATION

RWCD FLOODWAY
REACH 3
WSP COMPS
9/83

K+E 10 X 10 TO ½ INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.



****** WATER SURFACE PROFILE ******

JOB: RWCD REACH 3,ARIZONA.RUN1
BY: EB ALDERMAN
DATE: 9/12/83

Q= 6,900.00 N= 0.027 B= 200.00 Z= 3.00 S= 0.000300
Dc= 3.277 Vc=10.03 Sc=0.007305 Normal Depth= 8.405
ALPHA=1.00 K=0.00

No.	Station	Inv-El	WS-El	D	V	He	Sf	F
1	744+98.37	1299.53	1307.98	8.450	3.62	8.654	0.000295	0.232
2	744+50.00	1299.54	1307.99	8.450	3.62	8.654	0.000295	0.232
3	744+25.00	1299.55	1308.00	8.450	3.62	8.653	0.000295	0.232
4	744+00.00	1299.56	1308.01	8.449	3.62	8.653	0.000295	0.232
	Q= 6,900.00		N= 0.027	B= 150.00	Z= 3.00	S= 0.000300		
5	741+50.00	1299.63	1307.97	8.334	4.73	8.682	0.000532	0.309
6	741+00.00	1299.65	1308.00	8.347	4.72	8.693	0.000529	0.308
7	740+00.00	1299.68	1308.05	8.372	4.71	8.716	0.000524	0.307

ENTER NEXT STATION

****** WATER SURFACE PROFILE ******

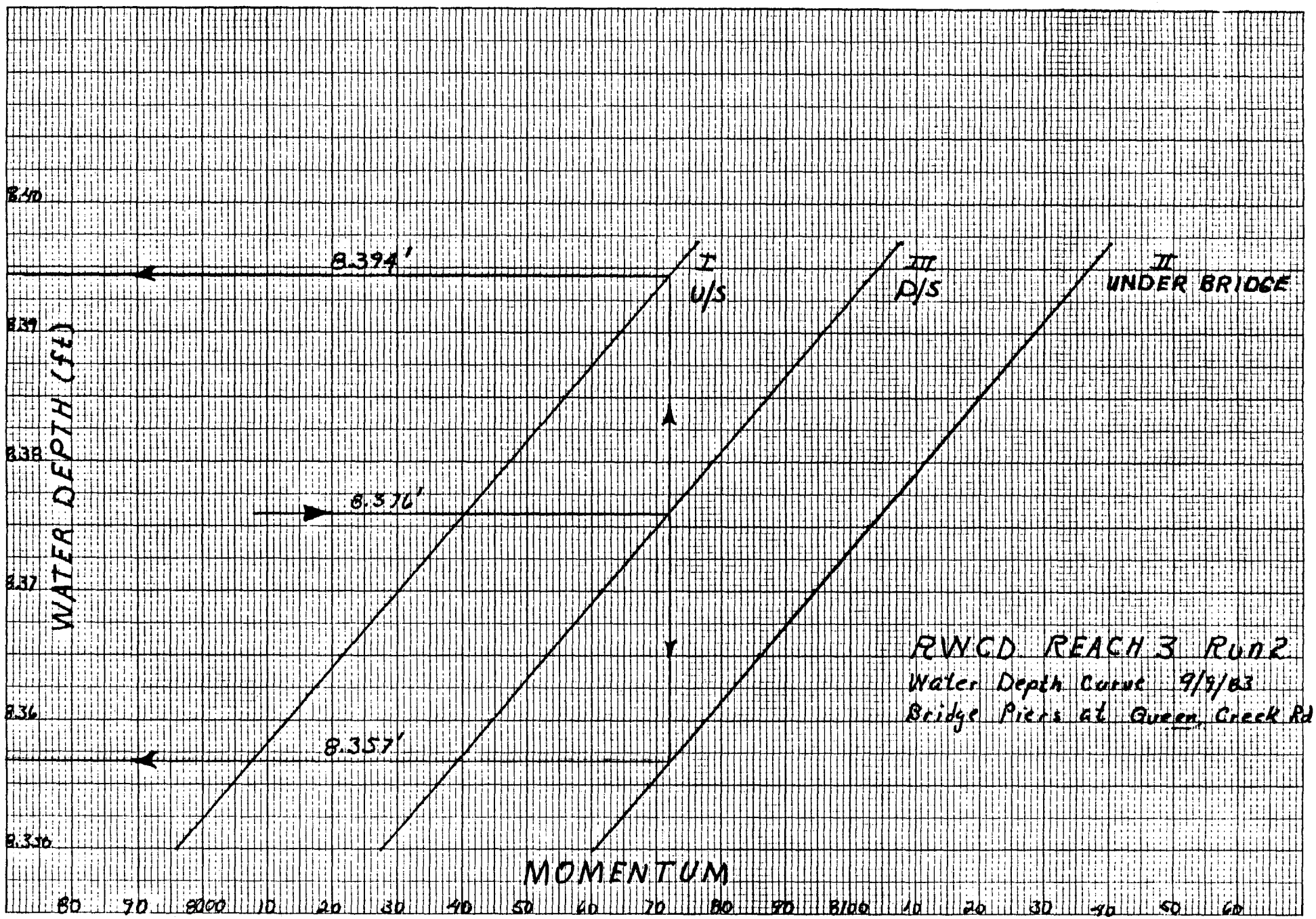
JOB: RWCD REACH 3,ARIZONA.RUN NUMBER 2
BY: EB ALDERMAN
DATE: 9/9/83

Q= 6,900.00 N= 0.027 B= 200.00 Z= 3.00 S= 0.000300
Dc= 3.277 Vc=10.03 Sc=0.007305 Normal Depth= 8.405
ALPHA=1.00 K=0.00

No.	Station	Inv-El	WS-El	D	V	He	Sf	F
1	842+00.00	1296.67	1304.97	8.300	3.70	8.512	0.000313	0.238
2	840+00.00	1296.73	1305.03	8.303	3.70	8.515	0.000313	0.238
3	835+00.00	1296.88	1305.19	8.309	3.69	8.521	0.000312	0.238
4	830+00.00	1297.03	1305.35	8.315	3.69	8.527	0.000311	0.238
5	825+00.00	1297.18	1305.50	8.321	3.69	8.532	0.000310	0.237
6	820+00.00	1297.33	1305.66	8.327	3.68	8.537	0.000310	0.237
7	810+00.00	1297.63	1305.97	8.336	3.68	8.546	0.000309	0.237
8	800+00.00	1297.93	1306.27	8.345	3.67	8.554	0.000307	0.236
9	775+00.00	1298.68	1307.04	8.362	3.67	8.571	0.000305	0.236
10	760+00.00	1299.13	1307.50	8.370	3.66	8.578	0.000304	0.235
11	750+00.00	1299.43	1307.80	8.374	3.66	8.582	0.000304	0.235
12	744+98.37	1299.58	1307.96	8.376	3.66	8.584	0.000304	0.235
	745+56.31	3	1					

ENTER NEXT STATION

K+E 10 X 10 TO 1 INCH 7 X 10 INCHES
KEUFFEL & ESSER CO. MADE IN U.S.A.
46 1320



****** WATER SURFACE PROFILE ******

JOB: RWCD REACH 3,ARIZONA.RUN 2
BY: EB ALDERMAN
DATE: 9/12/83

Q= 6,900.00 N= 0.027 B= 200.00 Z= 3.00 S= 0.000300
Dc= 3.277 Vc=10.03 Sc=0.007305 Normal Depth= 8.405
ALPHA=1.00 K=0.00

No.	Station	Inv-El	WS-El	D	V	He	Sf	F
1	744+98.37	1299.53	1307.92	8.394	3.65	8.601	0.000301	0.234
2	744+50.00	1299.54	1307.94	8.394	3.65	8.601	0.000301	0.234
3	744+25.00	1299.55	1307.95	8.394	3.65	8.601	0.000301	0.234
4	744+00.00	1299.56	1307.95	8.394	3.65	8.601	0.000301	0.234
	Q= 6,900.00		N= 0.027	B= 150.00	Z= 3.00		S= 0.000300	
5	741+50.00	1299.63	1307.91	8.279	4.77	8.632	0.000544	0.312
6	741+00.00	1299.65	1307.94	8.292	4.76	8.644	0.000541	0.311
7	740+00.00	1299.68	1308.00	8.319	4.74	8.668	0.000535	0.310

ENTER NEXT STATION

MEIZ

D.T

ENCO R3

8/15/83

2 2

CASE 1 :

d	M+F
8.1	7907
8.3	8253
8.28	8219 ← ≈ 8215 DS

$Q_{DS} = 6900$

CASE 2 : $Q_{DS} = 4800$

d	M+F
8.5	8213 ← ≈ 8215 DS

CASE 3 : $Q_{DS} = 0$

d	F
5.0	2625 ← ≈ 2640 DS
5.1	2734

ARIZ. RWCD RCH.3

D.T. 8/15/83

JUNCTION W/ QUEEN CREEK: SIDE WEIR

1 2

PROBLEM: USING MOMENTUM METHODS DETERMINE DEPTH OF FLOW UPSTREAM OF SIDE WEIR

ANALYSIS: 1. THE SIDE WEIR FLOW ENTERS THE RWCD AT 90° AND ∴ CONTRIBUTES NO MOMENTUM IN THE DIRECTION OF CHANNEL FLOW.

2. AS AN APPROXIMATION, ASSUME THAT THE DEPTH UPSTREAM (AND CORRESPONDING Q) WILL PROVIDE MOMENTUM FOR THE Q & D DOWNSTREAM FROM THE SIDE WEIR.

3. DEPTH DOWNSTREAM WILL BE AS DETERMINED BY WSP.

4. CASES:

	Q_{US}	Q_{WEIR}	Q_{DS}	C_{FS}	$M+F_{DS}$*
1.	6900	1200	5100	3.10	5015
2.	4000	3300	3100	3.10	9015
3.	0	3300	5300	4.69	6640

*M+F / 8

COMPUTATION SHEET
SCS-ENG-523A Rev. 9-89

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA	PROJECT RWCD REACH 3		
BY D.T.	DATE 8/15/83	CHECKED BY	DATE	JOB NO.
SUBJECT			SHEET OF

PROBLEM: DEVELOP WSP FROM UPSTREAM OF THE SED. BASIN SIDE WEIR TO THE UPPER END OF THE PROJECT

ASSUMPTIONS: 1. USE DEPTH AT STA 842+00 = 8.5 FT FOR Q = 4800

2. USE DEPTH AT STA 842+00 = 8.3 FT FOR Q = 6900

SOLUTION: INV. EL = 1296.22 @ STA 857+00

STA	INV. EL	K	X

COMPUTATION SHEET

SCS-ENG-5234 Rev. 9-59

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA | PROJECT: RWCD REACH 3

BY: D.T. | DATE: 7/22/83 | CHECKED BY | DATE | JOB NO.

SUBJECT: FREEBOARD CAP. OF DROP @ Sta 857+00 | SHEET

CHECK SUBMERGED WEIR CAPACITY AND DEPTHS:

$Q = 8100$

$H_2 = 9.0 - 5.5 = 3.5$

$q_s = 8100/120 = 67.5$

$q_s^{2/3}/H_2 = (67.5)^{2/3}/3.5 = 4.74$

$H_1/H_2 = 2.26$

$H_1 = 3.5 \times (2.26) = \underline{1.93 \text{ FT}}$

CHECK FREEBOARD CAP:

SOLVE BY TRIALS FOR VARIOUS TAILWATER DEPTHS THE FOLLOWING APPROXIMATE Q'S ARE OBTAINED: *

MANNINGS EQN NORMAL DEPTH FOR S=0.0003 n=0.027

to D_2	Q	H_2'	H_1/H_2	$q_s^{2/3}/H_2$	q_s	Q
8.9	7800	3.4	2.94	←		
9.4	8500	3.9	2.56	5.45	98.0	11760
9.9	9300	4.4	2.27	4.80	97.1	11647
10.4	10100	4.9	2.04	4.30	96.7	11605
10.9	10900	5.4	1.85	3.80	93.0	11154
11.4	11800	5.9	1.69	3.45	91.8	11020
11.9	12700	6.4	1.56	3.15	90.5	10862
12.4	13700	6.9	1.45	2.90	89.5	10741
12.9	14600	7.4	1.35	2.60	84.4	10127

SOLVE WITH $H_1 = 10$ ft UNTIL Q AND H_2' CORRESPOND TO VALUES ABOVE

FREEBOARD CAPACITY IS APPROX. 11,000 CFS

* LINING:

N	NONE	
B	COMPACTED EARTH	BOTTOM
S	"	SIDES
SB	"	BOTTOM & SIDES
R	ROCK RIP-RAP	
GR	GROUTED ROCK RIP-RAP	

STATION	Q CFS	S FT/FT	b FT	n	d WSP FT	d DESIGN FT	V FT/S	INV. EL.	LINING	COMMENTS
977+25	8100	0.0003	200	0.027	9.3	11	3.8	1287.13	N	
948+00								1288.01	B	
943+00								1288.16	SB	
941+00								1288.22	S	
936+00								1288.37	B	
926+00								1288.67	N	
917+00								1288.94	B	
891+00								1289.72	N	
870+00					9.2			1290.35	B	
867+00								1290.44	SB	
862+50								1290.58	B	
860+00								1290.65		
CHANDLER HTS. RD. BRIDGE										MOMENTUM ANALYSIS SHOWS ~0.1 FT INCR. IN DEPTH ACCROSS ~~BRIDGE~~
860+00					9.3			1290.65	N	
858+45				0.035				1290.65	R	ROCK TRANSITION
858+25			200	0.035	9.3		3.8	1290.70	R	
857+55			130		9.0		5.7	1290.72		DROP END SILL
DROP STRUCTURE										DROP WEIR L = 120 FT
857+00							—	1296.22	GR	WEIR CREST AT DROP
856+75		0.0003	200	—	7.8	—	4.7	1296.23		d_{WSP} FROM WEIR FORMULA

STATE ARIZONA
DT
9/83
HYDRAULIC DESIGN: SUMMARY - FLOODWAY CHANNEL
PROJECT RWCD REACH 3
CHECKED BY
DATE
JOB NO
SHEET 1 2
COMPUTATION SHEET

ARIZONA D.T. 9/83 RWCD REACH 3

HYDRAULIC DESIGN: SUMMARY - FLOODWAY CHANNEL

STATION	Q CFS	S FT/FT	b FT	n	d WSP FT	d DESIGN FT	V FT/S	INV. EL.	LINING	COMMENTS
856+75	8100	0.0003	200	0.027	7.8	10	—	1296.73	N	
845+00	↓	↓	↓	↓	8.1	↓	4.5	1296.65	B	
842+70					8.1		4.5	1296.66		- INCREASE IN DEPTH BY MOMENTUM ANALYSIS ≈ 0.4 FT.
SIDE INLET WEIR AT Q. CR.									N	
842+00	6900				8.5		3.6	1296.67	B	
830+00					↓		↓	1297.03	SB	
822+50								1297.26	B	
810+00								1297.63	SB	
788+00								1298.29	S	
766+00					8.4			1298.95	SB	
757+50					↓			1299.21	S	
753+00								1299.34	N	
745+00					8.4			1299.58		
Q. CR. RD. BRIDGE										- APPROX. 0.1 INCREASE IN DEPTH BY BRIDGE PIER MOM. LOSS ANAL.
745+00			↓		8.5		↓	1299.58	N	
744+00		↓	200		8.4		3.6	1299.61	R	TRANSITION
741+50			150	↓	8.3		4.7	1299.69		- BEGIN TEMP INLET
740+00	↓		—		—	↓		—		- MATCH EXISTING CHANNEL INVERT

2 2

COMPUTATION SHEET
SCS-ENG-573A Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA | PROJECT RWCD REACH 3
BY D. THACKERAY | DATE 5/27/83 | CHECKED BY | DATE | JOB NO.
SUBJECT HYDRAULIC DESIGN OF DROP @ STA 857+00 | SHEET OF

PROBLEM: MAKE A PRELIMINARY HYDRAULIC DESIGN OF THIS DROP SPILLWAY AT STA 857+00

ANALYSIS: 1. Q = 3100 CFS.

2. TRIAL CREST EL 1296.20 (U.S. CHANNEL INVERT).

3. CH. INV. EL 1290.70 (DOWNSTREAM).

4. TRANSITIONS FROM B=200, Z=3 EARTH CHANNEL (APPROPRIATE TO WEIR LENGTH L SELECTED) WILL BE CONSTRUCTED.

5. CHECK PREDICTED FLOW CHARACTERISTICS UP AND DOWNSTREAM BY WSP COMPUTATIONS.

6. USE NEH 11 procedures.

7. CHANNEL UPSTREAM (TRIAL) B=200, Z=3, S=0.0005

COMPUTATION SHEET

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

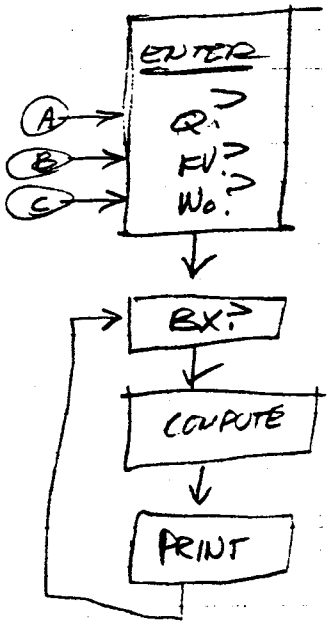
STATE: ARIZONA PROJECT: RWCD REACH 3
D.T. 7/19/83 CHECKED BY: YML DATE: 7/83 JOB NO.
SED. BASIN DESIGN SHEET

PROBLEM: NEED APPLE PROG. TO COMPUTE SED REMOVAL.

$W = W_0 e^{-\frac{WBX}{Q}}$

			PRINT
INPUT:	Q =	DES. FLOW	= Q
	BX =	(L)(W)	= BX
	W =	FALL V.	= FV
	W_0 =	INITIAL WT	= WO
OUT:	W		= FV
	W_0		= WO
	BX		= BX
	$e^{-\frac{WBX}{Q}} = K$		= K
	$W_0 K$		= W

FLOW CHART: HAVE: SEDR



REG	
00	
01	Q
02	BX
03	FV
04	WO
05	K
06	$W_0 K = W$

COMPUTATION SHEET

ARIZONA ROUTE REACH 3

D.T. 7/19/83

SED. BASIN DESIGN

CHECKED BY DATE JOB NO.

SHEET

SETTLING BASIN DESIGN:

ONE SEDIMENT REMOVAL RELATION IS GIVEN BY:

FROM ASCE "SED. ENGR" MAN OF PRACT 1975 PS82

$$W = W_0 e^{-Wx/q}$$

Where W = WT OF SED. LEAVING BASIN (lb)
W_0 = WT OF SED. ENTERING BASIN (lb.)
x = LENGTH OF SETTLING BASIN (ft.)
q = Unit discharge (cfs/ft)
W = settling Vel (ft/s)

USING $q = Q/b$ where b = AVG BASIN WIDTH

$$W = W_0 e^{-\frac{Wbx}{Q}} = (WO)\left(e^{-\frac{(FV)(Bx)}{Q}}\right)$$

ARIZ RINCO REACH 3

DT 7/19/83

SED. REMOV. PROG. /SEC. BASIN DESIGN

```
01♦LBL "SEDR"
02 ADV
03 " **SEDR**"
04 AVIEW
05♦LBL A
06 RCL 01
07 "Q?"
08 PROMPT
09 STO 01
10♦LBL B
11 RCL 03
12 "FV?"
13 PROMPT
14 STO 03
15♦LBL C
16 "W0?"
17 PROMPT
18 STO 04
19♦LBL D
20 RCL 02
21 "BX?"
22 PROMPT
23♦LBL 05
24 STO 02
25 RCL 03
26 *
27 RCL 01
28 /
29 CHS
30 E↑X
31 STO 05
32 RCL 04
33 *
34 STO 06
35 ADV
36 "FV="
37 ARCL 03
38 PRA
39 "W0="
40 ARCL 04
41 PRA
42 "BX="
43 ARCL 02
44 PRA
45 "K="
46 ARCL 05
47 PRA
48 "W="
49 ARCL 06
50 PRA
51 "BX?"
52 PROMPT
53 GTO 05
54 END
```

ARIZONA RWCD REACH 3

D.T. 7/19/83

SEC. BASIN DESIGN

```
        LBL T SCOR
T       ** SCOR **
        AVIEW
        PAUSE
        LBL A
        RCL 01
        T Q?
        PROMPT
LBL B   → STO 01
        RCL 03
        T FU?
        PROMPT
        STO 03
LBL C   → RCL 04
        T NO?
        PROMPT
        STO 04

        LBL D
        RCL 02
PR      > RX?
        STO 02

        RCL 3
        ×
        RCL 01
        ÷
        LN
        e^x
        STO 05

        RCL 04
        ×
        STO 06
```

```
PRINT
  > ADU FU=
    ARCL 01
  > PRA WO=
    ARCL 4
  > PRA RX=
    ARCL 02
  K= PRA
    ARCL 05
  > PRA
    W=
    ARCL 06
    PRA
    STOP
    GTO D
```

ARIZ RWCD REACH 3

DT 7/19/83

SED REMOVAL / SED. BASIN DESIGN

SEDP

FV=0.0394
W0=0.1200
BX=10,000.0000
K=0.9575
W=0.1065

FV=0.0394
W0=0.1200
BX=50,000.0000
K=0.5507
W=0.0661

FV=0.0394
W0=0.1200
BX=100,000.0000
K=0.3033
W=0.0364

FV=0.0394
W0=0.1200
BX=20,000.0000
K=0.7877
W=0.0945

FV=0.0394
W0=0.1200
BX=40,000.0000
K=0.6205
W=0.0745

FV=0.0394
W0=0.1200
BX=60,000.0000
K=0.4988
W=0.0587

FV=0.0394
W0=0.1200
BX=100,000.0000
K=0.3033
W=0.0364

FV=0.0492
W0=0.0800
BX=10,000.0000
K=0.9615
W=0.0689

FV=0.0492
W0=0.0800
BX=20,000.0000
K=0.7421
W=0.0594

FV=0.0492
W0=0.0800
BX=40,000.0000
K=0.5507
W=0.0441

FV=0.0492
W0=0.0800
BX=60,000.0000
K=0.4087
W=0.0327

FV=0.0492
W0=0.0800
BX=100,000.0000
K=0.2251
W=0.0180

FV=0.0886
W0=0.2000
BX=10,000.0000
K=0.7646
W=0.1529

FV=0.0886
W0=0.2000
BX=20,000.0000
K=0.5846
W=0.1169

FV=0.0886
W0=0.2000
BX=40,000.0000
K=0.3417
W=0.0683

FV=0.0886
W0=0.2000
BX=60,000.0000
K=0.1998
W=0.0400

FV=0.0886
W0=0.2000
BX=100,000.0000
K=0.0683
W=0.0137

FV=0.1411
W0=0.1500
BX=10,000.0000
K=0.6521
W=0.0978

FV=0.1411
W0=0.1500
BX=20,000.0000
K=0.4253
W=0.0638

FV=0.1411
W0=0.1500
BX=40,000.0000
K=0.1809
W=0.0271

FV=0.1411
W0=0.1500
BX=60,000.0000
K=0.0769
W=0.0115

FV=0.1411
W0=0.1500
BX=100,000.0000
K=0.0139
W=0.0021

ARIZ RWCO REACH 3

D.T. 7/19/83

SED. REMOVAL / SED. BASIN DESIGN

FV=0.2461
W0=0.3000
BX=10,000.0000
K=0.4744
W=0.1423

FV=0.2461
W0=0.3000
BX=20,000.0000
K=0.2251
W=0.0675

FV=0.2461
W0=0.3000
BX=40,000.0000
K=0.0507
W=0.0152

FV=0.2461
W0=0.3000
BX=60,000.0000
K=0.0114
W=0.0034

FV=0.2461
W0=0.3000
BX=100,000.0000
K=0.0006
W=0.0002

SEDR

FV=0.1805
W0=0.1500
BX=10,000.0000
K=0.5788
W=0.0868

FV=0.1805
W0=0.1500
BX=20 000.0000
K=0.7350
W=0.0502

FV=0.1805
W0=0.1500
BX=40,000.0000
K=0.1122
W=0.0168

FV=0.1805
W0=0.1500
BX=60,000.0000
K=0.0376
W=0.0056

FV=0.1805
W0=0.1500
BX=100,000.0000
K=0.0042
W=0.0006

ARIZONA RWCD REACH 3

D.T. 7/19/83 7/83

SED. REMOVAL / SED. BASIN DESIGN

EXAMPLE:

$Q = 3300$ CFS

$\Delta X = 10{,}000$ FT^2

$FU = W = 0.24606$ FT/S

$W_0 = 0.3$

$$W = W_0 \, e^{-\frac{(FU)(\Delta X)}{Q}}$$

$$= 0.3\left(e^{-\left(\frac{(0.24606)(10{,}000)}{3300}\right)}\right)$$

$$= 0.3\,(0.47443)$$

$$\underline{\underline{W = 0.14233}}$$ OK

ARIZ.
D.T.
SEL. PSHOT / SEL. BASIN DESIGN
7/19/83
RWCD DETAILS
SMK
7/83

SIZE		(W_o) REPRESENT. FRACTION	FALL VEL. FT/S	BX = 10,000		BX = 20,000		BX = 40,000		BX = 60,000		BX = 100,000	
				K	W	K	W	K	W	K	W	K	W
D_{85}	0.50	0.30*	0.24606	0.474	0.142	0.775	0.068	0.051	0.015	0.011	0.003	0.001	—
D_{60}	0.37	0.15	0.18045	0.579	0.087	0.335	0.050	0.112	0.017	0.038	0.006	0.004	0.001
D_{50}	0.30	0.15	0.14108	0.652	0.098	0.425	0.064	0.181	0.027	0.077	0.012	0.014	0.002
D_{30}	0.21	0.20	0.08858	0.764	0.153	0.585	0.117	0.342	0.068	0.200	0.040	0.068	0.014
D_{15}	0.14	0.08	0.04921	0.862	0.069	0.742	0.059	0.551	0.044	0.409	0.033	0.225	0.018
D_{10}	0.115	0.12	0.03937	0.887	0.107	0.788	0.095	0.621	0.075	0.489	0.059	0.303	0.036
			ΣW		0.55		0.45		0.25		0.15		0.07

$W = W_o K$

* Arbitrary values

ARIZONA

RWCD Reach 3

D. Tusdevay 7/19/83 LMS 7/83

SED. REM. / SED. BASIN DESIGN

DETERMINE PARTICLE SIZE FOR WHICH CRITICAL SHEAR STRESS EQUALS SHEAR STRESS IN THE CHANNEL WITH:

$Q_{10} = Q_{100} \times 0.25 = 8100(0.25) = 2025$ cfs

$b = 200, z = 3, n = 0.027, s = 0.0003$

$d = 4.08$
$V = 2.34$
$A = 865$
$P = 225.8$
$R = 3.83$

BASIC $\tau = \gamma_w R s_e = 62.4(3.83)(0.0003)$
≈ 0.0717 psf

ASCE MAN 54

— FROM FIG 2.46 USING VELOCITY CRITERIA CRITICAL SIZE BY THE VARIOUS CRITERIA RANGES FROM 4 TO 25 MM.

— FROM FIG 7.44 USING SHIELDS CURVE FOR 80°F d_s = 4 MM. (BASED ON τ_c = 0.07 psf)

CONCLUSION: MOST SEDIMENT, WITH GRAIN SIZE TYPIFIED BY SAMPLE TO 4.75 MM (0.2'), WILL TEND TO BE WELL DISTRIBUTED IN THE RWCD CHANNEL BELOW Q. CR. IF PASSED THROUGH THE SED. BASIN AT THE CONFLUENCE WITH Q. CR. THE SED. BASIN

AVERAGE VELOCITIES OF UP TO 0.7 FT/S HAVE BEEN SUCESSFULLY USED IN DESIGN OF DESILTING BASINS FOR CARRYING IRRIG. WATER. A MAX D OF 2.0 FT WILL BE ADEQUATE FOR DESIGN IF LONGER AND NARROW

COMPUTATION SHEET

SCS ENG-523A Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA | PROJECT: RWCD REACH 3

BY: D. THACKERAY | DATE: 5/31/83 | CHECKED BY | DATE | JOB NO.

SUBJECT: HYDRAULIC DESIGN OF DROP @ Sta 857+00 | SHEET

1. DETERMINE TRIAL WEIR LENGTH:

$Q = CLH^{3/2}$ $\quad C = 3.1$

$L = \left(\frac{Q}{CH^{3/2}}\right)$ $\quad Q = 8100$

$L = 2613\, H^{-3/2}$

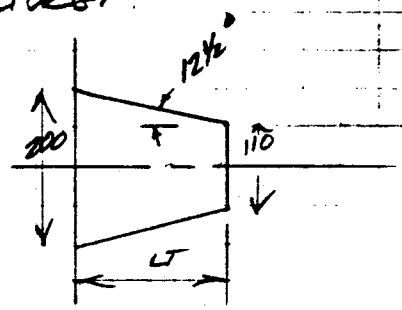
$H = \left(\frac{L}{2613}\right)^{-2/3}$

WORK PLAN SHOWS $L = 110$ FT

L	H	q	d_c
90	9.45	90.0	6.31
100	8.81	81.0	5.89
→ 110	8.26	73.6	5.55
120	7.80	67.5	5.21
130	7.39	62.3	4.94

2. TRY THE 110' WEIR LENGTH: DEVELOP A ROCK-LINED TRANSITION SECTION U.S. THAT WILL KEEP MAX. FLOW DEPTH BELOW THE TRIAL GRADE LINE.

TR25 & SI-19 SUGGESTS KEEPING MAX. TAPER OF TRANSITION TO 12½° FROM ℄ OF THE STRUCTURE:



$LT = \left(\frac{200-110}{2}\right)\frac{1}{\tan 12.5°}$

$= 203$ FT

USE $LT = 200$ FT

COMPUTATION SHEET

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ARIZONA — RWCD FLOODWAY REACH 3

D. THACKERAY — 6/7/83 — CHECKED BY — DATE — JOB NO.

SUBJECT: HYDRAULIC DESIGN OF DROP @ Sta 857+00 — SHEET

3. AT STA 857+20, 30' U.S. FROM WEIR (SEE WSP COMPS 5/31/83):

$D = 6.98$ FT
$H_t = 7.98$ FT
$V = 8.03$ FT/S

NEH 11 DROP SPILLWAYS

4. $Q_{FT} = (1.10 + 0.01F)Q_r$

$= (1.10 + 0.01(5.5))\ 8100)$

$= 9355$ CFS

p. 5-12

5. $Q_S > Q_{FT}$

$q_{FT} = 9355/110 = 85.045$

$d_{cFT} = 6.5$

$h_{FT} = 1.5(6.5) = 9.75$

$h_{min} \geq 9.75$ FT

6. REQUIRED to depth $t \geq 1.75 d_c$

$t \geq 1.75(5.55) = 9.71$

$t_{from\ WSP} = 9.22$ FT

$h/F = \frac{7.98}{5.5} = 1.45$ (1.4/3 is cited as max model tested)

$h/t = \frac{7.98}{9.22} = 0.866$

USE $L_C/F = 10$

$L_B = 55$

COMPUTATION SHEET

U.S. DEPARTMENT OF ... SOIL CONSERVATION ...

ARIZONA — RUCD FLOODWAY REACH 3

D. THACKERAY 6/13/83 — CHECKED BY — DATE — JOB NO

HYDRAULIC DESIGN OF DROP @ STA 857+00 — SHEET

7. LOCATION OF FLOOR BLOCKS LF

USE $\frac{LF}{F} = 8.5$

$\underline{LF = 46.75}$

8. FLOOR BLOCK HT $= 0.8 d_c$

$= 0.8(5.55)$

$= 4.44$ FT

9. FLOOR BLOCK WIDTH $= (0.4 \pm 0.15) d_c$

$= 2.22 \pm 0.833$

$= 1.39$ to 3.05 FT

10. FLOOR BL. LENGTH $= (0.4 \pm 0.15) d_c$

$= 1.39$ to 3.05 ft

11. FL. BL SPACING: $0.2 d_c$ @ SIDEWALL

$0.6 > \frac{\#BL(\text{BLOCK WIDTH})}{L+1} > 0.5$

12. LONG SILLS: AS REQ'D

COMPUTATION SHEET

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ARIZONA — PROJ: ROXO FLOODWAY REACH 3

O. THACKERAY — DATE: 6/13/83 — CHECKED BY — DATE — JOB NO

SUBJ: HYDRAULIC DESIGN OF DROP @ Sta 857+00 — SHEET

13. TRANSVERSE SILL HT $0.4d_c = 2.22$ ft

14. SIDEWALL HT $t + 0.85d_c = 9.22 + 0.85(5.55)$

$= 13.94$ ft

COMPUTATION SHEET

SCS-ENG-5234 Rev. 2-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ARIZONA — PROJ. RWCD FLOODWAY REACH 3

D. THACKERAY — CHECKED BY — 6/14/83 — DATE — JOB NO.

HYDRAULIC DESIGN OF DROP @ Sta 857+00 — SHEET

LAYOUT:

1. Net 11, ~~DROP SPILLWAYS~~, SHOWS THE TYPE "C" DROP WITH ARROYO CHANNEL WIDTH CHANGES UPSTREAM AND DOWNSTREAM.

2. TR-25 CALL FOR NON-IMPORTANT TRANSITIONS CONVERGE (OR DIVERGE) AT NO MORE THAN 12½° WITH ℄ OF CHANNEL.

3. SOMETHING BETWEEN THESE APPROACHES WILL BE NEEDED TO CONTROL VELOCITY AT MIN COST.

PROFILE:

1. PLACING THE DROP CREST AT THE CHANNEL INVERT LEVEL (U.S.) IS PROPOSED. THIS WILL REQUIRE ADDITIONAL RR AND A TRANSITION TO CONTROL VELOCITY.

PLACING THE CREST ABOVE THE INVERT IS UNDESIRABLE DUE TO POTENTIAL SEDIMENT ACCUMULATION. THIS ACCUMULATION WOULD REQUIRE ADD'L MAINTAINANCE

COMPUTATION SHEET
SCS ENGINEERING Rev. 9-69

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ARIZONA
PROJECT RWCD FLOODWAY REACH 3
D. THACKERAY 6/13/83
CHECKED BY DATE JOB NO
HYDRAULIC DESIGN OF DROP @ STA 657+00
SHEET OF

DISCUSSION ON THE DESIGN OF THE INLET AND OUTLET CHANNELS ADJACENT TO THE TYPE C DROP:

CONSIDERATIONS:

LOCATION:

1. A SITE ADJACENT TO CHANDLER HTS. BRIDGE MAY REQUIRE LESS TOTAL AMT. OF RIP-RAP. A NARROWER BOTTOM WIDTH WILL ALLOW CLEARANCE OF THE E. ABUT OF THE CHANDLER HTS. RD. BRIDGE, ON THE PRESENT FLOODWAY ALIGNMENT.

2. A SITE FARTHER UPSTREAM NEEDS TO BE EVALUATED FOR COST COMPARISON NOT NEEDED

ALIGNMENT:

1. THE ALIGNMENT WILL HAVE TO BE MOVED 20' W TO PROVIDE CLEARANCE UNDER CHAND. HTS. BRIDGE.

2. A TRANSITION TO THE BRIDGE CAN BE INCORPORATED WITH THE DROP.

ARIZONA RWCD REACH 3

D.T. 7/8/83

HYDR. DESIGN OF DROP @ Sta 857+00

$Q = 8100$, $L = 110$, $d_c = 5.55$, $q_s = 73.64$

$H \approx 9.5$

$F = 5.5$

$H/F = 1.73$

$0.7 d_c = 0.7(5.55) = 3.89$

$T_W \approx 9.4$ FT

SUB $= 9.4 - 5.5 = 3.9$ FT $= H_2$

ES207 SH 2/3

FIND H_1 given q_s and H_2

$$\frac{q_s^{2/3}}{H_2} = \frac{(73.64)^{2/3}}{3.9} = 4.5$$

FROM ES 207 FIND:

$H_1/H_2 = 2.15$

$H_1 = 2.15(3.9) = 8.39$

SUBMERGENCE $= 0.7 d_c$ ∴ FREE FLOW EQN APPLIES.

ARIZONA RWCD REACH 3

DT 7/8/83

HYDR. DESIGN OF DROP @ STA 237+00

$Q = 8100$

$L = 110$

$d_c = 5.55$; $0.7 d_c = 3.89$

$q_s = 73.64$

$T_w = 9.4$ FT

TRY DROP = 4 FT

FIND:

$H_2 = \text{SUM.} = 9.4 - 4 = 5.4$ FT

$$\frac{q_s^{2/3}}{H_2} = \frac{(73.64)^{2/3}}{5.4} = 5.25$$

FIND FROM EQ 207:

$H_1/H_2 = 1.6$

$H_1 = 1.6(5.4) = 8.64$

TRY DROP = 4.75 FT

$H_2 = 9.4 - 4.75 = 4.65$

$$\frac{q_s^{2/3}}{H_2} = \frac{(73.64)^{2/3}}{4.65} = 3.78$$

$H_1/H_2 = 1.82$

$H_1 = 1.82 H_2 = 1.82(4.65) = 8.46$

ARIZONA RIOCD REACH 3

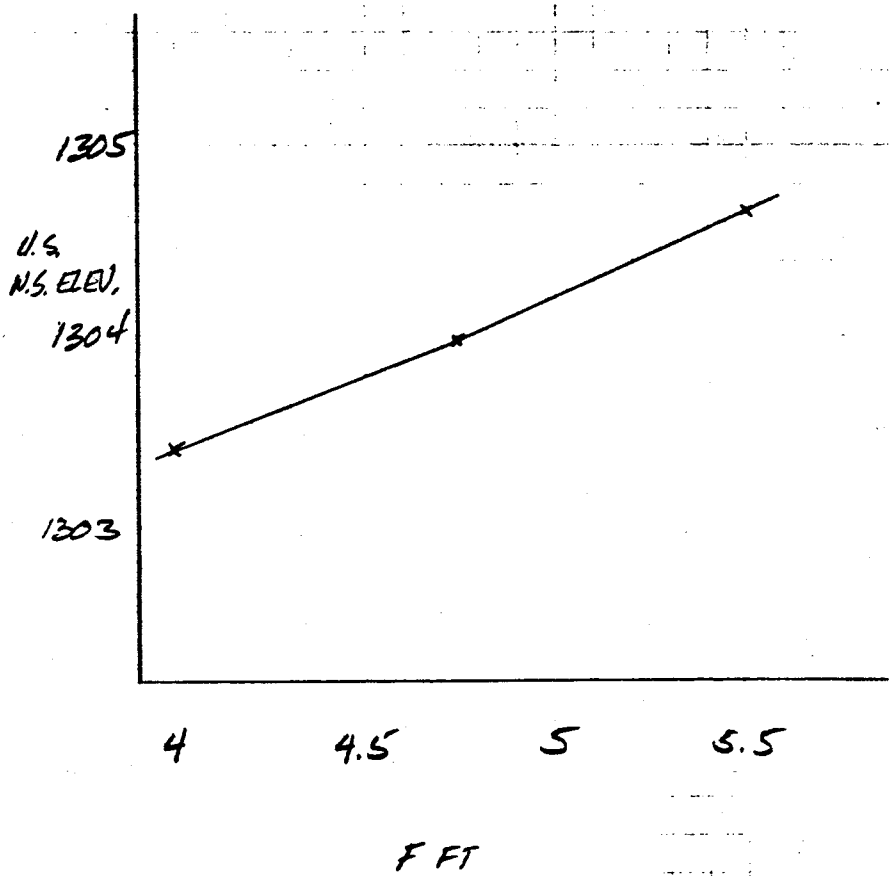
D.T. 7/8/03

HYDR. DESIGN OF DROP @ Sta 857+00

W.S. EL. U.S. VS. DROP

INV EL. OS = 1290.77

F	H_1	H_1 + F + INV. EL
4	8.64	1303.41
4.75	8.46	1303.98
5.5	8.39	1304.66



ARIZONA RIVER REACH 3

D.T 7/11/83 YM 7/83

HYDR. DESIGN OF DROP @ STA 857+00

TRY DESIGN w/ L = 120 FT

$Q = 8100$ $t_w = \cancel{9.4}$ 9.0 FT

$q = 67.5$

$d_c = 5.21$ ✓

DETERMINE H_1 FROM DW #15 FOR F = 5.5 FT

$H_2 = \cancel{9.4}\ 9.0\ FT - 5.5 = \cancel{3.9}\ 3.5$

$\frac{q_s^{2/3}}{H_2} = \frac{(67.5)^{2/3}}{\cancel{3.9}\ 3.5} = \cancel{4.25}\ 4.8$

ES 207 SH 3

$H_1/H_2 = \cancel{2.04}\ 2.28$

$H_1 = \cancel{3.9}\ 3.5\ (\cancel{2.04}\ 2.28) = \cancel{7.96}\ 7.98 \approx 8.0\ FT$ ✓

CHECK: $H/F = 8/5.5 = 1.45$ (slightly greater than 1.43 OK) ✓

$t_w/d_c = 9.4/5.21 = 1.80$ (> 1.75 ok)

7/25/83 $(9/5.2) = 1.73$

$V_{at\ crest} = 8100/120(5.2) = 12.96 \approx 13.0\ FT/S$

CHECK OTHER DIMENSIONS PER DEM 11:

$Q_{FR} = (1.10 + 0.01F)Q_1 = (1.1 + 0.1(5.5))8100$

$Q_{FR} = 9356$ CFS

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STATE ARIZONA PROJECT RWCD REACH 3

BY D.T. DATE 7/13/83 CHECKED BY YMK DATE 7/83 JOB NO.

SUBJECT HYDR. DESIGN OF DROP @ Sta 857+00 SHEET OF

NEH 11
p 5-12

REQUIRED TAILWATER DEPTH $t \geq 1.75 d_c$:

$t \geq 1.75 d_c$

$\geq 1.75(5.21)$

$\geq \underline{9.12}$ 9.0 per WSP CK YMK

L_B LENGTH OF BASIN:

$h = 8.0$ ft, $F = 5.5$, $h/F = 1.45$ ✓

$L_B/F = 10.1$ ✓

$L_B = 10.1(5.5) = 55.6$ ✓

USE $L_B = 55$ ft ✓

L_F LOCATION OF FLOOR BLOCKS:

$L_P/F = 8.4$

$L_P = \cancel{8}^{8.4}(5.5) = \cancel{44.0}^{46.2}$ USE 46.0

H_P HEIGHT OF FLOOR BLOCKS:

$H_P = 0.8 d_c = 0.8(5.21) = 4.17$

USE 4 ft ✓

COMPUTATION SHEET

STATE ARIZONA PROJECT ROOD REACH 3

BY D.T. 7/13/83 CHECKED BY LM DATE 7/83 JOB NO.

HYDR. DESIGN OF DROP @ Sta 357+00 SHEET OF

FLOOR BLOCK WIDTH $(0.4 \pm 0.15)d_c$

$FBW = 0.4(5.21) \pm 0.15(5.21)$

$= 2.08 \pm 0.78$

$= 1.30$ to 2.87

USE FBW = 2FT ✓

FLOOR BLOCK LENGTH FBL $(0.4 \pm 0.15)d_c$

USE FBL = 2FT ✓

FLOOR BLOCK SPACING: (50 - 60)% OF L TOTAL

- OR 60 TO 72 FT TOTAL BASIN WIDTH/ OCCUPIED OR 30 TO 36 BLOCKS USED.
- USE 34 BLOCKS ✓
- END SPACE $= 0.2d_c = 0.2(5.21) = 1.04$ FT AT SIDE
- TRY SIDE SP = 1 FT

USE: 34 BLOCKS @ 2' ✓ = 68 ✓
33 INTERIOR SP @ 1.5' ✓ = 49.5 ✓
2 END SP @ 1.25 ✓ 2.5 ✓
120 FT

COMPUTATION SHEET

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STATE ARIZONA PROJECT RWCD REACH 3

BY DT DATE 7/13/83 CHECKED BY DWF DATE 7/83 JOB NO.

HYDR. DESIGN OF DROP @ Sta 857+00 SHEET

TRANSVERSE SILL HEIGHT = 0.4dc

TSH = 0.4(5.21) = 2.08 USE 2 FT ✓

SIDEWALL HT = t + 0.85dc

= t + 0.85(5.21)

SWH = t + 4.43

FOR t = 9.4 (9.0) SWH = 9.4 + 4.4 = 13.8 (13.4) = 14.0 FT OK

USE SWH = 14 FT

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HYDR. DESIGN OF DROP @ sta 857+00

CHECK FREEBOARD REQ'D.

TRY $h = 10$

ES-111 $h/f = 10/5.5 = 1.82$ (NOT ON CHART)

DETERMINE H_1 USING DN 15

USE APPROX $t_w = 10.4$ FT FOR $Q = 9350$; $q = 77.92$

$H_2 = 10.4 - 5.5 = 4.9$

$\frac{q_s^{2/3}}{H_2} = 3.72$

ES-207 FIND $H_1/H_2 = 1.8$

$H_1 = 4.9(1.8) = \underline{8.82}$

Try $t_w = 10$
$H_2 = 4.5$
$q_s^{2/3}/H_2 = 4.05$
$H_1/H_2 = 1.95$
$H_1 = 7.91$

$t_w = 11$
$H_2 = 5.5$
$q_s^{2/3}/H_2 = 3.32$
$H_1/H_2 = 1.635$
$H_1 = 8.99$

USE TOTAL WEIR DEPTH = $\underline{10 \text{ FT}}$

ARIZONA RWCD REACH 3

D.T. 7/14/83

HHLF. DESIGN OF DROP @ STA 857+00

HEADWALL EXTENSIONS

TRY $C_{W_{REQD}} = 8.5$

$$C_W = \frac{\Sigma L_H + 3L_W}{3H}$$

$H_{MAX} = 5.5$

$L_W = 0$

$$\Sigma L_{H_{REQ}} = 3H C_W$$
$$= 3(5.5)8.5$$

$\Sigma L_{H_{REQ}} = 140.25$

$2L_{EXT} = 140.25 - L_P$

$$L_{EXT} = \frac{140.25 - 55}{2}$$

$L_{EXT} = 42.6$ FT FOR $C_W = 8.5$

FIND C_W FOR VARIOUS EXTENSIONS:

$$C_W = \frac{55 + 2EXT}{16.5}$$

EXT	CW
0	3.33
10	4.55
20	5.76
30	6.97
40	8.18

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SUBJECT HYDR. DESIGN OF DROP @ STA 857+00 | SHEET 1 OF 1

CONSIDERATIONS FOR THIS STRUCTURE FROM THE TECH. REP. FOR THE SOUTH FORK TILLATOBA CREEK DROP HYDRAULIC MODEL INVESTIGATION (SEPT 82) AND TRANSMITTAL LETTER FROM DAVE RALSTON TO J. STEVENSON 7/1/83:

1. THE ENTRANCE VELOCITIES WILL BE IN THE RANGE (8-9 FT/SEC) FOR WHICH IMPROVEMENT IN FLOW DISTRIBUTION CAN BE OBTAINED BY ADDITION OF CURVED WINGWALLS TO THE INLET. ($R \approx 18$ FT)

2. NARROWING OF THE OUTLET CHANNEL IMMEDIATELY BELOW THE STRUCTURE MAY IMPROVE RATE AT WHICH FLOW DISPERSES LATERALLY IN THE DOWNSTREAM CHANNEL AND ELIMINATE REVERSE FLOW.

3. ARMORING OF THE OUTLET CHANNEL ELIMINATES THE NEED FOR WINGWALLS.

4. IF THE OUTLET CHANNEL IS NARROWED, ARMORING WILL HAVE TO BE EXTENDED THROUGH AND BEYOND THE TRANSITION TO FULL CHANNEL WIDTH.

5. THE FLOW JET FROM THE WEIR TO THE STRUCTURE FLOOR CAN BE POSITIVELY CONTROLLED BY PROVIDING A TRAJECTORY SHAPED FLOOR. THIS MODIFICATION IS NOT JUSTIFIED IN THIS CASE WHERE CAPACITY FLOWS ARE INFREQUENT AND CONSTRUCTION COSTS WITH THE 110-120' DW WIDE SPILLWAY WILL BE GREATLY INCREASED.

COMPUTATION SHEET

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STATE ARIZONA | PROJECT RWCD FLOODWAY REACH 3

D. THACKERAY 5/23/83 | CHECKED BY JML | DATE 5/83 | JOB NO.

SELECT LOWER QUEEN CR. ALIGN & JCT. LOCATION | SHEET 1 | 3/4

PROBLEM: NEED TO DECIDE WHETHER OR NOT TO CONSTRUCT THE QUEEN CR. CUTOFF

ANALYSIS:

1. THE DECISION BETWEEN IMPROVING THE LOWER REACH OF QUEEN CR. ABOVE ITS EXISTING JUNCTION WITH THE RWCD FLOODWAY OR CONSTRUCTING A CHANNEL FROM THE QUEEN CR. BRIDGE ON HIGLEY ROAD WESTERLY TO THE RWCD ALIGNMENT WAS LEFT AS A DESIGNER'S CHOICE IN THE PRE-DESIGN DISCUSSIONS WITH THE ARIZONA DESIGN OFFICE. LEAST COST WAS THE SOLE CRITERIA DISCUSSED.

2. PEAK FLOW AT THE QUEEN CR. BRIDGE ON HIGLEY ROAD (Q_{100}) WITHOUT ADDITIONAL FLOOD CONTROL PROJECTS (AND WITHOUT THE SINCE CONSTRUCTED USBR SONOQUI DIKE) IS 8200 CFS (FROM UPDATE OF HYDROLOGY STUDIES — RWCD FLOODWAY — MAY 1977).

3. PEAK FLOW (Q_{100}) CONTRIBUTED BY THE QUEEN CR. WATERSHED BELOW SONOQUI DIKE IS 1871 CFS AT THE HIGLEY ROAD BRIDGE AND 1910 CFS AT CHANDLER HEIGHTS ROAD. (HYDROLOGY REPORTS P4 & 8). MAXIMUM OUTFLOW FROM THE SONOQUI DIKE IS 1400 CFS WITH THE W.S. AT THE DIKE TOP EL. MAXIMUM FLOW AT THE QUEEN CR. BRIDGE FOR THE 100YR EVENT IS 3300 CFS.

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BY D. THACKERAY | DATE 5/24/83 | CHECKED BY YMA | DATE 5/83 | JOB NO.
SUBJECT | SHEET 2 | B4

4. CAPACITY OF THE EXISTING Q. CREEK CHANNEL APPEARS TO BE GREATER THAN 3300 CFS, BASED ON ROUGH COMPUTATIONS. (SLOPE-AREA). VELOCITY, HOWEVER, WILL BE IN THE 5-7 FT/S RANGE.

5. THE HYDROLOGY STUDIES ASSUMED A CHANNEL CAPACITY OF 2000 CFS IMMEDIATELY DOWNSTREAM OF THE BRIDGE AT HIGLEY ROAD. THE REMAINING 6200 CFS WAS ASSUMED TO FLOW FROM THE BRIDGE TO THE RNCD FLOODWAY ALONG THE ALIGNMENT OF THE PROPOSED CUTOFF CHANNEL.

6. THE EXISTING QUEEN CR. CHANNEL INVERT AT THE QUEEN CR. BRIDGE IS AT APPROX. EL 1316.0; PROPOSED RNCD INVERT AT STA 757+44.25 IS EL 1296.81, LENGTH IS APPROX 2100 FT. CONSTRUCTION OF THE ALTERNATE ALIGNMENT WOULD NEED TO INCLUDE A STRUCTURE TO HANDLE A 19 FT DROP. (NOTE CTS ENG KELSH FOR Q CR 216 WORK SH#2 SHOWS EL 1317.80 ON SEC COR $\frac{10|11}{15|14}$ AT INTERSECTION OF QUEEN CREEK AND HIGLEY RD. CONTROL LEVELS, BK 3, P 36 HAS ADJ EL 1318.12 ON BC AT INTERSECTION OF Q CR & HIGLEY.)

7. ADDITIONAL FLOW IS DIRECTED TO THE EXISTING Q. CR. ALIGNMENT WESTERLY ALONG SECTION LINE $\frac{14}{23}$*. THIS FLOW WOULD HAVE TO BE COLLECTED REGARDLESS OF WHETHER OR NOT THE CUTOFF IS CONSTRUCTED.

*SONORUI
NASH

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ARIZONA — PROJECT: RWCD FLOODWAY REACH 3
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8. THE TWO ALTERNATES DIFFER IN THE DEGREE OF IMPROVEMENT PROVIDED:
- THE CUTOFF ALIGNMENT, INCLUDING AN ADDITIONAL DROP STRUCTURE, PROVIDES A CONTROLLED, STABLE GRADE FROM THE BRIDGE AT HIGLEY ROAD TO THE RWCD FLOODWAY.
- THE ALTERNATE USING THE EXISTING ALIGNMENT PROVIDES FOR ENTRY OF FLOW FROM THE QUEEN CR. CHANNEL TO THE RWCD FLOODWAY IN A SAFE, ECONOMIC MANNER - STABILITY OF THE QUEEN CR. CHANNEL UPSTREAM IS NOT IMPROVED OR ALTERED OTHER THAN BY LOCAL BACKWATER EFFECT FROM THE JUNCTION OR BASIN AT CHANDLER HTS RD.

ARIZONA
D. THACKERAY 5/24/83

RINCON REACH 3
JMJ 5/83

34 74

CONCLUSIONS:

1. THE LOWEST CONSTRUCTION COST ALTERNATIVE IS, BY INSPECTION, THE PRESENT ALIGNMENT. THE COST FOR A SEDIMENT REMOVAL BASIN AND SIDE INLET OF JUNCTION WITH THE RINCON FLOODWAY WILL BE OF THE SAME ORDER FOR EITHER ALTERNATE. THE CUTOFF ALTERNATE, HOWEVER, WOULD REQUIRE CONSTRUCTION OF 2100 FT (LESS THE DERRIS BASIN LENGTH) OF ADDITIONAL CHANNEL PLUS A DROP STRUCTURE WITH HEIGHT OF ORDER OF 19 FT AND Q ≈ 3300 CFS.

2. BENEFITS RESULTING FROM THE CUTOFF ALIGNMENT WOULD BE: REDUCED MAINTAINANCE COST, SINCE APPROX 1 MI. OF THE EXISTING Q. CR. CHANNEL COULD BE ABANDONED OR REDUCED IN SIZE; AND INCREASED PROPERTY VALUE OR PROFITS FROM SALE OF LAND ALONG THE PORTIONS OF THE EXISTING ALIGNMENT THAT MAY BE ABANDONED.

3. Construction of the cutoff would require review of the Wk-Plan and possible revision since it is outside the project boundary. JMJ

RECOMMENDATION:

BUILD ON THE EXISTING ALIGNMENT.

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ARIZONA | PROJECT: RWCD FLOODWAY
O. MACKEDAY | DATE: 6/1/83 | CHECKED BY | DATE | JOB NO.
SED. BASIN @ Q. CREEK | SHEET ___ OF ___

PROBLEM: DESIGN SED BASIN @ Q. CR.

ANALYSIS: 1. SUMMARIZE DESIGN SEDIMENT QUANTITIES.

2. DESIGN BASIN TO REMOVE RIND BEDLOAD.

3. PATTERN AFTER BASIN INSTALLED AT HONT HIGHWAY, WITH GROUTED ROCK CHUTE INLET & OUTLET WEIR, CHUTE, AND APRON.

4. KEEP AVE VEL IN BASIN < 2FT/S.

5. DESIGN FOR Q=3300 CFS.

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SED. BASIN DESIGN: SED. VOLUME, LAYOUT, TRAP. EFF. | SHEET

PROBLEM: NEED SEDIMENT VOLUME

ANALYSIS: 1. BEDLOAD QUANTITIES ARE PROVIDED IN A REPORT "BEDLOAD TRANSPORT ANALYSIS" TRANSMITTED APRIL 15, 1975 TO THE TSC BY R. ARRINGTON.

THE QUANTITIES CONTRIBUTED BY Q. CR. ARE:

Q (CFS)	VOL (TONS)	VOL @ γ_m = 85 pcf (A-F)
Q100	18,949 ✓	10.24 ✓
Q10	12,374 ✓	6.68 ✓
Q2	5,741 ✓	3.10 ✓

1 ton ✓ $= \frac{2000\ lb}{85\ lb/ft^3 \cdot (43560\ ft^3/AF)}$

$= 5.4016 \times 10^{-4}$ AF

[THE COMPUTATIONS AND ASSUMPTIONS (REGARDING PEAK FLOWS AND SEDIMENT QTYS.) USED TO DEVELOP THESE VALUES ARE NOT AVAILABLE] ✓

CONCLUSION: - PROVIDE 7 AF SED. STORAGE. ?
- Annual followed by 10 yr. event would exceed cap.
- 100 yr. would exceed cap.

OR PROVIDE 10 AF

D.T.

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D.T. — DATE: 7/19/83 — CHECKED BY: LMS — DATE: 7/83 — JOB NO.

SED. BASIN DESIGN — SHEET ... OF

TYPICAL SEDIMENT

	STATION	SAMPLE	PARTICLE SIZE (MM) D_{10}	D_{15}	D_{30}	D_{50}	D_{60}	D_{85}
2-7 SP/SM	759+50	TP-428 AWC	0.077	0.085	0.115	0.165	0.20	0.28
0-2 SP	731+00	TP-427 AWC	0.15	0.20	0.30	0.40	0.50	30.0
1-2 SP	701+90	TP-426 AWC	0.24	–	0.29	0.42	0.42	0.49
0-1.7 SP	649+50	TP-424 AWC	0.22	0.28	0.34	0.42	0.46	0.65
0-2 SP	759+50	TP-428 AWC	0.115	0.14	0.21	0.30	0.37	0.50

ASCE SED ENG M54 (1975) FIG 2.2 p.25

FALL VELOCITY

SAMPLE 759+50 0-2'
T = 20°C, WATER

SIZE MM	(FIG 2.2) FALL V CM/S	FIG 2.9 SF=G7 FV CM/S	FIG 2.9 FV FT/S	
0.115	0.9	1.2	0.03937 ✓	D_{10}
0.14	1.5	1.5	0.04921 ✓	D_{15}
0.21	1.8	2.7	0.08858 ✓	D_{30}
0.30	4.0	4.3	0.14108	D_{50}
0.37	5.3	5.5	0.18045	D_{60}
0.50	7.5	7.5	0.24606 ✓	D_{85}

1 FT/S =
1 FT = 12(2.54) CM
= 30.48 CM

1 CM/S = 0.03281 FT/S

ARIZONA RWCD REACH 3

D.T. 7/20/83

SEDIMENT BASIN AT Q(SED) CR.

PROBLEM: CONTINUE DESIGN of SED. BASIN AT Q CR.

ANALYSIS: 1.— DESIGN WITH KV = 60,000 MIN. (AVE. SURFACE AREA ≃ 60,000 FT²)
— THIS WILL ALLOW 85% OF MATERIAL REPRESENTED BY SAMPLE TP-428 ANC TO BE TRAPPED.

2. DESIGN WITH $V_{AVE\ MAX}$ = 2.0 FT/S WITH 2/3 OF SED CAP. USED.

3. CONSIDER TWO ALTERNATE JUNCTION SCHEMES:

A. USE A STRAIGHT DROP AT THE OUTLET OF THE SED. BASIN WITH A TRAPEZOIDAL CHANNEL ENTERING THE RWCD AT INVERT GRADE.

AND OTHER LAYOUTS PER 8/4/83 COMPS

B. USE A SIDE INLET WEIR AS USED AT HUNT HIGHWAY JCT w/ DWCD

4. PROVIDE 7 DAYS OF SED. STORAGE.

5. DIMENSION BASIN OUTLET SO THAT ALTERATION OF EXISTING FLOW CONDITIONS IN THE LOWER Q. CR. CHANNEL IS MINIMIZED. HIGH TAILWATER WILL CAUSE DEPOSITION UPSTREAM OF THE BASIN; LOW TAILWATER WILL CAUSE DEGRADATION.

ARIZONA
D.T.

RWCD REACH 3

7/20/83

1. CURRENT FLOW CONDITIONS IN QUEEN CR

"HYDROL. STUDIES"

Q_{10}: APPROX = 1/4 Q_{100}

RWCD 8100 × 0.25 = 2025 CFS
Q CR 3300 × 0.25 = 825 CFS

SLOPE & $\bar{S}$ STA 10+00 – STA 37+00

$$\bar{S} = \frac{9.9}{2700} = 0.0037 \text{ FT/FT}$$

SECTION & TYPICAL SECTION: b = 35
z = 4

NORMAL DEPTH:

n = 0.027
S = 0.0037
z = 4
b = 35

D (FT)	Q (CFS)	✓
10.0	8665	
9.0	6965	
8.0	5475	
7.0	4187	
6.5	3614	
6.0	3089	
5.5	2608	
5.0	2171	
4.0	1425	
3.0	839	
2.0	406	
6.21	3300	8.9

ARIZONA RWCD REACH 3

D.T. 7/21/83

CASE 1 STRAIGHT PIPE

- TRY WEIR EL. 1301
- BASIN INV. EL. 1297
- DESIGN W.S. IN RWCD ≈ 1304.7
- MAX W.S. IN BASIN ≈ 1307
- RWCD INV. EL ≈ 1296.4

FIND LENGTH OF WEIR FOR NON SUBMERGED CONDITION:

$$H = 1307 - 1301 = 6$$

$$Q = CLH^{3/2}$$

$$L = \frac{Q}{CH^{3/2}} = \frac{3300}{3.1(6)^{3/2}} = 72.4$$

H (ft)	L (ft)	D_c (ft)
4	133	2.68
5	95	3.35
6	72	4.03
7	57	4.71
8	47	5.35
6.8	60	4.55
7.7	50	5.14

ARIZONA D.T.

RWCD REACH 3

7/21/83

TRY L = 60 FT

Q = 3300
d_c = 4.55

H = 6.8 UNSUBMERGED

CHECK SUBMERGED CAPACITY:

WEIR EL 1300.5
INV = 1296.5
F = 4

H/F = 1.70

> 1.43 NOTED IN NEM 11 AS MAX.

SAF TP NO. 15 NOTES THAT THE STUDIES ARE VALID FOR MIN $\frac{Y}{d_c}$ = 1.0

WHERE Y = DIST FROM WEIR CREST TO THE APRON. WITH A SILL HT = 1 Y = 5.0
d_c = 4.55
AND $\frac{Y}{d_c}$ = 1.10

REQUIRED TAILWATER ≥ 1.75d_c
≥ 7.96 ~ 8.0 FT

ASSUMING PEAK FLOW IN Q. CR. W/ NO FLOW IN RWCD ; NORMAL DEPTH OF FLOW IN RWCD FOR Q = 3300 ≈ 5.5 FT.

FOR t_w = 5.5 , $d_c = \frac{T_w}{1.75} = \frac{5.5}{1.75} = 3.14$

WEIR LENGTH WOULD NEED TO BE ≈ 100 FT

ARIZONA
Q.T.

RWCD R.3

8/10/83

HYDRAULIC DESIGN: SEDIMENT BASIN

FROM RWCD BEDLOAD TRANSP. ANAL 4/15/75

1 TON = 2000#
@ γ_m = 80
1 TON = 25 FT³
= 5.7392E-4

Q. CR. SEDIMENT SUMMARY

EVENT	TONS	CY @ γ_m = 50 pcf
2 yr	5741	3.29
10	12374	7.10
100	18865	10.83

TEN A-F WAS SELECTED AS THE ORIGINAL SIZE FOR THE SEDIMENT BASIN AT QUEEN CR. THIS IS SLIGHTLY LESS THAN THE 100 YR BEDLOAD SEDIMENT QUANTITY AT THE JUNCTION WITH QUEEN CREEK ACCORDING TO THE STUDY OF 4/15/75. DESIGN VOLUME IS ALLOWED FOR 3 FT OF SEDIMENT STORAGE IN THE BASIN: DEPTH TO THE WEIR CREST IS 4 FT. AVERAGE VELOCITY IN THE BASIN WITH 3 FT OF SED. STORAGE IS 2 FT/S. STORAGE VOLUME AT THE OUTLET WEIR CREST IS APPROX 13 AF.

SEDIMENT WILL HAVE TO BE REMOVED FROM THE BASIN FOLLOWING ANY SIGNIFICANT FLOWS IN ORDER THAT CAPACITY TO RETAIN SEDIMENT FROM THE LESS FREQUENT EVENTS IS MAXIMIZED.

SOME BEDLOAD SEDIMENT WILL BE CARRIED INTO THE RWCD FOR THE LESS FREQUENT EVENTS. THE AMOUNTS CARRIED TO THE RWCD WILL NOT SIGNIFICANTLY REDUCE THE CHANNEL CAPACITY DURING THESE EVENTS. REMOVAL FROM THE CHANNEL WILL BE NEEDED. THIS APPROACH IS CONSISTENT WITH THE METHOD OF HANDLING SEDIMENT DELIVERED FROM THE SANTAN FRONT TO THE RWCD FLOODWAY IN REACH 2, THAT IS TO REMOVE IT FROM THE RWCD FLOODWAY

ARIZONA RWCD REACH 3

D.T. 7/25/83

SED. BASIN – TRAPEZOIDAL WEIR W/ GROUT CHUTE

PROBLEM: DESIGN ALTERNATE WITH GROUTED ROCK W/ R/C WEIR CREST.

ANALYSIS: 1. CRITERIA:

- MIN. 60,000 FT² AVE. MIN AREA
- 10 A-F SEDIMENT STORAGE
- DRAINAGE OF SEDIMENT POOL (RWCD INVERT EL 1296.9 APPROX.)
- MAX. WS EL. IN BASIN AT DESIGN FLOW = EL 1307 (3300 CFS).
- MAX AVE. VELOCITY IN BASIN = 2.0 FT/S

2. CHECK CONDITIONS WITH:

Q RWCD UPSTR OF JCT	Q RWCD DOWNSTREAM OF JCT	Q QUEEN CR
0	3300	3300
4800	8100	3300
6900	8100	1200

ARIZONA RWCD R3

D.T. 7/25/83

SED. BASIN DESIGN

1. NORMAL DEPTH IN RWCD: (NOT FROM WSP COMPUTATIONS:)

$n = 0.027$
$S = 0.0003$
$b = 200$
$z = 3$

Q (CFS)	d (FT)	APPROX. WS EL
3300	5.45	1302.0
4800	6.80	1303.3
6900	8.41	1304.9
8100	9.23	1305.7

2. THE SIDE WEIR SHOULD HAVE A CAPACITY OF 3300 CFS WITH A WS EL OF APPROX 1303.3 IN RWCD WITH WS. IN BASIN AT EL 1306.5.

USE 6:1 SS.

CHECK CAPACITY WITHOUT SUBMERGENCE (FOR DROP SPILLWAYS SUBMERGENCE LESS THAN 0.7 dc WILL NOT REDUCE THE WEIR CAPACITY)

$Q = CLH^{3/2} + CZH^{5/2}$

$C = 3.1$

$Z = 6$

Q = 3300 CFS

L	H
50	5.5
75	4.8
100	4.2
60	5.2

ARIZONA RWCD REACH 3

DT 7/28/83

SED. BASIN DESIGN

CHECK SUBMERGENCE:

SUB = WS EL - CREST EL
= 1303.3 - 1301.5
= 1.8

d_c: L = 70 ; Z = 6 ; Q = 3300

TEC #27

d_c = 3.67

SUB RATIO = $\frac{1.8}{3.67}$ = 0.49 OK

ARIZONA RWCD REACH 3
D.T. 7/25/03
SED. BASIN DESIGN

TEC PROG #27

CHECK CRITICAL DEPTH FOR:
$Q = 3300$
$d_c = 4.29$

WITH WEIR AT EL 1301.00
SUBMERGENCE FOR Q IN RWCD = 4600 CFS
AND APPROX WSEL = 1303.3

SUBMERGENCE = 1301 + 5.5 − 1303.3 = 3.2

RATIO = $\frac{3.2}{4.29}$ = 0.746 d_c

∴ SOME INCREASE IN WS EL WILL BE NEEDED IN THE BASIN TO PASS 3300 CFS.

TRY WEIR EL = 1301.5 H = 5.0

FIND L = 70 Z = 6 ; C = 3.1
Q = 3465 CFS
H = 5.0

→ OK USE WEIR L = 70 FT

- SET BASIN INVERT AT EL 1297.5
- ∴ DEPTH FROM INVERT TO WEIR = 4 FT.
- DESIGN BASIN FOR MAX. SED DEPTH = 3 FT
- KEEP V ≤ 2.0 FT/S W/SED DEPTH = 3 FT

FLOW AREA AT 2 FT/S W 3300 CFS = 1650 FT^2

D = 6 FT FIND BOTTOM WIDTH, WITH Z = 3, THAT WILL PROVIDE THIS AREA:

ARIZONA
O.T.

RWCD REACH 3

7/25/83

$z = 3 \quad d = 6$

b	A
100	708
200	1308
250	1608
275	1758
270	1668

USE CROSS SECTION W/ WIDTH AT EL 1300.5 = 270 FT.

AT BOTTOM EL 1297.5 BOTTOM WIDTH:

$= 270 - (2(3)3) = 252$

USE BOTTOM WIDTH = 250 FT.

FIND BASIN LENGTH:

VOL REQ'D = 10 AF = 435,600 FT^3

$$V = \frac{D}{6}(A + 4B + C)$$

WHERE: D = DEPTH
A = TOP AREA
B = MID "
C = BOTTOM "

D = 3 FT

$C = 250L$

$B = (250 + \frac{6D}{2})(L + \frac{6D}{2})$

$= (250 + 9)(L + 9) = 259L + 2331$

$A = (250 + 6D)(L + 6D) = 268L + 4824$

ARIZONA RWCD REACH 3

D.T. 7/25/83

SED. BASIN DESIGN

$$V = \frac{3}{6}\left(268L + 4824 + 4(259L + 2331) + 250L\right)$$

$$= \tfrac{1}{2}\left((268 + 1036 + 250)L + 14148\right)$$

$$= \tfrac{1}{2}(1554L + 14148)$$

$$V = 777L + 7074$$

FOR $V = 435600\ Ft^3$

$$435600 = 777L + 7074$$

$$L = \frac{435600 - 7074}{777}$$

$$= \frac{428\,526}{777}$$

$$\underline{\underline{L = 551.5\ Ft}}$$

CHECK:

$C = 250(551.5) = 137\,875$

$B = 259(560.5) = 145\,170$

$A = 268(569.5) = 152\,626$

$$V = 0.5\left(137875 + 4(145170) + 152626\right)$$

$$= \underline{\underline{435{,}590\ Ft^3}} \quad OK$$

ARIZONA RWCD REACH 3

D.T. 8/1/83

SED. BASIN DESIGN

WEIR : SUMMARY :

ELEV = 1301.5

LENGTH = 70 FT

SS = 6:1

ARIZONA RWCD REACH 3

D.T. 8/4/83

HYDRAULIC DESIGN: SED. BASIN OUTLET

PROBLEM: NEED TO DESIGN SIDE WEIR / SEDIMENT BASIN OUTLET / JCT. W/ RWCD.

ANALYSIS: 1. DESIGN OF THE SEDIMENT BASIN

PRESUMED:

Q = 3300

WEIR EL = 1301.7

WS " EL = 1306.7

2. DISCHARGES:

DESIGN FLOW IN RWCD BELOW JCT = 6100 CFS

" " " " ABOVE " = 6900

CASE 1: RWCD Q = 6900

Q CR Q = 1200

Σ Q = 8100

CASE 2: RWCD Q = 4800

Q CR Q = 3300

Σ Q = 8100

CASE 3: RWCD Q = 0

Q CR Q = 3300

Σ Q = 3300

ARIZONA D.T.

8/4/83

RWCD REACH 3

SOLUTION:

1. LAYOUT:

- THE SIDE WEIR CONFIGURATION WILL REQUIRE LESS EARTHWORK AND WILL PROVIDE A SMOOTHER CHANNEL SECTION THAN THE WYE-TYPE LAYOUT.
- NO MOMENTUM IN THE DIRECTION OF FLOW IN THE RWCD IS ADDED: THIS WILL CAUSE SOME INCREASE IN FLOW DEPTH UPSTREAM.
- THE NON-UNIFORM FLOW IN THE AREA OF THE WEIR AND ALONG THE OPPOSITE BANK WILL INCREASE THE EROSIVE ATTACK ON THE CHANNEL. SOME ADDITIONAL ROCK RR. WILL BE REQUIRED.

HEC HO 14
USDOT
12/75
p VI-13 ff

- A RECTANGULAR WEIR AND CHUTE SECTION WILL PROVIDE A MORE UNIFORM HYDRAULIC JUMP THAN THE TRAPEZOIDAL SECTION. THE TRAPEZOIDAL WEIR USED AT THE HUNT HIGHWAY BASIN USED AN EQUIVALENT $q = 13.3$ cfs/ft: HERE $q = 33$. cfs/ft. AT HUNT HIGHWAY THE DESIGN PEAK FLOW IN THE SIDE DRAINAGE IS A LESSER PROPORTION OF THE TOTAL RWCD FLOW: THE PEAK SIDE DRAINAGE FLOW ALSO OCCURS WITH LESS THAN PEAK FLOW IN RWCD AT HUNT HIGHWAY.

ARIZONA
D.T.

8/4/83

RWCD REACH 3

DEPTH Vs Q FOR TRAPEZOIDAL WEIR:*

B=35FT

D	A	V**	$V^2/2g$	H	Q
5.0	250	13.2	2.71	7.71	3,857
5.5	283.25	11.7	2.11	7.61	3,764
6.0	318.00	10.4	1.67	7.67	3 820
6.5	354.25	9.3	1.35	7.85	3 992
7.0	392.00	8.4	1.10	8.10	4 238
7.5	431.25	7.7	0.91	8.41	4 554
8.0	472.00	7.0	0.76	8.76	4 925
8.5	514.25	6.4	0.64	9.14	5 347

*

$Q = CLH^{3/2} + CZH^{5/2}$

$C = 3.1$

$H = D + \frac{V^2}{64.4}$

B= 30FT

D	A	V**	$V^2/2g$	H	Q
5.0	225.00	14.7	3.34	8.34	4168
5.5	255.75	12.9	2.59	8.09	3871
6.0	288.00	11.5	2.04	8.04	3824
6.5	321.75	10.3	1.63	8.13	3909
7.0	357.00	9.2	1.32	8.33	4078
7.5	393.75	8.4	1.09	8.59	4353
8.0	432.00	7.6	0.91	8.91	4677
8.5	471.75	7.0	0.76	9.26	5047

* 3300CFS

ARIZONA D.T. 8/4/83 RWCD REACH 3

HYDRAULIC DESIGN: SED. BASIN OUTLET

3. ALTERNATE LAYOUTS:

TYPE

A. TRAPEZOIDAL SIDE WEIR (⊥ TO RWCD)
THIS WOULD BE SIMILAR TO THE OUTLET AT HONT HWY. DEBRIS BASIN.

B. RECTANGULAR SIDE WEIR (⊥ TO RWCD)

C. STRAIGHT DROP.

D. CHUTE AND SAF.

~~E. BAFFLE CHUTE,~~ NO, DEBRIS PROBLEM.

ALIGNMENT

A. WYE - DROP TO SIDE CHANNEL, JOINING RWCD FWY AT A SKEW

B. SIDE WEIR (FLOW ⊥ TO RWCD)

ENERGY DISSIPATION

A. FLAT APRON - HYDRAULIC JUMP
B. SILL
C. BLOCKS / SAF

****** WATER SURFACE PROFILE ******

JOB: ASSUME NO ROCK U.S. FROM Sta. 17+50 n=0.027
BY:
DATE:

Q= 3,300.00 N= 0.027 B= 40.00 Z= 3.00 S= 0.001000
Dc= 5.197 Vc=11.42 Sc=0.006866 Normal Depth= 8.668
ALPHA=1.00 K=8.00

No.	Station	Inv-El	WS-El	D	V	He	Sf	F
1	18+00.00	1302.16	1310.04	7.882	6.58	8.554	0.001442	0.484
2	17+50.00	1302.21	1310.12	7.910	6.55	8.576	0.001423	0.481
3	17+00.00	1302.26	1310.20	7.937	6.52	8.596	0.001404	0.478
4	16+50.00	1302.31	1310.27	7.963	6.49	8.616	0.001387	0.475
5	16+00.00	1302.36	1310.35	7.987	6.46	8.635	0.001371	0.472
6	15+50.00	1302.41	1310.42	8.010	6.43	8.653	0.001356	0.470
7	15+00.00	1302.46	1310.49	8.033	6.41	8.671	0.001341	0.467
8	14+50.00	1302.51	1310.56	8.054	6.39	8.687	0.001328	0.465
9	14+00.00	1302.56	1310.63	8.075	6.36	8.703	0.001315	0.463
10	13+00.00	1302.66	1310.77	8.113	6.32	8.734	0.001291	0.459
11	12+00.00	1302.76	1310.91	8.148	6.28	8.762	0.001269	0.456
12	11+00.00	1302.86	1311.04	8.181	6.25	8.788	0.001250	0.452
13	10+00.00	1302.96	1311.17	8.211	6.22	8.812	0.001232	0.449
14	9+00.00	1303.06	1311.30	8.239	6.19	8.834	0.001216	0.447

ENTER NEXT STATION

RWD RCHS
P. CR. @ SEC. EPSIL
8/4/03
4/4

****** WATER SURFACE PROFILE ******

JOB:
BY:
DATE:

Q= 3,300.00 N= 0.030 B= 40.00 Z= 3.00 S= 0.001000
Dc= 5.344 Vc=11.02 Sc=0.007650 Normal Depth= 9.150
ALPHA=1.00 K=0.00

No.	Station	Inv-El	WS-El	D	V	He	Sf	F
9	17+50.00	1302.21	1310.14	7.931	6.52	8.592	0.001738	0.478
10	17+00.00	1302.26	1310.24	7.978	6.47	8.628	0.001700	0.473
11	16+50.00	1302.31	1310.33	8.022	6.42	8.662	0.001664	0.469
12	16+00.00	1302.36	1310.42	8.063	6.38	8.694	0.001632	0.464
13	15+00.00	1302.46	1310.60	8.140	6.29	8.755	0.001574	0.457
14	14+00.00	1302.56	1310.77	8.209	6.22	8.810	0.001523	0.450
15	13+00.00	1302.66	1310.93	8.271	6.16	8.860	0.001479	0.444
16	12+00.00	1302.76	1311.09	8.328	6.10	8.906	0.001441	0.438
17	11+00.00	1302.86	1311.24	8.381	6.04	8.948	0.001406	0.433
18	10+00.00	1302.96	1311.39	8.429	6.00	8.987	0.001376	0.429
19	9+00.00	1303.06	1311.53	8.473	5.95	9.023	0.001348	0.425

ENTER NEXT STATION

RWD REPHI3
QCR. @ SED. BASIN
JT 8/4/83
3/4

****** WATER SURFACE PROFILE ******

JOB:
BY:
DATE:

Q= 3,300.00 N= 0.030 B= 30.00 Z= 3.00 S= 0.001000
Dc= 6.048 Vc=11.33 Sc=0.007566 Normal Depth= 10.073
ALPHA=1.10 K=0.10

No.	Station	Inv-El	WS-El	D	V	He	Sf	F
1	19+10.00	1302.05	1308.58	6.526	10.20	8.141	0.005641	0.872
	Q= 3,300.00		N= 0.030	B= 32.00	Z= 3.00		S= 0.001000	
2	19+00.00	1302.06	1309.13	7.074	8.76	8.267	0.003756	0.720
	Q= 3,300.00		N= 0.030	B= 34.00	Z= 3.00		S= 0.001000	
3	18+90.00	1302.07	1309.39	7.324	8.05	8.330	0.003006	0.649
	Q= 3,300.00		N= 0.030	B= 36.00	Z= 3.00		S= 0.001000	
4	18+80.00	1302.08	1309.57	7.494	7.53	8.374	0.002530	0.598
	Q= 3,300.00		N= 0.030	B= 38.00	Z= 3.00		S= 0.001000	
5	18+70.00	1302.09	1309.71	7.622	7.11	8.408	0.002187	0.559
	Q= 3,300.00		N= 0.030	B= 40.00	Z= 3.00		S= 0.001000	
6	18+60.00	1302.10	1309.82	7.724	6.76	8.434	0.001924	0.526
	ALPHA=1.00		K=0.00					
7	18+50.00	1302.11	1309.94	7.829	6.64	8.514	0.001827	0.489
8	18+00.00	1302.16	1310.04	7.882	6.58	8.554	0.001781	0.484

EWCD RCH 3
Q @ SEC. BASIN
8/14/83
2/4

****** WATER SURFACE PROFILE ******

JOB:
BY:
DATE:

Q= 3,300.00 N= 0.030 B= 30.00 Z= 3.00 S= 0.001000
Dc= 5.889 Vc=11.76 Sc=0.008380 Normal Depth= 10.073
ALPHA=1.00 K=0.00

No.	Station	Inv-El	WS-El	D	V	He	Sf	F
1 *	19+60.00	1302.00	1307.89	5.889	11.76	8.035	0.008380	0.999
2	19+58.00	1302.00	1308.11	6.105	11.19	8.049	0.007296	0.937
3	19+56.00	1302.00	1308.19	6.190	10.98	8.061	0.006918	0.914
4	19+54.00	1302.01	1308.26	6.255	10.82	8.072	0.006648	0.897
5	19+50.00	1302.01	1308.36	6.355	10.58	8.094	0.006252	0.872
6	19+40.00	1302.02	1308.55	6.533	10.18	8.144	0.005617	0.829
7	19+30.00	1302.03	1308.69	6.664	9.91	8.188	0.005200	0.800
8	19+20.00	1302.04	1308.81	6.771	9.69	8.228	0.004888	0.777
	ALPHA=1.10		K=0.10					
9	19+10.00	1302.05	1308.58	6.526	10.20	8.141	0.005643	0.872
	Q= 3,300.00		N= 0.030	B= 32.00	Z= 3.00		S= 0.001000	
10	19+00.00	1302.06	1309.13	7.074	8.77	8.267	0.003756	0.720
	~~Q= 3,300.00~~		~~N= 0.030~~	~~B= 34.00~~	~~Z= 3.00~~		~~S= 0.001000~~	
~~11~~	~~19+00.00~~	~~1302.06~~	~~1309.34~~	~~7.279~~	~~8.12~~	~~8.303~~	~~0.003079~~	~~0.656~~

ENTER NEXT STATION

* → ASSUME CRITICAL DEPTH AT CREST

→ NORMAL WS. EL IN POOL = 1306.7 FOR Q = 3300 cfs.

DWD DEAHLS
QCR @ SED BASIN
DT 8/4/83
YA

COMPUTATION SHEET
SCS-ENG-223A Rev. 7-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA | PROJECT RWQ REACH 3
BY D. THACKERAY | DATE 8/4/83 | CHECKED BY | DATE | JOB NO
HYDRAULICS OF EXISTING LOWER Q. CREEK CHANNEL | SHEET | OF

CRITICAL DEPTH VS. CHANNEL WIDTH AT ENTRANCE TO SED. BASIN:

Q = 3300 CFS
K = 1.0
Z = 3.0

b	dc
25	6.308
30	5.890
35	5.521
40	5.196

NORMAL DEPTH:

MANNINGS EQUATION TEC

Q = 3300
n = 0.027
b = 40
Z = 3
S = 0.001

FIND: d = 8.67
A = 572
V = 5.76 ft/s

EXISTING CHANNEL DEPTH BETWEEN STA 8+00 & 15+00 IS A MINIMUM OF 7.5 FT.

COMPUTATION SHEET

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ARIZONA

PROJECT: PWCD REACH 3

D.T. 8/5/83

CHECKED BY | DATE | JOB NO.

WSP IN CHUTE BELOW SIDEWEIR

SHEET

RECTANGULAR WEIR / CHUTE:

L=100 FT
Q= 3300 CFS

S= 0.333
n= 0.012

* * PWSP *

SUPER
STA.=0+00.00
Q=3,300.00 CFS
BW=100.00 FT
Z=0.00:1
N=0.012
Scb=0.3330 F/F
a=1.000
k=0.000
CB-EL.=1,301.70 FT
WS-EL.=1,304.90 FT
EGL-EL.=1,306.55 FT
D=3.200 FT
V=10.313 F/S
DC=3.234 FT
VC=10.204 F/S
FR=1.016

SUPER
STA.=0+2.00
CB-EL.=1,301.03 FT
WS-EL.=1,303.33 FT
EGL-EL.=1,306.55 FT
EGL-S=0.0031738 F/F
D=2.292 FT
V=14.398 F/S
DC=3.234 FT
VC=10.204 F/S
FR=1.676

SUPER
STA.=0+4.00
CB-EL.=1,300.37 FT
WS-EL.=1,302.39 FT
EGL-EL.=1,306.53 FT
EGL-S=0.0059694 F/F
D=2.020 FT
V=16.338 F/S
DC=3.234 FT
VC=10.204 F/S
FR=2.026

SUPER
STA.=0+6.00
CB-EL.=1,299.70 FT
WS-EL.=1,301.55 FT
EGL-EL.=1,306.52 FT
EGL-S=0.0084357 F/F
D=1.845 FT
V=17.889 F/S
DC=3.234 FT
VC=10.204 F/S
FR=2.321

SUPER
STA.=0+10.00
CB-EL.=1,298.37 FT
WS-EL.=1,299.99 FT
EGL-EL.=1,306.47 FT
EGL-S=0.0123340 F/F
D=1.615 FT
V=20.430 F/S
DC=3.234 FT
VC=10.204 F/S
FR=2.833

SUPER
STA.=0+15.00
CB-EL.=1,296.71 FT
WS-EL.=1,298.14 FT
EGL-EL.=1,306.37 FT
EGL-S=0.0186098 F/F
D=1.433 FT
V=23.030 F/S
DC=3.234 FT
VC=10.204 F/S
FR=3.390

SUPER
STA.=0+20.00
CB-EL.=1,295.04 FT
WS-EL.=1,296.35 FT
EGL-EL.=1,306.24 FT
EGL-S=0.0261647 F/F
D=1.307 FT
V=25.244 F/S
DC=3.234 FT
VC=10.204 F/S
FR=3.891

COMPUTATION SHEET

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ARIZ.

PROJECT RWXD R.3

D.T. 8/8/83 CHECKED BY DATE JOB NO.

SED. BASIN OUTLET CHUTE/WSP SHEET 1

WSP IN CHUTE:

$q = 33$
$W = 100$
$S_o = 3.1$

SEE NEH 14 p2.179

$d_{crq} = 5.5$ FT

FIND: $d = 1.39$ = FICTITIOUS DEPTH OF FLOW
$p = 1.05$

$d_a = pd = 1.05(1.39) = 1.46$ FT. (AIR ENTRAINED)

COMPUTATION SHEET

ARIZ. RUCO RANCH 3

D.T. 8/8/83 CHECKED BY DATE

SED BASIN OUTLET — WSP IN CHUTE

* * PWSP * *

SUPER
STA.=0+16.50
Q=3,300.00 CFS
BW=100.00 FT
Z=0.00:1
N=0.012
Scb=0.0000 F/F
a=1.000
k=0.000
CB-EL.=1,296.21 FT
WS-EL.=1,297.60 FT
EGL-EL.=1,306.34 FT
D=1.391 FT
V=23.724 F/S
DC=3.234 FT
VC=10.204 F/S
FR=3.545

SUPER
STA.=0+18.00
CB-EL.=1,296.21 FT
WS-EL.=1,297.60 FT
EGL-EL.=1,306.30 FT
EGL-S=0.0244290 F/F
D=1.394 FT
V=23.670 F/S
DC=3.234 FT
VC=10.204 F/S
FR=3.533

SUPER
STA.=0+20.00
CB-EL.=1,296.21 FT
WS-EL.=1,297.61 FT
EGL-EL.=1,306.26 FT
EGL-S=0.0242151 F/F
D=1.398 FT
V=23.598 F/S
DC=3.234 FT
VC=10.204 F/S
FR=3.517

SUPER
STA.=0+25.00
CB-EL.=1,296.21 FT
WS-EL.=1,297.62 FT
EGL-EL.=1,306.14 FT
EGL-S=0.0237970 F/F
D=1.409 FT
V=23.420 F/S
DC=3.234 FT
VC=10.204 F/S
FR=3.477

SUPER
STA.=0+30.00
CB-EL.=1,296.21 FT
WS-EL.=1,297.63 FT
EGL-EL.=1,306.02 FT
EGL-S=0.0232135 F/F
D=1.420 FT
V=23.245 F/S
DC=3.234 FT
VC=10.204 F/S
FR=3.438

SUPER
STA.=0+35.00
Q=3,300.00 CFS
BW=100.00 FT
Z=0.00:1
N=0.032
Scb=0.0000 F/F
a=1.000
k=0.000
CB-EL.=1,296.21 FT
WS-EL.=1,297.67 FT
EGL-EL.=1,305.59 FT
EGL-S=0.0855974 F/F
D=1.461 FT
V=22.585 F/S
DC=3.234 FT
VC=10.204 F/S
FR=3.293

SUPER
STA.=0+40.00
CB-EL.=1,296.21 FT
WS-EL.=1,297.75 FT
EGL-EL.=1,304.91 FT
EGL-S=0.1369143 F/F
D=1.537 FT
V=21.474 F/S
DC=3.234 FT
VC=10.204 F/S
FR=3.053

SUPER
STA.=0+40.00
Q=3,300.00 CFS
BW=100.00 FT
Z=0.00:1
N=0.032
Scb=0.0000 F/F
a=1.000
k=0.000
CB-EL.=1,296.21 FT
WS-EL.=1,297.75 FT
EGL-EL.=1,304.91 FT
EGL-S=0.1255594 F/F
D=1.537 FT
V=21.474 F/S
DC=3.234 FT
VC=10.204 F/S
FR=3.053

SUPER
STA.=0+50.00
CB-EL.=1,296.21 FT
WS-EL.=1,297.90 FT
EGL-EL.=1,303.82 FT
EGL-S=0.1086845 F/F
D=1.690 FT
V=19.526 F/S
DC=3.234 FT
VC=10.204 F/S
FR=2.647

SUPER
STA.=0+60.00
CB-EL.=1,296.21 FT
WS-EL.=1,298.06 FT
EGL-EL.=1,303.02 FT
EGL-S=0.0802422 F/F
D=1.846 FT
V=17.875 F/S
DC=3.234 FT
VC=10.204 F/S
FR=2.318

COMPUTATION SHEET

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PROJECT ARIZ.
D.T.

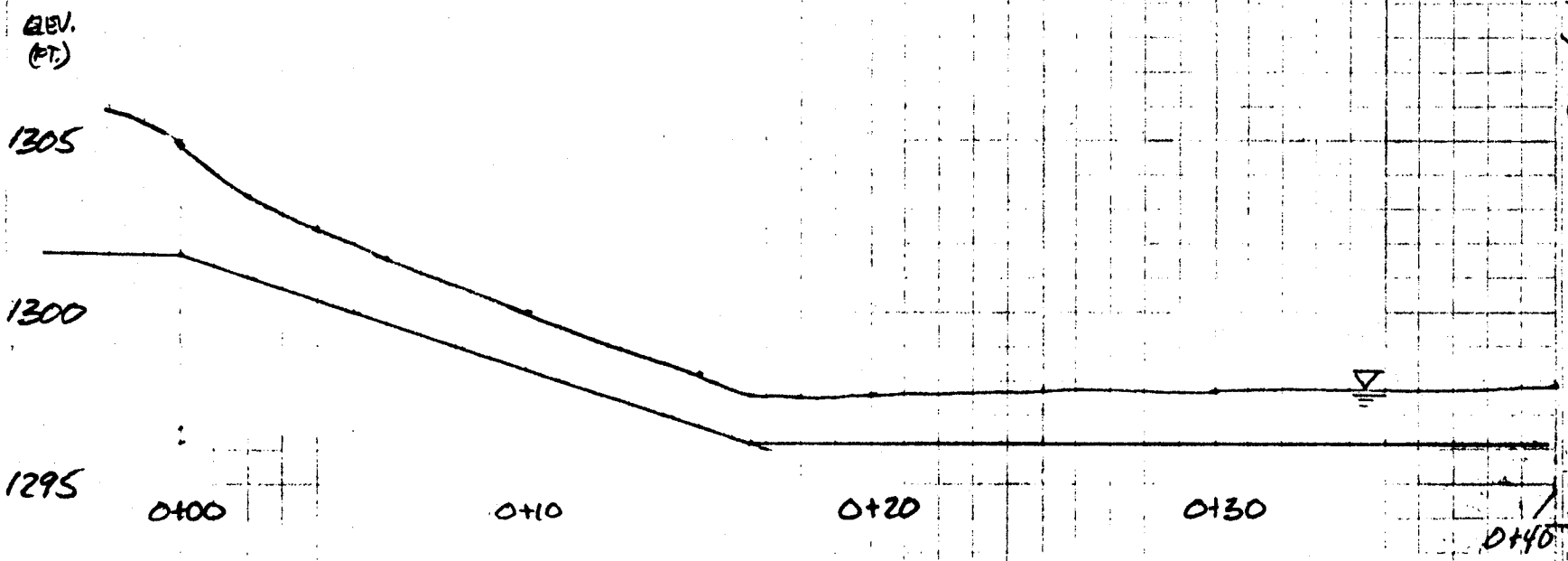
PROBLEM QUAD REACH 3

CHECKED BY 8/8/83 DATE

JOB NO

SED BASIN OUTLET CHUTE / USP

SHEET



PROFILE -

COMPUTATION SHEET

SCS-ENG-23A Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA PROJECT: RWCD REACH 3

BY: D.T. DATE: 8/8/83 CHECKED BY DATE JOB NO.

SED. BASIN OUTLET – HYDRAULIC JUMP IN RWCD SHEET

MOMENTUM BALANCE ON A UNIT SLICE:

F:

$$F = \gamma d(d/2) = \gamma d^2/2$$

M:

$$M = QV = \rho Q^2/A = \gamma Q^2/(gA) = \gamma Q^2/gd$$

TOTAL: DIVIDING BY γ:

$$\text{TOTAL} = d^2/2 + Q^2/gd$$

HP41C PROGRAM:

```
LBLB
STO 02
Q=
ARCLX
ADV
PRA
RTN

LBLA
ADV
STO 1
d=
ARCLX
PRA
X²
2
÷
STO 03
F=
ARCLX
PRA

RCL02
X²
32.16
÷
RCL01
÷
STO 4
M=
ARCLX
PRA
+
Σ=
ARCLX
PRA
RTN
```

REG

0	
1	d
2	Q
3	F
4	M

EXAMPLE:

$Q = 3300/100 = 33$

$d = 5$

$$\Sigma = 5^2/2 + 33^2/32.16(5)$$

$$= 12.50 + 6.77$$

$$= 19.27$$

COMPUTATION SHEET
U.S. ENGINEERS Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ARIZONA
D.T. 8/8/83

PROJECT RWCD R3
CHECKED BY DATE JOB NO.

SEC. BASIN OUTLET - HYDRAULIC JUMP IN RWCD

SHEET 1

MOMENTUM

Q	d	F	M	E
33	4.7	11.045	7.205	18.250
	1.39	0.967	24.36	25.33
	1.50	1.125	22.58	23.70
	2.00	2.00	16.93	18.93
	2.50	3.13	13.55	16.67
	3.00	4.50	11.29	15.79
	3.50	6.13	9.68	15.80
	5.9	17.41	5.74	23.14
	7.3	26.65	4.64	31.28
	8.1	32.81	4.18	36.99
6500	7.12	25.35	4.76	30.10
5400	6.32	19.97	5.36	25.33

ARIZONA RWCD E3

D.T. 8/8/83

SED. BASIN OUTLET — SAF ACT. 3

SAF

1. FROM PREVIOUS TRIAL $d_2 = 6.3$
$t_w = 4.7$

∴ FLOOR IS TO BE LOWERED 1.6 FT
AND $Y = 5.5 + 1.6 = 7.1$

2. FROM ES 147 Sh. 2/6 $d_1 = 1.28$

SOLUTION:

$V_1 = q_1/d_1 = 25.78$
$F_1 = V_1^2/gd_1 = 25.78^2/(32.16)1.28) = 16.15$
$d_2 = (d_1/2)(-1 - \sqrt{8F_1+1}) = (1.28/2)(-1 + \sqrt{8(16.15)+1}) = 6.66$
$d'_2 = 1.4(1.28)(16.15)^{0.45} = 6.27$
$L_B = 4.5(6.66)/16.15^{0.28} = 10.41$
$J = d_2/3 + d'_2 = 6.66/3 + 6.27 = 8.49$
$S = 0.07(6.66) = 0.47$
$z \geq 3\sqrt{16.15} = 12.01$

BLOCK HT $= d_1 = 1.28$
W. SPA. $= 3d_1/4 = 0.96$
MIN SW SPA $= 3/8\, d_1 = 0.48$
40-50% F.BL = 40-55 FT
STAGGER BL
SIMM LAYOUT

AB12 RWCD R3

D.T. 8/8/83

S.C. B/SIN OUTLET — SAF ALT. 2 3

SAF

$d_1 = 1.40$ FT

$q = 33$ CFS/FT

$V_1 = q/d_1 = 33/1.4 = 23.57$

$$F_1 = \frac{V_1^2}{g d_1} = \frac{23.57^2}{32.16(1.40)} = 12.34$$

$$d_2 = \frac{d_1}{2}\left(-1 + \sqrt{8F_1 + 1}\right) = \frac{1.4}{2}\left(-1 + \sqrt{8(12.34) + 1}\right) = 6.29$$

$$d_2' = 1.4(d_1) F_1^{0.45} = 1.4(1.4)(12.34)^{0.45} = 6.07$$

$$L_B = \frac{4.5 d_2}{F_1^{(0.38)}} = \frac{4.5(6.29)}{12.34^{(0.38)}} = 10.89$$

$$J = d_2/3 + d_2' = 6.29/3 + 6.07 = 8.17$$

$$S = 0.07 d_2 = 0.07(6.29) = 0.44$$

$$z \geq 3\sqrt{F_1} = 3\sqrt{12.34} = 10.5$$

1. BLOCK HT = d_1 = 1.4 FT
2. W'SP $3d_1/4$ = 1.05 FT
3. MIN SW ℄ = $3/8 d_1$ = 0.525 FT
4. 40-55% W FL RL = 40-55 FT
5. CHUTE RL STAGG.
6. SYMMETRY

ARIZ RUCO R3

D.T. 8/8/83 3 3

SOL. BASIN OUTLET ALT. - SAF

3RD TRIAL

$Y = d_2 - TW + 5.5 = 6.7 - 4.7 + 5.5 = 7.5$

$d_1 = 1.25$

$V_1 = 33/1.25 = 26.4$

$F_1 = 26.4^2/32.16(1.25) = 17.34$

$d_2 = (1.25/2)(-1 + \sqrt{8(17.34)+1}) = 6.76$

$d_2' = 1.4(1.25)(17.34)^{0.45} = 6.32$

$LB = 4.5(6.76)/17.34^{0.38} = 10.29$

$J = 6.76/3 + 6.32 = 8.57$

$S = 0.07(6.76) = 0.47$

$Z \geq 3\sqrt{17.34} \geq 12.5$

BL HT $= d_1 = 1.25$

W ≥ SP $= 3/4\, d_1 = 0.94$

MIN SW ℄ $= 0.47$

ARIZ. RNCD REACH 3
D.T. 8/9/83
SFL BASIN OUTLET - STRAIGHT DROP

CHECK STRAIGHT DROP:

$Q = 3300$ cfs
$h = 5.0$
$L = 100$

$F = 5.5$

$h/F = 0.909$

$d_c = 3.33$

$t_{trial} = 4.7$ (CASE 1)

$t \geq 1.75 d_c = 1.75(3.33) = 5.83$ FT

LOWER BASIN 1 FT; ∴ $t = 5.7$

NEH 11
ES 111
P.5-21 s/ 5/6

$h/t = 5/5.7 = 0.877$; $F = 6.5$; $h/F = 5/6.5 = 0.769$
$L_F/F = 2.25$
$L_F = 2.25(6.5) = 14.63$
$L_B/F = 3.15$
$L_B = 3.15(6.5) = 20.5$

ES 111 s/ 6/6

CHECK (CASE 2)

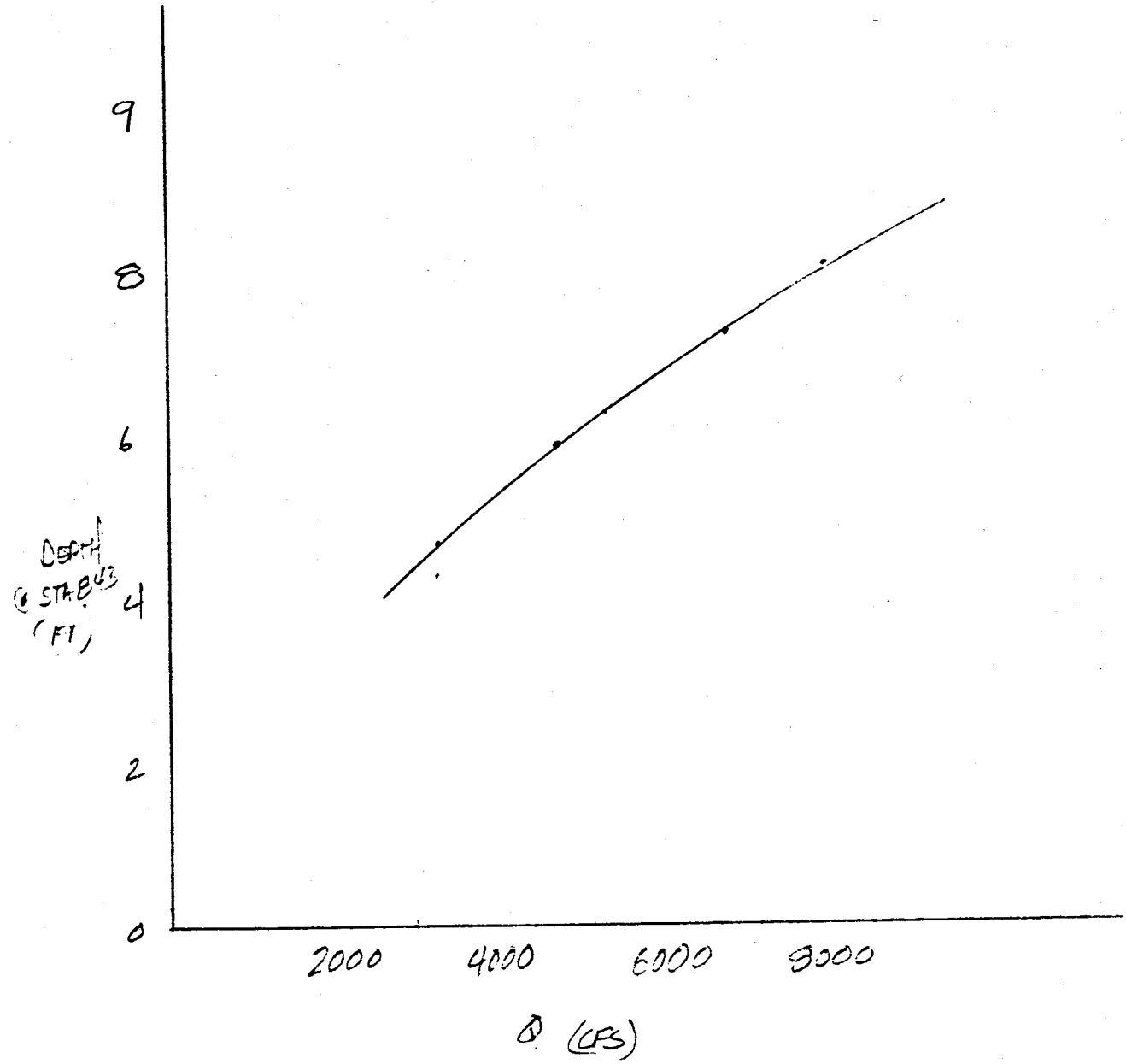
$t = 5.9 + 1 = 6.9$

$h/t = 5/6.9 = 0.725$; $h/F = 0.769$
$L_B/F = 3.35$; $L_B = 3.35(6.5) = 21.8$: USE 22
$L_F/F = 2.45$; $L_F = 2.45(6.5) = 15.9$: USE 16
$S = 0.4 d_c = 0.4(3.33) = 1.33$: USE 1.33
$L = 100$
$J = 10.0$

ARIZONA RWCD R3

DT 8/8/03

RATING CURVE: RWCD FLOODWAY @ STA 8+3+00



ALPHAMERIC INFORMATION SAF (TR-54)

PUCD REACH 3 SED. BASIN OUTLET
ARIZ. DT 8/9/83

W 100.0	J 10.5	LB 10.0	N 7.0	D1 1.25	V1 26.4	DESIGN 0.	DFALTS 1.
DFALT1 1.	DFALT2 1.	DFALT3 1.	—	—	—	—	—
HB 4.0	HTW2 8.5	HUP2 6.0	HTW1 1.0	HUP1 4.0	—	—	—
MAXFTG 8.0	FLOATR 1.25	SLIDER 1.0	ZS 3	BAT 0.375	—	—	—
GM 133	GS 137	KO 0.68	CFSC 0.35	HTW 4.0	TTW 10.0	—	—

W	J	LB	N	D1	V1	DESIGN	DFALTS
DFALT1	DFALT2	DFALT3	—	—	—	—	—
HB	HTW2	HUP2	HTW1	HUP1	—	—	—
MAXFTG	FLOATR	SLIDER	ZS	BAT	—	—	—
GM	GS	KO	CFSC	HTW	TTW	—	—

COMPUTATION SHEET

SCS-ENG-5234 Rev. 9-69

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZ. PROJECT RWCD R3

BY D.T. DATE 8/29/83 CHECKED BY DATE JOB NO.

SUBJECT APPROX SED. BASIN VOL. SHEET 1

VOLUME OF SED BASIN

BOTTOM	PLANIM ROG
	0
	1434
	2865
	4295

MEAN 1432 = 14.32 in²

SCALE 1" = 1 FT 1 IN² = 100 FT²

AREA = 143,200 FT²

= 3.29 ACRES

VOLUME @ 3 FT DEPTH

APPROX = 9.86 A-F

VOLUME OF PRISM OVER SIDE SLOPE ≈ PERIM X AREA

A = BA/2 = 3(3)(3)/2 = 4.5 FT²

V = PA ≈ 1400 (4.5)

≈ 6300 FT³

≈ 0.14 AF

→ TOTAL VOL = 9.86 + 0.14

= 10.0 AF

ARIZONA FWCD P3

D.T. 8/4/83

SEDIMENT BASIN INLET

PROBLEM: THE DESIGN FLOW, 3300 CFS, (100 YR) USED FOR LOWER Q. CREEK IS GREATER THAN THE CAPACITY OF THE EXISTING DIKED CHANNEL (APPROX. 2100 CFS).

THE RIGHT DIKE (LOOKING DOWNSTREAM) OF THE LOWER Q. CR. CHANNEL IS HIGHER THAN THE LEFT. FLOW ENTERING BACK DURING CREEK WILL THEORETICALLY BE CONTAINED BY THE RIGHT DIKE. EXCESS FLOW WOULD BE CARRIED OVERLAND AGAINST TO THE LEFT CHANNEL DIKE.

THE EXISTING Q. CR. CHANNEL INVERT IS APPROX. 4FT BELOW GROUND SURFACE.

WITHOUT IMPROVEMENTS TO THE LOWER Q. CR. CHANNEL WHICH WILL CONTAIN THE Q100 EVENT SOME PROVISION FOR ENTRY OF THE OVERLAND FLOW TO THE RWCD CHANNEL IS ADVISABLE.

ANALYSIS:

THE BEST LOCATION FOR RETURN FLOW IS BETWEEN THE END OF THE LINE AT STA 857+55 AND THE CHANDLER HIS RD. BRIDGE.

CONCLUSION:

PROVIDE RR ALONG THE L. SIDESLOPE BETWEEN THE DESIT AND THE BRIDGE.

ARIZONA RWCD REACH 3

D.T. 8/3/83

WATER SURFACE PROFILE QC

START AT d_c IN INLET CHANNEL

* * PWSP * *

* * PWSP * *

SUB
STA.=19+45.00
Q=3 700.00 CFS
BW=[illegible].00 FT
Z=3.00:1
N=0.027
Scb=0.0010 F/F
a=1.000
k=0.000
CB-EL.=1,302.00 FT
WS-EL.=1,307.20 FT
EGL-EL.=1,309.22 FT
D=5.200 FT
V=11.414 F/S
DC=5.194 FT
VC=11.430 F/S
FR=0.998

SUB
STA.=19+40.00
CB-EL.=1,302.01 FT
WS-EL.=1,307.49 FT
EGL-EL.=1,309.25 FT
EGL-S=0.0062343 F/F
D=5.488 FT
V=10.649 F/S
DC=5.194 FT
VC=11.430 F/S
FR=0.910

SUB
STA.=19+35.00
CB-EL.=1,302.01 FT
WS-EL.=1,307.81 FT
EGL-EL.=1,309.28 FT
EGL-S=0.0054211 F/F
D=5.597 FT
V=10.281 F/S
DC=5.194 FT
VC=11.430 F/S
FR=0.880

SUB
STA.=19+30.00
CB-EL.=1,302.02 FT
WS-EL.=1,307.69 FT
EGL-EL.=1,309.31 FT
EGL-S=0.0050898 F/F
D=5.678 FT
V=10.198 F/S
DC=5.194 FT
VC=11.430 F/S
FR=0.859

SUB
STA.=19+20.00
CB-EL.=1,302.03 FT
WS-EL.=1,307.83 FT
EGL-EL.=1,309.35 FT
EGL-S=0.0047598 F/F
D=5.806 FT
V=9.900 F/S
DC=5.194 FT
VC=11.430 F/S
FR=0.827

SUB
STA.=19+00.00
CB-EL.=1,302.05 FT
WS-EL.=1,308.04 FT
EGL-EL.=1,309.44 FT
EGL-S=0.0043103 F/F
D=5.993 FT
V=9.497 F/S
DC=5.194 FT
VC=11.430 F/S
FR=0.783

SUB
STA.=18+50.00
CB-EL.=1,302.10 FT
WS-EL.=1,308.40 FT
EGL-EL.=1,309.62 FT
EGL-S=0.0037098 F/F
D=6.392 FT
V=8.890 F/S
DC=5.194 FT
VC=11.430 F/S
FR=0.717

ARIZONA
D.T.

RWCD R.3

2/4/83

SUB
STA.=18+00.00
Q=3,300.00 CFS
BW=40.00 FT
Z=3.00:1
N=0.027
Scb=0.0010 F/F
a=1.000
k=0.000
CB-EL.=1,302.15 FT
WS-EL.=1,308.66 FT
EGL-EL.=1,309.78 FT
EGL-S=0.0031682 F/F
D=6.513 FT
V=8.510 F/S
DC=5.194 FT
VC=11.430 F/S
FR=0.677

SUB
STA.=17+00.00
CB-EL.=1,302.25 FT
WS-EL.=1,309.06 FT
EGL-EL.=1,310.06 FT
EGL-S=0.0027410 F/F
D=6.814 FT
V=8.013 F/S
DC=5.194 FT
VC=11.430 F/S
FR=0.626

SUB
STA.=16+00.00
CB-EL.=1,302.35 FT
WS-EL.=1,309.38 FT
EGL-EL.=1,310.29 FT
EGL-S=0.0023691 F/F
D=7.030 FT
V=7.684 F/S
DC=5.194 FT
VC=11.430 F/S
FR=0.592

SUB
STA.=15+00.00
CB-EL.=1,302.45 FT
WS-EL.=1,309.65 FT
EGL-EL.=1,310.50 FT
EGL-S=0.0021330 F/F
D=7.200 FT
V=7.440 F/S
DC=5.194 FT
VC=11.430 F/S
FR=0.568

SUB
STA.=14+00.00
CB-EL.=1,302.55 FT
WS-EL.=1,309.88 FT
EGL-EL.=1,310.70 FT
EGL-S=0.0019651 F/F
D=7.340 FT
V=7.250 F/S
DC=5.194 FT
VC=11.430 F/S
FR=0.549

```
PROGRAM TO COMPUTE THE NORMAL FLOW-DEPTH RELATIONSHIP
FOR AN IRREGULAR CROSS-SECTION
ENTER - D1,S1,N9 - WHERE:
    D1 = OUTPUT TABLE DEPTH INCREMENT
    S1 = STREAM REACH SLOPE
    N9 = STREAM REACH MANNINGS N
1,.0027,.03
ENTER - XSECTION OFFSET,ELEV PAIRS - X,Y  (ENTER E,E TO END)
 1.....65
1338
 2.....86
1332
 3.....108
1330
 4.....115
1328
 5.....165
1328
 6.....183
1332
 7.....200
1336
 8.....210
1337.7
 9.....E
E
```

STA 675+00

PIMA FLOODWAY REPORT
ARIZONA DT 5/23/83
CHECK OF CHANNEL CAPACITY
WILLIAMS GUESTIMATE, VER.
SLOPE-AREA METH.
SECTIONS TAKEN FROM
CIS REPORT

DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q
0.00	1328.0	0.0	0.0	0.0	0.0	0.0
1.00	1329.0	54.0	58.2	0.9	51.3	132.5
2.00	1330.0	116.0	66.5	1.7	168.1	433.9
3.00	1331.0	189.8	82.2	2.3	331.6	855.9
4.00	1332.0	279.0	97.8	2.9	561.4	1448.7
5.00	1333.0	379.9	105.8	3.6	891.0	2299.5
6.00	1334.0	488.5	113.8	4.3	1290.7	3331.0
7.00	1335.0	604.9	121.8	5.0	1761.3	4545.6
8.00	1336.0	729.0	129.8	5.6	2304.3	5946.8
9.00	1337.0	861.7	139.4	6.2	2903.5	7493.2
10.00	1338.0	1003.5	147.3	6.8	3609.3	9314.7

DO YOU WANT A GRAPH?

Value

675100

DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q	
0.00	1324.0	0.0	0.0	0.0	0.0	0.0	
1.00	1325.0	40.5	43.3	0.9	38.7	99.8	
2.00	1326.0	85.8	48.6	1.8	125.4	323.5	
3.00	1327.0	143.4	68.3	2.1	235.2	607.1	
4.00	1328.0	220.3	87.9	2.5	406.8	1049.9	
5.00	1329.0	311.0	96.0	3.2	680.8	1757.0	
6.00	1330.0	409.5	104.2	3.9	1020.1	2632.5	V= 6.43
7.00	1331.0	514.5	109.6	4.7	1443.4	3725.2	V= 7.24
8.00	1332.0	624.3	114.9	5.4	1931.1	4983.7	
9.00	1333.0	738.4	119.1	6.2	2493.8	6435.8	
10.00	1334.0	855.8	123.3	6.9	3116.6	8043.3	
11.00	1335.0	976.5	126.4	7.7	3819.3	9856.8	
12.00	1336.0	1100.0	129.4	8.5	4584.1	11830.4	

DO YOU WANT A GRAPH?

STA 690+00

```
PROGRAM TO COMPUTE THE NORMAL FLOW-DEPTH RELATIONSHIP
FOR AN IRREGULAR CROSS-SECTION
ENTER - D1,S1,N9 - WHERE:
    D1 = OUTPUT TABLE DEPTH INCREMENT
    S1 = STREAM REACH SLOPE
    N9 = STREAM REACH MANNINGS N
1,.0015,.03
ENTER - XSECTION OFFSET,ELEV PAIRS - X,Y  (ENTER E,E TO END)
 1.....100
1330
 2.....115
1326
 3.....118
1324
 4.....160
1322.5
 5.....185
1324
 6.....200
1326
 7.....210
1328
 8.....220
1330
 9.....225
1332
 10.....230
1334
 11.....E
E
```

700+00

DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q
0.00	1322.5	0.0	0.0	0.0	0.0	0.0
1.00	1323.5	22.3	44.7	0.5	14.1	27.0
2.00	1324.5	84.9	71.8	1.2	94.9	182.6
3.00	1325.5	160.9	81.1	2.0	254.0	488.6
4.00	1326.5	245.8	90.3	2.7	479.5	922.3
5.00	1327.5	339.6	99.3	3.4	771.3	1483.6
6.00	1328.5	442.1	108.3	4.1	1130.0	2173.7
7.00	1329.5	553.3	117.2	4.7	1557.8	2996.5
8.00	1330.5	672.6	123.1	5.5	2087.8	4016.0
9.00	1331.5	795.1	125.8	6.3	2719.9	5232.0
10.00	1332.5	920.1	128.5	7.2	3420.8	6580.2
11.00	1333.5	1047.6	131.2	8.0	4188.7	8057.3

DO YOU WANT A GRAPH?

V=5.41

700+00

```
PROGRAM TO COMPUTE THE NORMAL FLOW-DEPTH RELATIONSHIP
FOR AN IRREGULAR CROSS-SECTION
ENTER - D1,S1,N9 - WHERE:
    D1 = OUTPUT TABLE DEPTH INCREMENT
    S1 = STREAM REACH SLOPE
    N9 = STREAM REACH MANNINGS N
1,.0015,.03
ENTER - XSECTION OFFSET,ELEV PAIRS - X,Y  (ENTER E,E TO END)
 1.....80
1328
 2.....88
1326
 3.....95
1324
 4.....100
1322
 5.....108
1320
 6.....132
1320
 7.....220
1322
 8.....235
1324
 9.....250
1326
 10.....260
1328
 11.....E
E
```

716-83

DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q
0.00	1320.0	0.0	0.0	0.0	0.0	0.0
1.00	1321.0	48.0	72.1	0.7	36.6	70.4
2.00	1322.0	144.0	120.3	1.2	162.4	312.3
3.00	1323.0	269.0	130.5	2.1	435.7	838.2
4.00	1324.0	404.0	140.8	2.9	816.1	1569.8
5.00	1325.0	549.5	152.0	3.6	1294.9	2490.9
V=5.11 6.00	1326.0	706.0	163.2	4.3	1875.3	3607.3
7.00	1327.0	872.5	172.4	5.1	2573.1	4949.5
8.00	1328.0	1048.0	181.6	5.8	3373.2	6488.6

DO YOU WANT A GRAPH?

716+23

```
PROGRAM TO COMPUTE THE NORMAL FLOW-DEPTH RELATIONSHIP
FOR AN IRREGULAR CROSS-SECTION
ENTER - D1,S1,N9 - WHERE:
    D1 = OUTPUT TABLE DEPTH INCREMENT
    S1 = STREAM REACH SLOPE
    N9 = STREAM REACH MANNINGS N
1,.0023,.03
ENTER - XSECTION OFFSET,ELEV PAIRS - X,Y  (ENTER E,E TO END)
 1.....140
1324
 2.....168
1322
 3.....195
1318
 4.....220
1318
 5.....260
1320
 6.....280
1322
 7.....290
1324
 8.....E
E
```

725 +00

DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q
0.00	1318.0	0.0	0.0	0.0	0.0	0.0
1.00	1319.0	38.4	51.8	0.7	31.4	74.8
2.00	1320.0	103.5	78.7	1.3	124.3	296.0
3.00	1321.0	190.4	95.6	2.0	301.5	718.1
4.00	1322.0	294.0	112.4	2.6	558.2	1329.5
5.00	1323.0	415.5	131.6	3.2	894.7	2131.0
6.00	1324.0	556.0	150.7	3.7	1328.0	3163.3

J-5.69

DO YOU WANT A GRAPH?

725+00

```
PROGRAM TO COMPUTE THE NORMAL FLOW-DEPTH RELATIONSHIP
FOR AN IRREGULAR CROSS-SECTION
ENTER - D1,S1,N9 - WHERE:
    D1 = OUTPUT TABLE DEPTH INCREMENT
    S1 = STREAM REACH SLOPE
    N9 = STREAM REACH MANNINGS N
1,.0025,.03
ENTER - XSECTION OFFSET,ELEV PAIRS - X,Y  (ENTER E,E TO END)
 1.....47
1328
 2.....82
1316
 3.....135
1314.2
 4.....185
1316
 5.....185
13166
1316
 6.....220
1324
 7.....233
1324
 8.....247
1318
 9.....E
E
```

732 100

DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q
0.00	1314.2	0.0	0.0	0.0	0.0	0.0
1.00	1315.2	28.6	57.3	0.5	18.0	44.7
2.00	1316.2	113.4	104.6	1.1	119.8	297.4
3.00	1317.2	221.5	112.1	2.0	348.9	866.4
4.00	1318.2	337.0	120.2	2.8	670.2	1664.2
5.00	1319.2	461.3	130.3	3.5	1071.8	2661.7
V=6.51 6.00	1320.2	595.3	140.4	4.2	1559.7	3873.3
7.00	1321.2	738.8	150.6	4.9	2134.7	5301.2
8.00	1322.2	892.0	160.7	5.6	2798.5	6949.6
9.00	1323.2	1054.8	170.8	6.2	3553.3	8823.9
10.00	1324.2	1229.8	192.5	6.4	4236.9	10521.5
11.00	1325.2	1420.1	195.6	7.3	5329.0	13233.6
12.00	1326.2	1613.4	198.6	8.1	6523.7	16200.6
13.00	1327.2	1809.6	201.7	9.0	7818.5	19415.8

DO YOU WANT A GRAPH?

732+00

```
PROGRAM TO COMPUTE THE NORMAL FLOW-DEPTH RELATIONSHIP
FOR AN IRREGULAR CROSS-SECTION
ENTER - D1,S1,N9 - WHERE:
     D1 = OUTPUT TABLE DEPTH INCREMENT
     S1 = STREAM REACH SLOPE
     N9 = STREAM REACH MANNINGS N
1,.002,.03
ENTER - XSECTION OFFSET,ELEV PAIRS - X,Y  (ENTER E,E TO END)
 1.....0
1326.6
 2.....50
1326
 3.....80
1314
 4.....180
1314
 5.....195
1318
 6.....215
1324
 7.....E
E
```

790 +00

DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q
0.00	1314.0	0.0	0.0	0.0	0.0	0.0
1.00	1315.0	103.1	106.6	1.0	100.9	224.1
2.00	1316.0	212.5	113.1	1.9	323.5	718.6
3.00	1317.0	328.1	119.7	2.7	642.8	1427.8
4.00	1318.0	450.0	126.3	3.6	1050.2	2332.7
5.00	1319.0	577.9	132.5	4.4	1543.8	3429.0
6.00	1320.0	711.7	138.6	5.1	2118.9	4706.4
7.00	1321.0	851.3	144.8	5.9	2774.3	6162.1
8.00	1322.0	996.7	151.0	6.6	3509.4	7795.0
9.00	1323.0	1147.9	157.2	7.3	4324.3	9604.9
10.00	1324.0	1305.0	163.3	8.0	5219.2	11592.8
11.00	1325.0	1466.3	166.0	8.8	6269.3	13925.0
12.00	1326.0	1630.0	168.7	9.7	7399.5	16435.5

V = 5.93

DO YOU WANT A GRAPH?

740 +00

```
PROGRAM TO COMPUTE THE NORMAL FLOW-DEPTH RELATIONSHIP
FOR AN IRREGULAR CROSS-SECTION
ENTER - D1,S1,N9 - WHERE:
    D1 = OUTPUT TABLE DEPTH INCREMENT
    S1 = STREAM REACH SLOPE
    N9 = STREAM REACH MANNINGS N
1,.002,.03
ENTER - XSECTION OFFSET,ELEV PAIRS - X,Y  (ENTER E,E TO END)
 1.....39
1312
1324
 2.....65
1311
1312
 3.....175
1312
 4.....210
1322
 5.....E
E
```

750 +00

V=5.99

DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q
0.00	1312.0	0.0	0.0	0.0	0.0	0.0
1.00	1313.0	112.8	116.0	1.0	110.8	246.0
2.00	1314.0	231.3	122.1	1.9	354.4	797.1
3.00	1315.0	355.5	128.1	2.8	702.4	1560.1
4.00	1316.0	485.3	134.1	3.6	1144.5	2542.2
5.00	1317.0	620.8	140.1	4.4	1675.5	3721.6
6.00	1318.0	762.0	146.2	5.2	2292.4	5091.7
7.00	1319.0	908.8	152.2	6.0	2993.3	6648.6
8.00	1320.0	1061.3	158.2	6.7	3777.5	8390.4
9.00	1321.0	1219.5	164.2	7.4	4644.6	10316.3
10.00	1322.0	1383.3	170.3	8.1	5594.6	12426.4
11.00	1323.0	1551.1	172.6	9.0	6708.1	14899.7
12.00	1324.0	1721.0	175.0	9.8	7904.6	17557.4

DO YOU WANT A GRAPH?

750 100

```
PROGRAM TO COMPUTE THE NORMAL FLOW-DEPTH RELATIONSHIP
FOR AN IRREGULAR CROSS-SECTION
ENTER - D1,S1,N9 - WHERE:
    D1 = OUTPUT TABLE DEPTH INCREMENT
    S1 = STREAM REACH SLOPE
    N9 = STREAM REACH MANNINGS N
1,.0026,.03
ENTER - XSECTION OFFSET,ELEV PAIRS - X,Y  (ENTER E,E TO END)
 1.....55
1324
 2.....100
1310
 3.....122
1310
 4.....220
1324
 5.....E
E
```

757+70

DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q
0.00	1310.0	0.0	0.0	0.0	0.0	0.0
1.00	1311.0	27.1	32.4	0.8	24.0	60.9
2.00	1312.0	64.4	42.9	1.5	84.5	214.1
3.00	1313.0	112.0	53.3	2.1	183.7	465.1
4.00	1314.0	169.7	63.7	2.7	326.1	825.9
5.00	1315.0	237.7	74.2	3.2	516.7	1308.6
6.00	1316.0	315.9	84.6	3.7	760.3	1925.6
7.00	1317.0	404.3	95.1	4.3	1061.6	2688.5
J=7.18 8.00	1318.0	502.9	105.5	4.8	1425.0	3608.7
9.00	1319.0	611.7	115.9	5.3	1854.8	4697.3
10.00	1320.0	730.7	126.4	5.8	2355.4	5965.1
11.00	1321.0	860.0	136.8	6.3	2930.8	7422.3
12.00	1322.0	999.4	147.2	6.8	3585.1	9079.2
13.00	1323.0	1149.1	157.7	7.3	4322.1	10945.8
14.00	1324.0	1309.0	168.1	7.8	5145.7	13031.6

DO YOU WANT A GRAPH?

757+70

```
PROGRAM TO COMPUTE THE NORMAL FLOW-DEPTH RELATIONSHIP
FOR AN IRREGULAR CROSS-SECTION
ENTER - D1,S1,N9 - WHERE:
    D1 = OUTPUT TABLE DEPTH INCREMENT
    S1 = STREAM REACH SLOPE
    N9 = STREAM REACH MANNINGS N
1,.0028,.03
ENTER - XSECTION OFFSET,ELEV PAIRS - X,Y  (ENTER E,E TO END)
 1.....20
1318
 2.....25
1316
 3.....75
1314
 4.....95
1312
 5.....115
1306
 6.....135
1306
 7.....160
1308
 8.....200
1318
 9.....E
E
```

772+05

	DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q
	0.00	1306.0	0.0	0.0	0.0	0.0	0.0
	1.00	1307.0	27.9	36.0	0.8	23.6	61.9
	2.00	1308.0	71.7	52.0	1.4	88.7	233.2
	3.00	1309.0	127.0	59.6	2.1	210.3	552.6
	4.00	1310.0	189.7	67.2	2.8	378.8	995.4
	5.00	1311.0	259.7	74.8	3.5	595.3	1564.6
	6.00	1312.0	337.0	82.5	4.1	861.9	2265.1
7.00	7.00	1313.0	425.0	96.6	4.4	1141.5	2999.9
V=7.44	8.00	1314.0	527.0	110.8	4.8	1491.3	3919.2
	9.00	1315.0	650.5	139.9	4.6	1812.7	4764.1
	10.00	1316.0	803.0	169.1	4.7	2269.9	5965.7
	11.00	1317.0	973.3	175.9	5.5	3046.3	8006.1
	12.00	1318.0	1150.0	182.7	6.3	3922.6	10309.1

DO YOU WANT A GRAPH?

7>2+06

```
PROGRAM TO COMPUTE THE NORMAL FLOW-DEPTH RELATIONSHIP
FOR AN IRREGULAR CROSS-SECTION
ENTER - D1,S1,N9 - WHERE:
    D1 = OUTPUT TABLE DEPTH INCREMENT
    S1 = STREAM REACH SLOPE
    N9 = STREAM REACH MANNINGS N
1,.0016,.03
ENTER - XSECTION OFFSET,ELEV PAIRS - X,Y  (ENTER E,E TO END)
 1.....60
1314
 2.....100
1312
 3.....110
1310
 4.....112
1308
 5.....165
1308
 6.....184
1316
 7.....E
E
```

784 135

	DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q
	0.00	1308.0	0.0	0.0	0.0	0.0	0.0
	1.00	1309.0	54.7	57.0	1.0	53.2	105.7
	2.00	1310.0	112.8	61.0	1.8	169.9	337.5
	3.00	1311.0	176.2	68.7	2.6	330.3	656.3
	4.00	1312.0	247.0	76.3	3.2	540.6	1073.9
	5.00	1313.0	332.7	98.9	3.4	747.0	1484.1
	6.00	1314.0	440.8	121.5	3.6	1040.8	2067.7
5.43	7.00	1315.0	561.2	124.1	4.5	1535.3	3050.1
V=6.12	8.00	1316.0	684.0	126.7	5.4	2106.2	4184.4

DO YOU WANT A GRAPH?

784+35

```
PROGRAM TO COMPUTE THE NORMAL FLOW-DEPTH RELATIONSHIP
FOR AN IRREGULAR CROSS-SECTION
ENTER - D1,S1,N9 - WHERE:
    D1 = OUTPUT TABLE DEPTH INCREMENT
    S1 = STREAM REACH SLOPE
    N9 = STREAM REACH MANNINGS N
1,.0017,.03
ENTER - XSECTION OFFSET,ELEV PAIRS - X,Y  (ENTER E,E TO END)
 1.....85
1310
 2.....109
1304
 3.....150
1304
 4.....170
1312
 5.....E
E
```

807 +67.20

DEPTH	ELEV	AREA	WPER	HYD-R	AR2/3	Q
0.00	1304.0	0.0	0.0	0.0	0.0	0.0
1.00	1305.0	44.3	47.8	0.9	42.0	86.1
2.00	1306.0	95.0	54.6	1.7	137.4	281.4
3.00	1307.0	152.3	61.4	2.5	278.9	571.1
4.00	1308.0	216.0	68.3	3.2	465.7	953.7
5.00	1309.0	286.3	75.1	3.8	698.9	1431.3
6.00	1310.0	363.0	81.9	4.4	980.0	2006.8
7.00	1311.0	444.3	84.6	5.3	1343.0	2750.3
V=6,80 8.00	1312.0	528.0	87.3	6.0	1754.1	3592.0

DO YOU WANT A GRAPH?

807 +67.20

```
EXECUTION DATE:  07/20/83
REVISION      :  09/01/82
=========      ==================================================      ========================================

                                STRAIGHT DROP SPILLWAY
                                  STRUCTURAL  DESIGN
                        ELASTIC ANALYSIS AND WORKING STRESS DESIGN ARE USED

                                SPECIAL DESIGN PREPARED BY
                          DESIGN UNIT, ENGINEERING, LANHAM, MARYLAND
                                          FOR

            RWCD FLOODWAY REACH 3 STA 857+00
            ARIZONA,DT 7/83

                   DESIGN PARAMETERS
   H= 10.00  J = 14.00  CREEPR= 5.00  HB   =  2.00  GMH= 137.  GSH= 133.  KOH= 0.68                BAT = 0.0
   F=  5.50  L =120.00  FLOATR= 1.00  ZPS =  3.55  GMW= 137.  GSW= 133.  KOW= 0.68  KPW= 2.50  CFSS= 0.550
   S=  2.00  LB= 55.00  SLIDER= 1.00  HTOE=  6.00  GMF= 137.  GSF= 133.  KOF= 0.68  KPF= 2.50  CFSC= 0.350
                        SWLDRN= 0.0   TTOE= 10.00

             DW2=10.00  HEAD2=13.00  TAIL2= 9.00  HEAD1= 3.50
             SUBMERGED FLOW OCCURS FOR SOME DISCHARGES
             SOME HEADWALL HEADS HAVE BEEN ADJUSTED

             M     DW          HEAD        TAIL+S
             1   10.00        17.50        11.00
             2    8.60        16.10         9.74
             3    7.10        14.60         8.39
             4    5.40        12.90         6.86
             5    3.40         6.73         5.06
             6    0.0          3.50        -1.00
             7    0.0         -1.00        -1.00

       WARNING, H/F EXCEEDS 1.43, MAY MEAN HYDRAULIC DESIGN ERROR

                MONOLITHIC DESIGN =    0. FOLLOWS

                TRIAL VALUES
   TRANSVERSE APRON SLABS = 2                  C-HS-FA-SC-A= 1-16-16-10-0                          QUANT= 653.37
   THW= 12.00  TSW= 18.00  TCUT= 15.00  HCUT=  7.00  HWFTG= 1.75  BUTT=  2.75  TBLS= 12.00  HESTUB=   4.00
   TAP= 20.00  TSB= 18.00  TTOE= 15.00  HTOE=  7.00  SWFTG= 0.0                 BOTT=  0.75    HBAT=   7.00

                WINGWALL DESIGN - TRIAL VALUES                                                        QUANT=  23.72
   TWW= 10.00  TWF= 10.00  BUP= 11.00  BDN=  1.00  LEVEL= 15.46  WPROJ=  9.90  WWLB= 15.23   VWING=  23.72
=========================================END PRELIMINARY DESIGN=========================================
                                                                                WINGWALL  PER TRNOTICE 54-1

    END OF INPUT DATA CARDS, END OF JOB
```

FILENA (ENG/ABBY.EBA1) 1 :04 07/20/83

RWCD FL AY REACH 3 STA 857+00
ARIZONA,DT 7/83

10.0	5.5	2.0	14.0	120.0	55.0	0.0	1.0
1.0	1.0	1.0	1.0	0.0	1.0	0.0	
5.0	1.0	1.0	0.0	0.0			
2.0	3.55	6.0	10.0	0.55	0.35		
0.68	137.0	133.0					
0.68	137.0	133.0	2.5				
10.0	13.0	9.0	3.5				

137 137 133 137

1.0
1.1
1.2
1.3
1.4
5 runs

(ENG/STDPSP. EBA2) 1.1
EBA3) 1.2
4) 1.3
5) 1.4

STDPSP

COMPUTATION SHEET

SCS-ENG-523A Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA PROJECT EWCD REACH 3

BY DT DATE 7/10/83 CHECKED BY DATE JOB NO

SUBJECT PRELIM. STRUCTURAL DESIGN OF DROP @ STA 837+00 SHEET

PROBLEM: NEED BASIC VALUES FOR DESIGN OF THE DROP STRUCTURE. PROVIDE TR63 PARAMETERS.

SOLUTION:

PRIMARY PARAMETERS:

H = 10
F = 5.5
S = 2.0
J = 14.0
L = 120.0
LB = 55.0

SECONDARY PARAMETERS:

CREEPR = 5
FLOATR = 1.5
SLIDER = 1.0
BAT = 0.0
SWLDRN = 0.

HB = 2.0
ZPS = 3.55
HTOE = 6.0
TTOE = 10.0
CFSS = 0.55
CFSC = 0.35

KOH = 0.69 = KOF = KOW
GMH = 133 = GMF = GMW
GSH = 137 = GSF = GSW
KPF = KPW = 2.5

COMPUTATION SHEET
SCS-ENG-5274 Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA PROJECT RWCD REACH 3
BY DT DATE 7/18/83 CHECKED BY DATE JOB NO.
SUBJECT DROP STR. SOIL PARAMETERS SHEET

NO SOIL BORINGS ARE AVAILABLE AT THE STRUCTURE SITE.

THE DESIGN GEOLOGY INDICATES THAT FOUNDATION SOILS AT ELEV = 1290.77 - 2.0 (SILL) - 1.5 (SLAB) ≈ 1287 ARE UNIT 23 ; THESE ARE OVERLAIN BY UNIT 17 AND UNIT 19.

THE UNIT 23 SOILS: ARE TYPIFIED BY LAB SAMPLE 740050 TAKEN AT STA 827+00:

SP-SM
G_s (-4) = 2.71
D_{10} = 0.12 mm
C_u = 48.3
C_c = 0.52

NO DENSITY VALUE
NO STRENGTH VALUE

UNIT 17 SOILS: TYPIFIED BY SAMPLES 82W1050 AND 82W1051

CL / CL-ML
G_s (-4) = 2.68
LL 25/29
PI 5/10
γ_d ≥ 91#/ft³ (IN PLACE)

COMPUTATION SHEET

SCS-ENG 523A Rev 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA | PROJECT RWCD REACH 3

BY DT | DATE 7/18/83 | CHECKED BY | DATE | JOB NO.

SUBJECT PRELIM. STR. DES @ STA 857400 | SHEET

USING VALUES FROM "SMALL DAMS"

GROUP	MAX γ_d	e_o	$\tan\phi$	MAX γ_d	MAX e_o	MAX γ_s	MIN $\tan\phi$	MIN ϕ
SP	110±2	0.50±0.03	0.74±0.02	112	0.53	134	0.72	35.8
SM	114±1	0.48±0.02	0.67±0.02	115	0.50	136	0.65	33.0
SM-SC	119±1	0.41±0.02	0.66±0.07	120	0.43	139	0.59	30.5
SC	115±1	0.48±0.01	0.60±0.07	116	0.49	137	0.53	27.9
ML-CL	103±1	0.54±0.03	0.62±0.06	104	0.57	127	0.56	29.2
CL	109±2	0.56±0.01	0.54±0.04	111	0.57	134	0.50	26.6

$$\gamma_s = \left(\frac{e}{1+e}\right)\gamma_w + \gamma_d$$

FIG 44
LAT E.P.
DRAFTER

GROUP	γ_s	γ_M	ϕ	K_o	$K_o\gamma_M$	$K_o\gamma_b$
SP	134	130	35.8	0.55	71.5	39.4
SM	136	132	33.0	0.56	73.9	41.2
SM-SC	139	135	30.5	0.60	81.0	46.0
SC	137	133	27.9	0.68	90.4	50.7 ←
ML-CL	127	123	29.2	0.65	80.0	42.0
CL	134	130	26.6	0.68	88.4	48.7

DESIGN $\gamma_s = 137$
$\gamma_M = 133$
$K_o = 0.68$
$K_p = 2.5$ *

* K_p min FOR LEVEL BACKFILL
FIG 45 ≃ 2.7 FOR $\phi = 27$

ARIZONA RWCD REACH 3

D.T. 7/18/83

PRELIM. STR. DES. @ STA 857+00

LOADING CONDITIONS:

DW = SPECIFIC ENERGY HEAD AT WEIR CREST

$= V^2/64.4 + D_c = \left(\frac{8100}{120(5.21)}\right)^2/64.4 + 5.21$

$= 2.61 + 5.21$

$= \underline{7.82}$ FT

USE 8 FT AT DESIGN FLOW

10 FT AT FREEBOARD

PARTIAL DEFAULT VALUES

DW2 = H = 10.

HEAD2 = 13.0

HEAD1 = 3.5

TAIL2 = 9.4

FILENA (ENG/STDPSP.EBA5) :55 07/25/83

RWCD FLOODWAY REACH 3 STA 857+00
ARIZONA.DT 7/83

10.0	5.5	2.0	14.0	120.0	55.0	0.0	1.0
1.0	1.0	1.0	1.0	0.0	1.0	0.0	
5.0	1.4	1.0	0.0	0.0			
2.0	3.55	6.0	10.0	0.55	0.35		
0.68	133.0	137.0					
0.68	133.0	137.0	2.5				
10.0	13.0	9.0	3.5				

RWCD FLOODWAY REACH 3 STA 857+00
ARIZONA,DT 7/83

10.0	5.5	2.0	14.0	120.0	55.0	0.0	1.0
1.0	1.0	1.0	1.0	0.0	1.0	0.0	
5.0	1.3	1.0	0.0	0.0			
2.0	3.55	6.0	10.0	0.55	0.35		
0.68	133.0	137.0					
0.68	133.0	137.0	2.5				
10.0	13.0	9.0	3.5				

FILENAM! :NG/STDPSP.EBA3) 1: 7 07/25/83

RWCD FLOODWAY REACH 3 STA 857+00
ARIZONA,DT 7/83

10.0	5.5	2.0	14.0	120.0	55.0	0.0	1.0
1.0	1.0	1.0	1.0	0.0	1.0	0.0	
5.0	1.2	1.0	0.0	0.0			
2.0	3.55	6.0	10.0	0.55	0.35		
0.68	133.0	137.0					
0.68	133.0	137.0	2.5				
10.0	13.0	9.0	3.5				

FILENA (ENG/STDPSP.EDA2) Date: 7/2 Time: 13:46:39

RWCD FLOODWAY REACH 3 STA 857+00
ARIZONA,DT 7/83

10.0	5.5	2.0	14.0	120.0	55.0	0.0	1.0
1.0	1.0	1.0	1.0	0.0	1.0	0.0	
5.0	1.1	1.0	0.0	0.0			
2.0	3.55	6.0	10.0	0.55	0.35		
0.68	133.0	137.0					
0.68	133.0	137.0	2.5				
10.0	13.0	9.0	3.5				

FILENAME NG/ABBY.EBA1) 13 6 07/25/83

RWCD FLOODWAY REACH 3 STA 857+00
ARIZONA,DT 7/83

10.0	5.5	2.0	14.0	120.0	55.0	0.0	1.0
1.0	1.0	1.0	1.0	0.0	1.0	0.0	
5.0	1.0	1.0	0.0	0.0			
2.0	3.55	6.0	10.0	0.55	0.35		
0.68	133.0	137.0					
0.68	133.0	137.0	2.5				
10.0	13.0	9.0	3.5				

NCC

ALPHAMERIC INFORMATION — STRAIGHT DROP SPILLWAYS (TR-63)

1 RWCD FLOODWAY REACH3 STA 857+00

2 ARIZONA, DT 7/83

FORMAT 8-10COL FIELDS

H (1,2,3,4) 10.0	F (11,12,13) 5.5	S (1) 2.0	J (31) 14.0	L (41) 120.0	LB (51) 55.0	DESIGN (61) 0.	DFALTS (71) 1.
DFALT1 1.	DFALT2 1.	DFALT3 1.	DFALT4 1.	DFALT5 0.	DFALT6 1.	DFALT7 0.	—
CREEPR 5.0	FLOATR 1.0 * (14, 1.2, 13, 1.4)	SLIDER 1.0	BAT 0.0	SWLDRN 0.0	—	—	—
HB 2.0	ZPS 3.55	* HTOE 4.0	TTOE 10.0	CFSS 0.55	CFSC 0.35	—	—
KOH 0.68	GMH * ~~133~~ ~~137.~~	GSH * ~~137~~ ~~133.~~	—	—	—	—	—
KOF 0.65	GMF * ~~133~~ ~~137.~~	GSF * ~~137~~ ~~133.~~	KPF 2.5	—	—	—	—
KOW —	GMW —	GSW —	KPW —	—	—	—	—
DW2 10.	HEAD2 13.0	TAIL2 9.0	HEAD1 3.5	—	—	—	—
DWM2 —	HEADM2 —	TAILM2 —	—	—	—	—	—
DWM3 —	HEADM3 —	TAILM3 —	—	—	—	—	—
DWM4 —	HEADM4 —	TAILM4 —	—	—	—	—	—
DWM5 —	HEADM5 —	TAILM5 —	—	—	—	—	—

* Revised 7/25/83

PWCD – Drop Structure
Prel. Design Review [illegible]

Type C

Floor blocks:

Longitudinal side should [illegible] floor block. ∴ adjust floor block [illegible] starting with floor block on ℄.

Weir length = 120 ft.
floor block width 2'

1 block @ ℄

Try: 16 block & 16 full spaces each side

L = 120

$120 - (33)(2) - (32)(19.5) - W_x = 0$

$= 4 - W_x = 0$

$W_x = \frac{4}{32} = 1.44 = 17.5$

use $W_x = 17.5''$ adjust [illegible]

o.c. Spacing along sidewall [illegible]

$L = (33)(2) + (32)(19.5/12) + W_x = 120$

$W_x = 120 - 118 = 2.0$

Sidewall spacing = 1.0 foot

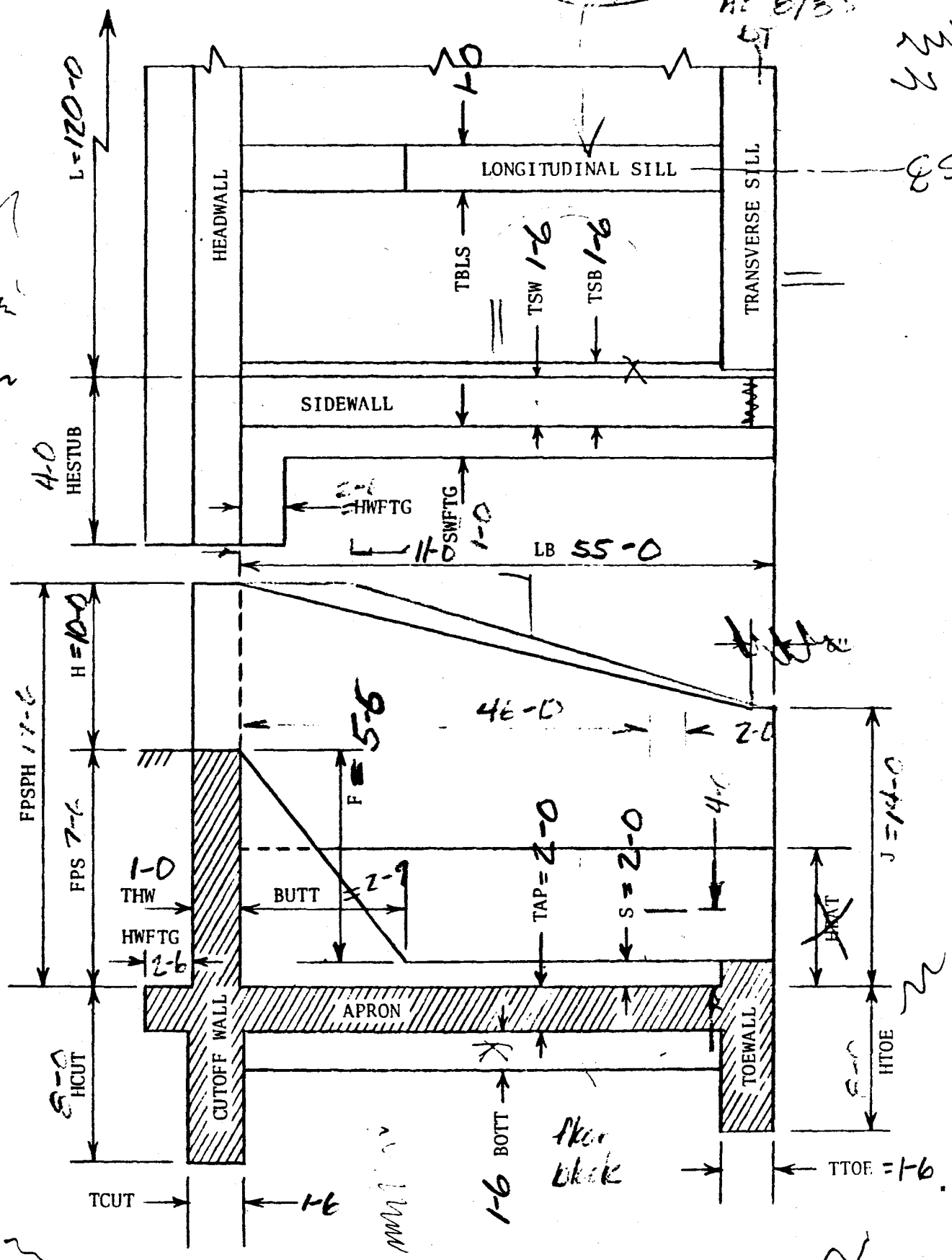


Figure 1. Straight drop spillway definition sketch.

```
EXECU    DATE:  07/25/83
REVIS.   ATE:   07/01/82
==========================================================================================

                    STRAIGHT DROP SPILLWAY
                      STRUCTURAL  DESIGN
          ELASTIC ANALYSIS AND WORKING STRESS DESIGN ARE USED

                 SPECIAL DESIGN PREPARED BY
             DESIGN UNIT, ENGINEERING, LANHAM, MARYLAND
                          FOR

        RWCD FLOODWAY REACH 3 STA 857+00
        ARIZONA,DT 7/83

              DESIGN PARAMETERS
 H= 10.00  J = 14.00  CREEPR= 5.00  HB  =  2.00  GMH= 133.  GSH= 137.  KOH= 0.68                BAT = 0.0
 F=  5.50  L =120.00  FLOATR= 1.10  ZPS =  3.55  GMW= 133.  GSW= 137.  KOW= 0.68  KPW= 2.50  CFSS= 0.550
 S=  2.00  LB= 55.00  SLIDER= 1.00  HTOE=  6.00  GMF= 133.  GSF= 137.  KOF= 0.68  KPF= 2.50  CFSC= 0.350
                      SWLDRN= 0.0   TTOE= 10.00

          DW2=10.00  HEAD2=13.00  TAIL2= 9.00  HEAD1= 3.50
          SUBMERGED FLOW OCCURS FOR SOME DISCHARGES
          SOME HEADWALL HEADS HAVE BEEN ADJUSTED

          M     DW          HEAD        TAIL+S
          1   10.00        17.50        11.00
          2    8.60        16.10         9.74
          3    7.10        14.60         8.39
          4    5.40        12.90         6.86
          5    3.40         6.73         5.06
          6    0.0          3.50        -1.00
          7    0.0         -1.00        -1.00

     WARNING, H/F EXCEEDS 1.43, MAY MEAN HYDRAULIC DESIGN ERROR

              MONOLITHIC DESIGN =   0. FOLLOWS

              TRIAL VALUES
 TRANSVERSE APRON SLABS = 2                C-HS-FA-SC-A= 1-14-14-10-0                    QUANT= 781.87
 THW= 12.00 TSW= 18.00 TCUT= 18.00 HCUT=  8.00 HWFTG= 2.50 BUTT=  2.75  TBLS= 12.00 HESTUB=   4.00
 TAP= 24.00  TSB= 18.00  TTOE= 18.00 HTOE=  8.00 SWFTG= 1.00            POTT=  1.50  HBAT=    7.00

              WINGWALL DESIGN - TRIAL VALUES                                            QUANT=  25.39
 TWW= 10.00  TWF= 10.00  BUP= 10.50  BDN=  1.00  LEVEL= 15.46  WPROJ= 9.90  WWLB= 14.53  VWING=  26.24

=========================================END PRELIMINARY DESIGN=========================================
                                                                          WINGWALL  PER TRNOTICE 54-1

    END OF INPUT DATA CARDS, END OF JOB
```

EXECUTION : 07/25/83
REVISION : 09/01/82

STRAIGHT DROP SPILLWAY
STRUCTURAL DESIGN
ELASTIC ANALYSIS AND WORKING STRESS DESIGN ARE USED

SPECIAL DESIGN PREPARED BY
DESIGN UNIT, ENGINEERING, LANHAM, MARYLAND
FOR

RWCD FLOODWAY REACH 3 STA 857+00
ARIZONA,DT 7/83

DESIGN PARAMETERS

H= 10.00	J = 14.00	CREEPR= 5.00	HB = 2.00	GMH= 133.	GSH= 137.	KOH= 0.68			BAT = 0.0
F= 5.50	L =120.00	FLOATR= 1.20	ZPS = 3.55	GMW= 133.	GSW= 137.	KOW= 0.68	KPW= 2.50		CFSS= 0.550
S= 2.00	LB= 55.00	SLIDER= 1.00	HTOE= 6.00	GMF= 133.	GSF= 137.	KOF= 0.68	KPF= 2.50		CFSC= 0.350
		SWLDRN= 0.0	TTOE= 10.00						

DW2=10.00 HEAD2=13.00 TAIL2= 9.00 HEAD1= 3.50
SUBMERGED FLOW OCCURS FOR SOME DISCHARGES
SOME HEADWALL HEADS HAVE BEEN ADJUSTED

M	DW	HEAD	TAIL+S
1	10.00	17.50	11.00
2	8.60	16.10	9.74
3	7.10	14.60	8.39
4	5.40	12.90	6.86
5	3.40	6.73	5.06
6	0.0	3.50	-1.00
7	0.0	-1.00	-1.00

WARNING, H/F EXCEEDS 1.43, MAY MEAN HYDRAULIC DESIGN ERROR

MONOLITHIC DESIGN = 0. FOLLOWS

FLOTATION CRITERIA NOT SATISFIED FOR M= 1, DESIGN CANCELED

END OF INPUT DATA CARDS, END OF JOB

EXECUTION : 07/25/83
REVISION : 09/01/82

STRAIGHT DROP SPILLWAY
STRUCTURAL DESIGN
ELASTIC ANALYSIS AND WORKING STRESS DESIGN ARE USED

SPECIAL DESIGN PREPARED BY
DESIGN UNIT, ENGINEERING, LANHAM, MARYLAND
FOR

RWCD FLOODWAY REACH 3 STA 857+00
ARIZONA,DT 7/83

DESIGN PARAMETERS

H= 10.00	J = 14.00	CREEPR= 5.00	HB = 2.00	GMH= 133.	GSH= 137.	KOH= 0.68			BAT = 0.0
F= 5.50	L =120.00	FLOATR= 1.30	ZPS = 3.55	GMW= 133.	GSW= 137.	KOW= 0.68	KPW= 2.50		CFSS= 0.550
S= 2.00	LB= 55.00	SLIDER= 1.00	HTOE= 6.00	GMF= 133.	GSF= 137.	KOF= 0.68	KPF= 2.50		CFSC= 0.350
		SWLDRN= 0.0	TTOE= 10.00						

DW2=10.00 HEAD2=13.00 TAIL2= 9.00 HEAD1= 3.50
SUBMERGED FLOW OCCURS FOR SOME DISCHARGES
SOME HEADWALL HEADS HAVE BEEN ADJUSTED

M	DW	HEAD	TAIL+S
1	10.00	17.50	11.00
2	8.60	16.10	9.74
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4	5.40	12.90	6.86
5	3.40	6.73	5.06
6	0.0	3.50	-1.00
7	0.0	-1.00	-1.00

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MONOLITHIC DESIGN = 0. FOLLOWS

FLOTATION CRITERIA NOT SATISFIED FOR M= 1, DESIGN CANCELED

END OF INPUT DATA CARDS, END OF JOB

EXECUTION : 07/25/83
REVISION D. . 09/01/82

STRAIGHT DROP SPILLWAY
STRUCTURAL DESIGN
ELASTIC ANALYSIS AND WORKING STRESS DESIGN ARE USED

SPECIAL DESIGN PREPARED BY
DESIGN UNIT, ENGINEERING, LANHAM, MARYLAND
FOR

RWCD FLOODWAY REACH 3 STA 857+00
ARIZONA,DT 7/83

DESIGN PARAMETERS

H= 10.00	J = 14.00	CREEPR= 5.00	HB = 2.00	GMH= 133.	GSH= 137.	KOH= 0.68			BAT = 0.0
F= 5.50	L =120.00	FLOATR= 1.40	ZPS = 3.55	GMW= 133.	GSW= 137.	KOW= 0.68	KPW= 2.50		CFSS= 0.550
S= 2.00	LB= 55.00	SLIDER= 1.00	HTOE= 6.00	GMF= 133.	GSF= 137.	KOF= 0.68	KPF= 2.50		CFSC= 0.350
		SWLDRN= 0.0	TTOE= 10.00						

DW2=10.00 HEAD2=13.00 TAIL2= 9.00 HEAD1= 3.50
SUBMERGED FLOW OCCURS FOR SOME DISCHARGES
SOME HEADWALL HEADS HAVE BEEN ADJUSTED

M	DW	HEAD	TAIL+S
1	10.00	17.50	11.00
2	8.60	16.10	9.74
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4	5.40	12.90	6.86
5	3.40	6.73	5.06
6	0.0	3.50	-1.00
7	0.0	-1.00	-1.00

WARNING, H/F EXCEEDS 1.43, MAY MEAN HYDRAULIC DESIGN ERROR

MONOLITHIC DESIGN = 0. FOLLOWS

FLOTATION CRITERIA NOT SATISFIED FOR M= 1, DESIGN CANCELED

END OF INPUT DATA CARDS, END OF JOB

```
EXECUTION DATE:  07/25/83
REVISION         09/01/82
==========  ==================================================  ========================================

                    STRAIGHT DROP SPILLWAY
                      STRUCTURAL  DESIGN
          ELASTIC ANALYSIS AND WORKING STRESS DESIGN ARE USED

                 SPECIAL DESIGN PREPARED BY
          DESIGN UNIT, ENGINEERING, LANHAM, MARYLAND
                          FOR

        RWCD FLOODWAY REACH 3 STA 857+00
        ARIZONA,DT 7/83

              DESIGN PARAMETERS
H= 10.00  J = 14.00  CREEPR= 5.00  HB  =  2.00  GMH= 133.  GSH= 137.  KOH= 0.68                BAT = 0.0
F=  5.50  L =120.00  FLOATR= 1.00  ZPS =  3.55  GMW= 133.  GSW= 137.  KOW= 0.68  KPW= 2.50  CFSS= 0.550
S=  2.00  LB= 55.00  SLIDER= 1.00  HTOE=  6.00  GMF= 133.  GSF= 137.  KOF= 0.68  KPF= 2.50  CFSC= 0.350
                     SWLDRN= 0.0   TTOE= 10.00

          DW2=10.00  HEAD2=13.00  TAIL2= 9.00  HEAD1= 3.50
          SUBMERGED FLOW OCCURS FOR SOME DISCHARGES
          SOME HEADWALL HEADS HAVE BEEN ADJUSTED

          M     DW          HEAD        TAIL+S
          1   10.00        17.50        11.00
          2    8.60        16.10         9.74
          3    7.10        14.60         8.39
          4    5.40        12.90         6.86
          5    3.40         6.73         5.06
          6    0.0          3.50        -1.00
          7    0.0         -1.00        -1.00

     WARNING, H/F EXCEEDS 1.43, MAY MEAN HYDRAULIC DESIGN ERROR

              MONOLITHIC DESIGN =   0. FOLLOWS

              TRIAL VALUES
TRANSVERSE APRON SLABS = 2                C-HS-FA-SC-A= 1-14-14-10-0                        QUANT= 653.37
THW= 12.00  TSW= 18.00  TCUT= 15.00  HCUT=  7.00  HWFTG= 1.75  BUTT=  2.75  TBLS= 12.00  HESTUB=   4.00
TAP= 20.00  TSB= 18.00  TTOE= 15.00  HTOE=  7.00  SWFTG= 0.0                 BOTT=  0.75    HBAT=   7.00

              WINGWALL DESIGN - TRIAL VALUES                                              QUANT=  23.19
TWW= 10.00  TWF= 10.00  BUP= 10.50  BDN=  1.00  LEVEL= 15.46  WPROJ=  9.90  WWLB= 14.53   VWING=  23.19

==========================================END PRELIMINARY DESIGN==========================================
                                                                          WINGWALL  PER TRNOTICE 54-1

    END OF INPUT DATA CARDS, END OF JOB
```

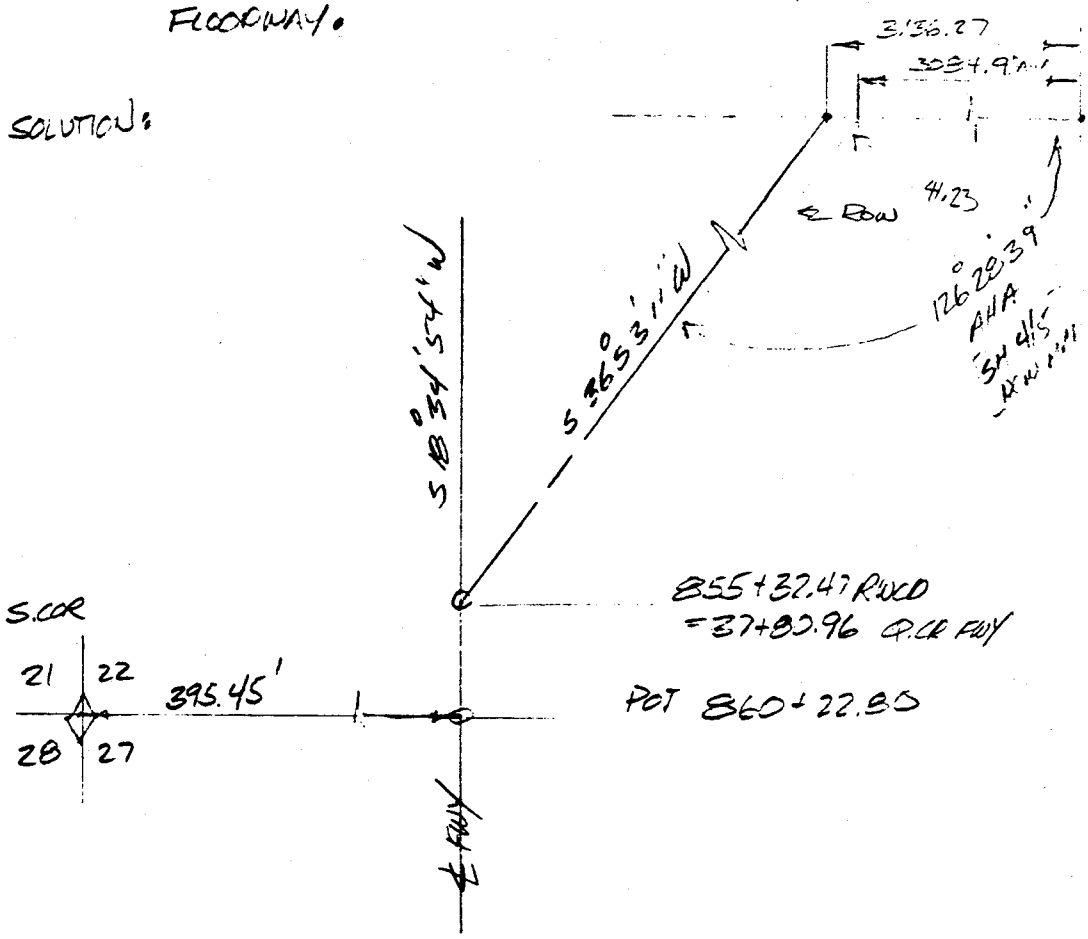
ARIZONA
D.THANGWAY 5/31/83

RWCD FLOODWAY REACH 3

PROBLEM: NEED TO CORRELATE ROW & ALIGNMENT SURVEYS AT JCT. OF QUEEN CR. & RWCD FLOODWAY.

SOLUTION:

ALIGNMENT SURVEY BOOK 1 p.12 & p.4



COMPUTATION SHEET

SCS-ENG-5234 Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA
PROJECT: RWCD FLOODWAY REALIG
BY: D. THACKERAY
DATE: 6/1/83
CHECKED BY
DATE
JOB NO.
SUBJECT
SHEET 1

CHECK COMPUTED BEARING OF SECTION LINE 22-27:

HP97 SURVEY PAC

TRAVERSE SW 1/4 SEC 22:

SH 4/5 AHA ROW SURVEY

POINT	BRG	DIST	N	E
28,21 / 27,22	N 00°05'33"E	2693.24	10,000.00	50,000.00
W1/4 COR	S 89°43'43"E	2680.62	12693.24	50 004.35
CENTER	S 00°04'12"E	2680.54	12680.54	52 684.94
S1/4 COR	S 89°59'59.9"W	2680.21	10,000.004	52 680.213
SW COR				

USE & RWCD BEARINGS FROM CTS ALIGNMENT SURVEY. ADJUST THE CORRESPONDING ROW BEARINGS AND USE HP97 SURVEY PAC TO DETERMINE ROW LINES ON PLAN-PROFILE SHEETS.

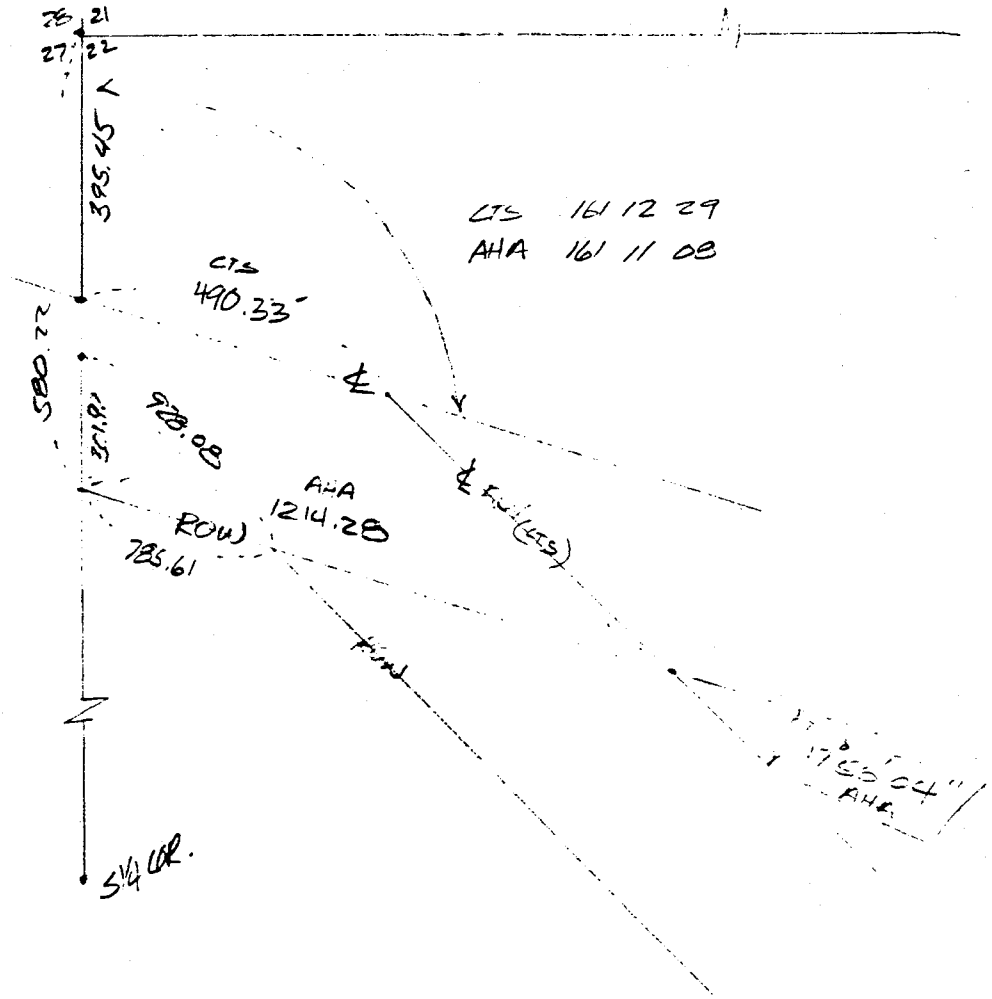
BEARING ADJUSTMENT:

LINE	AHA	CTS	Δ
RWCD ROW/℄ N. FR SEC 22-D	N 18°48'52"E	N 18°35'54"W	0°12'58"
SL 22/27	S 89 59 59.9 W	S 89°48'23"W	0°11'36.9"
@ 270+00	S 00 07 20 W	S 00°06'28 E	0°13'48"

ARIZONA
D. THACKERAY 6/1/93

RWCD FLOODWAY REACH 3

USE INTERSECTION OF CHANDLER HTS RD & RWCD ℄
AS POINT OF BEGINNING N 30 000
E 10 000



CTS (CHARLES T. SING ENGR, INC.) REV. 5/27/93
AHA (ADAM, HAMLYN, ANDERSON ENGR., INC.) CONS. 1/8/93

COMPUTATION SHEET
ENG-5724 Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA
SUBJECT: THACKERAY 6/7/83
PROJECT: ROXCO REACH 3
CHECKED BY | DATE | JOB NO.
SHEET

PROBLEM: NEED TO DETERMINE QUEEN CREEK AND CHANDLER HTS. RD. BRIDGE ELEVATIONS IN TERMS OF THE DATUM USED FOR ROXCO REACH 3 SURVEYS BY CTS ENGR (PBI). THE REACH 3 SURV. USES BM ANDERSON NEAR GILA BUTTE AS DATUM (EL = 1303.39). ELEVATIONS WERE CARRIED BY A SERIES OF CLOSED LEVELING LOOPS BETWEEN ADJACENT BM'S. THIS DATA IS FOUND IN BOOK 3 OF THE ROXCO FLOODWAY REACH 3 SURVEYS.

CTS BENCHMARK SUMMARY SH 1/1

ANALYSIS: 1. MCHD BC ON NW COR. QUEEN CR. BRIDGE:

BM "L" REACH 3 EL = 1315.24
MACO EL = 1318.63 $\Delta = 3.39'$

SECTION COR
21 | 22
28 | 27

2. MCHD BC IN HANDHOLE* @ INT. CHANDLER HTS RD. & GREENFIELD:

BM "P" REACH 3 EL = 1307.65

3. LOW PT UNDERSIDE OF CH. HTS. BR ≈ 1307 MCHD DATUM:
PROFILE ON SH 2/4 OF BRIDGE DRWGS SHOWS RD EL AT SEC COR = 1309

4. POINT L': CTS EL 1314.85'

SH 31/31
CTS SURVEY COMPS

MCHD BRIDGE DRWGS SH #4
EL ON ℄ = 1314.75: SS = 0.015 FT/FT
THEN AT PT L' (APPROX 5' U.S FROM ℄
EL = 1314.75 - 5(0.015) = 1314.68

COMPUTATION SHEET

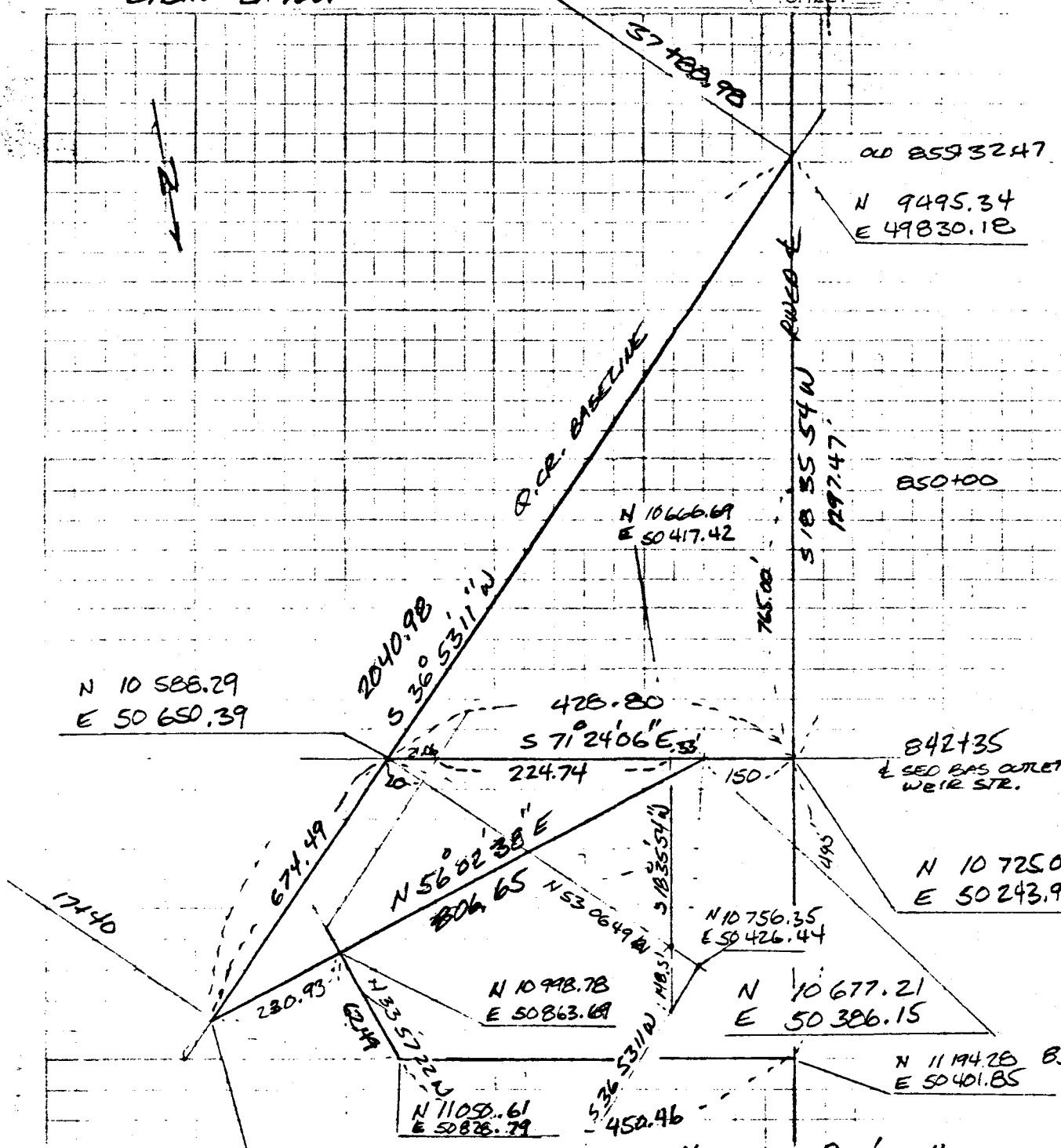
SCS-ENG-523A Rev. 9-69

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZ. | PROJECT RWCD R.3

BY D.T. | DATE 8/16/83 | CHECKED BY | DATE | JOB NO.

SUBJECT BASIN LAYOUT | SHEET



CURVE #6 Δ = 19°09'27"
T = 50
R = 296.29
L = 99.07
C = 98.61
D = 19.20

COMPUTATION SHEET

SCS-ENG-1234 Rev. 9-69

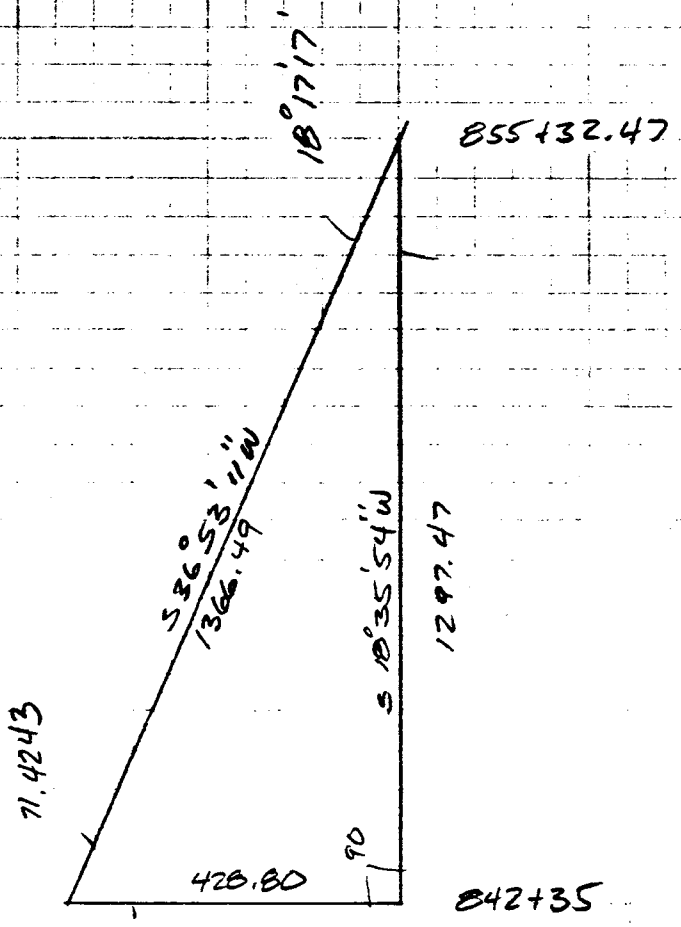
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZ. PROJECT: RWCD R3

BY: D.T. DATE: 8/16/83 CHECKED BY DATE JOB NO.

SUBJECT

SHEET



COMPUTATION SHEET
SCS-SS-Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

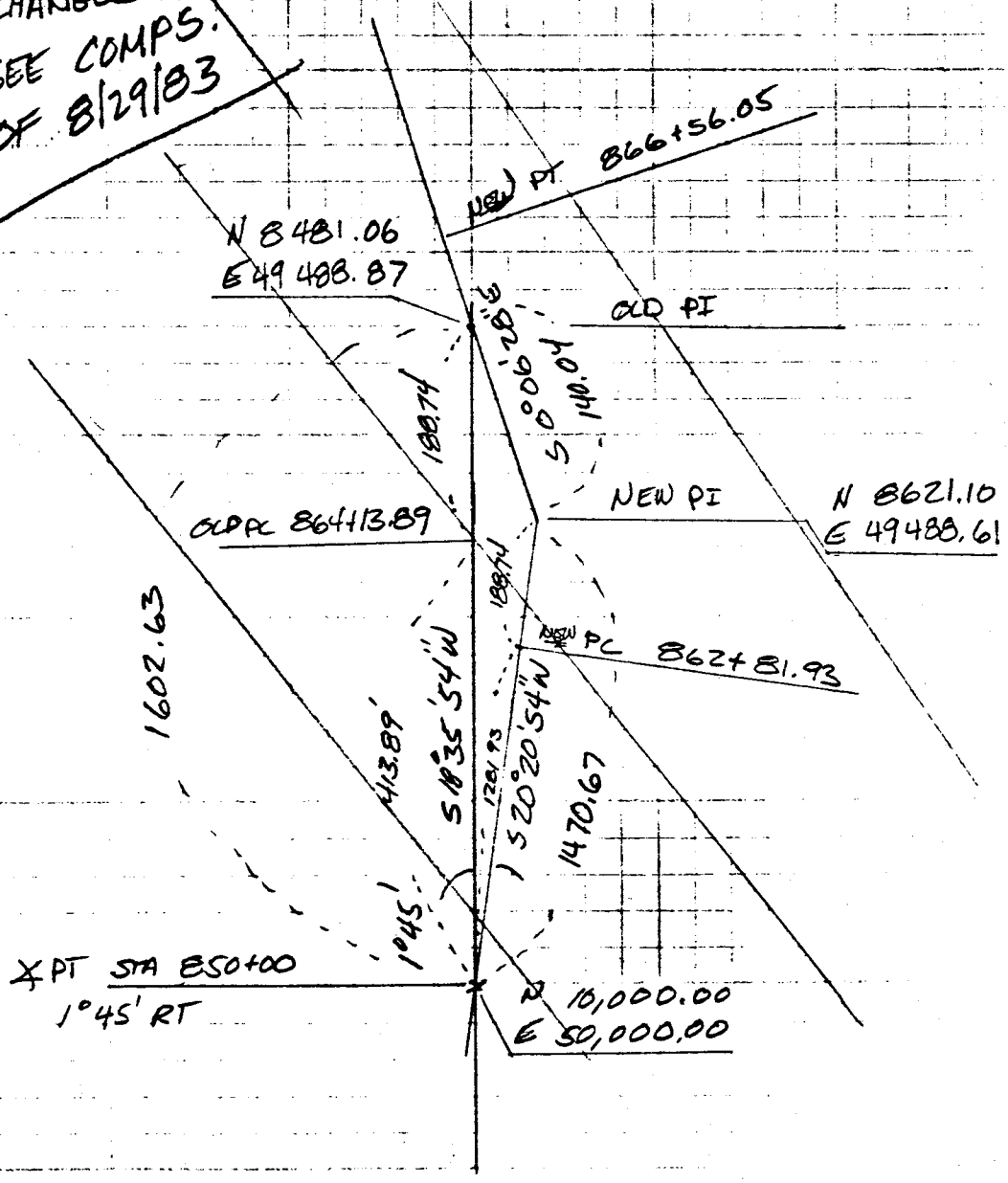
STATE: ARIZONA
PROJECT: RWCD R. 3
BY: D.T.
DATE: 8/15/83
CHECKED BY
DATE
JOB NO.
SUBJECT
SHEET 1 of 3

PROBLEM: REVISE CURVE DATA FOR CURVE NO. 4: ADD ∡ PT AT 850+00; EQUATION AT NEW PC.

SOLUTION:

1. ANGLE PT AT STA 850+00 = 1°45' RT.

CHANGED SEE COMPS. OF 8/29/83



COMPUTATION SHEET

SCS-ENG-E234 Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA | PROJECT: RWCD R3

BY: D.T. | DATE: 8/15/83 | CHECKED BY | DATE | JOB NO.

SUBJECT | SHEET 2 3

2. NEW CURVE:

OLD CURVE

HP97
SURV
PAC

D = 5°00'00"
Δ = 18°42'22"
R = 1145.92
T = 188.74
C = 372.46
L = 374.12

COMPUTATION SHEET

SCS-ENG-523A Rev. 9-69

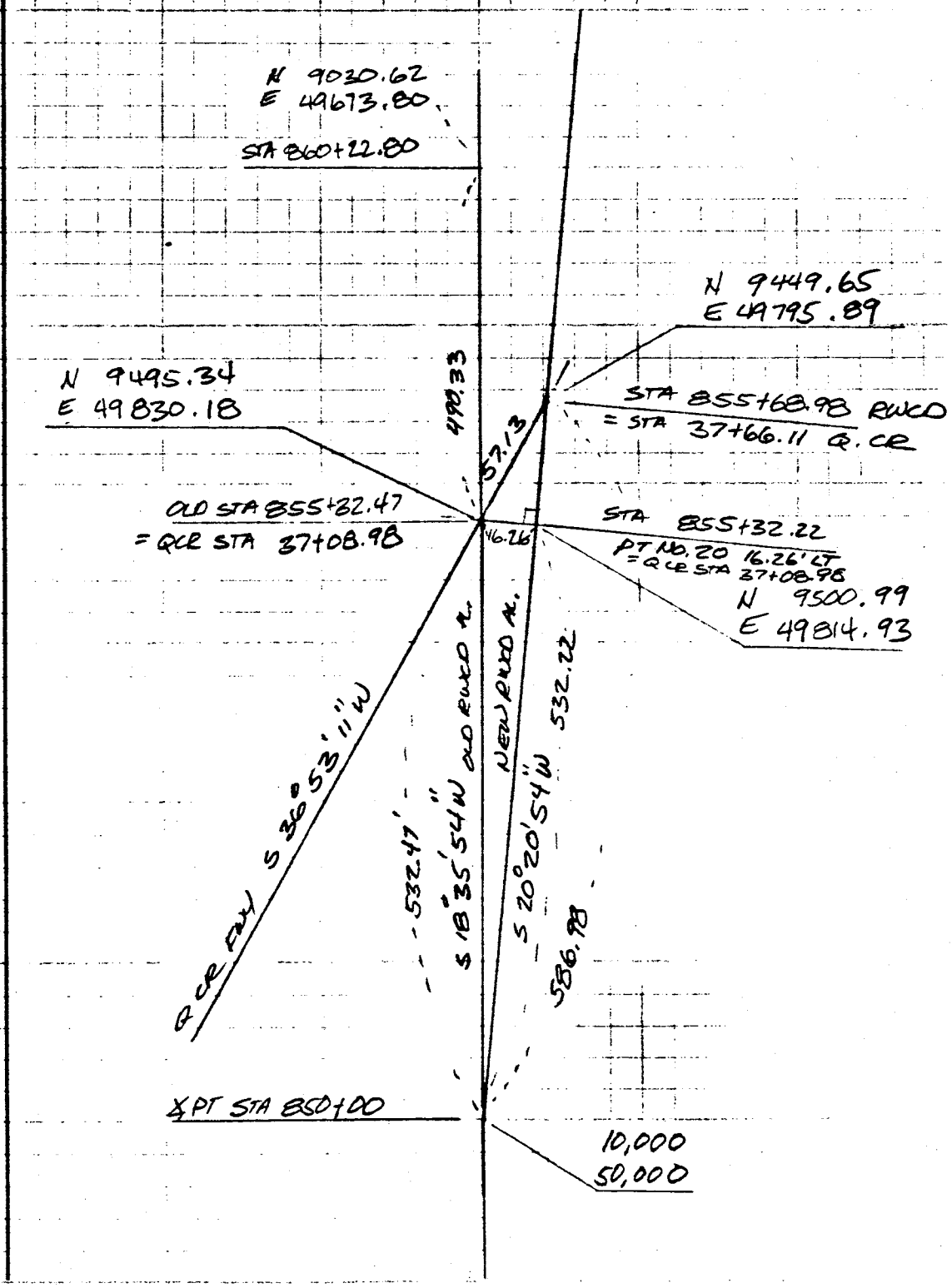
U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA | PROJECT RWCD R.3

BY D.T. | DATE 8/15/83 | CHECKED BY | DATE | JOB NO.

SUBJECT | SHEET 3 3

3. NEW INTERSECTION W/ Q CR



COMPUTATION SHEET

ARIZ

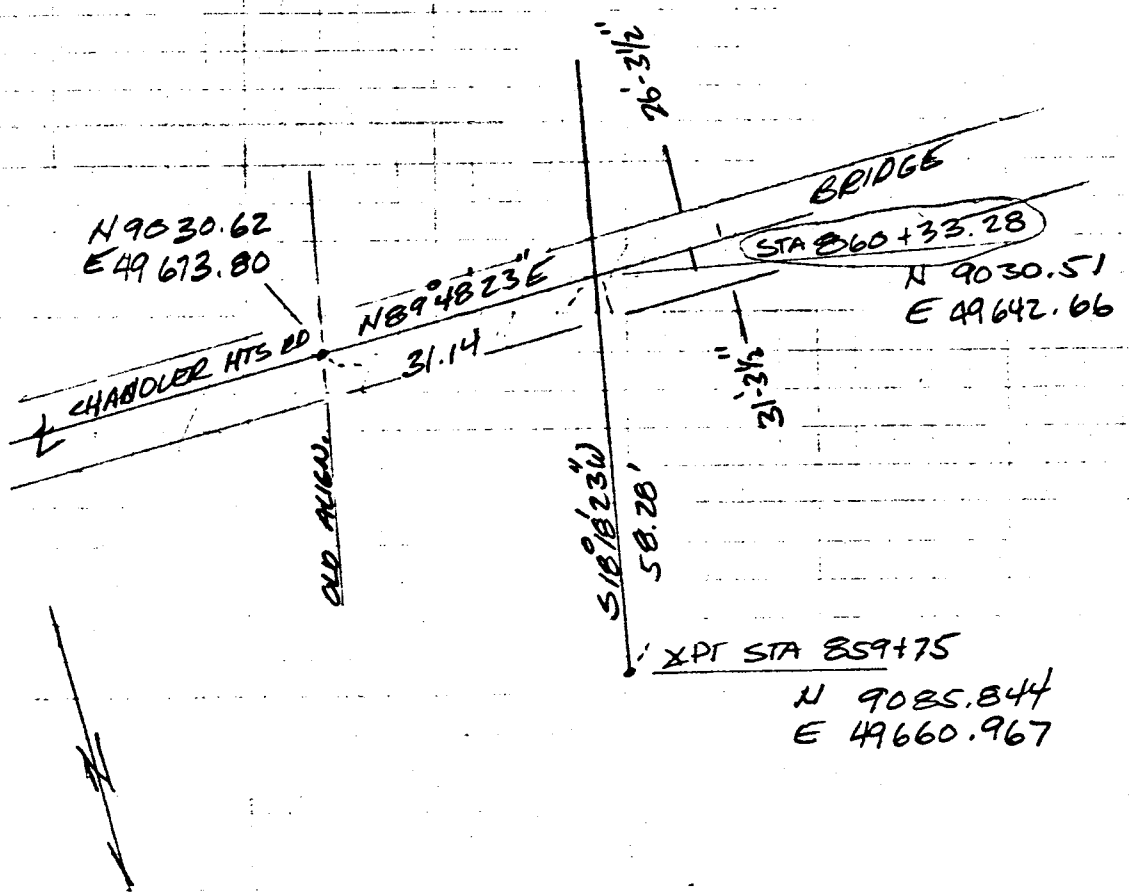
D.T.

RWCD R3

8/15/83

SHEET

4. COMPUTE INTERSECTION OF ℄ CHANDLER HTS RD WITH NEW ℄ PV ALIGN.



T= 9,030.6200
Z= 49,673.8000
Y= 31.1384
X= 269.4823

T= 9,085.8440
Z= 49,660.9670
Y= 58.2787
X= 198.1823

9,030.5148 ***
49,642.6618 ***

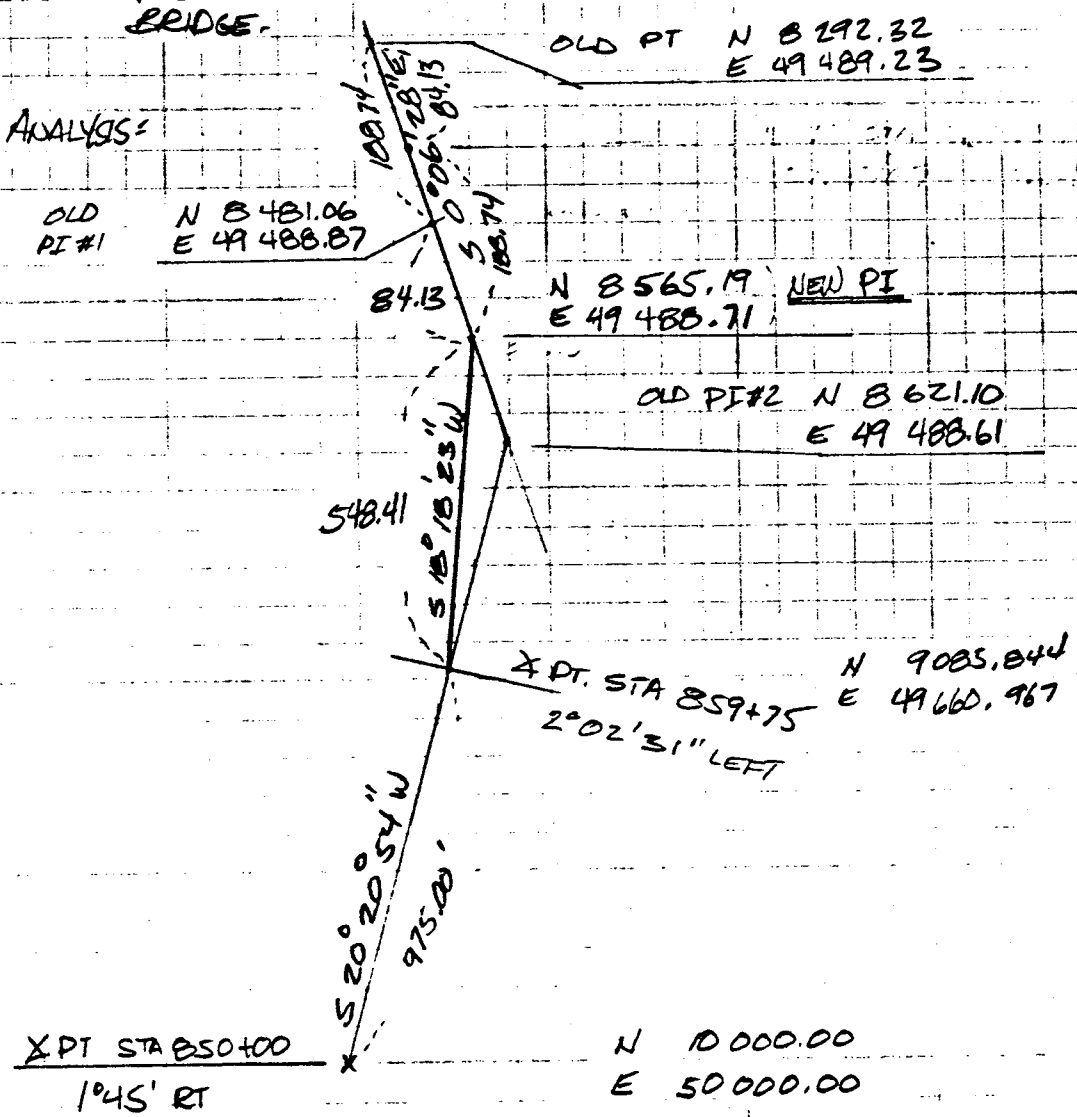
COMPUTATION SHEET
SCS-ENG-5234 Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZ
PROJECT: RWCD R3
BY: D.T.
DATE: 8/19/83
CHECKED BY
JOB NO.
SUBJECT
SHEET 1 OF

PROBLEM: ADD ANGLE POINT AT STA 859+75 SO THAT FLOW DOWNSTREAM WILL PARALLEL THE BRIDGE PIERS ~~AT~~ THE CHANDLER HEIGHTS BRIDGE.

ANALYSIS:



X BETWEEN BRIDGE PIER AXIS AND ℄ CHANDLER HTS. RD. IS 71°30' PER MARICOPA COUNTY FLOOD CONTROL DISTRICT AS BUILT DRAWINGS; CHANDLER HTS RD. ℄ BRG N89°48'23"E IS USED ON REACH3 DRAWINGS.

∴ USE BRG PIERS = (N89°48'23"E) − (71°30') = N18°18'23"E

COMPUTATION SHEET

SCS-ENG-5004 Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: AZ12 PROJECT: RWCD R3.

BY: DT DATE: 8/29/83 CHECKED BY: DATE: JOB NO.

SUBJECT:

SHEET

INVERT ELEVATIONS

CONTROL POINTS

STA 857+00 ELEV 1296.22

STA 982+00 ELEV 1286.99

STA	INV. EL.
740	1299.73
750	1299.43
760	1299.13
770	1298.83
780	1298.53
790	1298.23
800	1297.93
810	1297.63
820	1297.33
830	1297.03
840	1296.73
850	1296.43
860	1290.65
870	1290.35
880	1290.05
890	1289.75
900	1289.45
910	1289.15
920	1288.85
930	1288.55
940	1288.25
950	1287.95
960	1287.65
970	1287.35
976	1287.17

ARIZONA
DT
LAYOUT

RWCD R.3
9/1/83

CHECKED BY | DATE | JOB NO.

SHEET

1.0000	***
50,000.0000	***
10,000.0000	***
210.2758	***
1,314.2400	***
2.0000	***
48,867.2182	***
9,333.6427	***
210.2758	***
170.8400	***
3.0000	***
48,719.9662	***
9,247.0219	***
198.0212	***
170.8400	***
4.0000	***
48,557.5215	***
9,194.1255	***
108.0212	***
75.0000	***
5.0000	***
48,534.2996	***
9,265.4399	***
108.0212	***
175.0000	***
6.0000	***
48,480.1151	***
9,431.8401	***
18.0212	***
143.6200	***

7.0000	***
48,616.6774	***
9,476.3085	***
30.2758	***
1,604.5400	***
8.0000	***
49,999.6773	***
10,289.8563	***
270.0351	***
405.7900	***
9.0000	***
50,000.1318	***
9,884.0665	***
90.0351	***
115.9400	***
10.0000	***
50,000.0019	***
10,000.0065	***
270.0351	***
1.0000	***
50,000.0000	***
10,000.0000	***
90.0351	***
20.9850	***
2.0000	***
49,999.9675	***
10,028.9850	***

T= 49,999.9675
Z= 10,028.9850
Y= 1,264.7216
X= 210.2758

T= 48,534.3000
Z= 9,265.4400
Y= 394.9768
X= 18.0212

48,909.8671	***
9,387.7349	***

COMPUTATION SHEET

STD. ENG-503A Rev. 9-69

U.S. DEPARTMENT OF ...

SOIL CONSERVATION SERVICE

STATE: ARIZONA

PROJECT: RWCD R3

BY: D.T. 9/1/83

CHECKED BY

DATE

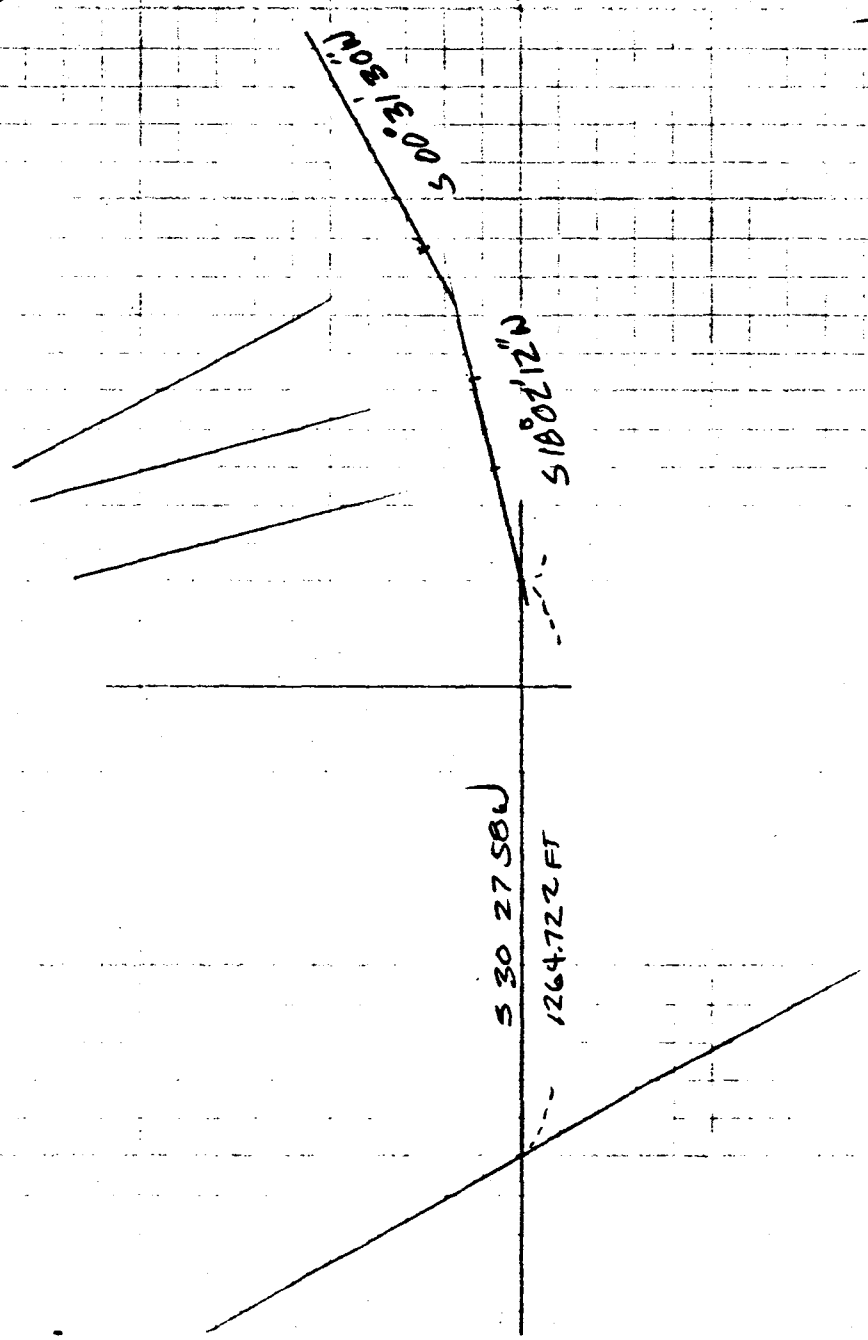
JOB NO.

SUBJECT: LAYOUT - UPSTREAM OF QUEEN CREEK RD. BRIDGE

SHEET

PROBLEM: DETERMINE LAYOUT OF TRANSITION AND CURVES D.S. OF Q. CR. RD. BRIDGE.

SOLUTION: (SEE ALSO SH. 5 OF RWCD DWGS)



CALCULATION SHEET

ARIZONA

PROJECT RWCD R3

DT 9/1/83

CHECKED BY DATE JOB NO

SHEET

1.0000	***
50,000.0000	***
10,000.0000	***
~~40.0000~~	***
90.0351	***
57.9700	***

DT ON RT. BOY RWCD FLOODWAY AT INT ℄ & Q. CR. RD. (SECTION LINE)

2.0000	***
49,999.9351	***
10,057.9700	***

℄ FLOODWAY AND ℄ Q CR RD

STA 745 +28.37

T= 49,999.9351
Z= 10,057.9700
Y= 1,392.8159
X= 210.2758

T= 48,534.3000
Z= 9,265.4400
Y= 278.8284
X= 18.0212

48,799.4264	***
9,351.7724	***

PI

CURVE: USE T= 280

PCSTA ≈ 74528.37 + 1392.82 - 280

≈ 756 +41.19

COMPUTATION SHEET

ENGINEERING

ARIZ DT LAYOUT

9/7/83

PROJECT: RWCD R3

CHECKED BY DATE JOB NO

SHEET

PROBLEM: DETERMINE LOCATION OF INTERSECTION OF CHANDLER HTS. RD. BRIDGE AND RWCD FLOODWAY

ANALYSIS: 1. MHCD DRWGS SHOWS SECTION CORNER 21 | 22 / 28 | 27 AT STA 20+00

WITH CENTER PIER AT STA 23+68.18 ON ℄ CHND HTS RD (SECTION LINE)

2. BOOK 1 P12 SHOWS ℄ FLOODWAY SURVEY AT 395.45 E. ON ℄ CHND. HTS RD FROM SEC. COR.

3. THE ℄ SURVEY IS 27.27' E ON ℄ CHAND. HTS RD. FROM CENTER PIER (AS DEDUCED FROM THE ABOVE

COMPUTATION SHEET
SCS-ENG-573A Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ST: ARIZ PR: RWCD R3
D.T. 9/7/83 CHECKED BY DATE JOB NO
SUBJECT: LAYOUT: FLOODWAY @ Q. CR. RD SHEET

PROBLEM: DETERMINE LOCATION OF QUEEN CREEK RD. BRIDGE CENTER SPAN RELATIVE TO THE FLOODWAY ROW.

ANALYSIS:

1. BRIDGE DRWGS – PLAN AND PROFILE – DRWG #3.
   - ℄ RD IS ON SECTION LINE 10-15
   - SEC. COR $\frac{9/10}{16/15}$ = STA 0+00
   - CENTER PIER = STA 37+54.85

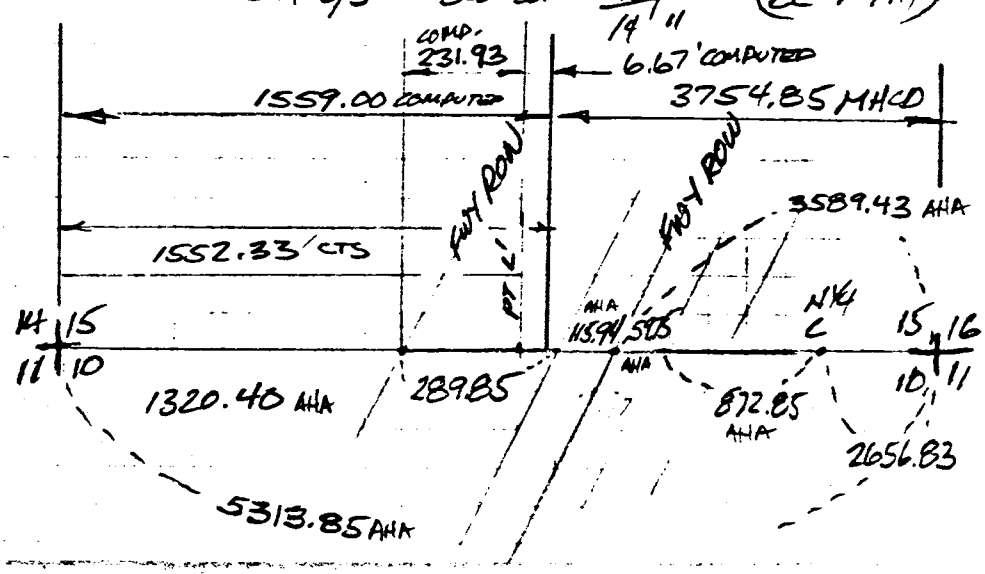
2. CTS ALIGNMENT SURVEY PT L' ON BRIDGE ℄ AT STA 745+28.37
   - CTS PT K AT INTERSECTION OF Q. CR AND HIGLEY RD (BC IN HH)
   - L' TO K DIST = 1552.33

BOOK 2 P22

AHA

3. ROW SURVEY –

SH 5/5 - SEC COR $\frac{15/10}{14/11}$ (BC IN HH)



SOLICITATION SHEET

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ARIZ.

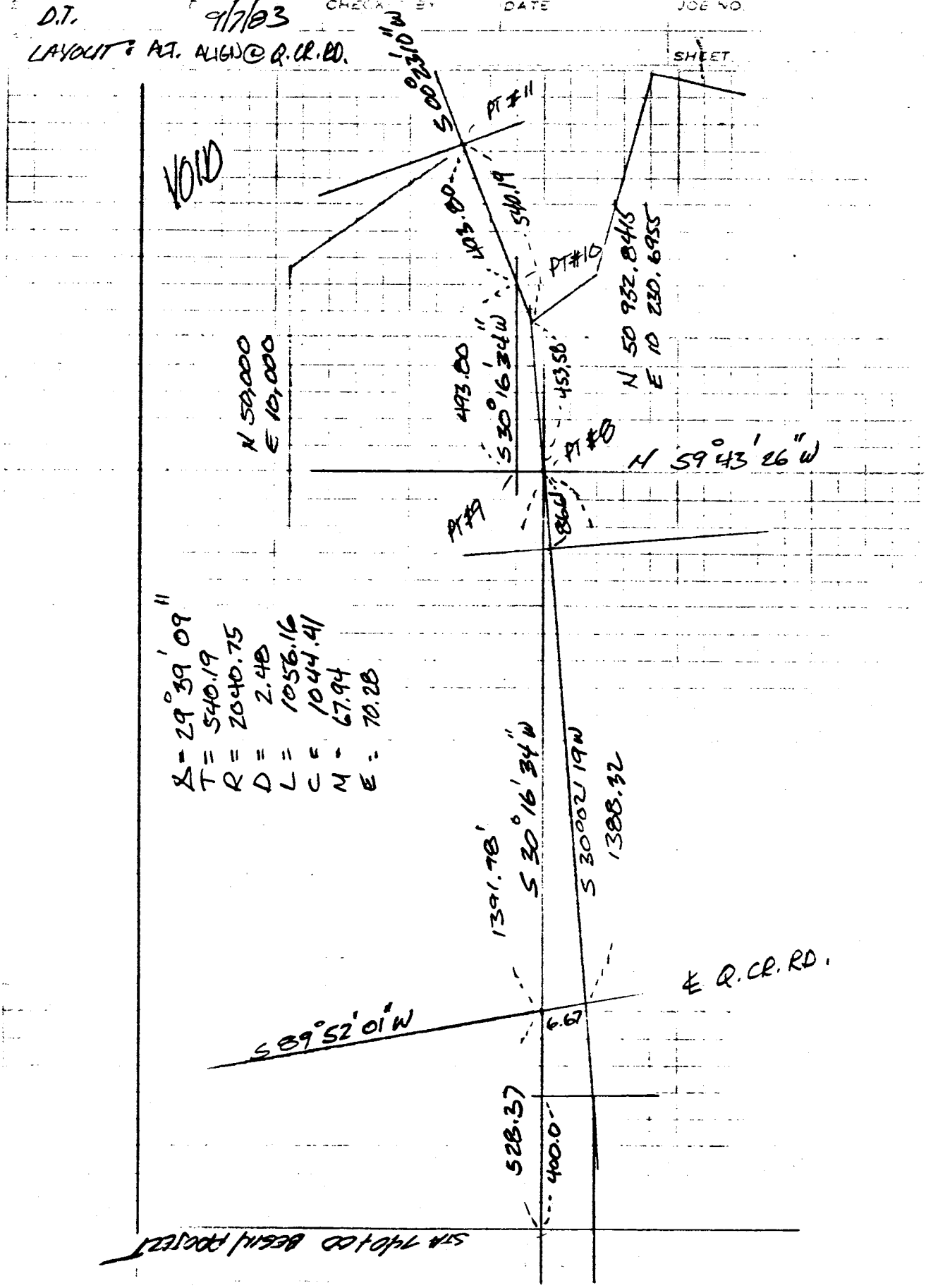
PROJECT RWCD R3

D.T. 9/7/83

CHECKED BY DATE JOB NO.

LAYOUT: ALT. ALIGN @ Q.CR.RD.

SHEET



COMPUTATION SHEET

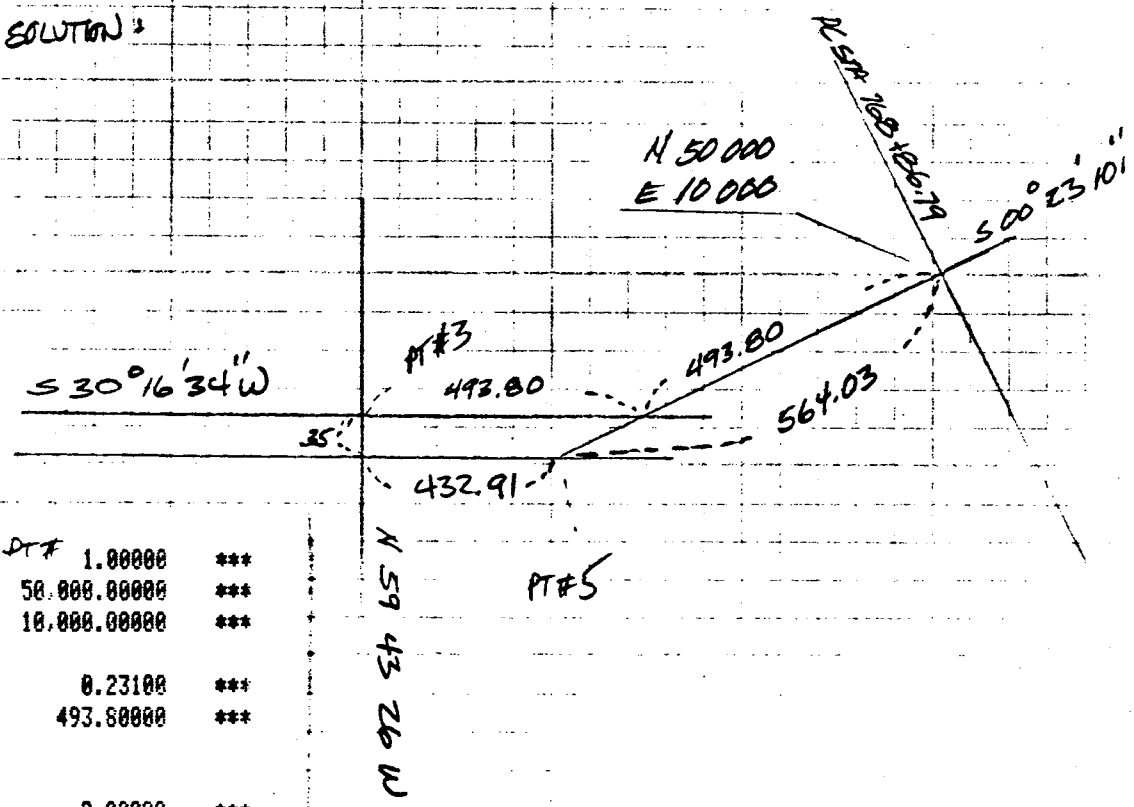
SCS-ENG-527A Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZ.
PROJECT: RWCD R3
BY: D.T.
DATE: 9/7/83
CHECKED BY:
DATE:
JOB NO.:
SUBJECT: LAYOUT, ALT. ALIGN. @ Q. CR. RD
SHEET

PROBLEM: MOVE RWCD ℄ 10' N, SO THAT POT ℄ ALIGNS WITH BRIDGE ℄.

SOLUTION:




```
PT #   1.00000    ***
      50,000.00000  ***
      10,000.00000  ***

           0.23100  ***
         493.80000  ***


           2.00000  ***
      50,493.78879  ***
      10,003.32765  ***

          30.16340  ***
         493.80000  ***

PT #   3.00000    ***
N     50,920.23735  ***
E     10,252.28561  ***

         300.16340  ***
          35.00000  ***

PT #   4.00000    ***
      50,937.88321  ***
      10,222.05940  ***
```

```
T=  50,937.88321
Z=  10,222.05940
Y=  432.90854
X=  210.16340

T=  50,000.00000
Z=  10,000.00000
Y=  564.03368
X=  0.23100
      50,564.02087   ***
PT #5 10,003.80094   ***
```

COMPUTATION SHEET

ARZ. RWCD R3

D.T. 9/7/83

LAYOUT

SHEET 1

PROBLEM: INVERSE THE DIST FROM CONTROL POINT P TO POINT "19".

SOLUTION:

SH 3/31

CTS ENGR SURVEY CORPS 7/8/81

1. STA 846+00 PT. 19 N

N 813 954.23
E 555 665.08

6/9/81

2. PT P N 812 604.47
E 554 815.56

3. INVERSE

	1.0000	***
	813,954.2300	***
	555,665.0800	***
AZ	212.1105	***
AST	1,594.8891	***
	2.0000	***
	812,604.4200	***
	554,815.5600	***

4. SCALED DIST ON PLAN PHOTO BASE = 1585 FT.

RATIO $\left(\frac{\text{HORS}}{\text{ACT}}\right)$ = 0.99373

COMPUTATION SHEET

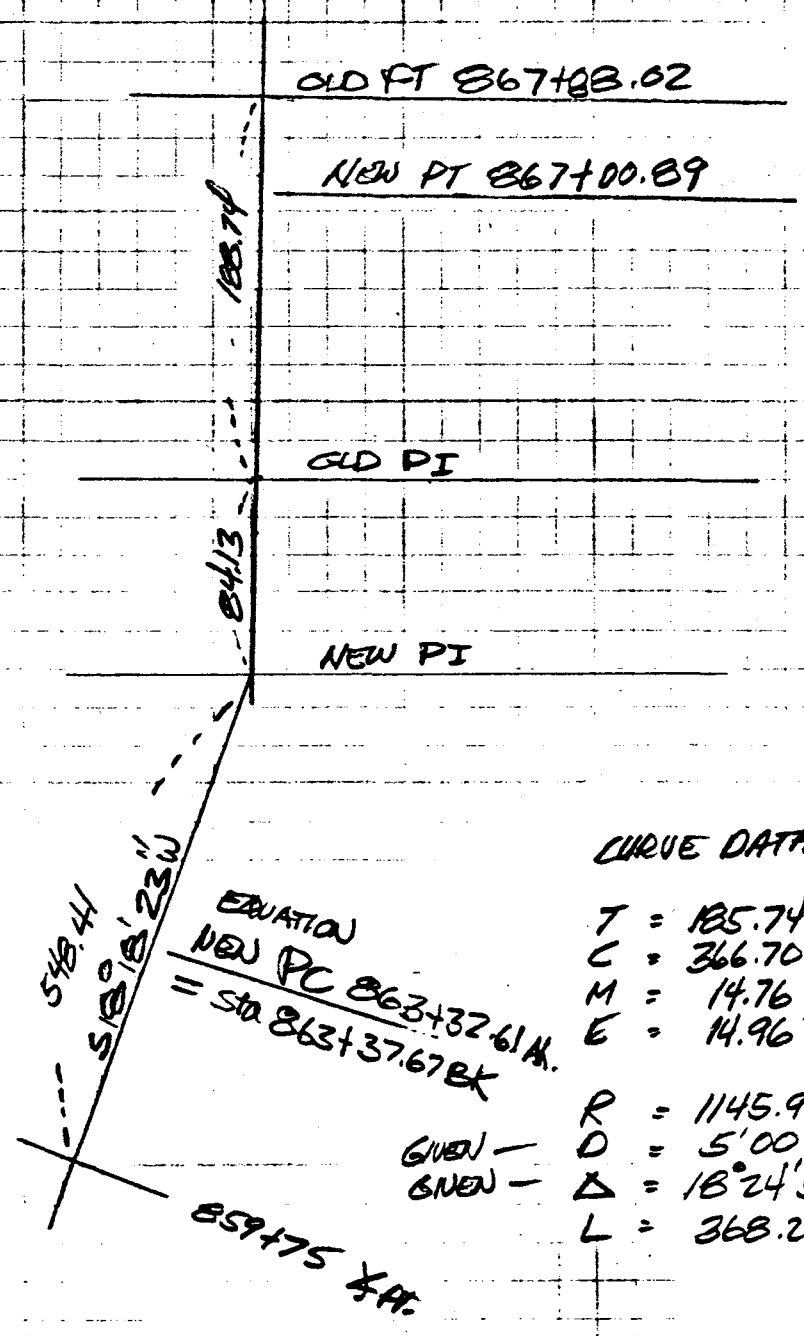
SCS-ENG-523A Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZ. PROJECT: RWCD R3

BY: D.T. DATE: 9/27/83 CHECKED BY: DATE: JOB NO.:

SUBJECT: REVISE CURVE #4 SHEET: OF



CURVE DATA

T = 185.74'
C = 366.70'
M = 14.76'
E = 14.96'

R = 1145.92'
GIVEN — D = 5°00'00"
GIVEN — Δ = 18°24'51"
L = 368.28'

COMPUTATION SHEET

S.E.D.-ENG-503A Rev. 9-65

U.S. DEPARTMENT OF A
SOIL CONSERVATION SERVICE

STATE ARIZ | PROJECT RWCD R3

BY DT | DATE 9/2/03 | CHECKED BY | DATE | JOB NO.

SUBJECT | SHEET

CURVE LAYOUT

R T= 2,037.9468
D Z= 2.4841
Δ Y= 29.5324
L X= 1,063.1539

O T= 0.0000
PT Z= 76,886.7939
PI Y= 76,367.6100
PC X= 75,823.6400

TAN OFFSET

T= 0.0000
TO Z= 1.4304
TD Y= 76.3421
STA X= 75,900.0000

T= 0.0000
Z= 7.6262
Y= 176.1400
X= 76,000.0000

T= 0.0000
Z= 18.7095
Y= 275.5138
X= 76,100.0000

T= 0.0000
Z= 34.6537
Y= 374.2243
X= 76,200.0000

T= 0.0000
Z= 55.4204
Y= 472.0340
X= 76,300.0000

T= 0.0000
Z= 80.9596
Y= 568.7074
X= 76,400.0000

T= 0.0000
Z= 111.2098
Y= 664.0118
X= 76,500.0000

T= 0.0000
Z= 146.0982
Y= 757.7177
X= 76,600.0000

T= 0.0000
Z= 185.5408
Y= 849.5995
X= 76,700.0000

T= 0.0000
Z= 229.4427
Y= 939.4361
X= 76,800.0000

T= 0.0000
Z= 271.0801
Y= 1,015.5831
X= 76,886.7939

ARIZ.

D.T. 9/2/83

PROJECT RWCD R3

CHECKED BY DATE JOB NO.

SHEET

TRAN

	1.0000	***
	50,000.0000	***
#1	10,000.0000	***
	0.2310	***
	493.8000	***
	2.0000	***
	50,493.7888	***
#2	10,003.3277	***
	30.1634	***
	493.8000	***
	3.0000	***
	50,920.2374	***
#3	10,252.2856	***
	300.1634	***
	25.0000	***
	4.0000	***
	50,932.8415	***
#4	10,230.6955	***

INTERSECT

#4 T= 50,932.8415
Z= 10,230.6955
DIST Y= 450.3061
AZ X= 210.1634

#1 T= 50,000.0000
Z= 10,000.0000
DIST Y= 543.9669
AZ X= 0.2310

	50,543.9546	***
#5	10,003.6657	***

COMPUTATION SHEET

U.S. DEPARTMENT OF ...

SOIL CONSERVATION SERVICE

ARIZ. | RUXO R3

D.T. | 9/2/83 | CHECKED BY | DATE | JOB NO

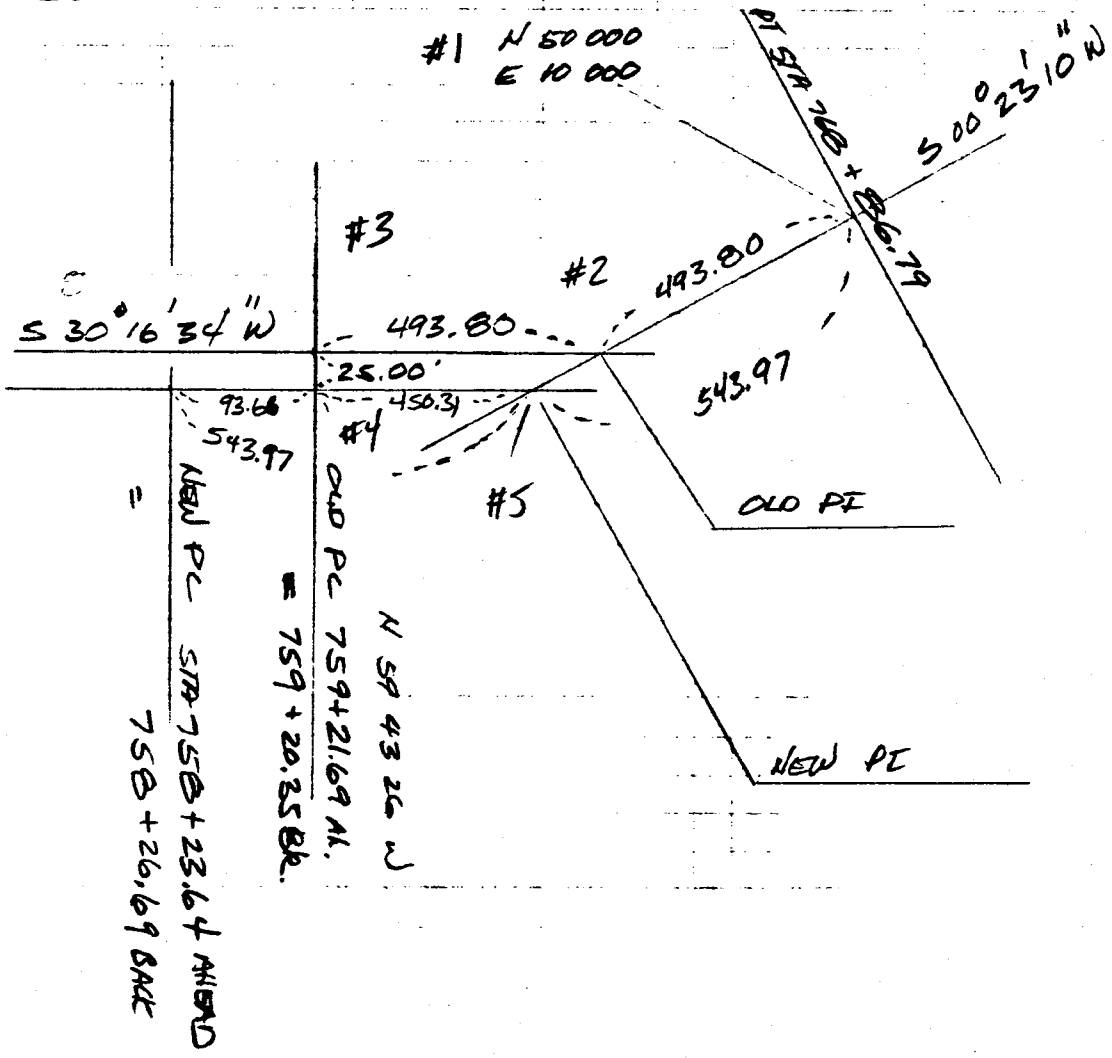
SUBJECT | SHEET

PROBLEM: NEED TO REALIGN CURVE NO. 4.

ANALYSIS:

1. KEEP PT AT STA 768+86.79
2. LOCATE PI AT INTERSECTION OF FLOODWAY ℄ (25' RT. OF ROW ℄) UPSTREAM AND ℄ OF FLOODWAY DS (℄ OF ROW).
3. DEVELOP CURVE DATA

SOLUTION:



COMPUTATION SHEET
SCS-ENG-523A Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZ
PROJECT: RWCD REACH 3
BY: D.T.
DATE: 9/2/83
CHECKED BY
DATE
JOB NO.
SUBJECT
SHEET

CURVE DATA

$\Delta = 29°53'24''$
$T = 543.97$

XEQ c

T=	2,037.9468	R
Z=	2.4841	D
Y=	29.5324	Δ
X=	1,063.1539	L

XEQ d

T=	543.9700	T
Z=	1,051.1392	C
Y=	68.9359	M
X=	71.3494	E

PC STA = 768 + 86.79
— 10 63.15

PC STA 758 + 23.64 AHEAD

EQUALS 759 + 20.35
— 93.66

PC STA 758 + 26.69 BACK

COMPUTATION SHEET

SCS-ENG-N32 Rev. 9-69

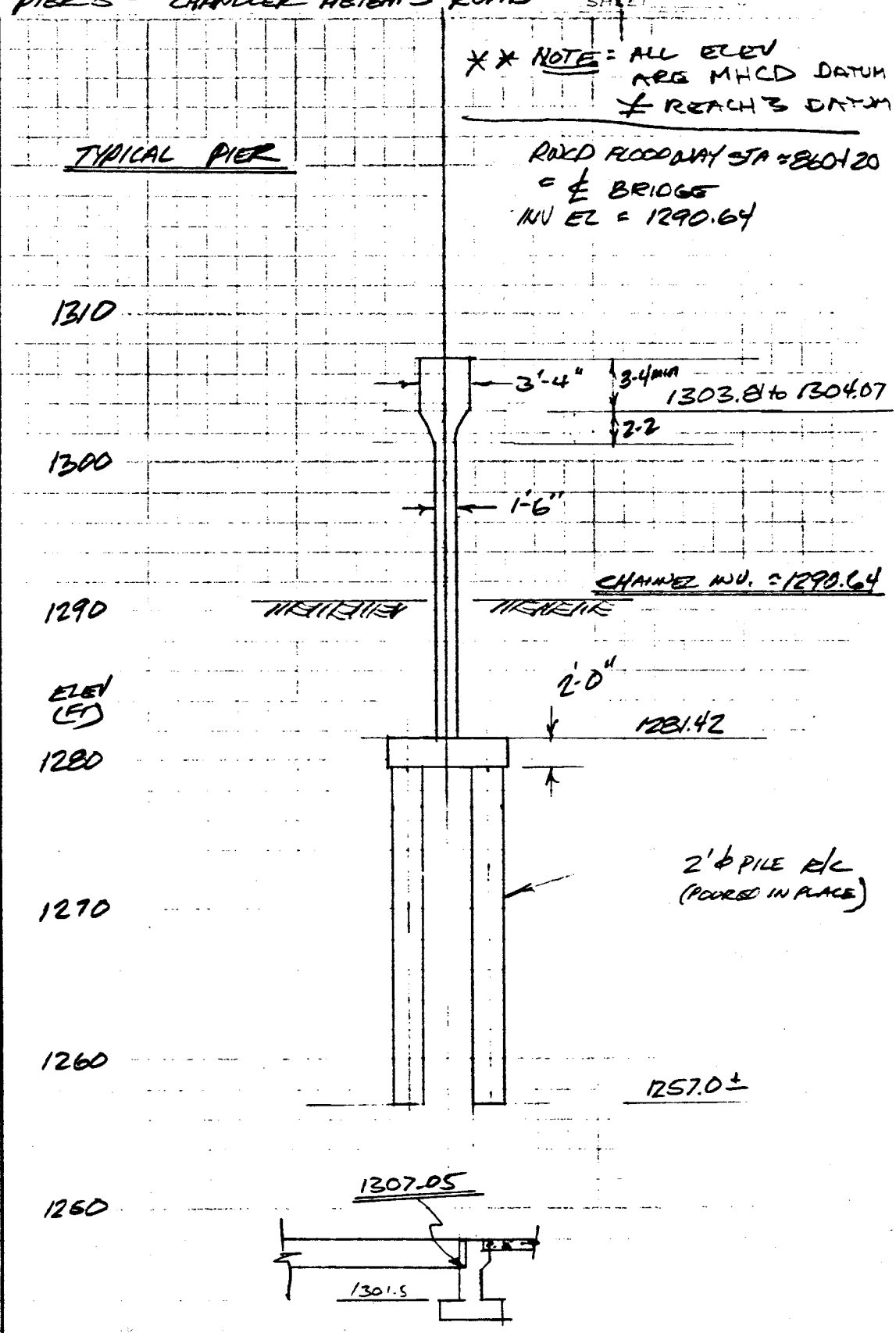
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

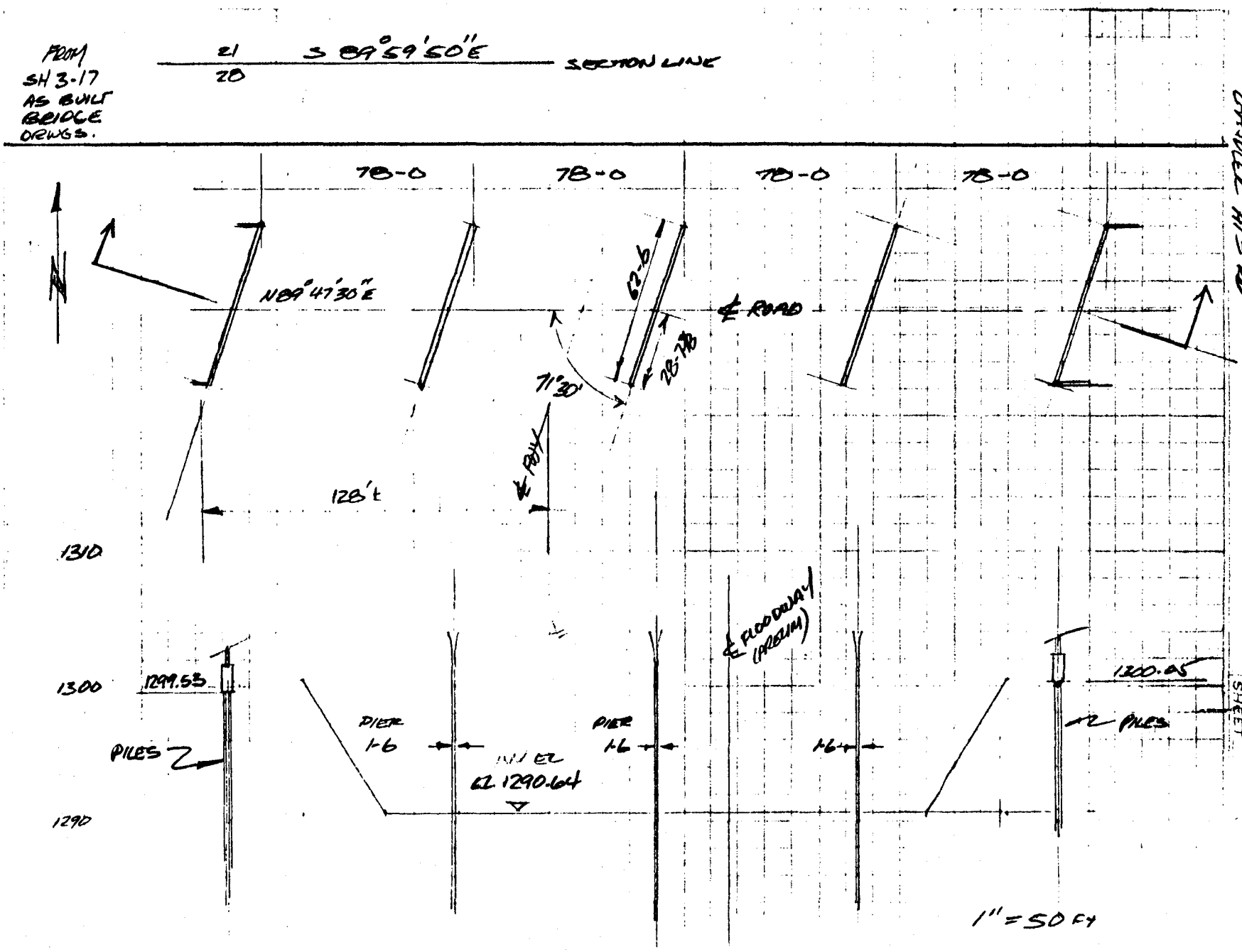
ARIZONA — RMCD FLOODWAY REACH 3

D. THALGRAN — 5/24/83 — CHECKED BY — DATE — JOB NO.

BRIDGE PIERS - CHANDLER HEIGHTS ROAD — SHEET

** NOTE: ALL ELEV ARE MHCD DATUM ≠ REACH 3 DATUM




FROM SH 3-17 AS BUILT BRIDGE DRWGS.
21
20
S 89°59'50"E
SECTION LINE
78-0
78-0
78-0
78-0
N89°47'30"E
℄ ROAD
62-6
28-7½
71°30'
℄ BRIDGE
128'±
1310
1300
1299.53
PILES
PIER 1-6
PIER 1-6
1-6
INVERT EL 1290.64
1290
℄ FLOODWAY (APPROX)
1300.05
12 PILES
1" = 50 FT
ARIZONA
D. MACKEBAY
5/24/83
CHECKED BY
DATE
JOB NO
SHEET
DUAL FLOODWAY DETAILS
U.S. DEPARTMENT OF
SOIL CONSERVATION SERVICE
CONSTRUCTION SHEET

COMPUTATION SHEET

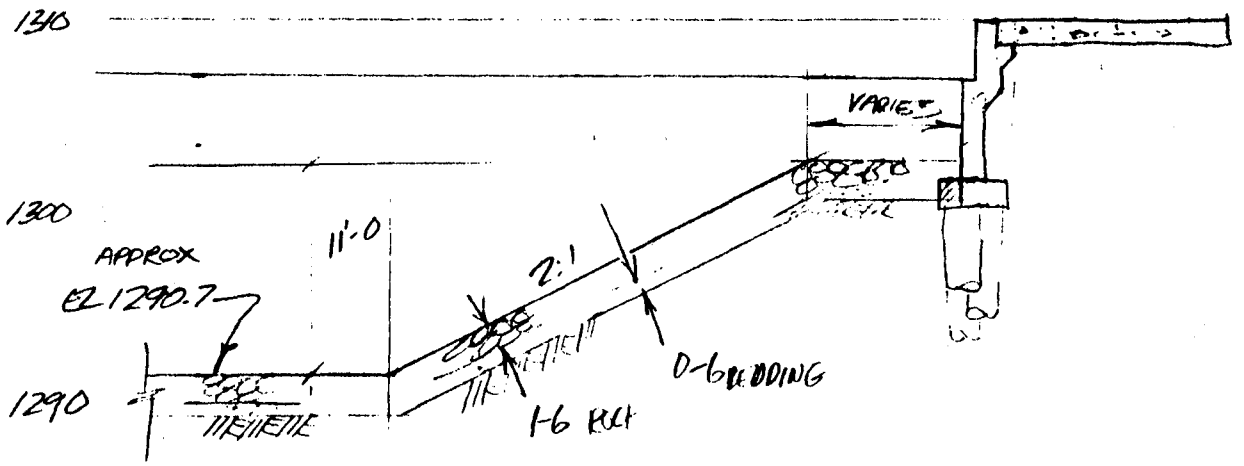
SCS-ENG-523A Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA
PROJECT: RWCD FLOODWAY REACH 3
BY: D.T.
DATE: 5/26/03
CHECKED BY
DATE
JOB NO.
SUBJECT: WORK PLAN TOPO
SHEET

STATION	FIELD ELEVATION
725+00	1311.0
730+00	1311.0
735+00	1310.5
740+00	1310.6
745+00	1311.0
750+00	1310.2
755+00	1310.4
760+00	1310.4
765+00	1310.0
770+00	1310.7
775+00	1310.8
780+00	1311.5
785+00	1310.0
790+00	1309.5
795+00	1308.8
800+00	1308.5
805+00	
670	1316.4
675	1315.2
680	1313.6
685	1313.2
690	1313.0
695	1313.0
700	1312.6
705	1312.0
710	1312.2
715	1312.2
720	1311.6
650	1316.0
655	1316.6
660	1317.0
665	1316.2

ARIZONA
THACKERAY
6/29/83
RWCO RCRAHLS



scale 1"=10'

ELEVATION

CHANNEL @ CHAN. ID. 1115 BRIDGE

E. ABUT. - LOOKING U.S.

COMPUTATION SHEET

SCS ENG-523 Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA
PROJECT: RUCD REACH 3
BY: D.T.
DATE: 7/18/83
CHECKED BY
DATE
JOB NO.
SUBJECT
SHEET 1 OF 1

TEC #22
TRAP CH.
NORMAL
DEPTH

```
01♦LBL 67
02♦LBL 11
03♦LBL B
04 ENTER↑
05 0
06 X<>Y
07 RCL 22
08 RCL 23
09 SQRT
10 *
11 /
12 .6
13 Y↑X
14 STO 25
15 RCL 21
16 .6
17 Y↑X
18 /
19♦LBL 05
20 -
21 LASTX
22 /
23 LASTX
24 X<>Y
25 ABS
26  E3-
27 X<>Y
28 X<=Y?
29 SF 02
30 RDN
31 RDN
32 FS?C 02
33 RTN
34 ENTER↑
35 ENTER↑
36 ENTER↑
37 RCL 20
38 X↑2
39 1
40 +
41 SQRT
42 2
43 *
44 *
45 RCL 21
46 +
47 .4
48 Y↑X
49 X<>Y
50 RCL 20
51 *
52 RCL 21
53 +
54 /
55 RCL 25
56 *
57 GTO 05
58♦LBL 12
59♦LBL C
60 ENTER↑
61 ENTER↑
62 RCL 20
63 *
64 RCL 21
65 +
66 *
67 RTN
68♦LBL 10
69♦LBL A
70 ENTER↑
71 XEQ 12
72 X<>Y
73 RCL 20
74 X↑2
75 1
76 +
77 SQRT
78 *
79 2
80 *
81 RCL 21
82 +
83 /
84 2
85 ENTER↑
86 3
87 /
88 Y↑X
89 X<>Y
90 RCL 22
91 *
92 *
93 FS?C 02
94 RTN
95 RCL 23
96 SQRT
97 *
98 RTN
99♦LBL 13
100♦LBL D
101 RDN
102 STO 25
103 R↑
104 SF 02
105 XEQ 10
106 RCL 25
107 X<>Y
108 /
109 X↑2
110 RTN
111 STOP
112 END
```

COMPUTATION SHEET

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA PROJECT RWCD REACH 3

BY DT DATE 5/9/83 CHECKED BY DATE JOB NO.

SHEET

001	*LBLA	21 11
002	STOA	35 11
003	SPC	16-11
004	3	03
005	Y^x	31
006	3	03
007	2	02
008	.	-62
009	1	01
010	6	06
011	÷	-24
012	RCLC	36 13
013	÷	-24
014	RCLD	36 14
015	÷	-24
016	STO1	35 01
017	RCLA	36 11
018	3	03
019	2	02
020	.	-62
021	1	01
022	6	06
023	ENT↑	-21
024	RCLB	36 12
025	×	-35
026	RCLD	36 14
027	×	-35
028	√X	54
029	÷	-24
030	RCLA	36 11
031	PRTX	-14
032	R↓	-31
033	RCLD	36 14
034	DSP5	-63 05
035	PRTX	-14
036	R↓	-31
037	DSP2	-63 02
038	X⇄Y	-41
039	SCI	-12
040	PRTX	-14
041	X⇄Y	-41
042	PRTX	-14
043	FIX	-11
044	RTN	24
045	GTOA	22 11
046	*LBLB	21 12
047	STOB	35 12
048	RTN	24
049	GTOA	22 11
050	*LBLC	21 13
051	STOC	35 13
052	RTN	24
053	GTOA	22 11
054	*LBLD	21 14
055	STOD	35 14
056	RTN	24
057	GTOA	22 11
058	R/S	51

COMPUTATION SHEET

SCS-ENG-5234 Rev 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE WNTC | PROJECT AP 97 OPEN CHANNEL MOM-FORCE

BY DT | DATE 6/20/83 | CHECKED BY | DATE | JOB NO.

SUBJECT

SHEET 1 of 5

TRAPEZOIDAL CHANNEL M+F

$$F = P = \bar{y} A \gamma$$

$$M = Q \rho V = \frac{Q^2 \rho}{A}$$

DIVIDING BY γ

$$F = \bar{y} A$$

$$M = \frac{Q^2 \rho}{A \gamma} \qquad \rho = \frac{\gamma}{g}, \; g = \frac{\gamma}{\rho}$$

$$M = \frac{Q^2}{A g}$$

$\bar{y}$ from W.S. to centroid:

$$= \frac{d(T+2b)}{3(T+b)} \qquad T = 2dz + b$$

$$A = bd + zd^2$$

COMPUTATION SHEET

SCS-ENG-523A Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE	PROJECT		
UNTC	OPEN CH. MOM.-FORCE		
BY DT	DATE 6/20/83	CHECKED BY	DATE	JOB NO.

SUBJECT

SHEET 2 5

PROGRAM:

ENTER DATA:

Q B Z D

SOLVE FOR M:

SOLVE FOR A

SOLVE $\frac{Q^2}{Ag}$

SOLVE FOR F:

SOLVE FOR T:

SOLVE FOR $\bar{Y}$:

SOLVE FOR $F = A\bar{Y}$

PRINT

REG

20	A	D
21	B	B
22	C	Z
23	D	Q
	E	
	0	A
	1	M
	2	T
	3	$\bar{Y}$
	4	F
	5	M+F
	6	
	7	
	8	
	9	

KEYS:

A	B	C	D
D > D, M, F, M+F	B	Z	Q

COMPUTATION SHEET

SCS-ENG-523A Rev 9-69

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE Utah | PROJECT OPEN CH. MOM. - FORCE

BY DT | DATE 6/20/83 | CHECKED BY | DATE | JOB NO.

SUBJECT

SHEET 3 5

```
LBL A
STO A
** SOLVE A ***
↑
↑
RCL C
X
RCL B
+
X
STO D

*** SOLVE M ***
RCL D
X²
32.16
÷
÷
STO 1

*** SOLVE FOR T ***
RCL A
RCL C
X
2
X
RCL B
+
STO 2
÷
** SOLVE Y ***
RCL B
2
X
+
RCL A
X
3
÷
RCL 2
RCL B
+
÷
STO 3
** SOLVE F ***
RCL 0
X
STO 4
** PRINT **
PRT SP
RCL A
PRT X
RCL 1
PRT X
RCL 4
PRT X
RCL 5
PRT X
RTN
GTO A
```

RCL 1 +
STO 5

EXAMPLE:

GIVEN

$B = 150$

$Z = 3$

$Q = 8100$ CFS

$D = 5.00$

FIND: $A = bd + zd^2 = 150(5) + 3(25) = 825$

$$M = \frac{Q^2}{Ag} = \frac{(8100)^2}{825(32.16)} = 2472.86$$

$$\bar{T} = 2dz + b = 2(5)(3) + 150 = 180$$

$$\bar{Y} = \frac{d(T+2b)}{3(T+b)} = \frac{5(180+300)}{3(330)} = 2.4242$$

$$F = \bar{Y}A = 2.4242(825) = 2000$$

$$F + M = \quad = 4472.86$$

WNTC
DT

HP 97 [illegible]

4/28/87

5 5

001	*LBLA	21 11
002	STOA	35 11
003	ENT↑	-21
004	ENT↑	-21
005	RCLC	36 13
006	×	-35
007	RCLB	36 12
008	+	-55
009	×	-35
010	STO0	35 00
011	RCLD	36 14
012	X^2	53
013	3	03
014	2	02
015	.	-62
016	1	01
017	6	06
018	÷	-24
019	X⇄Y	-41
020	÷	-24
021	STO1	35 01
022	RCLA	36 11
023	RCLC	36 13
024	×	-35
025	2	02
026	×	-35
027	RCLB	36 12
028	+	-55
029	STO2	35 02
030	RCLB	36 12
031	2	02
032	×	-35
033	+	-55
034	RCLA	36 11
035	×	-35
036	3	03
037	÷	-24
038	RCL2	36 02
039	RCLB	36 12
040	+	-55
041	÷	-24
042	STO3	35 03
043	RCL0	36 00
044	×	-35
045	STO4	35 04
046	RCL1	36 01
047	+	-55
048	STO5	35 05
049	SPC	16-11
050	RCLA	36 11
051	PRTX	-14
052	RCL1	36 01
053	PRTX	-14
054	RCL4	36 04
055	PRTX	-14
056	RCL5	36 05
057	PRTX	-14
058	RTN	24
059	GTOA	22 11
060	*LBLB	21 12
061	STOB	35 12
062	RTN	24
063	*LBLC	21 13
064	STOC	35 13
065	RTN	24
066	*LBLD	21 14
067	STOD	35 14
068	RTN	24
069	GTOA	22 11
070	R/S	51

ARIZONA RWCD FLOODWAY REACH 3

D. Thackeray 5/9/83

CHANNEL STABILITY - TRACTIVE STRESS - TR-25

PROBLEM: NEED HP97 PROG TO COMPUTE:

V^3/gVS_e ; $V/(gR_sS_e)^{1/2}$

(A) (B)

V/R → A,B	R_s	V	S_e
A	B	C	D

LBL A	LBL B	LBL C
~~STO D~~	STO E	STO C
	RTN	RTN
STO A	GTO A	GTO A
PRT SP		
3		
y^x		LBL D
32.16		STO C
÷		RTN
RCL C		GTO A
÷		
RCL D		
÷		
STO 1		
RCL A		
32.16		
↑		
RCL E		
×		
RCL D		
y^x		
√		
÷		
↔		
PRTX		
↔		
PRTY		
RTN		
GTO A		

OK

REG	
A	V
B	R_s
C	ν
D	S_e
E	ρ
0	
1	(A)
2	(B)
3	
4	
5	
6	
7	

ARIZONA RNCD REACH 3

D.T. 5/9/83

CHANNEL STABILITY - TRACTIVE STRESS - TK 25

HP PROG:

GIVEN V, $V/\sqrt{\tau/\rho}$, τ_b/τ

FIND τ, τ_b, τ_{LV}

V or $V/\sqrt{\tau/\rho}$			ρ	τ_b/τ
A	B	C	D	E

$K = V/\sqrt{\tau/\rho}$; $\tau = \left(\frac{V}{K}\right)^2 \rho$

$\tau_b = \tau_b/\tau \, (\tau)$

FCS

A	V	
B	K	
C		
D	ρ	(1.935)
E	τ_b/τ	(1.3)
0		
1	τ	

```
LBL A
STO B
V
STO A
↑
÷
√x
x²
RCL D
×
STO 1
PRT SPC
RCL A
PRT X
⇄
PRT X
RCL E
×
PRT X
×
PRT X
RTN
```

```
LBL D
STO D
RTN
GTO A
```

```
LBL E
STO E
RTN
GTO A
```

CONSERVATION SHEET

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ARIZONA
D.T

8/2/83

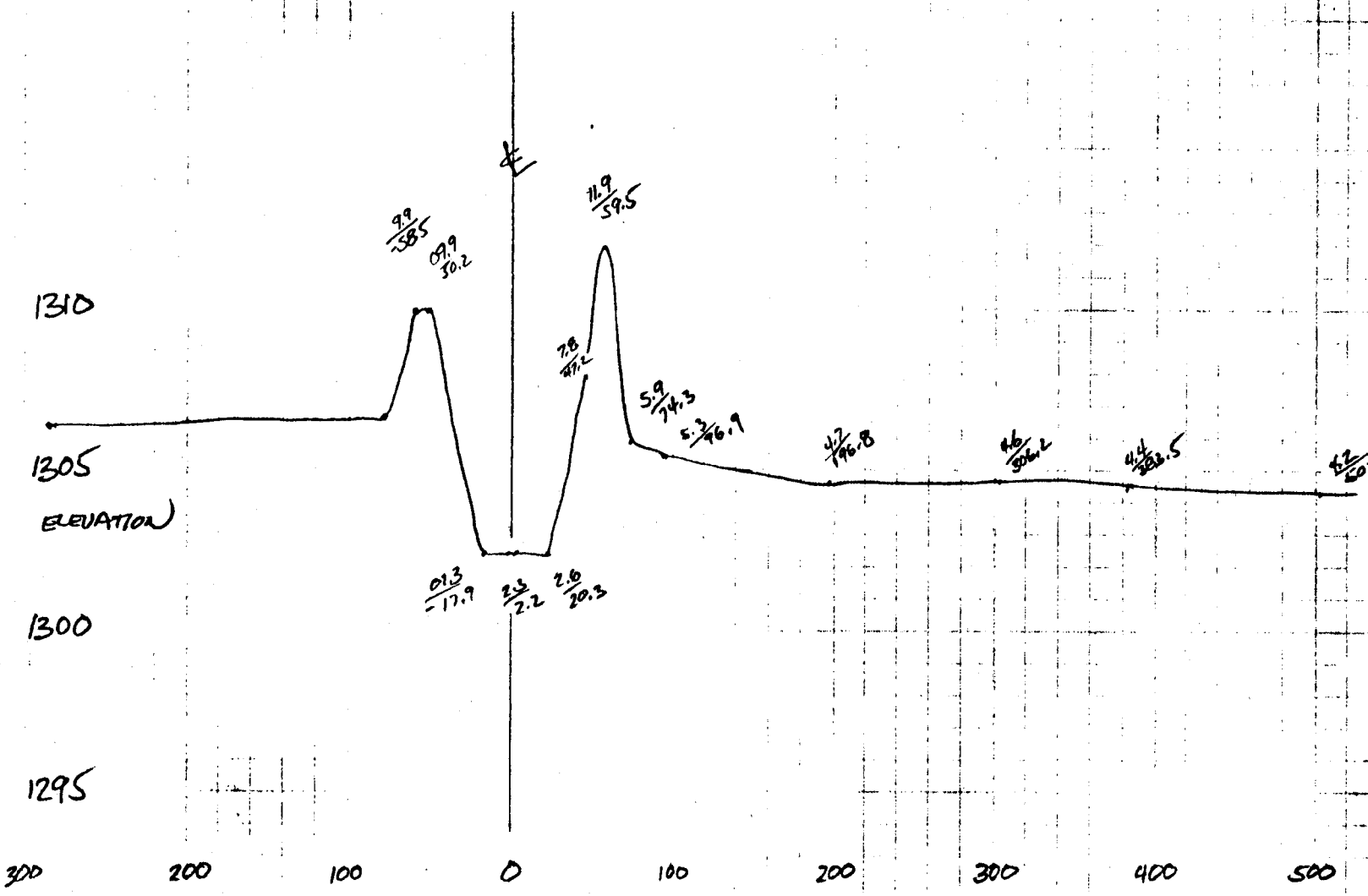
RWCD R3

CHECKED BY

DATE

JOB NO.

SHEET



SECTION
STA 16+00
QUEEN CREEK

COMPUTATION SHEET

STS-ENG-223A Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA
PROJECT: RWCD FLOODWAY REACH 3
FROM: D. THACKERAY
DATE: 5/19/83
CHECKED BY
DATE
JOB NO.
SUBJECT
SHEET

675+00

1332/50 1338/60 1338/65 1332/86 1330/108 1328/115 1328/165 1332/183

1336/200 1337.7/210 1336/220

690+00

1326/40 1328/60 1330/65 1332/70 1334/75 1336/78 1336/85 1324/120

1324/158 1326/162 1328/195 1330/205 1332/209 1334/210

700+00

1324/5 1324/50 1324/58 1326/80 1328/85 1330/94 1330/100 1326/115 1324/118 1322.5/160

1324/185 1326/200 1328/210 1330/220 1332/225 1334/230 1334/235 1324/270

COMPUTATION SHEET

SCS-ENG-522A Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA | PROJECT: RWCD FLOODWAY REACH 3

BY: D. THACKERAY | DATE: 5/19/83 | CHECKED BY | DATE | JOB NO.

SUBJECT

SHEET 1

716+23.06

1324/20 1326/50 1328/65 1328/80 1326/88 1324/95 1322/100 1320/108

1320/132 1322/220 1324/235 1326/250 1328/260 1328/280 1320/300

725+00

1322/-155 1322/92 1324/110 1324/140 1322/168 1318/195 1318/220 1320/260 1322/280

1324/290 1328/300 1328/324

732+00

1328/47 1316/82 1314.2/135 1316/185 1324/220 1324/233 1318/247

COMPUTATION SHEET

SCS ENG-51CA Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA PROJECT: RUCO FLOODWAY REACH 3

FROM: D. THACKERAY DATE: 5/19/83 CHECKED BY DATE JOB NO.

SUBJECT SHEET

740+00

1326.6/0 1326/50 1314/80 1314/180 1318/195 1324/215 1324/225 1316/250

750+00

1324/39 1312/65 1312/175 1322/210 1322/225 1316/235

757+70

1324/55 1310/100 1310/122 1324/220 1324/235 1318/250

772+06

1318/20 1316/25 1314/75 1312/95 1306/115 1306/135 1308/160 1318/200

1318/210 1214/215

784+35

1314/60 1312/100 1310/110 1308/112 1308/165 1316/184 1316/198 1312/207

COMPUTATION SHEET

SCS-ENG-503A Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA

PROJECT RWCD FLOODWAY REACH 3

BY N THOMKGRAY DATE 5/23/83

CHECKED BY

DATE

JOB NO.

SUBJECT

SHEET

807467.20

$\frac{1308}{60}$ $\frac{1310}{70}$ $\frac{1310}{85}$ $\frac{1304}{109}$ $\frac{1304}{150}$ $\frac{1312}{170}$ $\frac{1312}{175}$ $\frac{1308}{195}$

ARIZONA RWCD - REACH 3

Elev. Interpolations @ 175' Lt. of ℄

		175'
Sta. 740+00		
202.8	152.0	
1310.5	1311.1	1310.8
Sta. 741+00		
228.6	174.1	
1311.2	1310.0	1310.0
Sta. 742+00		
251.8	121.9	
1312.0	1310.9	1311.3
Sta. 743+00		
223.2	66.7	
1312.8	1309.4	1311.8
Sta. 744+00		
222.0	155.3	
1314.2	1314.2	1314.2
Sta. 745+00	153.6	
321.4 ~~[illegible]~~	~~[illegible]~~	
1312.2 ~~1314.3~~	~~1314.1~~	1313.0
	1313.1	
Sta. 746+00		
244.8	158.5	
1313.6	1314.5	1314.3
Sta. 747+00		
252.3	88.5	1313.2
1312.5	1314.0	
Sta. 748+00		
186.4	114.8	
1312.7	1313.1	1312.8
Sta. 749+00		
220.9	78.3	
1313.1	1312.2	1312.8
Sta. 750+00		
209.3	100.1	
1313.3	1312.4	1313.0

7 / 11

Sta. 750+00		
249.3	104.9	175'
1314.3	1312.5	1314.4
Sta. 752+00		
299.9	165.2	175'
1312.7	1311.3	1311.4
Sta. 753+00		
244.5	134.0	
1311.9	1310.9	1311.3
Sta. 754+00		
178.8	36.3	
1311.0	1310.5	1311.0
Sta. 755+00		
218.1	91.1	
1311.8	1310.7	1311.4
Sta. 756+00		
309.7	140.8	
1311.4	1310.9	1311.0
Sta. 757+00		
286.5	134.8	
1311.7	1310.7	1311.0
~~Sta 758+00~~		
~~219.2~~	~~127.9~~	
~~1322.5~~	~~1321.9~~	
~~Sta 759+00~~		
Sta. 760+00		
315.3	122.5	
1311.1	1310.6	1310.7
Sta. 761+00		
211.3	0	
1310.6	1310.0	1310.5

ARIZONA RWCD-REACH 3

Elev. Interpolations @ 175' Lt of ℄ | B2 11

Sta. 762+00		175'
274.8	164.3	
1310.3	1310.8	1310.8
Sta. 763+00		
265.5	85.0	
1311.3	1310.8	1311.0
Sta 764+00		
256.3	67.6	
1311.0	1310.7	1310.9
Sta 765+00		
264.7	164.3	
1311.7	1311.4	1311.4
Sta. 766+00		
199.9	0	
1311.5	1311.1	1311.5
Sta 767+00		
261.1	134.5	
1311.4	1311.4	1311.4
Sta 768+00		
339.1	172.3	
1311.8	1310.9	1310.9
Sta. 769+00		
254.0	52.3	
1311.7	1310.6	1311.3
Sta. 770+00		
330.4	159.5	
1311.7	1310.9	1310.8
Sta. 771+00		
306.9	113.8	
1311.3	1310.7	1310.9
Sta. 772+00		
319.5	174.5	
1311.3	1310.6	1310.6
Sta. 773+00		
219.1	52.9	
1310.9	1310.9	1310.9
Sta. 774+00	170.4	
270.9 ~~203.4~~	~~152.2~~	
1311.2 ~~1311.0~~	1311.4	1311.4
Sta. 775+00		
216.0	157.6	
1310.7	1311.5	1311.3
Sta. 776+00		
235.5	160.3	
1311.3	1312.2	1312.0
Sta. 777+00		
216.6	147.4	
1312.0	1313.8	1313.1
Sta. 778+00		
269.0	172.2	
1311.4	1311.6	1311.6
Sta. 779+00		
196.1	126.9	
1311.2	1311.8	1311.4
Sta 780+00		
239.5	96.9	
1310.8	1310.3	1310.6
Sta. 781+00		
198.6	134.8	
1310.6	1310.3	1310.5
Sta. 782+00		
205.7	87.8	
1310.2	1310.0	1310.1
Sta. 783+00		
244.3	78.2	
1310.7	1310.3	1310.5

ARIZONA RWCD - REACH 3

Elev. Interpolations @ 175' Lt. of ℄ | 93 11

Sta. 784+00
227.3 56.9
1310.0 1309.8 1309.9

Sta. 785+00
500.6 116.1
1311.2 1309.6 1309.8

Sta. 787+00
240.0 91.9
1310.2 1309.6 1309.9

Sta. 788+00
314.7 113.7
1310.3 1309.8 1310.0

Sta. 789+00
193.2 153.4
1308.6 1309.8 1309.7

Sta. 790+00
287.0 113.1
1309.6 1309.3 1309.4

Sta. 791+00
294.3 157.7
1309.2 1309.3 1309.3

Sta. 792+00
275.6 124.5
1309.2 1309.1 1309.1

Sta. 793+00
276.8 92.0
1309.2 1309.1 1309.1

Sta. 794+00
211.8 0
1309.2 1309.0 1309.2

Sta. 795+00
353.8 154.0
1309.3 1308.6 1308.7

Sta. 796+00
265.1 144.9
1309.2 1309.0 1309.1

Sta. 797+00
256.7 113.5
1308.9 1308.8 1308.8

Sta. 798+00
293.5 156.7
1309.6 1309.1 1309.2

Sta. 799+00
212.4 95.7
1308.7 1308.7 1308.7

Sta. 800+00
188.3 114.4
1308.2 1308.4 1308.2

Sta. 801+00
180.4 118.3
1307.8 1307.9 1307.8

Sta. 802+00
274.8 157.3
1308.6 1308.3 1308.3

Sta. 803+00
224.6 152.2
1307.5 1307.6 1307.6

Sta. 804+00
176.6 53.7
1307.5 1307.0 1307.5

Sta. 805+00
253.0 94.4
1307.5 1307.4 1307.5

Sta. 806+00
189.7 66.0
1307.3 1307.3 1307.3

ARIZONA RWCD-REACH 3

Elev. Interpolations @ 175' Lt of ℄

		175'
Sta. 807+00		
356.6	173.9	
1307.1	1307.1	1307.1
Sta. 808+00		
187.2	173.5	
1307.6	1306.5	1306.6
Sta. 809+00		
186.8	106.0	
1306.4	1306.7	1306.4
Sta. ~~809~~ 810+00		
187.6	116.3	
1306.4	1306.9	1306.5
Sta. 811+00		
176.8	116.2	
1306.1	1306.7	1306.1
Sta. 812+00		
175.8	120.0	
1306.0	1306.3	1306.0
Sta. 813+00		
190.3	172.9	
1307.2	1306.1	1306.2
Sta. 814+00		
177.1	99.6	
1305.8	1306.0	1305.8
Sta. 815+00		
175.2	98.4	
1305.2	1305.9	1305.2
Sta 816+00		
186.7	170.5	
1307.1	1306.1	1306.4
Sta 817+00		
187+00	76.2	
1306.5	1306.3	1306.5

104 11

		175'
Sta 818+00		
186.6	148.8	
1306.8	1305.9	1306.5
Sta. ~~818+00~~ 820+00		
187.2	157.8	
1307.4	1305.8	1306.7
Sta. ~~820+00~~ 819+00		
184.3	170.5	
1307.2	1306.5	1306.5
Sta. 821+00		
258.7	-1.2	
1306.4	1306.3	1306.4
Sta 822+00		
210.7	0	
1306.4	1306.0	1306.3
Sta. 823+00		
345.1 ~~321.2~~	150.7 ~~162.9~~	
1306.3	1306.1	1306.1
Sta. 824+00		
317.5	152.5	
1306.3	1306.2	1306.2
Sta. 825+00		
326.5	149.4	
1306.5	1306.3	1306.3
Sta. 826+00		
346.4	152.5	
1306.3	1305.9	1305.9
Sta 827+00		
328.3	158.5	
1305.8	1305.8	1305.8
Sta. 828+00		
331.9	157.8	
1305.5	1305.3	1305.3

ARIZONA RWCO - REACH 3

Elev. Interpolations @ 175' Lt of ℄ | 5 11

		175' ↓
Sta. 829+00		
323.6	148.9	
1305.4	1305.3	1305.3
Sta. 830+00		
304.3	166.9	
1304.9	1304.9	1304.9
Sta. 831+00		
359.6	159.1	
1304.8	1304.9	1304.9
Sta. 832+00		
383.6	172.3	
1304.6	1304.8	1304.8
Sta. 833+00		
334.2 ~~[illegible]~~	174 ~~[illegible]~~.0	
1305.~~[illegible]~~	1305.1	1305.1
Sta. 834+00		
345.4	148.3	
1305.0	1304.9	1304.9
Sta. 835+00		
330.9	159.8	
1304.5	1304.6	1304.6
Sta. 836+00		
287.0	144.1	
1303.9	1303.8	1303.8
Sta. 837+00		
198.4	0	
1303.9	1303.9	1303.9
Sta. 838+00		
258.1	118.8	
1303.8	1303.7	1303.7
Sta. 839+00		
213.4	0	
1303.7	1303.4	1303.6

		175' ↓
Sta. 840+00		
190.0	0	
1303.4	1303.2	1303.4
Sta. 841+00		
269.9	144.6	
1303.3	1303.2	1303.2
Sta. 842+00		
233.5	128.0	
1303.3	1303.2	1303.2
Sta. 843+00		
178.4	61.5	
1303.1	1303.1	1303.1
Sta. 844+00		
267.6	148.2	
1302.6	1302.7	1302.7
Sta. 845+00		
239.4	157.4	
1302.4	1302.4	1302.4
Sta. 846+00		
199.3	79.4	
1302.5	1302.2	1302.4
Sta. 847+00	182.6	
196.4	~~[illegible]~~	1304.2
~~[illegible]~~	~~[illegible]~~	~~[illegible]~~
1303.7	1304.0	
Sta. 848+00		
178.9	161.5	
1310.5	1303.6	1309.0
Sta. 849+00		
177.7	146.5	
1301.5	1310.1	1302.2

ARIZONA RWCD - REACH 3

ELEV. INTERPOLATION @ 175' Lt. ℄ 36 11

STATION 850+00

200.5'L	172.3'L	175'L
1301.8	1301.3	1301.35

STATION 851+00

191.6'L	169.4'L	175'L
1307.4	1301.5	1303.0

STATION 852+00

181.9'L	171.1'L	175'L
1305.2	1307.5	~~1306.7~~ 1306.7

STATION 853+00

180.2'L	172.4'L	175'L
1305.8	1304.8	1305.1

STATION 854+00

500.1'L	166.9'L	175'L
1303.4	1303.9	1303.9

STATION 855+00

500.1'L	159.1'L	175'L
1303.2	1303.7	1303.7

STATION 856+00

182.5'L	158.5'L	175'L
1303.1	1305.5	1303.9

STATION 857+00

178.3'L	172.3'L	175'L
1305.0	1303.4	1304.3

STATION 858+00

204.1'L	122.4'L	175'L
1303.3	1303.4	1303.3

STATION 859+00

252.2'L	141.2'L	175'L
1303.2	1303.0	1303.1

STATION 860+00

208.4'L	146.5'L	175'L
1299.5	1310.9	1305.7

STATION 861+00

500.2'	122.6	175
1300.7	1301.9	1301.7

STATION 862+00

208.9	82.3	175
1300.9	1302.0	1301.2

STATION 863+00

219.1	100.3	175
1300.5	1301.6	1300.9

STATION 864+00

500.0	169.9	175
1300.7	1300.7	1300.7

STATION 865+00

500.2	~~1300~~ 91.2	175
1300.1	1300.7	1300.6

STATION 866+00

500.5	132.4	175
1300.6	1300.3	1300.3

STATION 867+00

210.1	77.3	175
1300.1	1300.3	1300.2

STATION 868+00

321.80	171.6	175
1300.0	1300.6	1300.6

STATION 869+00

500.4	326.6	175
1300.1	1300.1	1300.1

STATION 870+00

500.4	318.9	175
1300.0	1300.0	1300.0

STATION 871+00

309.7	0.0	175
1300.1	1300.4	1300.7

ARIZONA RWCD – REACH 3

Elev. Interpolations @ 175' Lt. of ℄ | 27 11

STA. 872+00

301.4' Lt.	0	175'
1300.2	1301.7	1300.8

STA 873+00

315.8	0	175
1300.0	1301.3	1300.6

STA. 874+00

259.9	172.7	175
1300.1	1300.1	1300.1

STA. 875+00

258.1	160.9	175
1299.5	1300.3	1300.2

STA. 876+00

261.2	155.4	175
1299.4	1300.2	1300.1

STA. 877+00

269.4	9.7	175
1299.3	1299.6	1299.4

STA. 878+00

263.4	7.9	175
1299.6	1299.5	1299.6

STA. 879+00

265.5	10.9	175
1299.6	1299.6	1299.6

STA 880+00

267.5	10.2	175
1299.6	1299.6	1299.6

STA. ~~880~~ 881+00

267.0	9.1	175
1299.4	1299.7	1299.5

STA. 882+00

267.0	9.0	175
1299.7	1300.3	~~1300.3~~ 1299.9

STA. 883+00

268.8	8.5	175
1299.5	1299.7	1299.6

STA. 884+00

266.4	2.4	175
1300.0	1300.1	1300.0

STA. 885+00

270.6	0	175
1299.9	1300.1	1300.0

STA. 886+00

272.4	0	175
1300	1299.9	1300

STA 888+00

326.7	21.2	175
1299.4	1299.7	1299.5

STA 889+00

309.7	20.5	175
1299.2	1299.5	1299.3

STA 890+00

290.2	12.4	175
1298.9	1301.1	1299.8

STA 891+00

277.8	16.9	175
1298.6	1299.1	1298.8

STA 892+00

262.3	16.4	175
1298.5	1298.8	1298.6

STA 893+00

247.8	22.9	175
~~1298.4~~ 1298.4	1298.4	1298.4

STA. 894+00

230.4	18.1	175
1298.1	1298.2	1298.1

ARIZONA RWCD – REACH 3

ELEV. INTERPOLATIONS @ 175' Lt. of ℄ | 38 11

STA. 895+00

217.3	21.9	175
1298.0	1298.0	1298.0

STA. 896+00

193.6	25.3	175
1297.7	1297.3	1297.7

STA. 897+00

319.5	160.7	175
1298.2	1298.0	1298.1

STA. 898+00

189.3	8.1	175
1298.3	1297.9	1298.3

STA 899+00

269.3	32.1	175
1298.4	1298.1	1298.3

STA. 900+00

500.6	167.4	175
1299.4	1298.0	1298.0

STA 901+00

336.7	98.6	175
1300.0	1298.2	1298.8

STA. 902+00

268.6	59.6	175
1300.9	1298.4	1299.8

STA 903+00

192.5	39.3	175
1300.3	1298.0	1300.0

STA 904+00

242.6	53.3	175
1300.2	1298.3	1299.5

STA 905+00

357.9	153.1	175
1300.2	1299.1	1299.2

STA. 906+00

348.8	171.4	175
1300.7	1299.1	1299.1

STA. 907+00

217.6	143.5	175
1299.4	1299.1	1299.2

STA. 908+00

225.0	131.6	175
1299.0	1298.9	1298.9

STA. 909+00

271.8	145.3	175
1299.5	1298.8	1299.0

STA. 910+00

245.8	144.6	175
1299.8	1299.4	1299.5

STA. 911+00

219.0	146.1	175
1299.4	1299.4	1299.4

STA. 912+00

227.9	153.7	175
1301.1	1299.9	1300.2

STA 913+00

237.1	136.5	175
1300.5	1300.0	1300.2

STA 914+00

194.2	144.7	175
1298.8	1302.1	1300.1

STA 915+00

179.8	153.3	175
1302.5	1302.5	1302.5

STA 916+00

180.9	164.1	175
1299.1	1300.1	1299.5

ARIZONA RWCD - REACH 3

ELEV. INTERPOLATIONS @ 175' Lt. of ℄ | 49 11

STA 917+00

186.6	158.8	175
1301.1	1301.8	1301.4

STA. 918+00

186.4	170.8	175
1299.4	1301.5	1300.9

STA 919+00

185.9	163.6	175
1299.2	1301.6	1300.4

STA. 920+00

186.6	173.4	175
1298.8	1300.0	1299.9

STA. 921+00

183.0	169.7	175
1298.9	1299.7	1299.4

STA. 922+00

185.6	168.7	175
1298.9	1299.9	1299.5

STA. 923+00

183.8	165.7	175
1299.1	1299.8	1299.4

STA 924+00

183.6	168.0	175
1299.0	1299.5	1299.3

STA 925+00

189.5	148.6	175
1298.7	1299.4	1299.3

STA. 926+00

191.7	145.9	175
1299.1	1299.7	1299.3

STA 927+00

197.5	151.8	175
1298.8	1299.6	1299.2

STA. 928+00

198.4	135.2	175
1298.7	1300.2	1299.3

STA 929+00

196.0	133.3	175
1298.9	1300.7	1299.5

STA 930+00

199.5	130.2	175
1299.1	1300.9	1299.7

STA 931+00

200.2	156.8	175
1298.9	1299.4	1299.2

STA 932+00

198.3	157.3	175
1299.0	1299.4	1299.2

STA 933+00

199.5	158.6	175
1298.7	1299.5	1299.2

STA 934+00

203.8	167.6	175
1298.8	1299.9	1299.7

STA 935+00

202.9	171.6	175
1298.8	1299.4	1299.3

STA 936+00

200.4	149.8	175
1298.6	1299.4	1299.0

STA 937+00

200.4	153.4	175
1298.3	1299.3	1298.8

STA. 938+00

198.0	156.4	175
1298.7	1299.1	1298.9

ARIZONA RWCD - REACH 3

ELEV. INTERPOLATION @ 175' Lt. of ℄ | #0 11

STA. 939+00

198.9	153.7	175
1298.5	1299.4	1299.0

STA 940+00

199.0	144.8	175
1298.7	1299.6	1299.1

STA. 941+00

195.3	154.9	175
1298.5	1299.0	1298.8

STA. 942+00

193.6	126.1	175
1298.3	1300.7	1299.0

STA 943+00

192.8	119.3	175
1298.6	1304.2	1300.0

STA 944+00

177.7	150.0	175
1299.0	1299.1	1299.0

STA 945+00

193.9	172.3	175
1298.6	1298.8	1298.8

STA. 946+00

238.0	173.0	175
1299.1	1298.7	1298.7

STA 947+00

215.1	169.4	175
1298.9	1299.5	1299.4

STA 948+00

324.1	165.4	175
1299.6	1298.8	1298.8

STA 949+00

292.4	126.5	175
~~126.5~~	1298.9	1299.1
1299.6		

STA. 950+00

287.0	38.2	175
1299.4	1298.2	1298.9

STA. 951+00

300.3	143.5	175
1299.1	1298.6	1298.7

STA 952+00

288.8	34.0	175
1299.1	1298.0	1298.6

STA 953+00

341.7	159.7	175
1299.6	1298.7	1298.8

STA 954+00

177.5	27.9	175
1298.7	1297.9	1298.7

STA 955+00

303.3	153.6	175
1299.1	1298.4	1298.5

STA 956+00

189.7	34.7	175
1298.4	1297.7	1298.3

STA 957+00

321.2	158.4	175
1299.2	1298.3	1298.4

STA 958+00

314.7	153.6	175
1299.3	1298.4	1298.5

STA 959+00

297.4	106.8	175
1299.1	1298.1	1298.5

STA 960+00

273.9	158.5	175
1299.1	1298.2	1298.3

ARIZONA RWCD – REACH 3

ELEV. INTERPOLATIONS @ 175' Lt. of ℄

STA 961+00		
233.0	46.7	175
1298.8	1297.6	1298.4
STA 962+00		
223.4	84.0	175
1298.6	1298.0	1298.4
STA. 963+00		
330.9	151.2	175
1299.6	1298.3	1298.5
STA. 964+00		
225.8	31.7	175
1298.4	1297.3	1298.1
STA 965+00		
314.2	129.1	175
1298.9	1297.9	1298.1
STA. 966+00		
290.7	124.2	175
1298.7	1297.5	1297.9
STA. 967+00		
207.8	23.3	175
1298.0	1296.4	1297.7
STA 968+00		
253.4	52.6	175
1298.1	1296.8	1297.6
STA. 969+00		
265.9	101.2	175
1298.3	1296.9	1296.9
STA 970+00		
319.5	115.1	175
1298.6	1297.2	1297.6
STA. 971+00		
309.8	70.7	175
1298.4	1296.8	1297.5
Sta. 972+00		
279.2	64.1	175
1298.2	1296.6	1297.[illegible]
Sta. 973+00		
272.0	83.9	175
1298.5	1296.9	1297.[illegible]
Sta. 974+00		
183.3	58.0	175
1298.0	1296.8	1297.[illegible]
Sta. 975+00		
258.0	89.3	175
1298.4	1296.7	1297.6
Sta 976+00		
247.7	138.6	175
1298.4	1297.5	1297.[illegible]
Sta 977+00		
239.1	134.3	175
1298.2	1297.2	1297.[illegible]
~~Sta 978+00~~		~~175~~
~~[illegible]~~	~~[illegible]~~	~~1294.9~~
Sta 978+00		
185.6	149.5	175
1294.8	1295.1	1294.9
STA 979+00		
176.2	147.9	175
1292.6	1295.5	~~1297~~ 1297.[illegible]

END OF FIRST SET OF X-SECTION

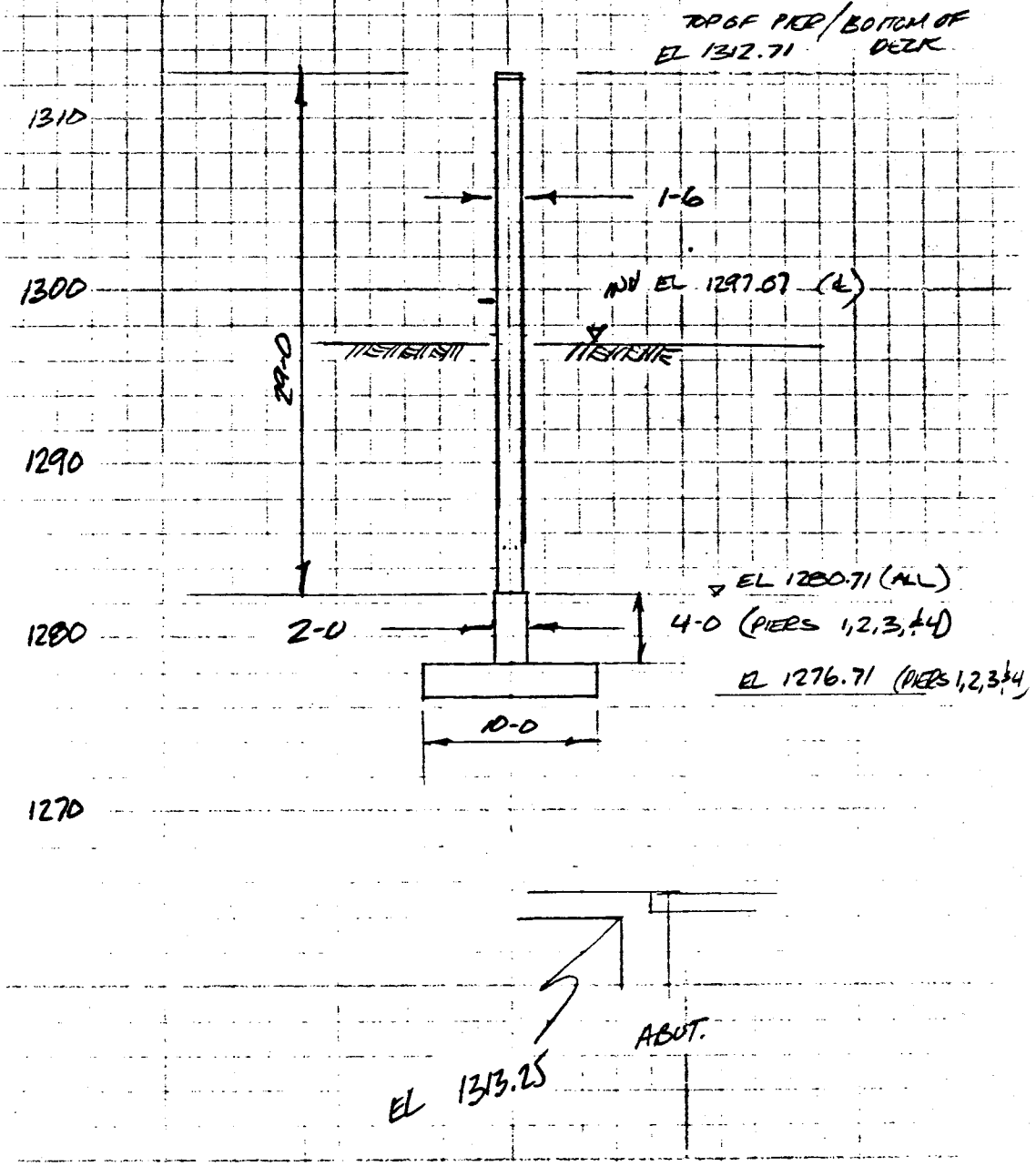
COMPUTATION SHEET

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

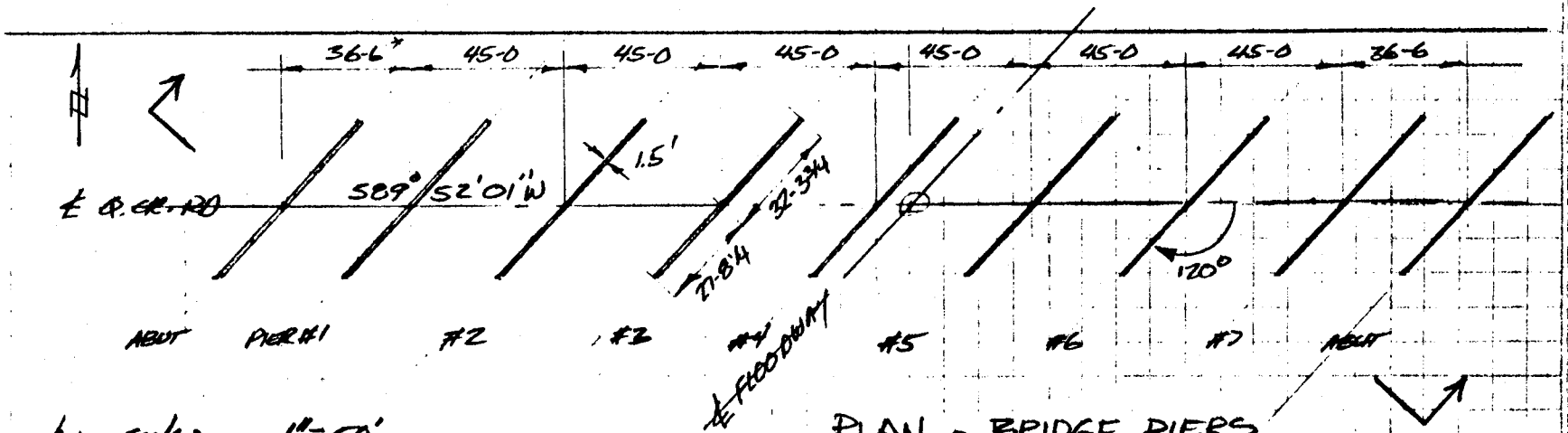
STATE: ARIZONA
PROJECT: RWCD FLOODWAY REACH 3
BY: D. THACKERAY DATE: 5/25/83
CHECKED BY | DATE | JOB NO.
SUBJECT: BRIDGE ON QUEEN CR. ROAD
SHEET ___ OF ___

** NOTE: ALL ELEV. ARE MHCD DATUM
— ≠ REACH 3 DATUM
℄ BRIDGE = ℄ RWCD STA 745+28.37

TYPICAL PIER

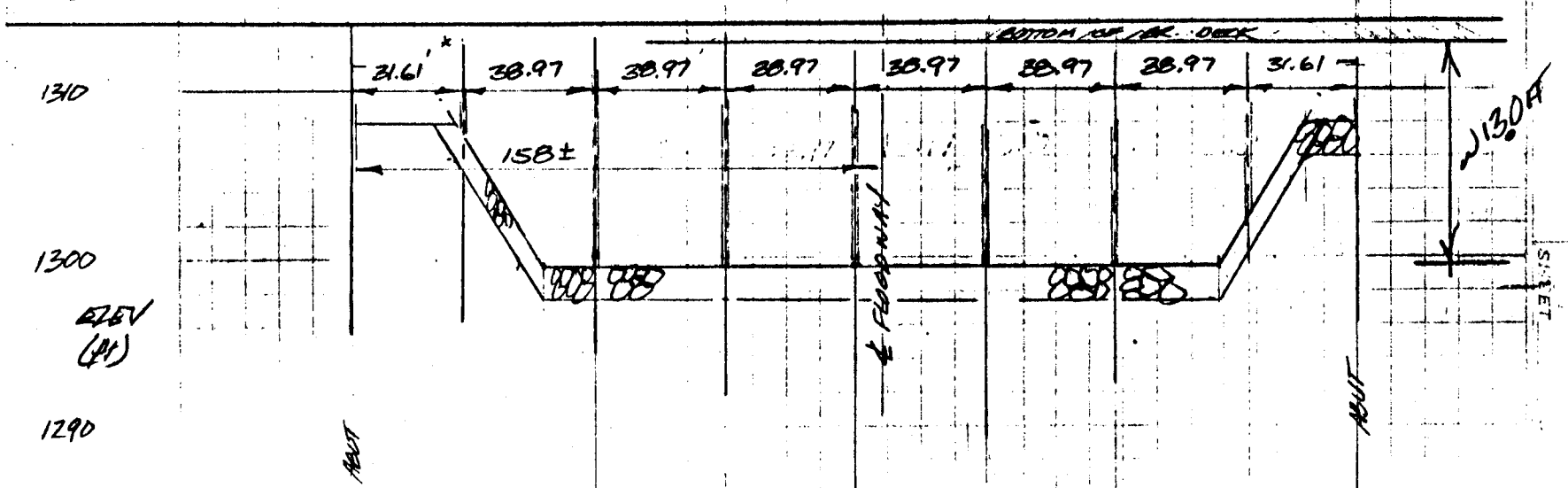


ANTICIPATED MAX FLOW DEPTH AT TIME OF BRIDGE DESIGN WAS EL 1310.7



horiz scale: 1" = 50'

PLAN - BRIDGE PIERS



ELEVATION

Scale 1" = 50 ft

* NOTE ALL DIST ARE ℄-℄ OF PIERS

LOOKING UPSTREAM

ARIZONA
D. THACKERAY 5/25/83
PWCD FLOODWAY REACH 3
CHECKED BY
DATE
JOB NO
SHEET
U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
CONSTRUCTION SHEET

COMPUTATION SHEET

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZ. PROJECT: RWCD R3

BY: D.T. DATE: 9/26/83 CHECKED BY: DATE: JOB NO.

SHEET

PROBLEM: NEED ELEVATIONS FOR LEFT AND RIGHT BERM SHOWN TO BE SHOWN ON DRWGS.

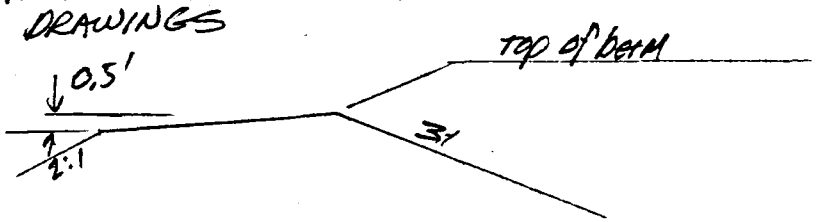
ANALYSIS:

1. DESIGN FLOW DEPTH FOR STA 740+00 TO STA 857+00 IS 8.5 FT:
- DESIGN DEPTH WITH FREEBOARD IS 10.0 FT (FLOW DEPTH +18%; SLIGHTLY LESS THAN 20% SUGGESTED BY TR25).

2. DESIGN FLOW DEPTH STA 857+00 TO STA 977+25 = 9.2 FT. DEPTH WITH FREEBOARD = 11.0 FT (FLOW D +20%)

3. BERMS (MAINTAINANCE ROADWAYS) ADJACENT TO THE FLOODWAY WILL SHOW 0.5 FT DROP FROM THE EDGE NEAREST THE FLOODWAY & OUTWARD. THIS SHOULD REDUCE SOME OF THE SURFACE RILLING OBSERVED ON THE CHANNEL SIDE SLOPES ALREADY INSTALLED.

SOLUTION: 1. TOP OF BERM EL WILL BE NOTED ON THE DRAWINGS



∴ ADD 0.5 FT TO FREEBOARD DEPTH.

LOC	FB DEPTH	DRWGS
740 - 857	10.0	10.5
857 - 977+25	11.0	11.5

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PROJECT DRAWING SHEET

AREA
OT

9B3

CROSS SECTION RWCD CHANNEL

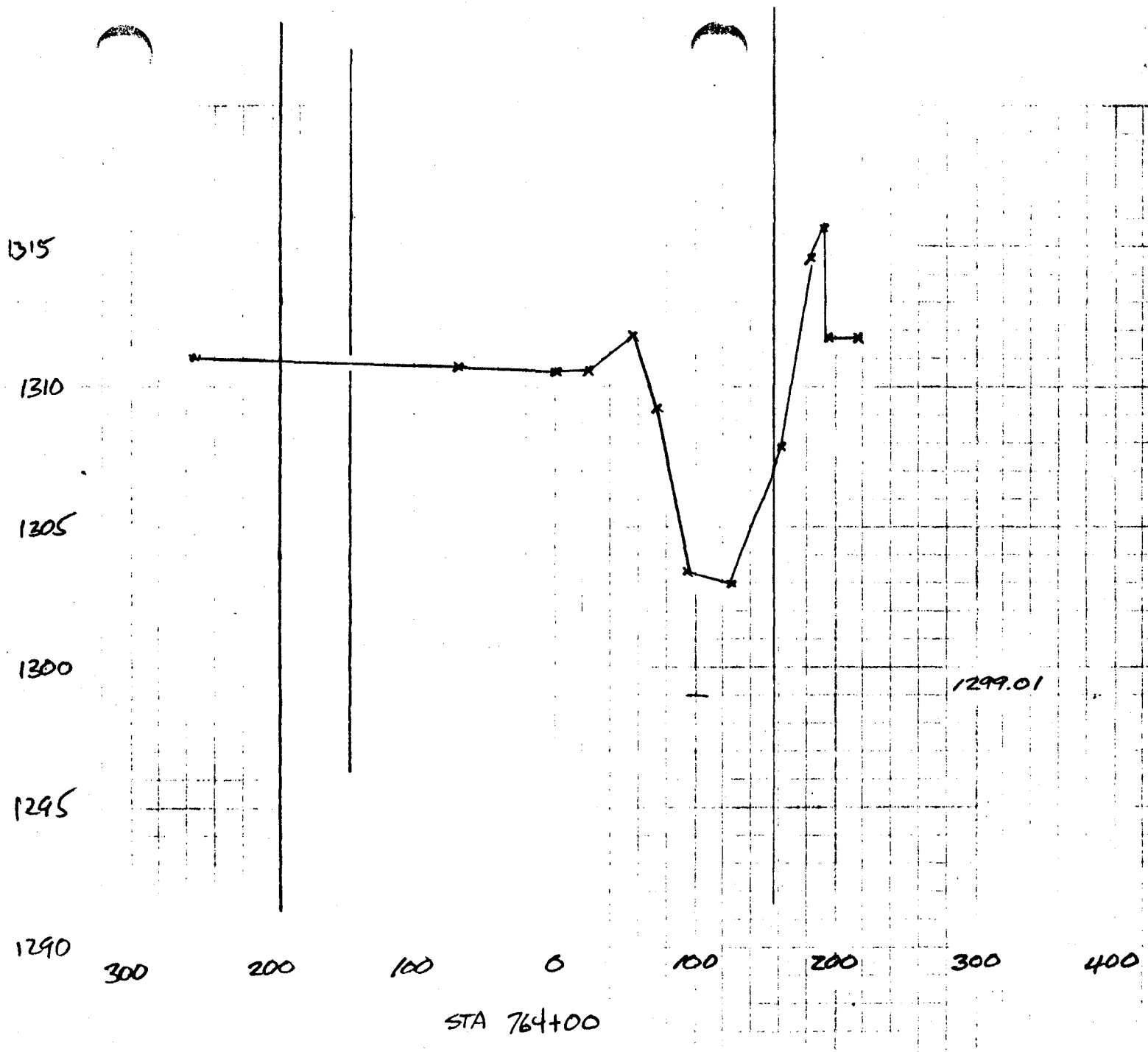
PROJECT RWCD R3

CHECKED BY

DATE

JOB NO

SHEET



COMPUTATION SHEET

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ARIZONA DT

9/1/83

RWCD R3

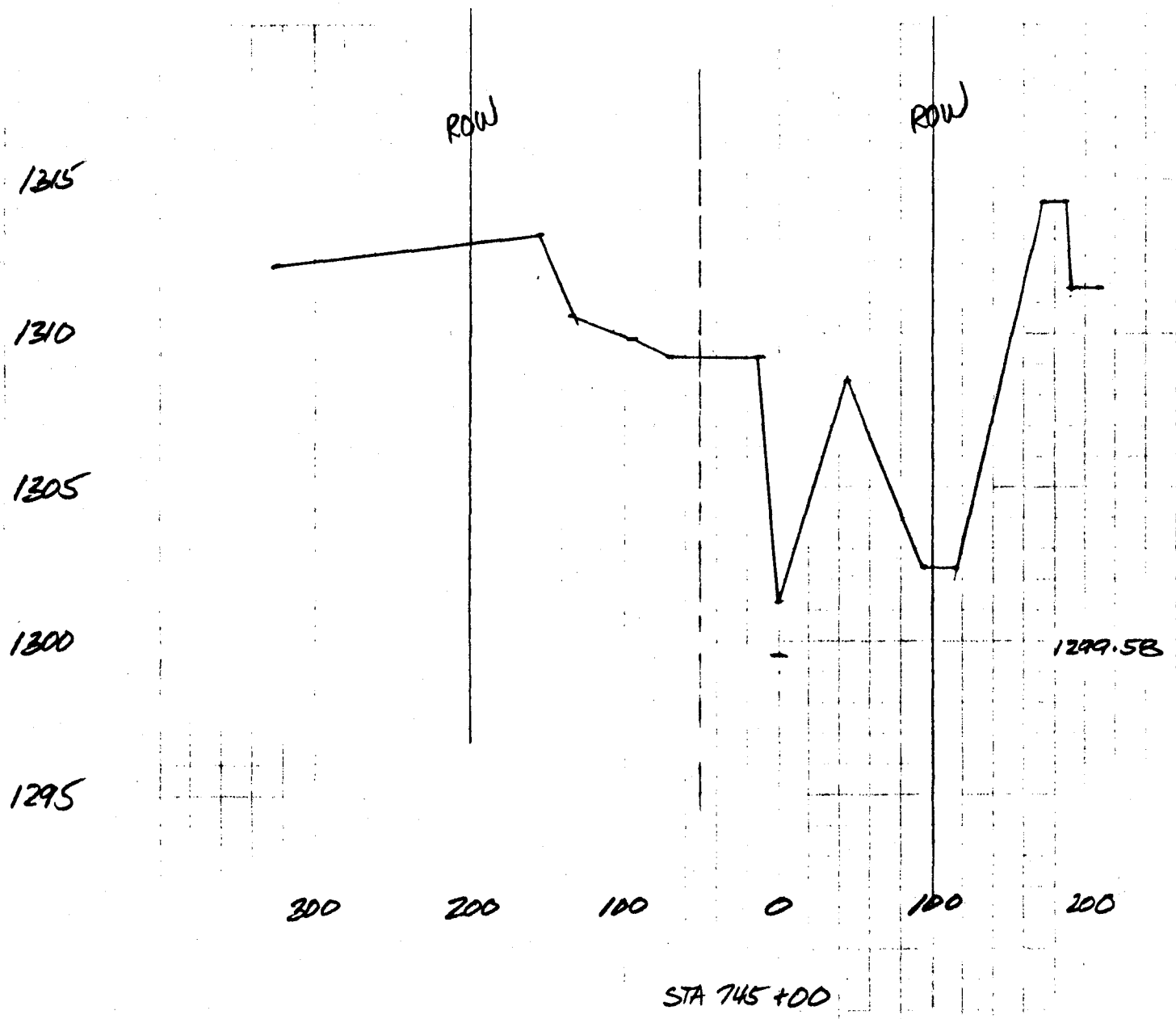
CROSS SECTION RWCD CHANNEL

CHECKED BY

DATE

JOB NO

SHEET



COMPUTATION SHEET

ARIZONA

P.T.

CROSS SECTION RWCD CHANNEL

1"=10'

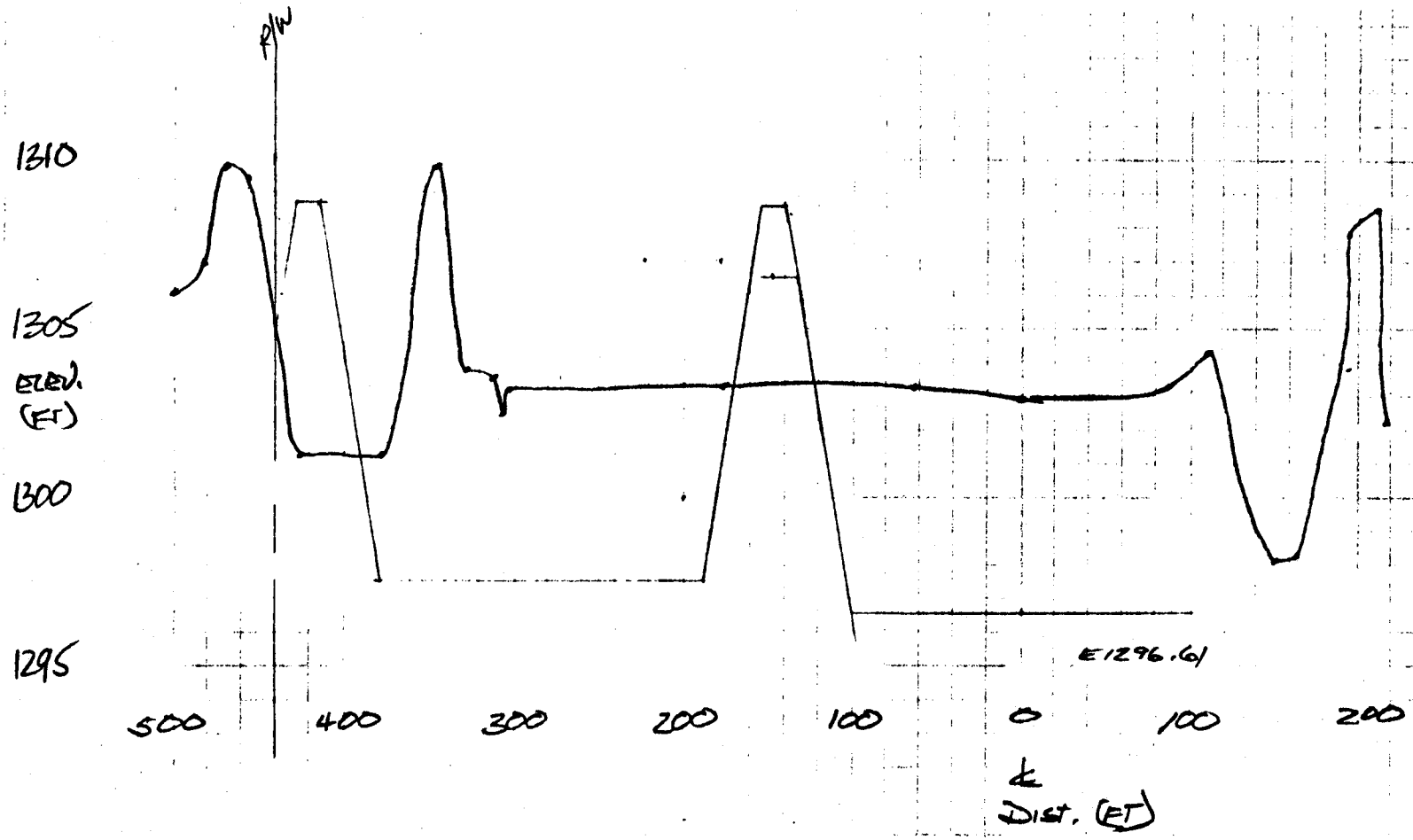
RWCD REACH 3

CHECKED BY

DATE

SHEET

JOB NO.



SECTION
STA 844+00

COMPUTATION SHEET

ENGINEERING FORM 0-59

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA

PROJECT RWCD REACH 3

FOR D.T.

COMPUTED BY

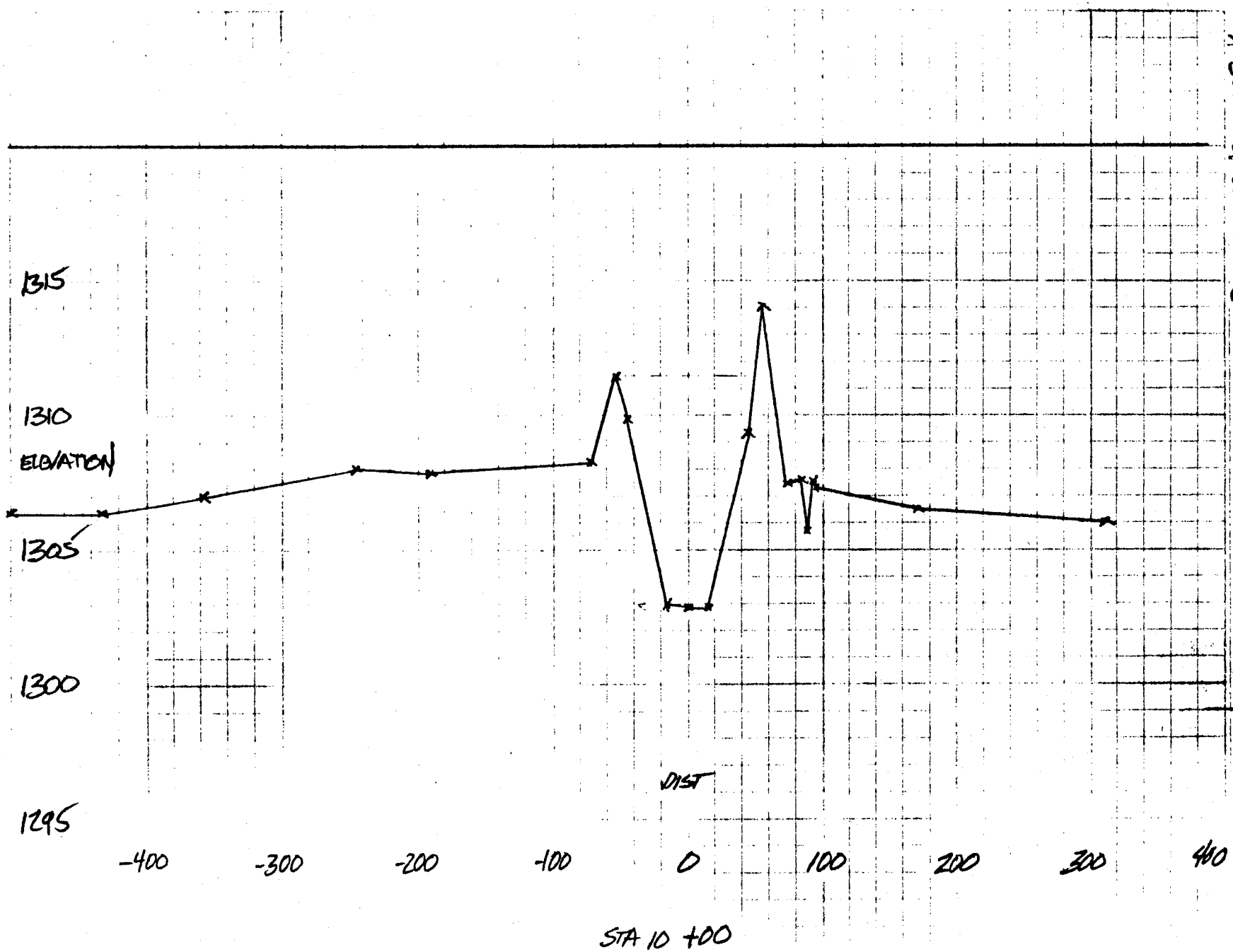
CHECKED BY

DATE 10/18/83

SUBJECT X-SEC QUEEN CREEK

JOB NO.

SHEET



COMPUTATION SHEET

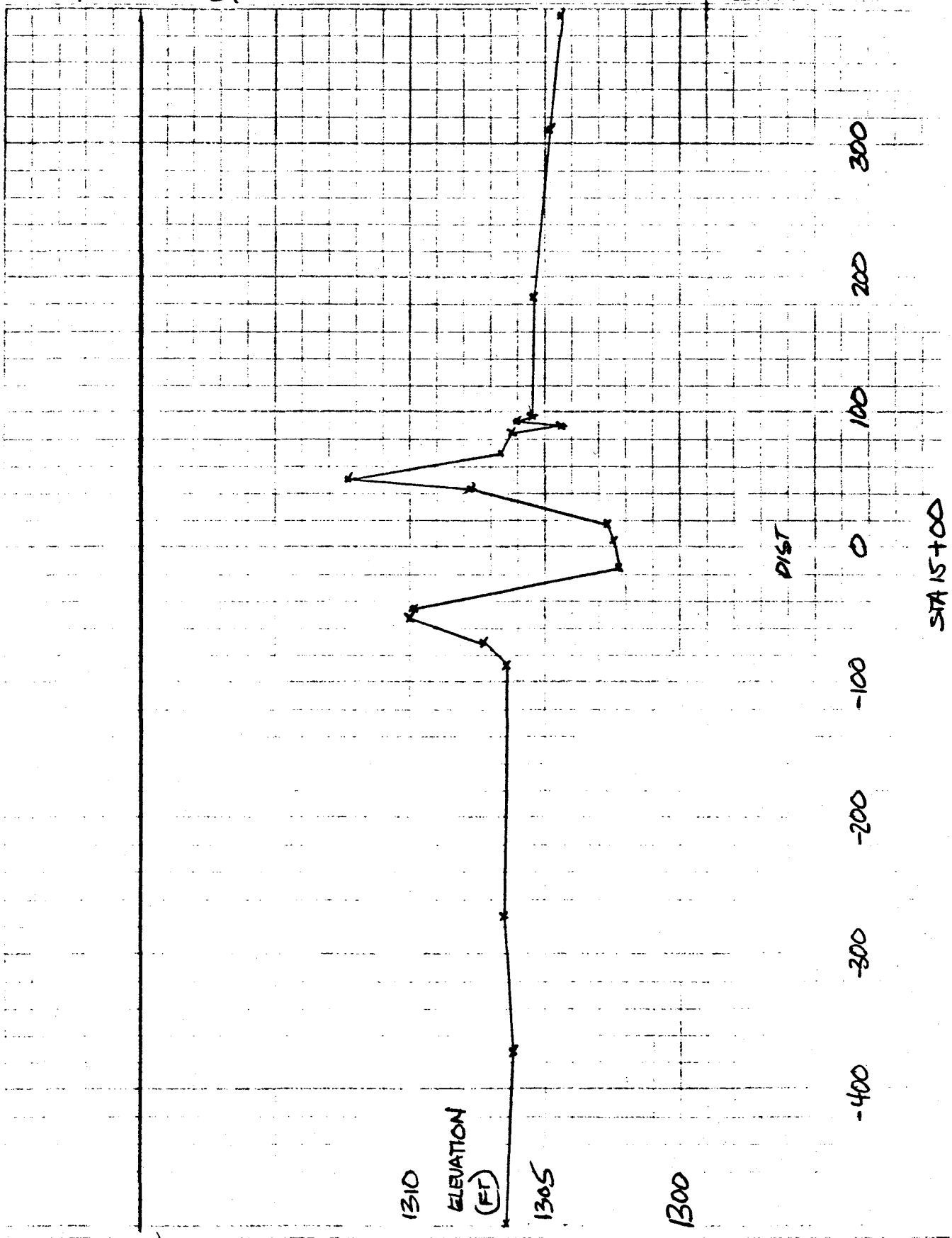
SCS-ENG-5234 Rev. 9-69

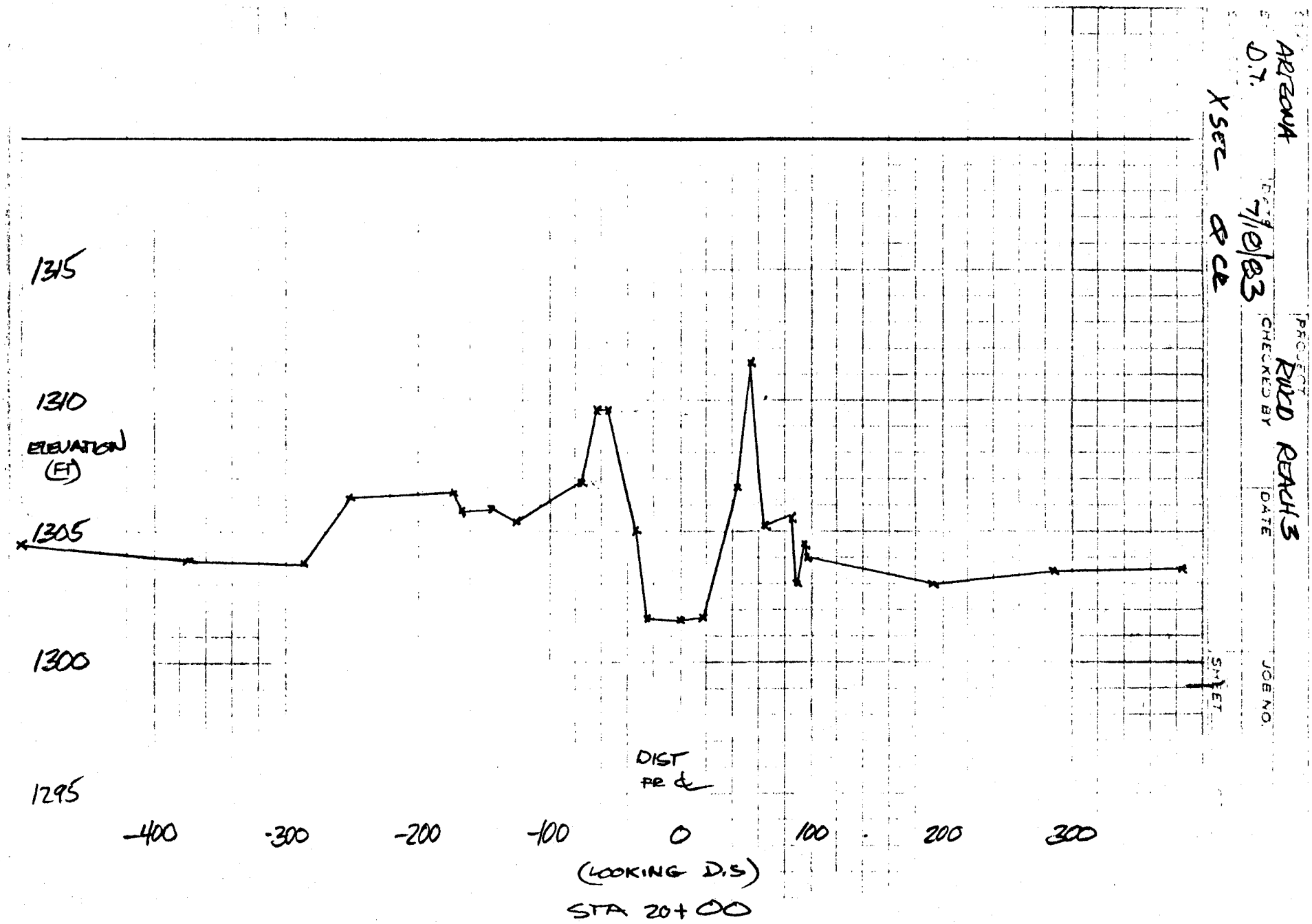
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA | PROJECT RWCD REACH 3

BY D.T. | DATE 10/10/83 | CHECKED BY | DATE | JOB NO.

SUBJECT XSEC Q-CR. | SHEET ___ OF ___




CUT AND FILL CALCULATION SHEET
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ARIZONA
D.T.
X SEC @ CL
7/8/83
PROJECT RWCD REACH 3
CHECKED BY
DATE
JOB NO.
SHEET
1315
1310
ELEVATION (FT)
1305
1300
1295
DIST FR ℄
-400
-300
-200
-100
0
100
200
300
(LOOKING D.S)
STA 20+00

COMPUTATION SHEET

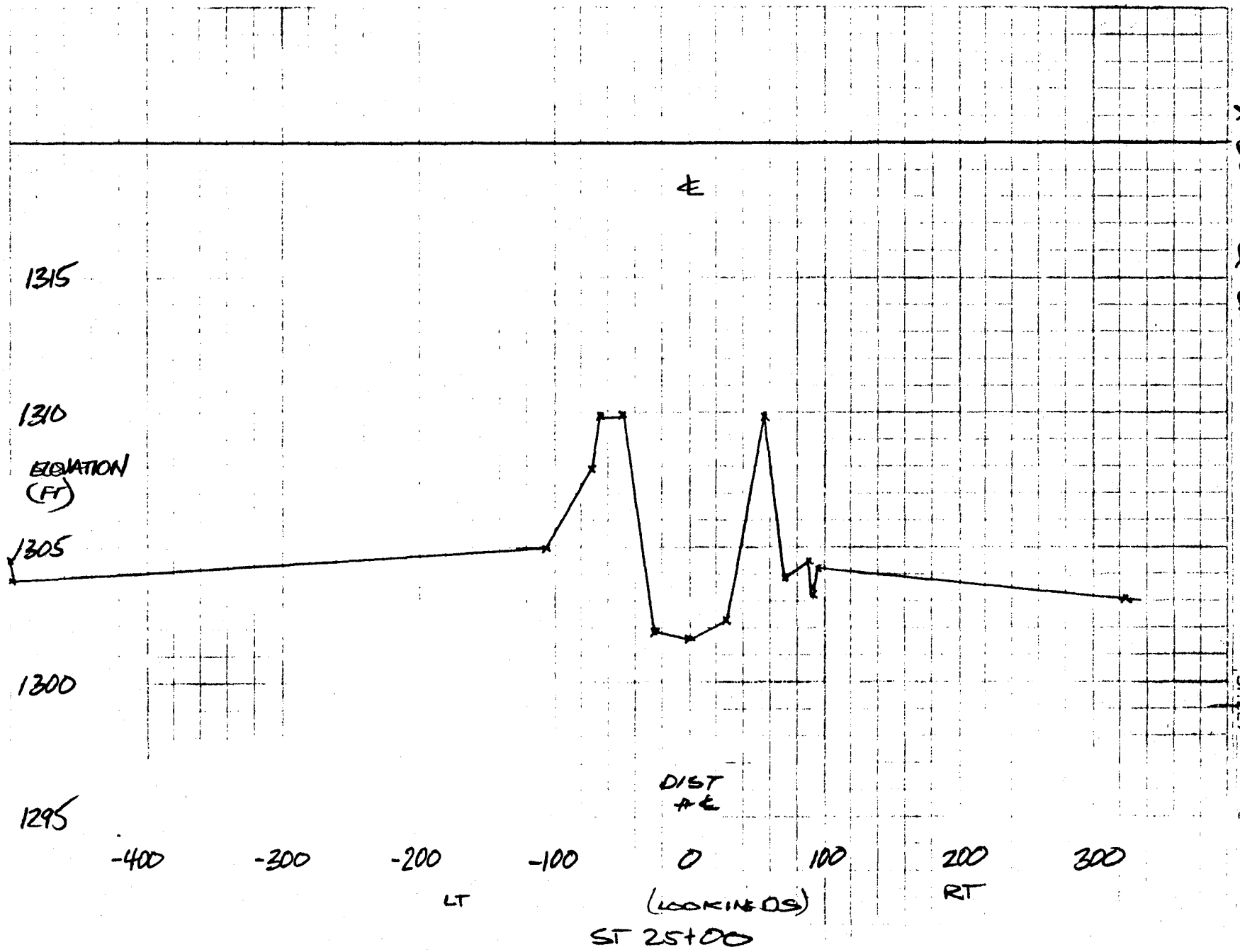
SCS-ENG-5224 Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA
BY D.T.
SUBJECT X-SEC Q.CR.

DATE 7/8/83
CHECKED BY

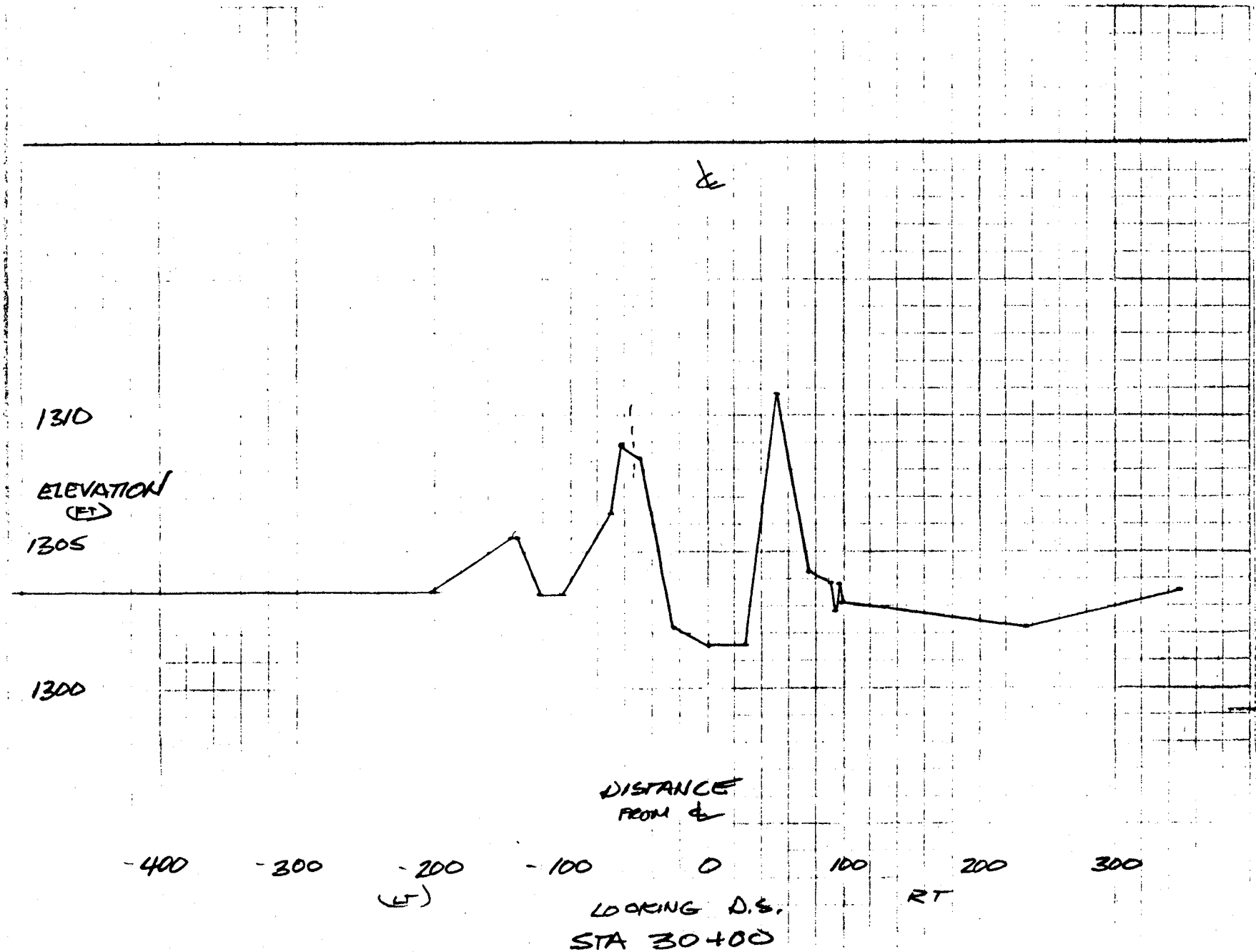
PROJECT RIVCO RENOVATS
DATE
JOB NO.
SHEET



COMPUTATION SHEET

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA
PROJECT PUKKO REACH 3
BY D.T.
DATE 7/18/83
CHECKED BY
DATE
SUBJECT RIVER CR.
JOB NO.
SHEET



COMPUTATION SHEET

SCS-ENG-523A Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA

BY O.T. DATE 7/20/83

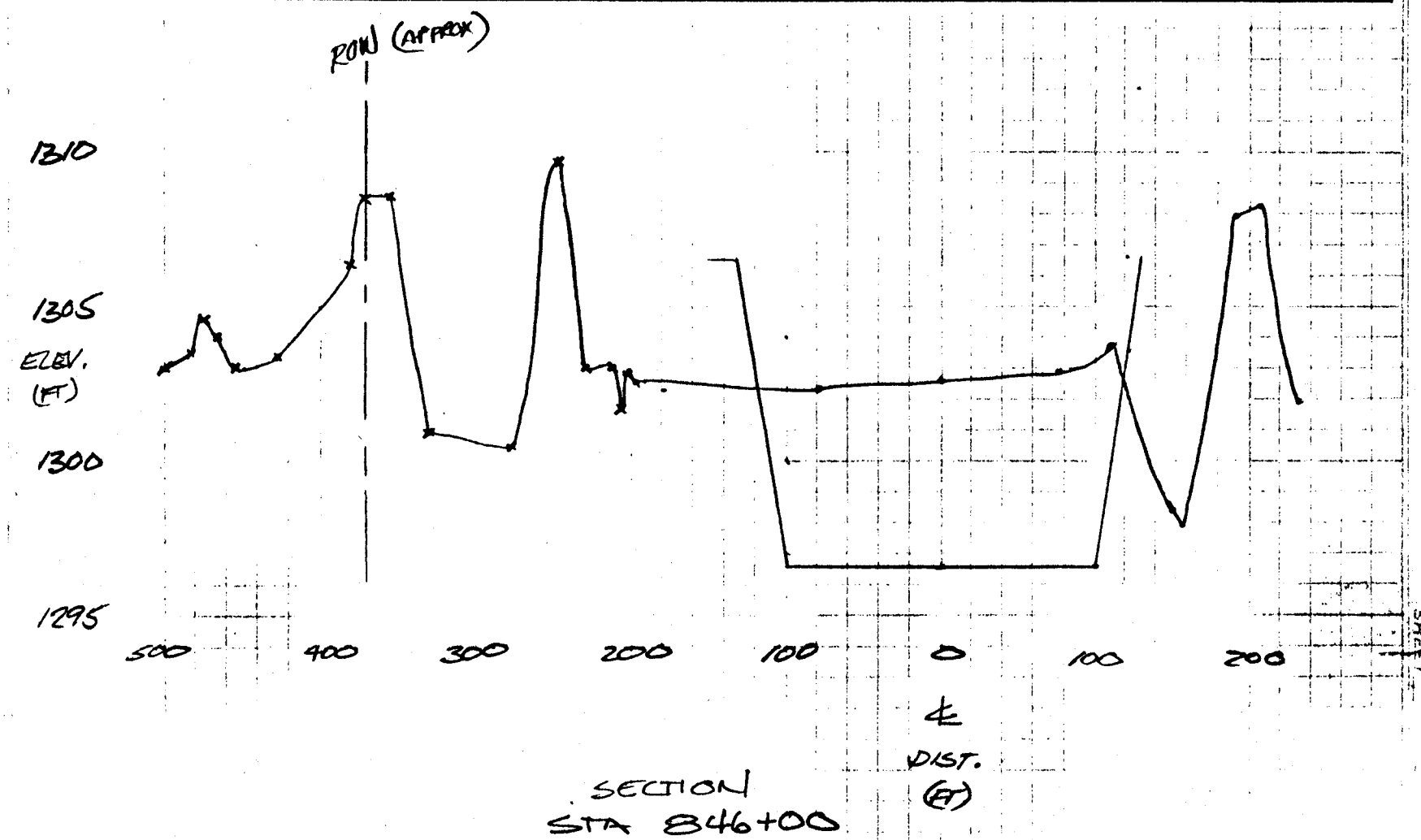
SUBJECT

PROJECT RWCD REACH 3

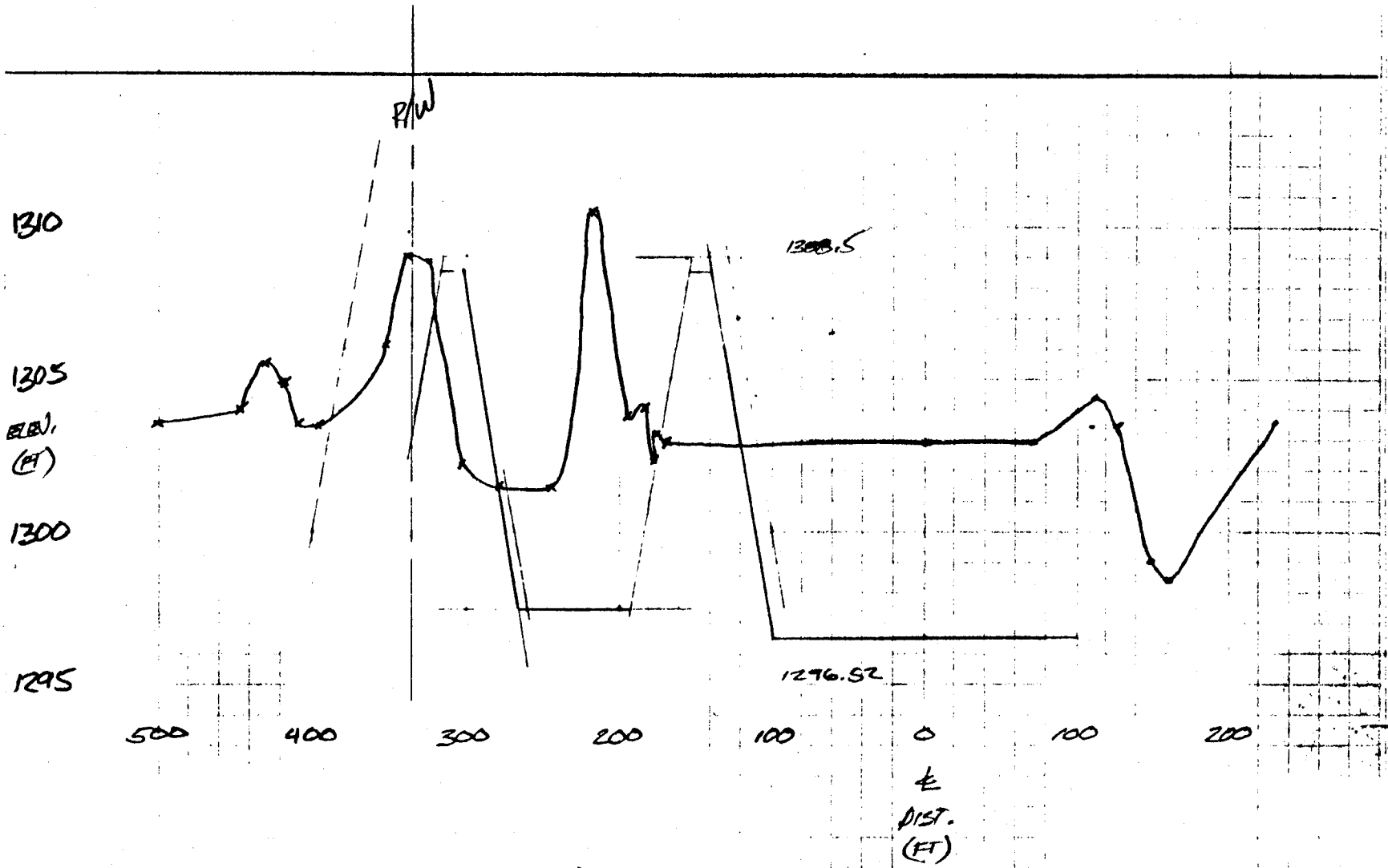
CHECKED BY DATE

JOB NO.

SHEET 1



SECTION
STA 846+00



SECTION
STA 847+00

ARIZONA D.T.

8/1/83

RWCD REACH 3

CHECKED BY

DATE

JOB NO

SHEET

COMPUTATION SHEET

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE

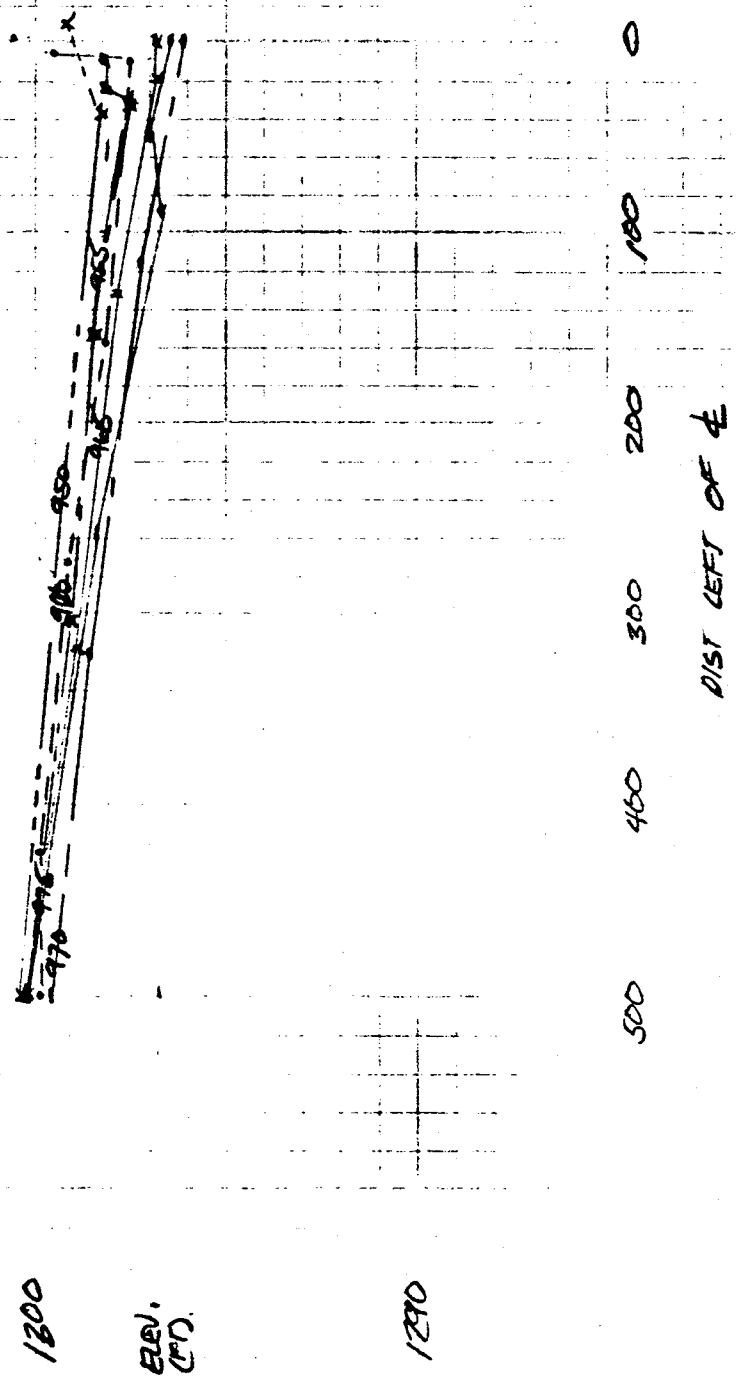
PROJECT RWCD REACH 3

D.T. 9/19/83

CHECKED BY DATE JOB NO

CROSS-SECTIONS: GROUND SLOPE L. OF ℄

SHEET

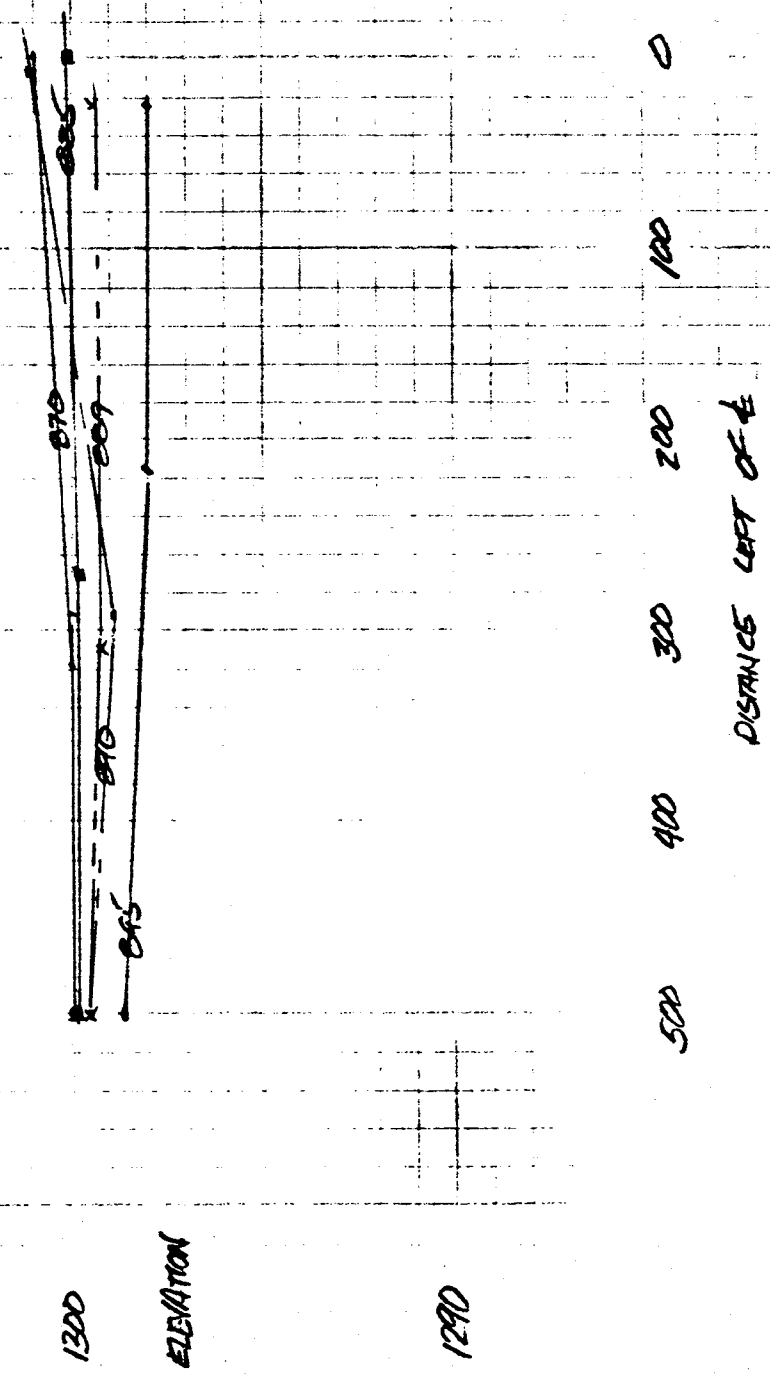


COMPUTATION SHEET

STANDARD FORM 9-69

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ARIZ.	PROJECT RWCD REACH 3		
BY C.T. DATE 9/20/83	CHECKED BY	DATE	JOB NO
CROSS-SECTIONS: GROUND SLOPE ⊥ OF ℄			SHEET



COMPUTATION SHEET

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZONA
PROJECT: RWCD FLOODWAY REACH 3
D. THACKERAY 5/23/83
CHECKED BY DATE JOB NO.
SUBJECT
SHEET OF

STATION	ELEV	L	ΔEL	S
675+00	1328	1500	4	0.0027
690+00	1324	1000	1.5	0.0015
700+00	1322.5	1623	2.5	0.0015
716+23	1320	877	2	0.0023
725+00	1318	700	3.8	0.0054
732+00	1314.2	800	0.2	0.00025
740+00	1314	1000	2	0.002
750+00	1312	770	2	0.0026
757+70	1310	1436	4	0.0028
772+06	1306	1229	2	0.0016
784+35	1308	2332	4	0.0017
807+67	1304			

COMPUTATION SHEET

SCS ENG. 523A Rev. 9-69

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ST. ARIZONA

BY TRACKEWAY

DATE 6/29/83

PROJECT ROXD RETACHS

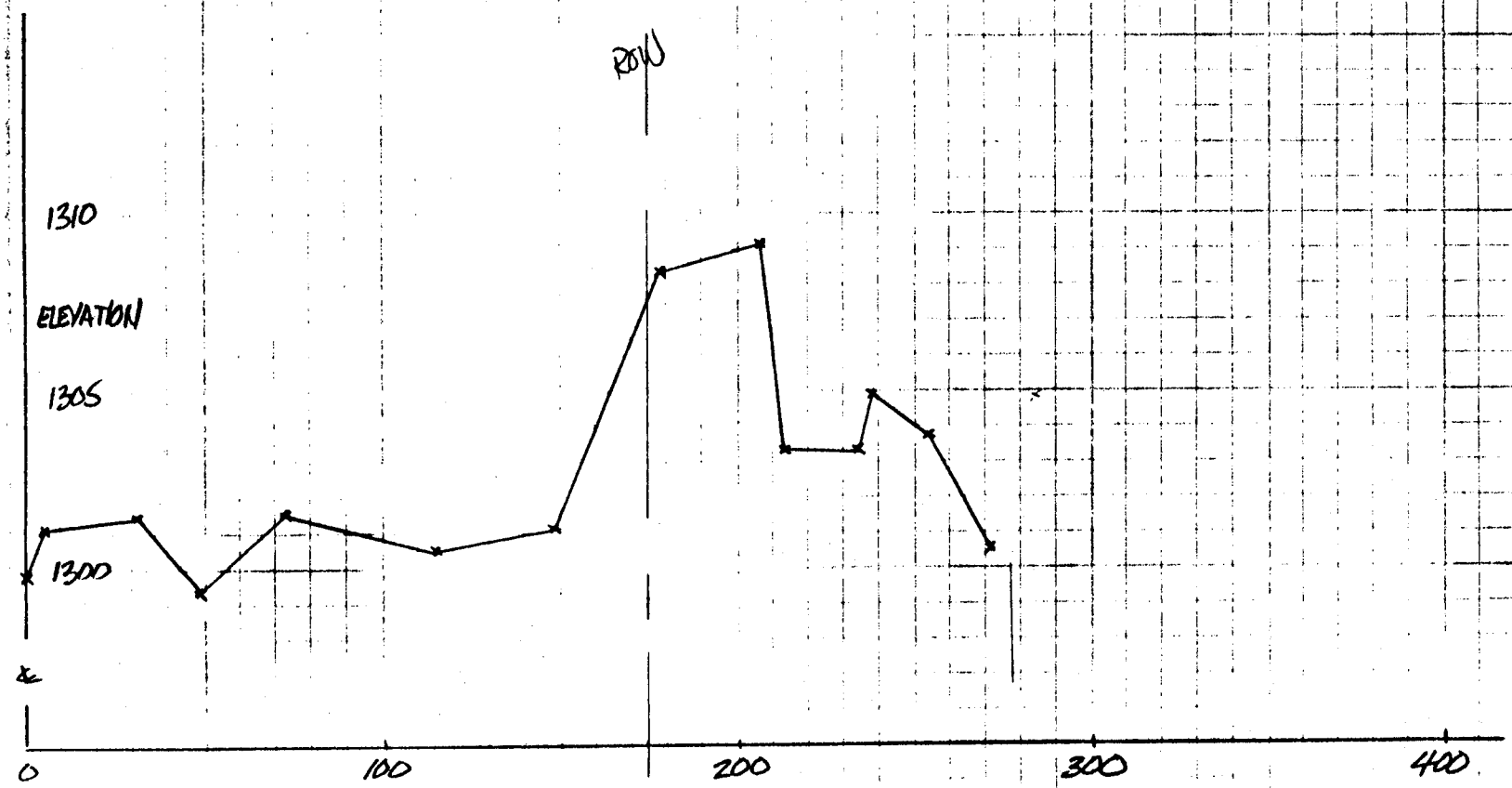
CHECKED BY

DATE

SUBJECT

SHEET

JOB NO.



DISTANCE RT OF ROW ⊥ ℄ FLOODWAY

STA 855+00

COMPUTATION SHEET

SCS-ENG-5234 Rev 9-69

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STA ARIZONA

PROJECT RWCD RETREAT

BY DT

DATE 6/29/83

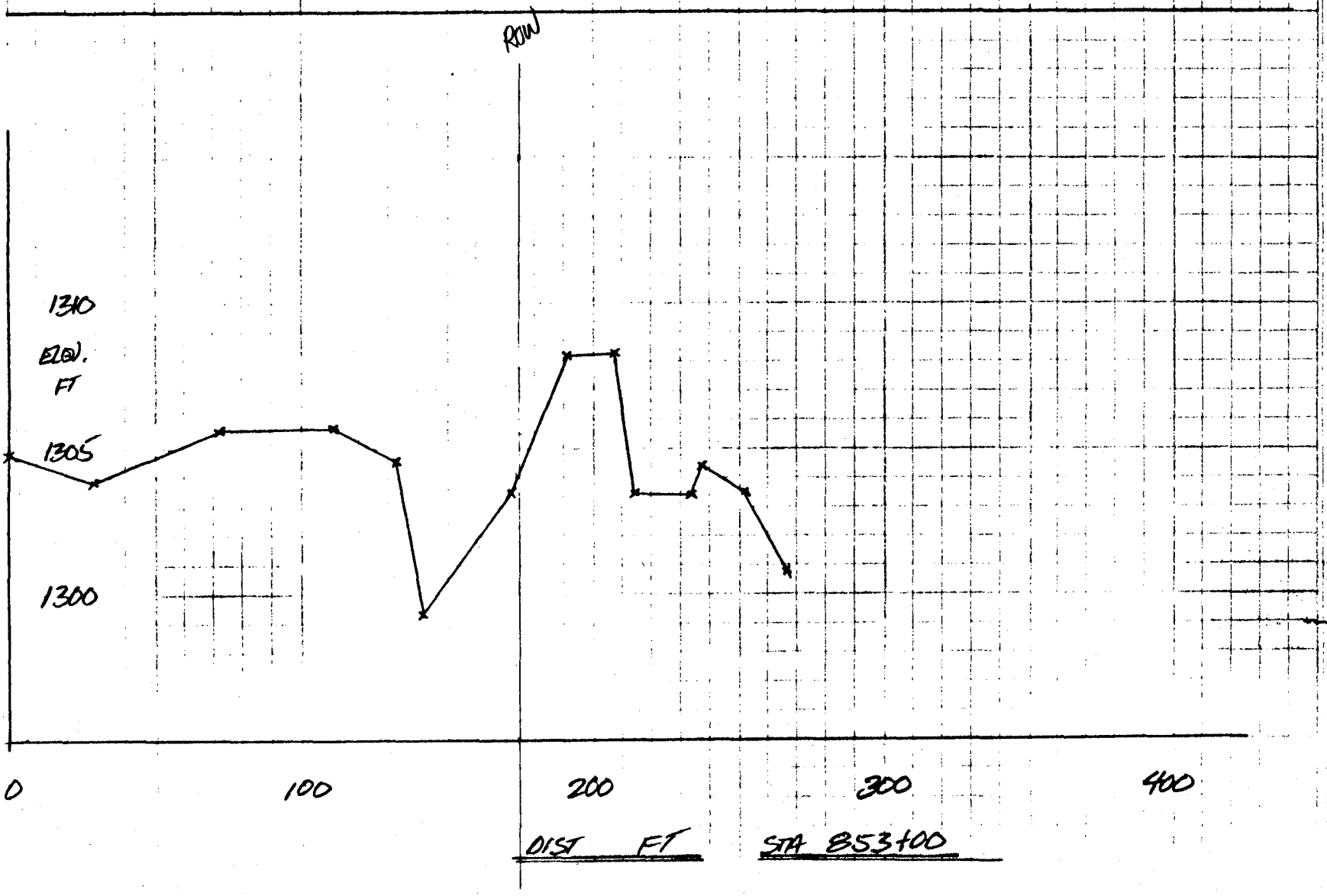
CHECKED BY

DATE

SUBJECT

JOB NO.

SHEET



COMPUTATION SHEET

SOIL ENG. 5234 Rev. 9-66

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA

THACKEDAY

DATE 6/29/83

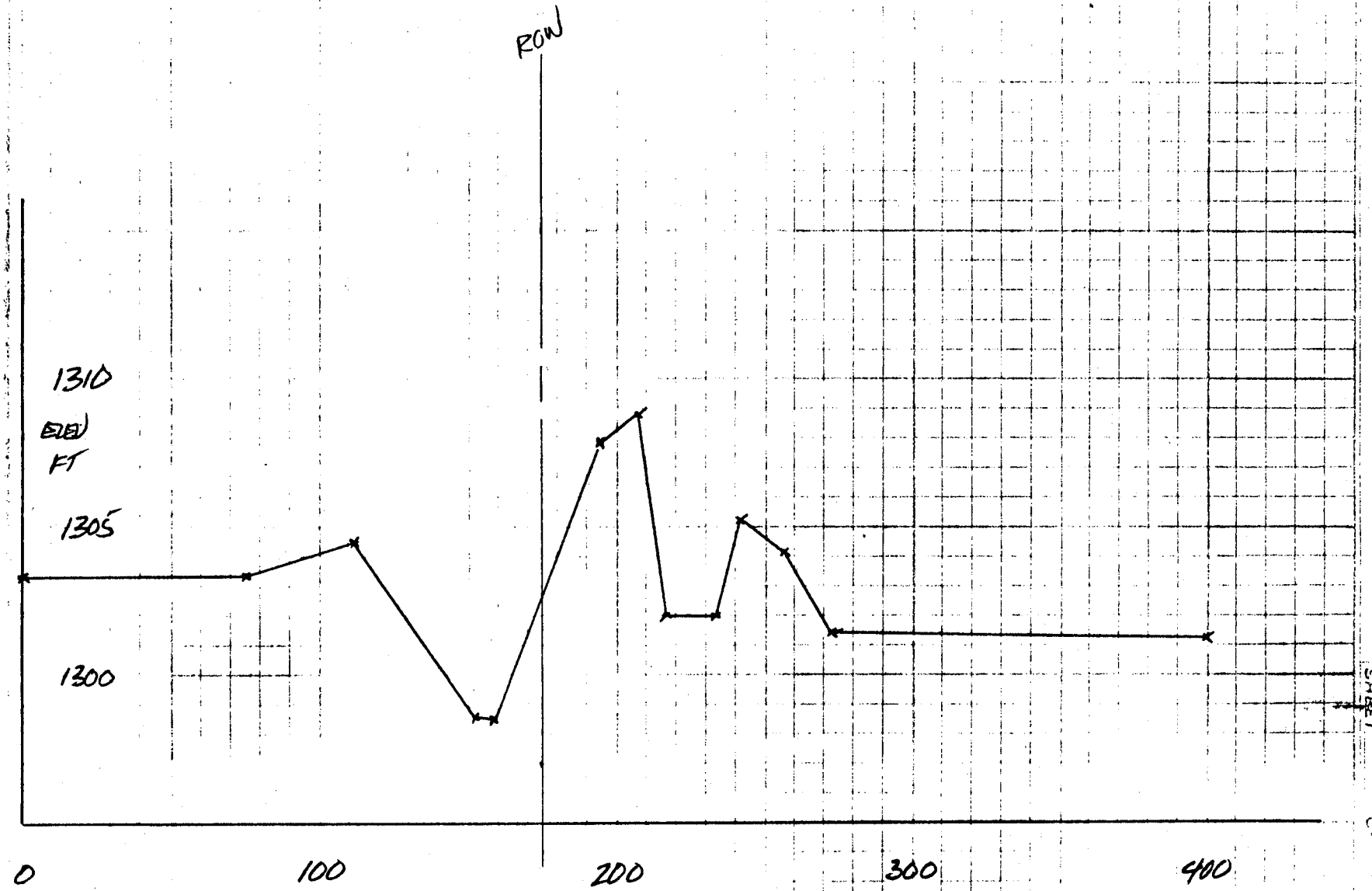
PROJECT RWCD RE4H43

CHECKED BY

DATE

JOB NO.

SHEET



COMPUTATION SHEET

SCS-ENG-5032 Rev. 6-66

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA

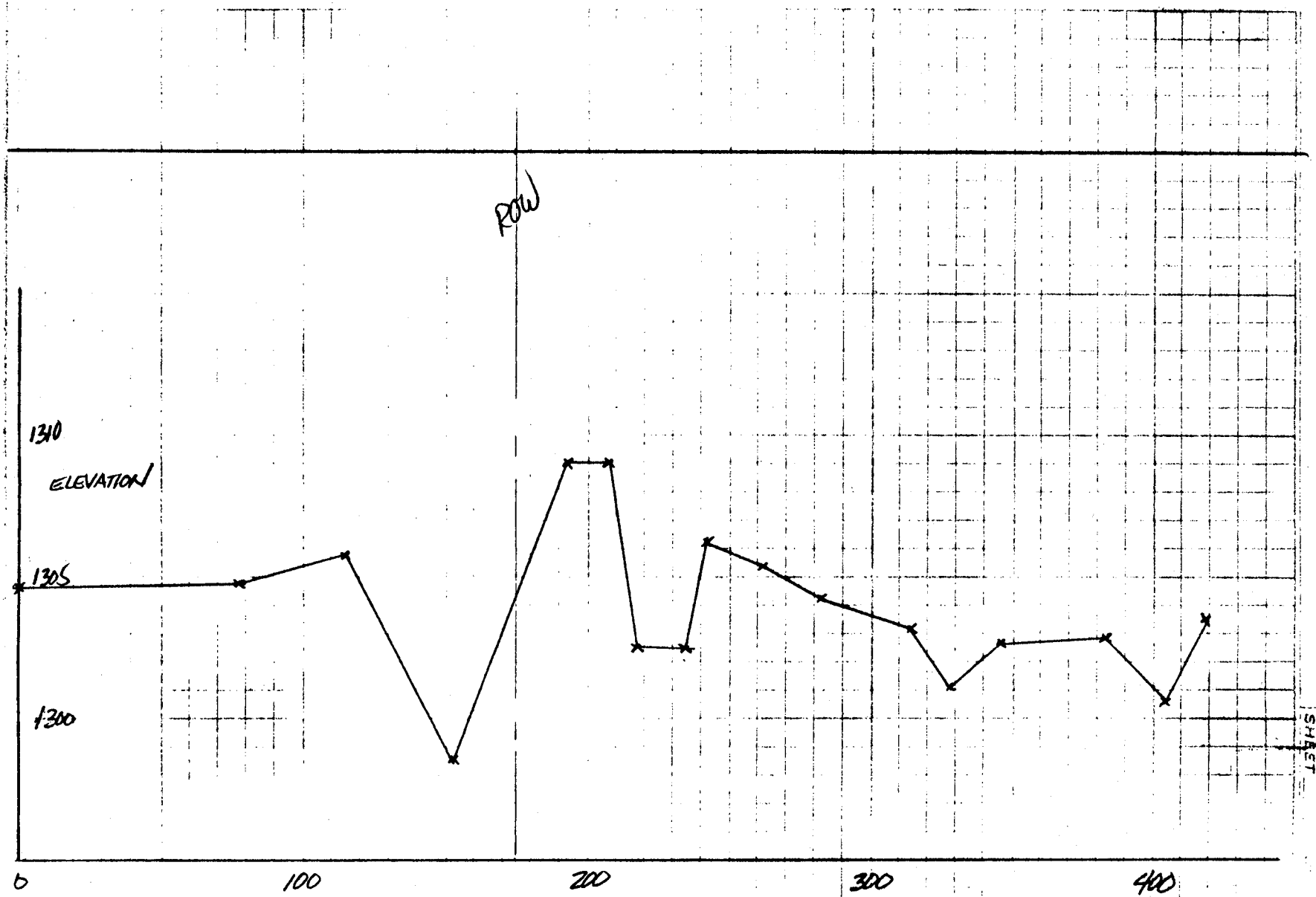
BY MACKERRAY DATE 6/29/83

SUBJECT

PROJECT PAICO REACH 3

CHECKED BY DATE

SHEET JOB NO.



DIST. RT. OF ℄ FLOODWAY & ℄ ROW

STA 833+00

COMPUTATION SHEET

SCS-ENG-5224 Rev 9-69

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA

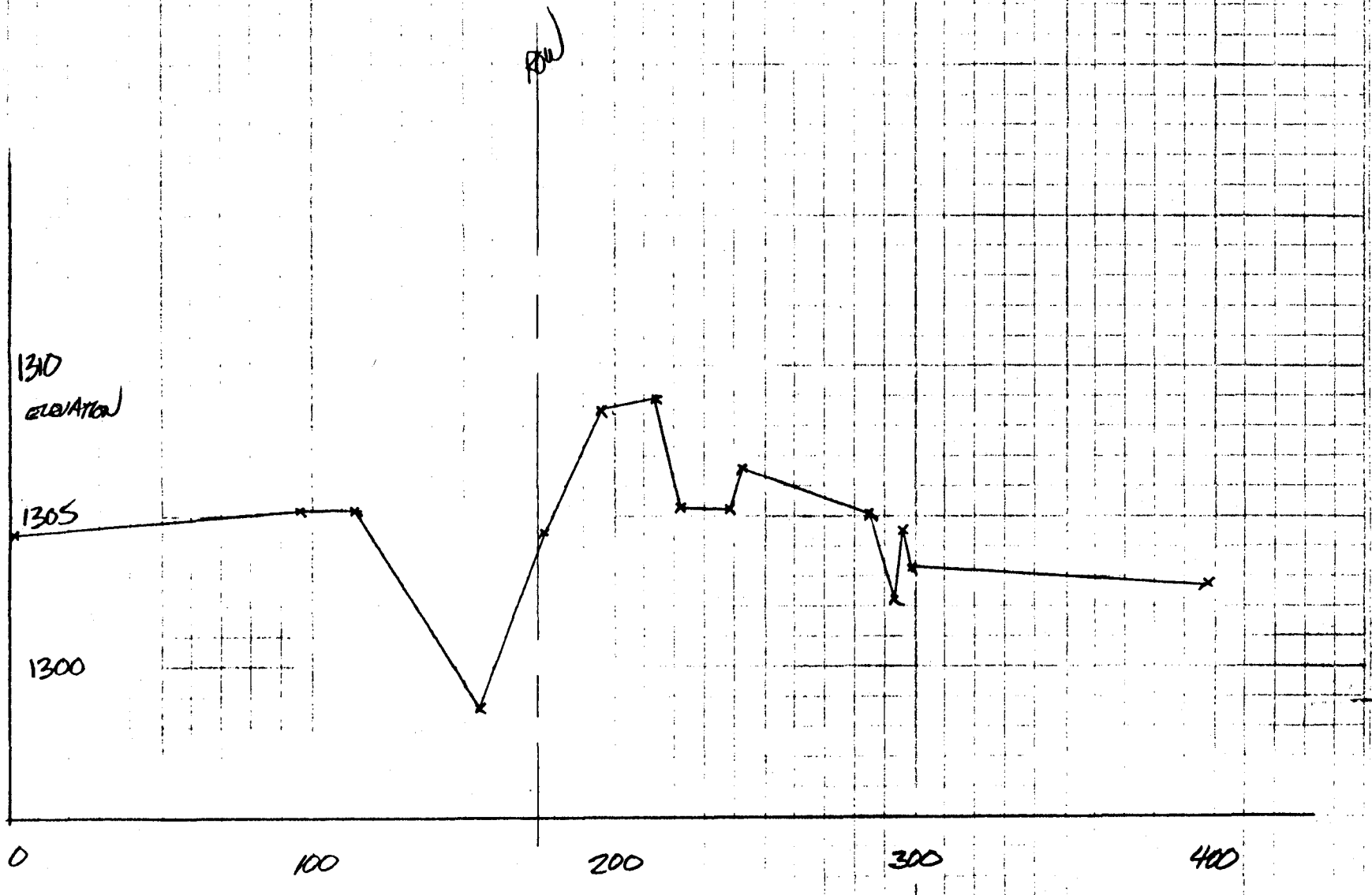
PROJECT RUCO RETACH 3

BY MACKEDAY DATE 6/29/83 CHECKED BY DATE

SUBJECT

JOB NO

SHEET 1 OF



CONSTRUCTION SHEET

U S DEPARTMENT OF ... SOIL CONSERVATION SERVICE

ARIZONA

THACKERAY

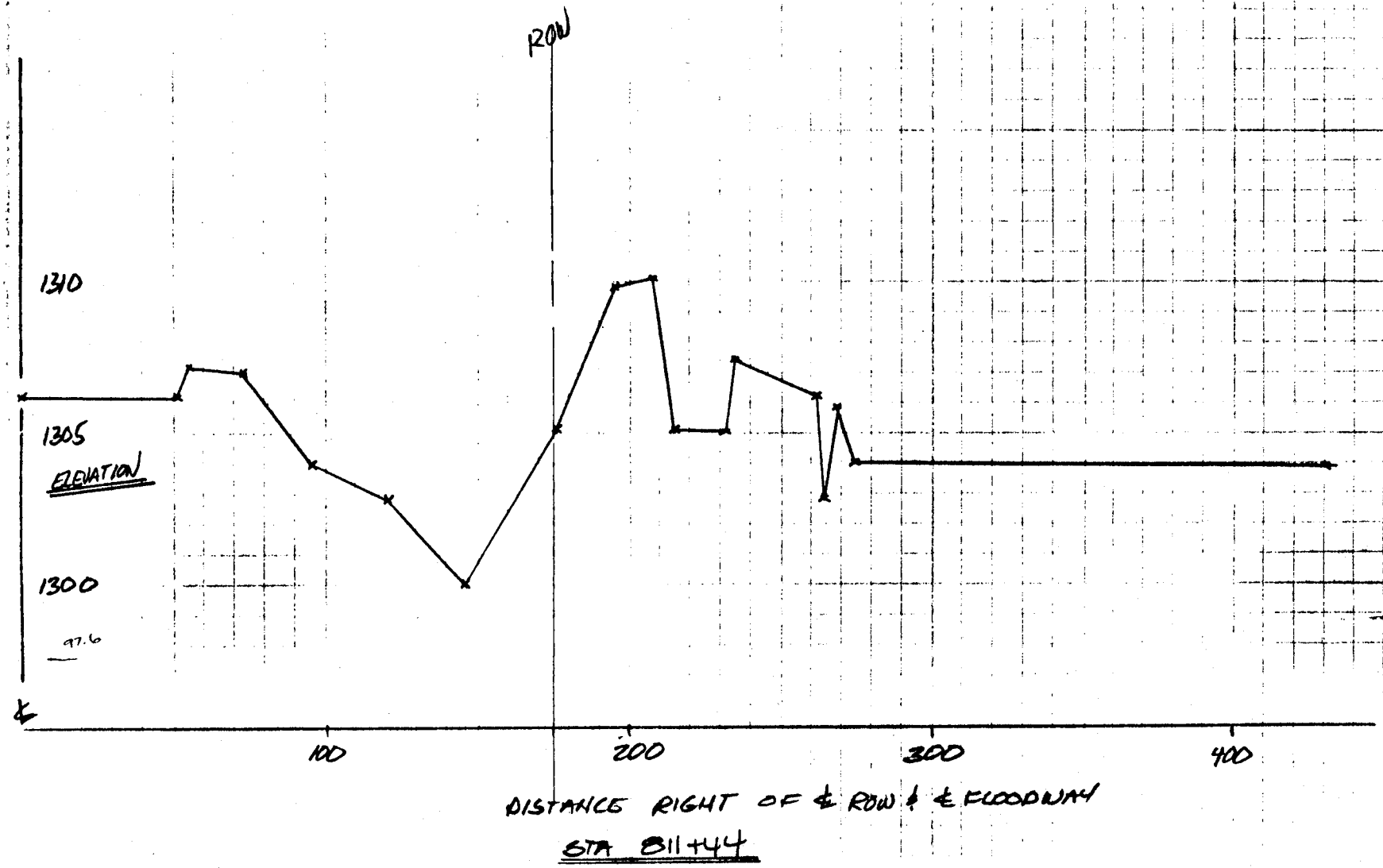
6/29/83

RWCD REACH 3

DATE

JOB NO

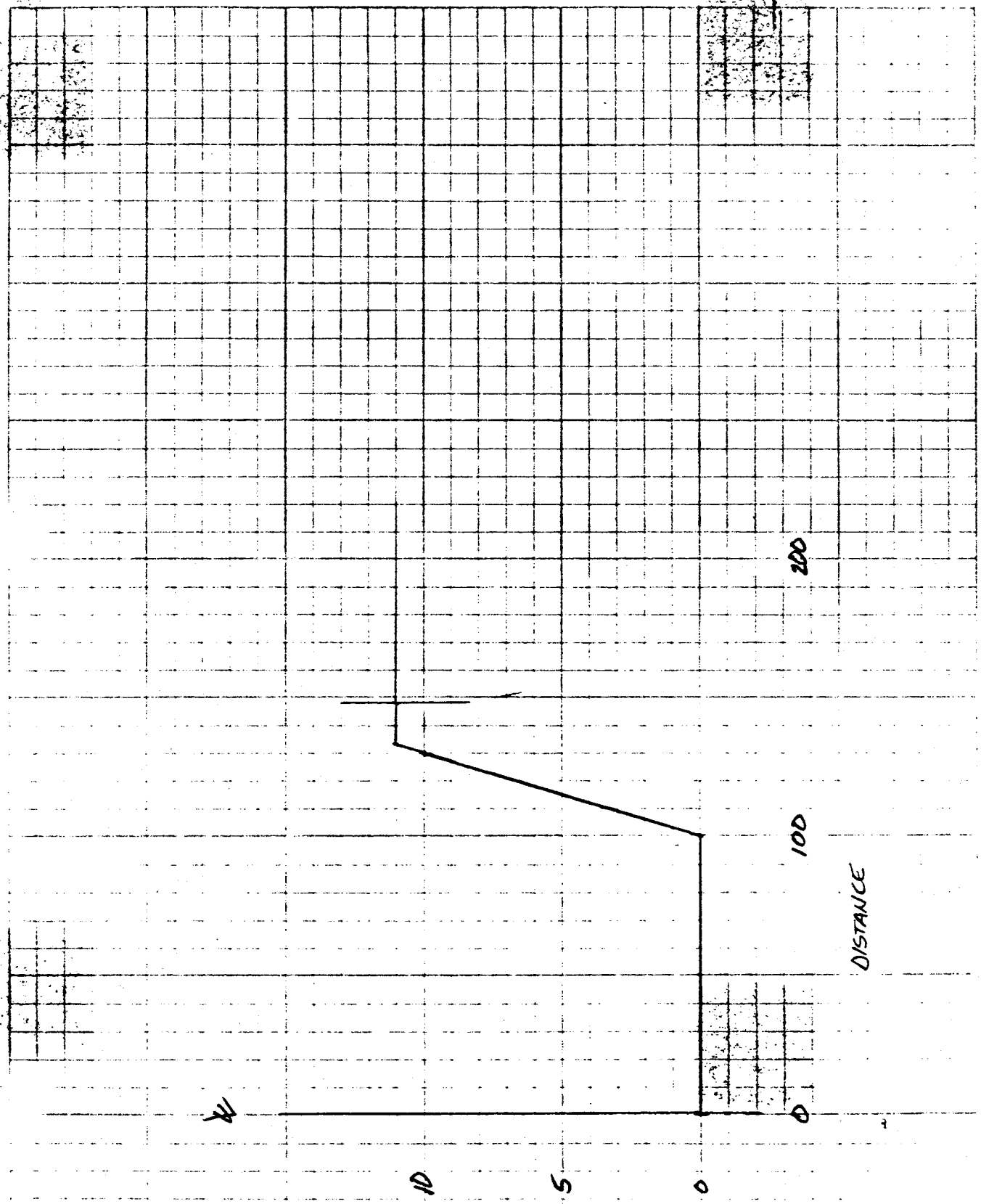
SHEET



COMPUTATION SHEET
SCS-ENG-523 Rev. 8-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE		PROJECT		
BY	DATE	CHECKED BY	DATE	JOB NO.
SUBJECT				SHEET ___ OF ___



COMPUTATION SHEET

U S DEPARTMENT OF

SOIL CONSERVATION SERVICE

STA ARIZONA

BY DT

DATE 9/1/83

PROJ RWCD R3

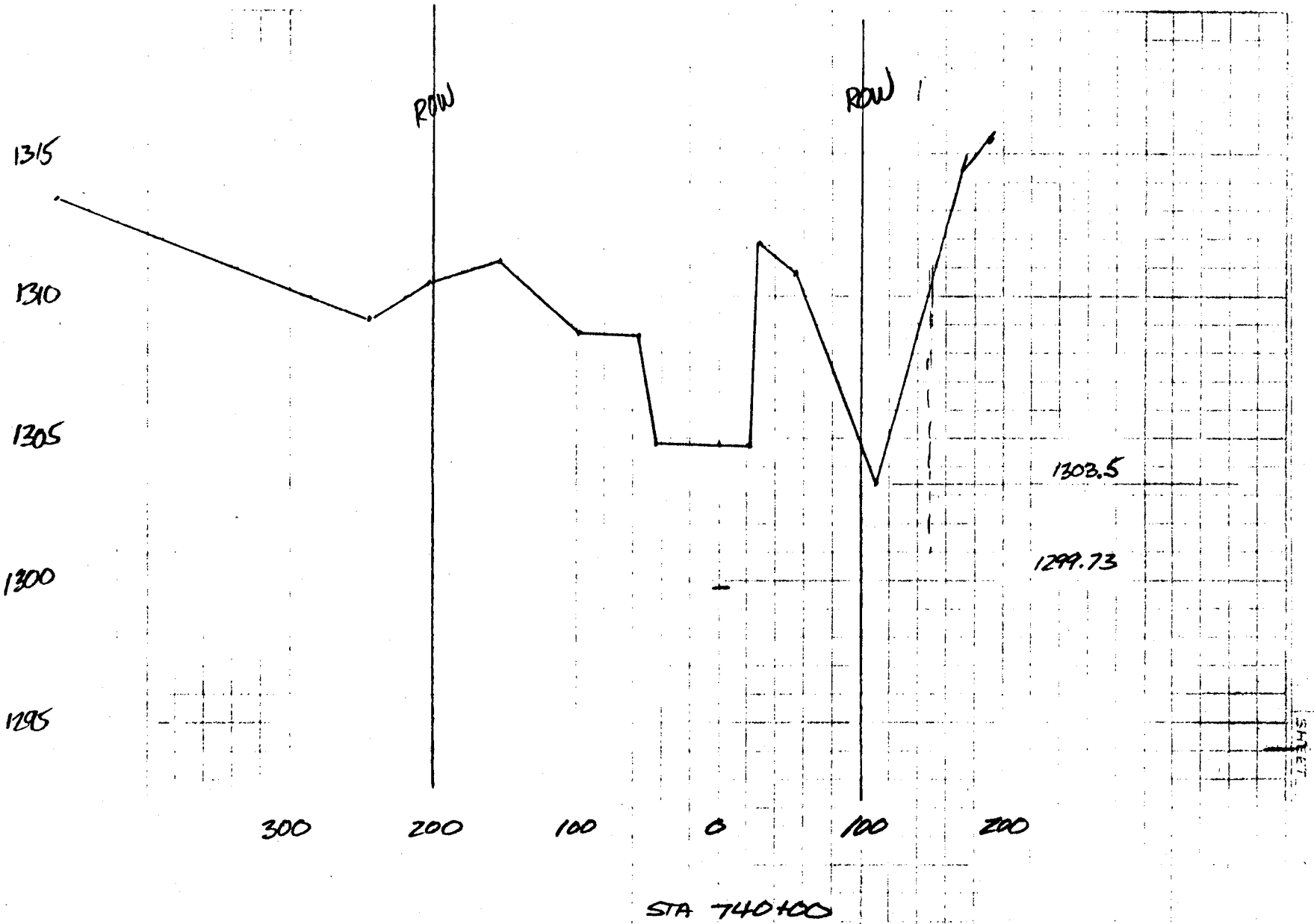
CHECKED BY

DATE

SUBJECT

JOB NO.

SHEET



COMPUTATION SHEET

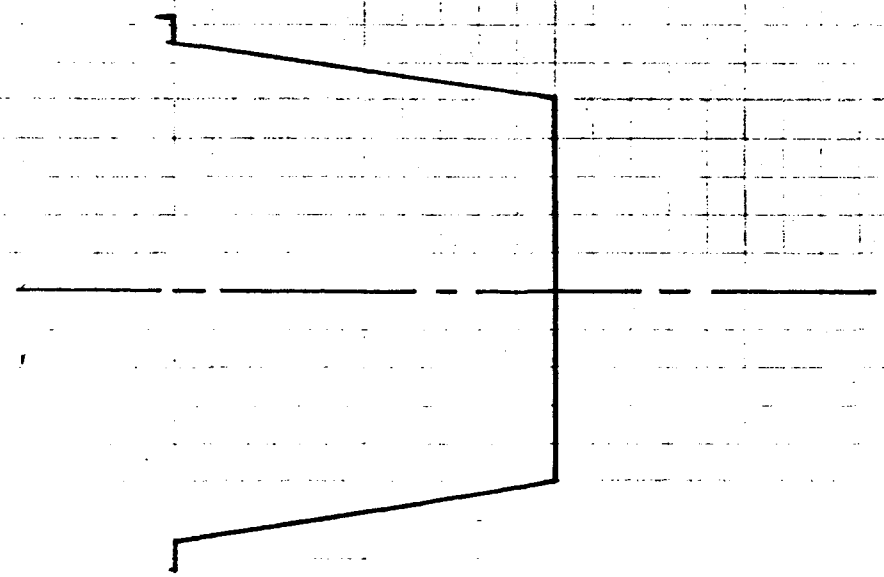
SCS ENG-5224 Rev. 7-69

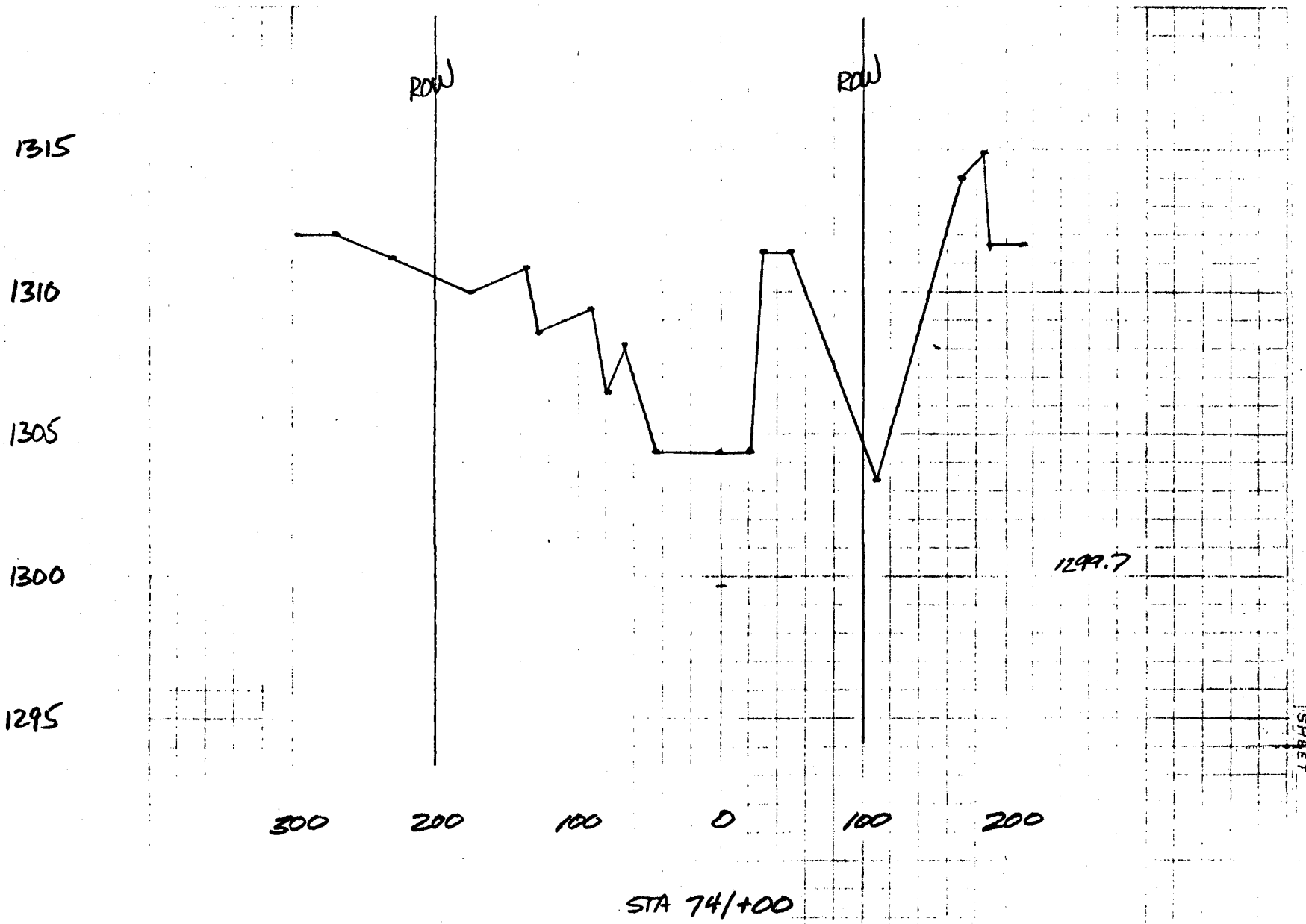
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE		PROJECT		
BY	DATE	CHECKED BY	DATE	JOB NO

SUBJECT

SHEET





ARIZONA DT

9/1/83

PROJECT RIKO R3

CHECKED BY

DATE

SHEET

LEGEND

CONSTRUCTION SHEET

ENGINEERING

U S DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

COMPUTATION SHEET

ARIZONA D.T.

9/1/83

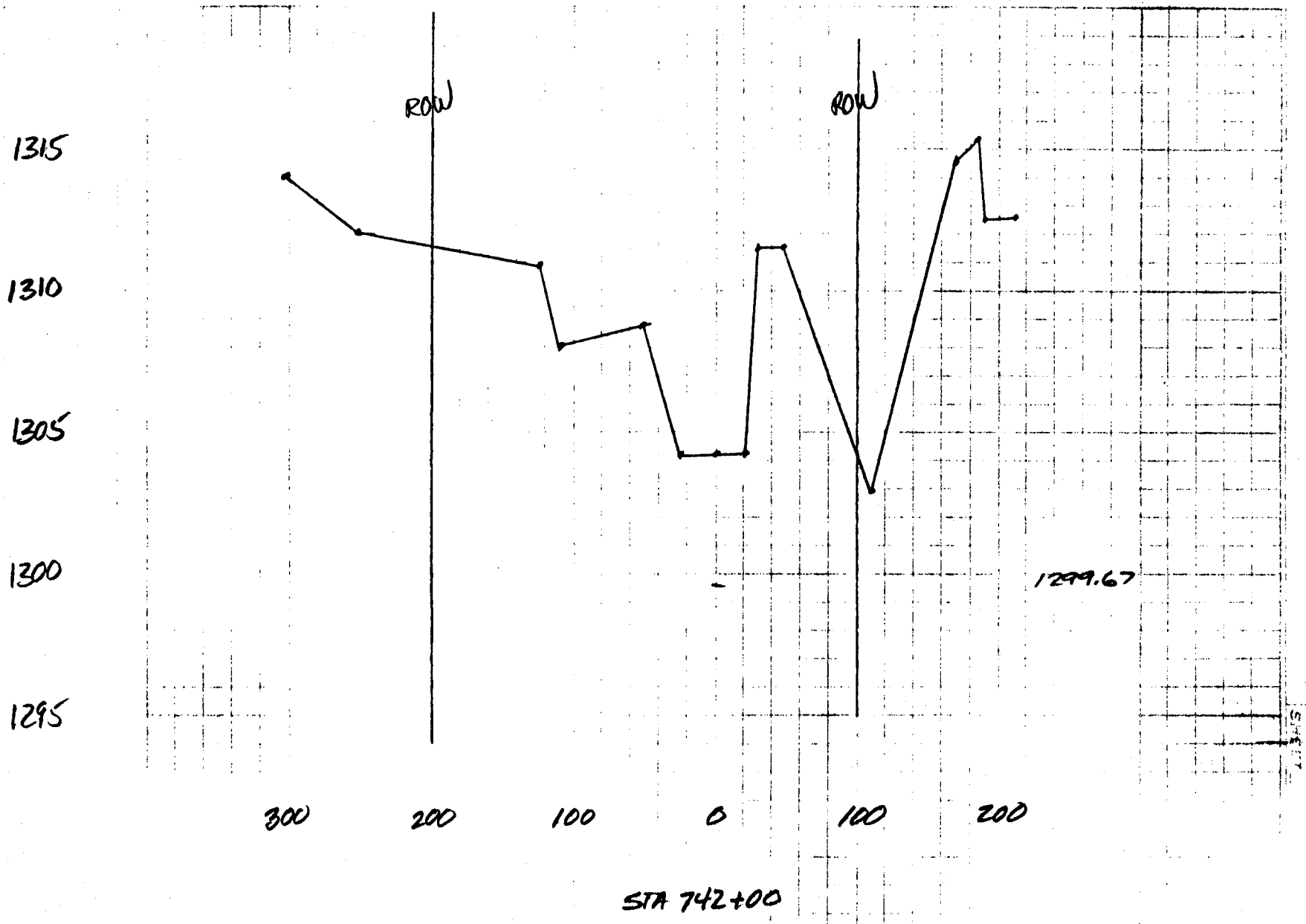
RWCD R3

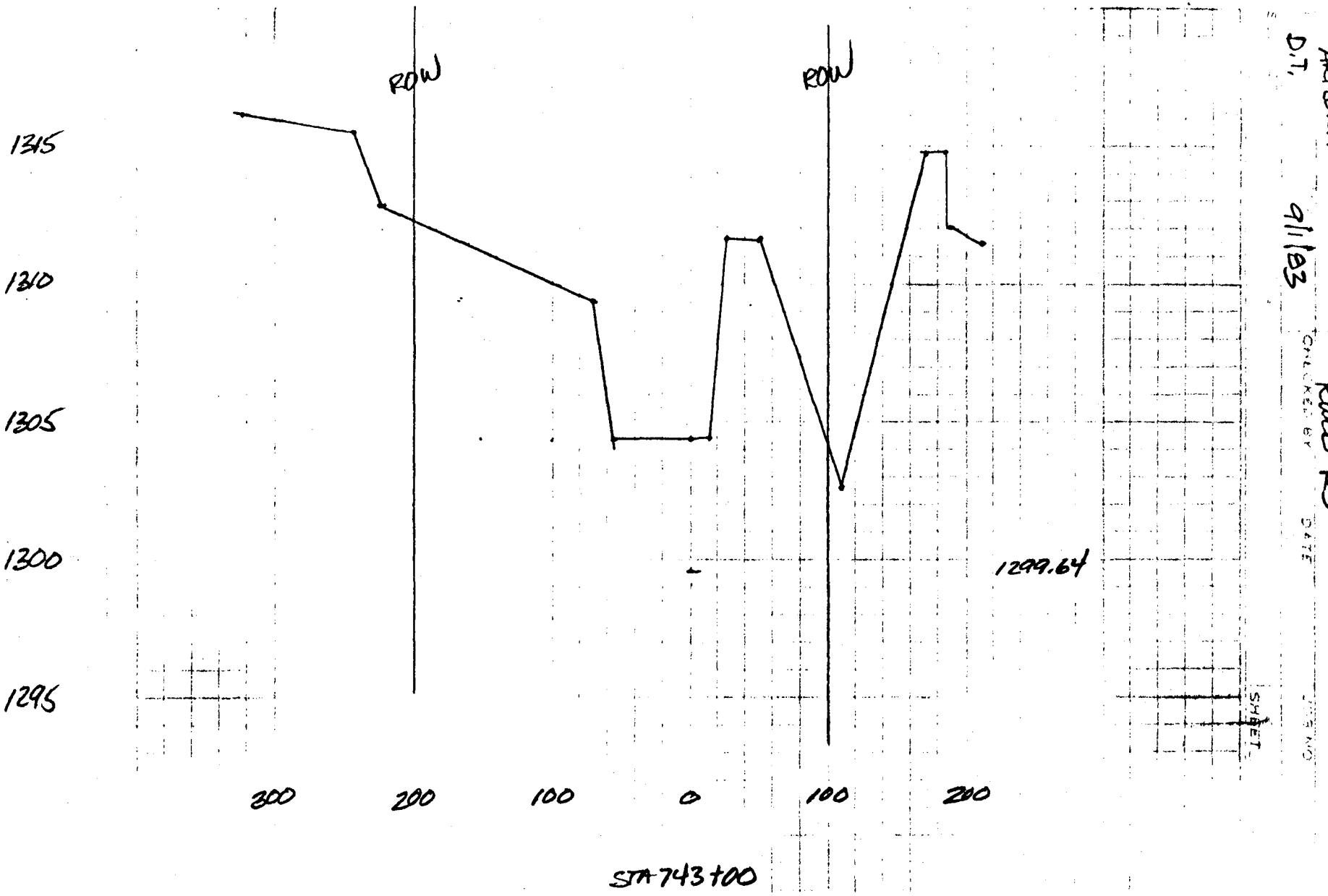
CHECKED BY

DATE

JOB NO.

SHEET



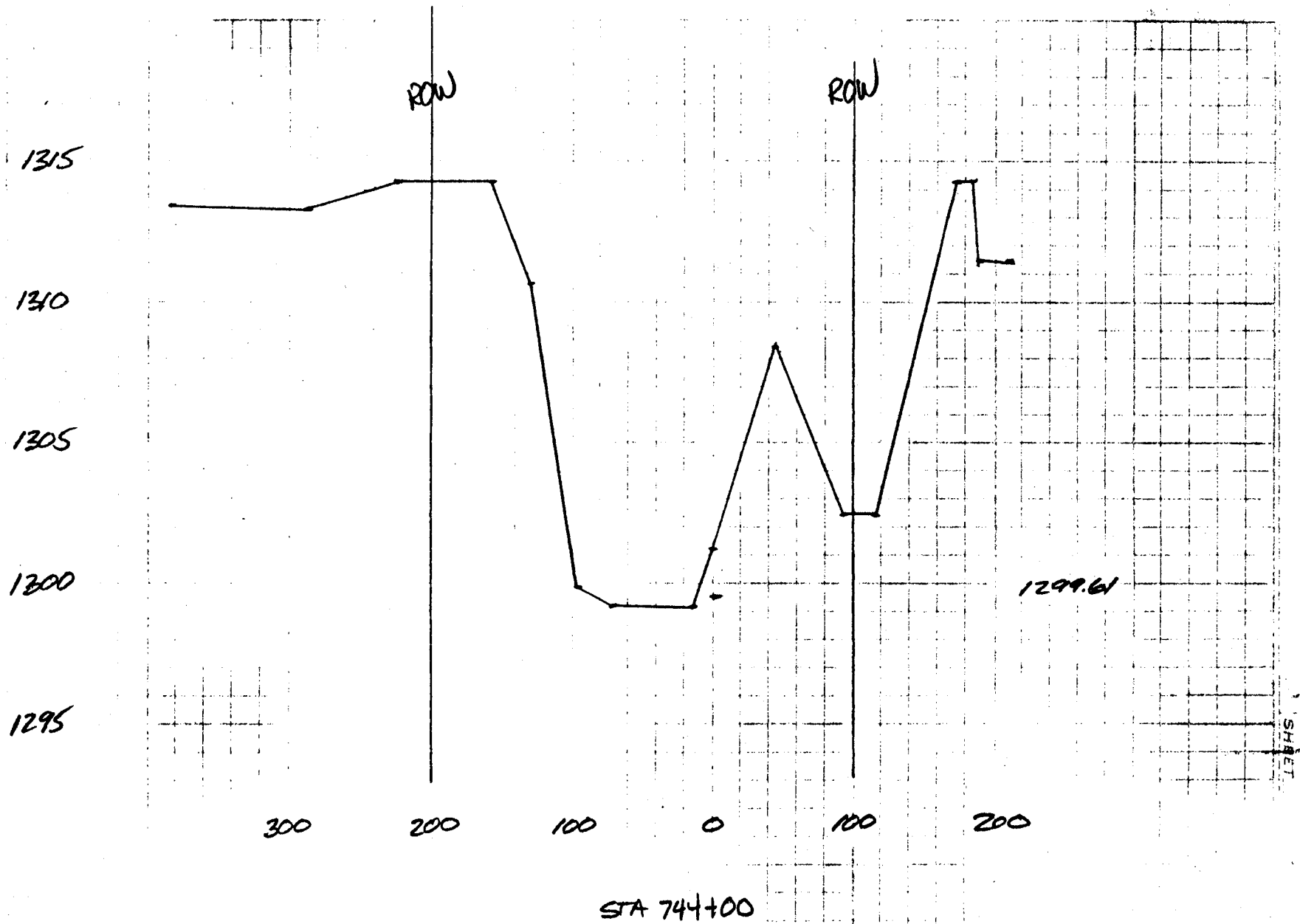

ARIZONA
D.T.
9/1/03
RWCD R3
ROW
ROW
1315
1310
1305
1300
1295
1299.64
300
200
100
0
100
200
STA 743+00

CONVERSATION SHEET

SCS-ENG-5224 Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZONA
PROJECT RWCD R3
SUBJECT ΔT_r
DATE 9/1/83
CHECKED BY
JOB NO.
SHEET



COMPUTATION SHEET

SCS-ENG-ECDA Rev 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ARIZ

D.T.

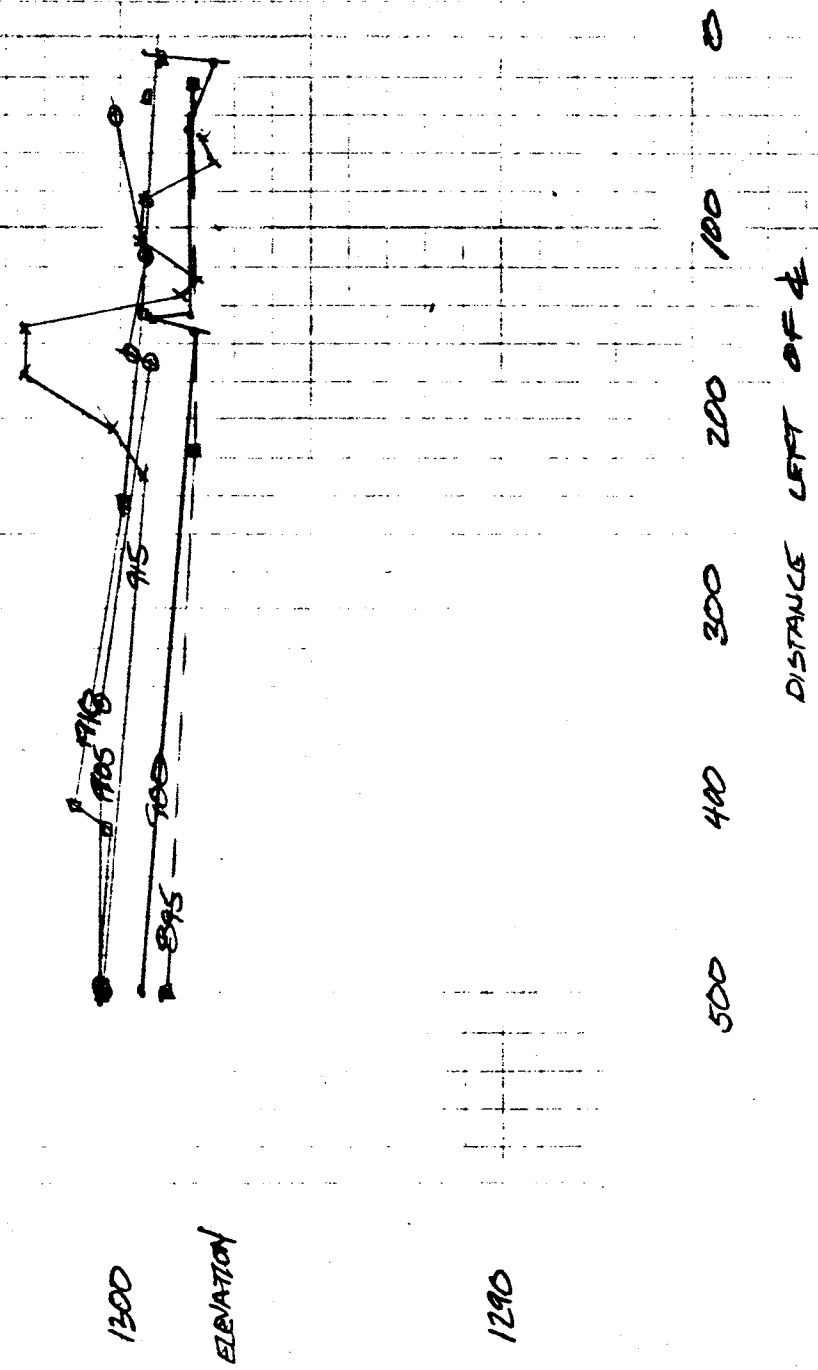
PROJECT ROOD REACH 3

CHECKED BY DATE 9/19/83

JOB NO

CROSS SECTIONS - GROUND SLOPE L. OF ℄

SHEET



COMPUTATION SHEET

SCS-ENG-223 Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ARIZ.

RWCD REACH 3

D.T.

CHECKED BY

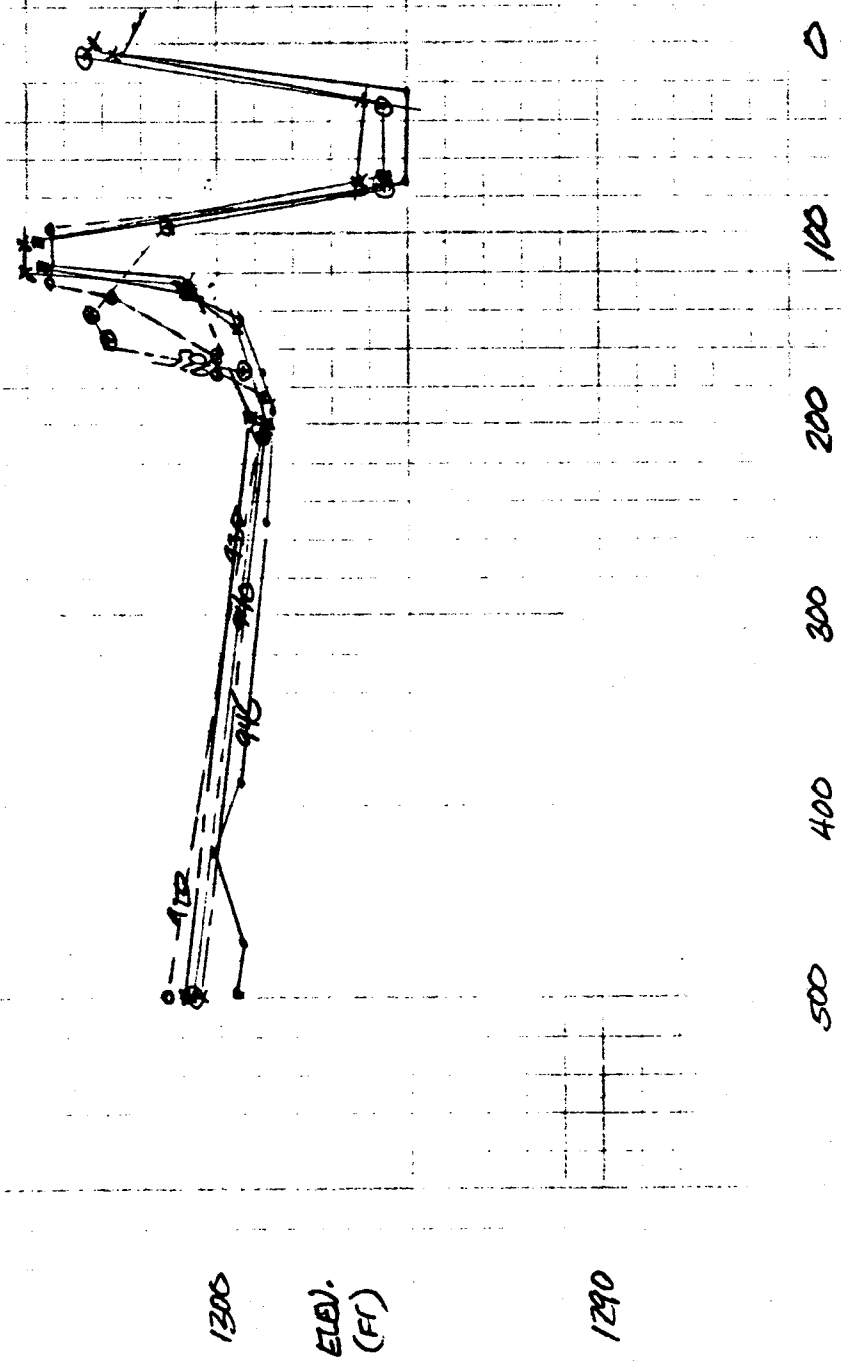
9/19/83

DATE

JOB NO.

CROSS SECTIONS - GROUND SLOPE L. OF ℄

SHEET 1



COMPUTATION SHEET

SCS-ENG-503A Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE AZ | PROJECT RWCD R3

BY DT | DATE 8/31/83 | CHECKED BY | DATE | JOB NO.

SUBJECT | SHEET ___ OF ___

SPOIL

BASIN	NET		19000 cy
* CHANNEL	EXC.	1,950,403	
CHANNEL	FILL RT	184,228	
	LT	34,000	
	SF	218,228	
CHANNEL	NET	1732175	1732175
TOTAL			1,751,175
ROUND	TO		1,750,000 cy

COMPUTATION SHEET

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ARIZ.
D.T. 8/11/83

PROJECT: RWCD R3
CHECKED BY | DATE | JOB NO.

SHEET 1 3

PROBLEM: NEED EST. UNIT COSTS FOR R/C AND GROUTED ROCK RR

ANALYSIS: USE RCH. 2 COSTS

SOLUTION:

1. R/C: USE $\frac{\$ \text{ CONCRETE} + \$ \text{ CEMENT} + \$ \text{ REBAR}}{\Sigma \text{ CY}}$

CY = 11077

SHED #1 CONTR.	# 12 CONCR	13 CEMENT	14 REBAR	Σ	Σ/CY
SUNDT	875 083	282 455	479 309	1636 847	$147.77
KEC	985 853	265 846	495 286	1746 985	157.71
BALL&BALL	1218 470	282 455	479 309	1980 234	178.77
KIEWIT	908 314	265 840	479 309	1653 463	149.27
OWL	830 775	315 685	319 539	1465 999	132.35
POLICE	996 930	398 760	479 309	1874 999	169.27
BEUTOCO	996 930	249 225	447 355	1693 510	152.89
MIDST	908 314	282 455	511 263	1702 032	153.65
RPMURRAY	1406 779	418 532	487 298	2312 609	208.78
ST GROVES	1107 700	299 070	511 263	1918 033	173.15

MEAN = 1798 471 = $162/CY

(LOW 3 TOTAL $161.42)

COMPUTATION SHEET
SCS-ENG-523A Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZ. | PROJECT: RUCO R3.
BY: D.T. | DATE: 8/29/83 | CHECKED BY: | DATE: | JOB NO.
SUBJECT: SPOIL QUANTITY ESTIMATE | SHEET ___ OF ___

PROBLEM: BILL PAYNE NEEDS AN ESTIMATE OF SPOIL QUANTITY FOR THE ENTIRE REACH 3 BY 10 AM WED AUG 31.

ANALYSIS: 1. PROVIDE A ROUGH ESTIMATE BY PLANIMETERING (COORD METHOD OR) NET CUT AND FILL ON CROSS SECTIONS ALREADY DRAWN AT 10 STATION INTERVALS (1000 FT).

2. MAKE A SIMILAR ESTIMATE FOR THE SEDIMENT BASIN CONSTRUCTION.

3. ASSUME THAT SHRINK AND SWELL = 0; THAT THE SPOIL VOLUME = Σ CUT VOL. − Σ FILL VOL. WITHOUT CORRECTION.

4. DRAWING SCALE: H: 1" = 20 FT.; V: 1" = 4 FT.

A: $1 in^2 = 80 ft^2$

Average unit = $0.8 ft^2$

COMPUTATION SHEET

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZ.
BY: D.T.
DATE: 8/11/83
PROJECT: RWCO RCH.3
CHECKED BY
DATE
JOB NO.
SHEET 2 3

2. R/C SCHED. 2 88 CY

CONTR	CONCR.	CEMENT (ALL $)	REBAR	2 $	$/CY
SUNDT	8800	2376	7300.50	18476.50	209.96
KEC	8800	2112	5110.35	16022.35	182.07
B&B	13200	2244	5840.40	21284.40	241.87
KIENIT	17600	2112	4380.30	24092.30	273.78
ONL	22000	2508	2920.20	27428.20	311.68
POLICE	5280	3168	4818	13266.00	150.75
BRUTOCO	9680	1980	4818	16478.00	187.25
MID ST.	13024	2270	4672	19966.00	226.89
RP MUR	8096	2046	4672	14814.00	168.34
ST GROVES	8800	2376	4672	15848.00	180.09

MEAN = 213.27
(LOW 3 TOTAL) = 211.30)

3. GROUTED ROCK 726 CY

CONTR	UNIT $/CY
SUNDT	30
KEC	45
B&B	50
KIENIT	41
ONL	35
POLICE	54
BRUTOCO	30
MID ST	32
RP MUR.	30
ST GROVES	30

MEAN = 37.70 $/CY

(LOW 3 TOTAL = 41.67)

COMPUTATION SHEET

STD-ENG-5234 Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZ
PROJECT: RWCD R3
BY: D.T.
DATE: 8/11/83
CHECKED BY
DATE
JOB NO.
SUBJECT
SHEET 3 3

4. LOOSE ROCK RR 45,500 CY

CONTR	UNT $/CY
SUNDT	10
KEC	11
B&B	10
KIEWIT	10
OWL	13
POLICE	12.50
BRUT	12.00
MID	11.75
RAM	10.00
SJG	11.00

(MEAN $11.13)

(LOW 3, TOTAL, MEAN $10.33)

COMPUTATION SHEET
SCS ENG-SCRA Rev 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZ
PROJECT: RWCD R3
BY: DT
DATE: 8/31/83
CHECKED BY
DATE
JOB NO.
SUBJECT
SHEET OF

APPROXIMATE SPOIL VOLUME FOR DEBRIS BASIN:

AVE GROUND SURFACE EL = 1303.5
INV EL 1297.7

5.8 FT

VOL AT D = 3FT = 10AF

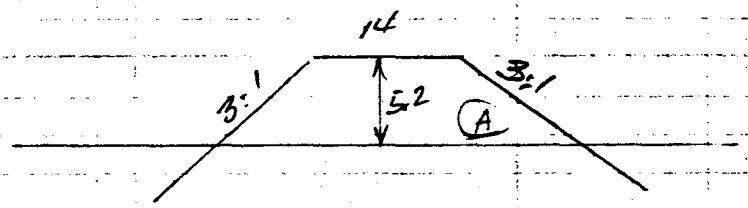
AS AN APPROXIMATION USE $V_{EXC.} = \frac{5.8}{3}(10AF)$

= 19.33AF

= 842,160 FT^3

= 31 191 cy

APROX FILL IN DIKES ASSOCIATED WITH THE DEBRIS BASIN.



$A = BD + CD^2 = 14(5.2) + 3(5.2)^2 = 154\ FT^2$

$V = A \times L \approx 154 \times 2200 \approx 338\,800\ FT^3$
$\approx 12\,548$ cy

NET SPOIL ≈ 31 191 − 12 548
≈ 18 643 cy
≈ 19,000 cy

COMPUTATION SHEET

STS-ENG-553A Rev 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE: ARIZ
PROJECT: ROUND R3
BY: DT
DATE: 8/31/83
CHECKED BY:
DATE:
JOB NO.:
SUBJECT:
SHEET 1 OF

FILL LT

STA	SQ	A
810	18	29
820	32	51
830	60	96
840	108	173
850	80	128
870	18	29
880	40	64
890	18	29
900	66	106
910	16	26
920	20	32
930	9	14
940	8	13
950	—	
960	—	

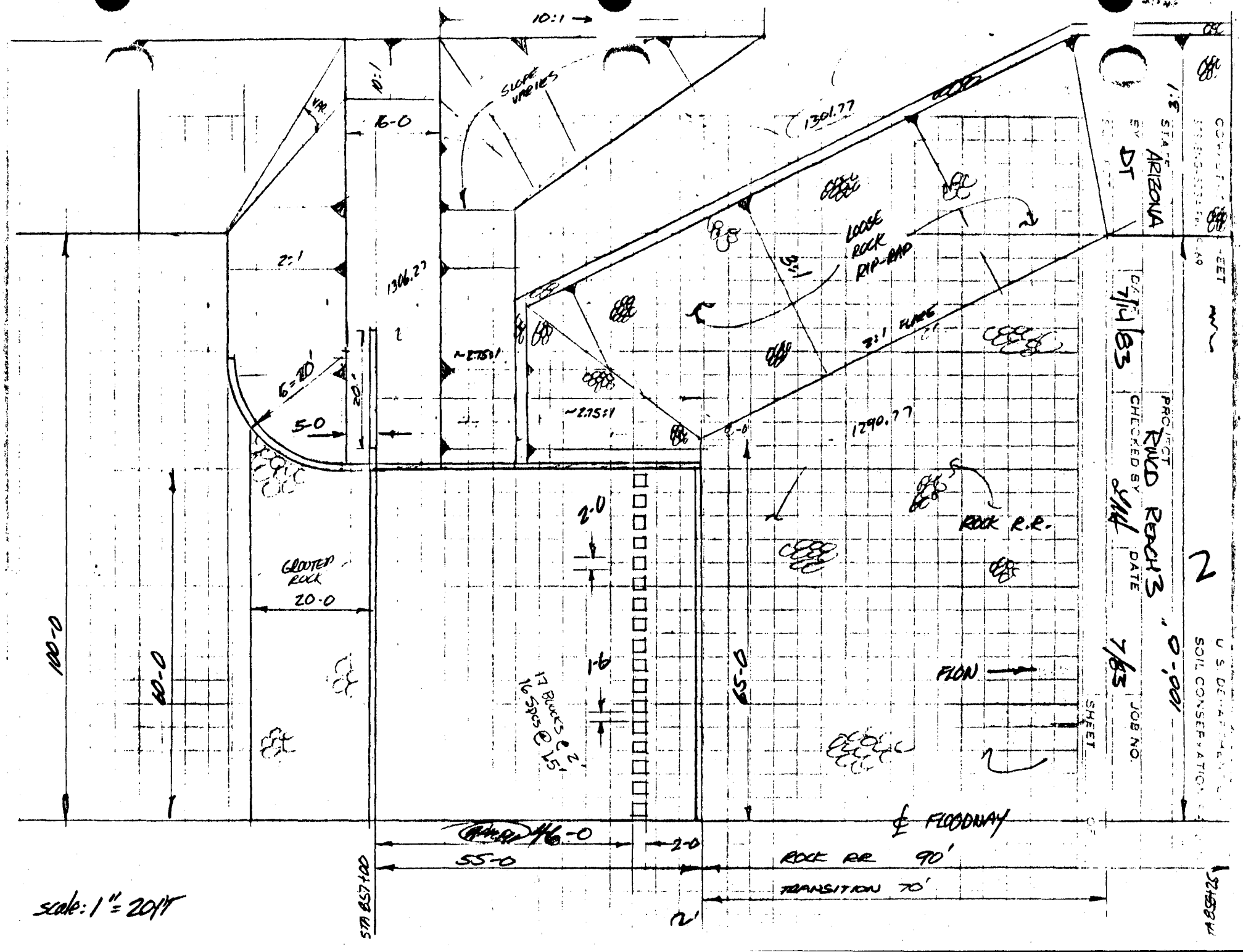
AREA = MEAN AREA = 60.8 FT^2

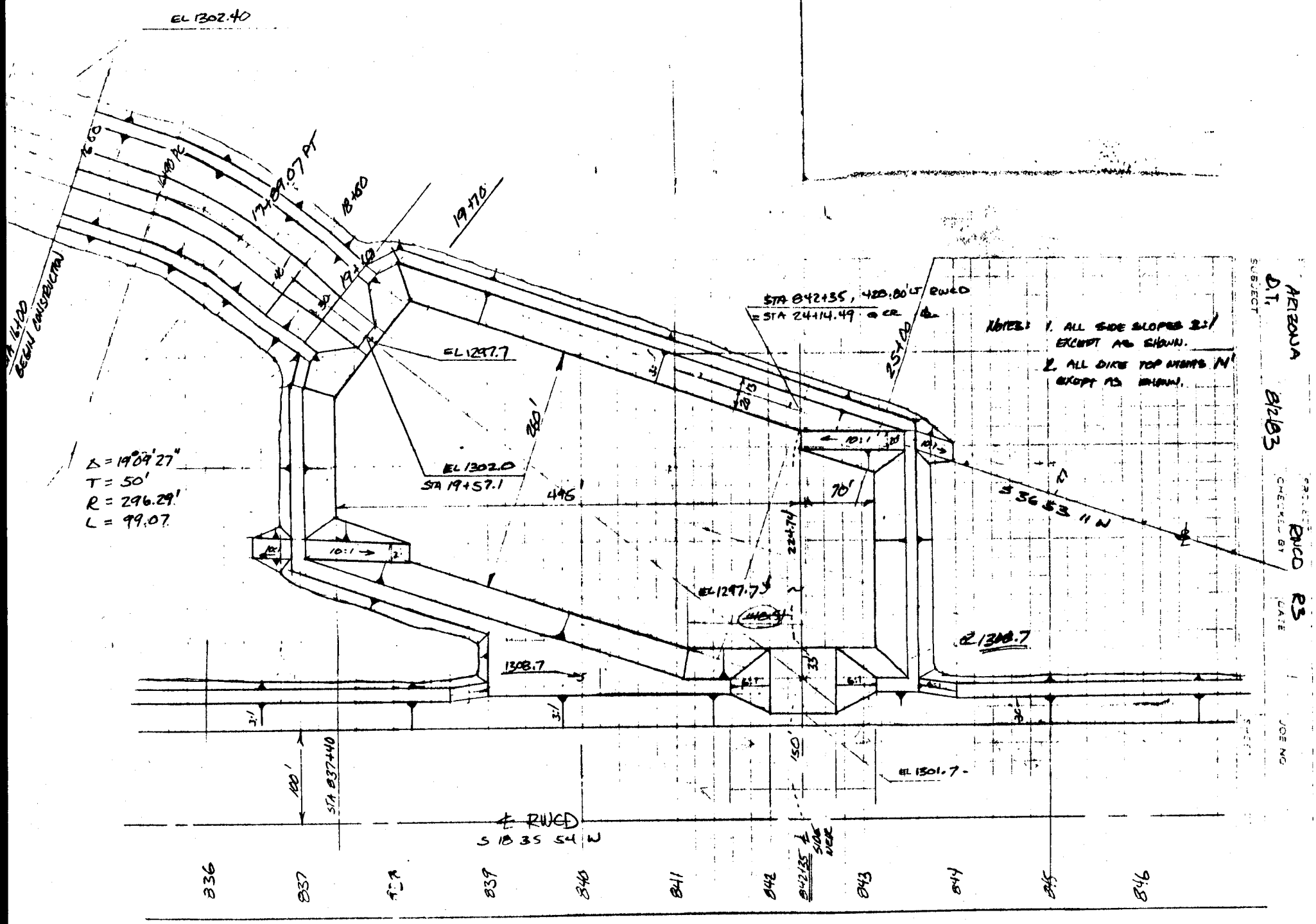
L ≈ 15,000 FT

V ≈ 912,000 FT^3

≈ 34,000 CY

EACH SQUARE IS 0.4F X 4FT OR 1.6 FT^2


10:1
SLOPE VARIES
1301.77
16-0
10:1
2:1
1306.27
6=20'
5-0
20'
~2.75:1
~2.75:1
LOOSE ROCK RIP-RAP
3:1
3:1 FLARE
1290.77
ROCK R.R.
GROUTED ROCK
20-0
100-0
80-0
2-0
1-6
17 Blocks @ 2'
16 Spaces @ 1.5'
65-0
FLOW
℄ FLOODWAY
46-0
2-0
55-0
ROCK RR 90'
TRANSITION 70'
STA 857+00
12'
STATE ARIZONA
BY DT
DATE 7/14/83
PROJECT RWCD REACH 3
CHECKED BY
DATE 7/83
JOB NO.
SHEET 2
SOIL CONSERVATION
scale: 1" = 20'



ARIZONA D.T.

8/2/83

PROJECT RWCD R3

CHECKED BY

DATE

JOB NO.

SUBJECT

SHEET

COMPUTATION SHEET VOID

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

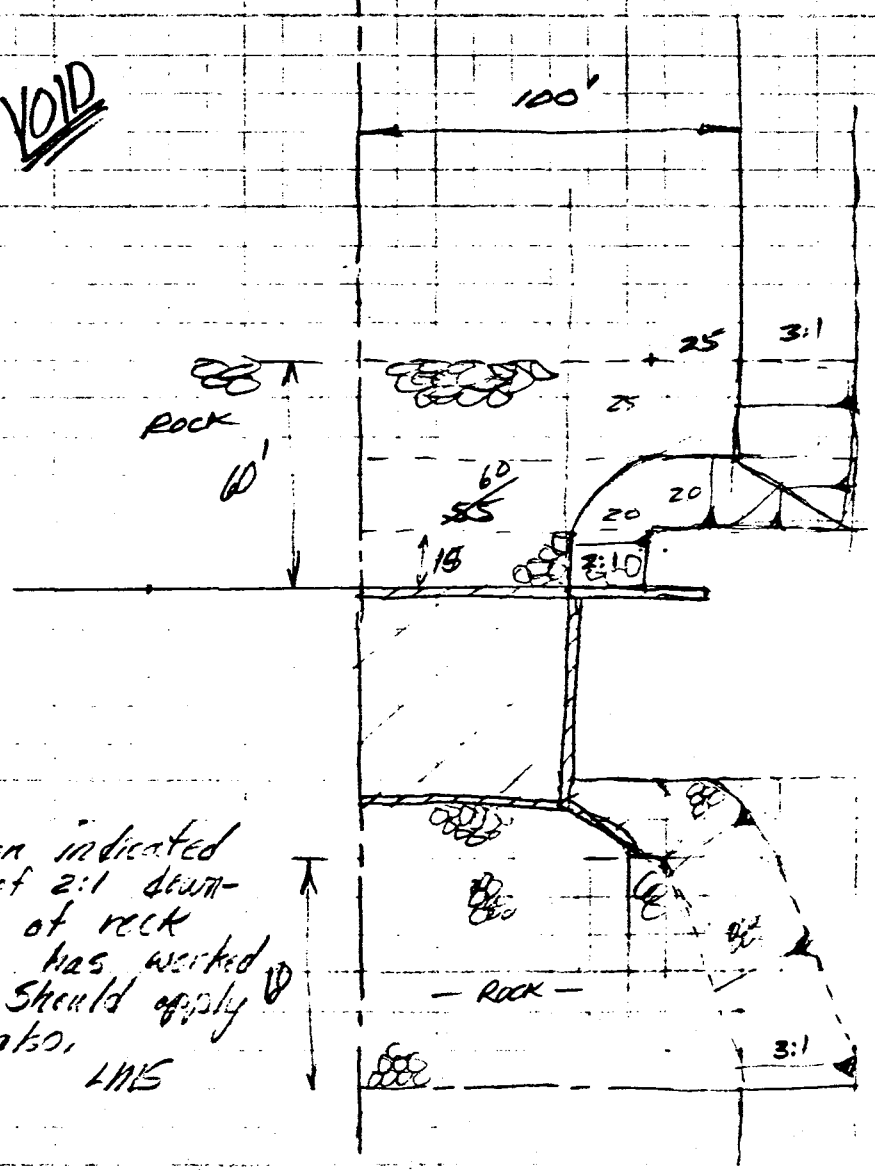
STATE ARIZONA | PROJECT RINCO REACH 3

BY THACKERAY | DATE 6/21/83 | CHECKED BY LMS | DATE 6/83 | JOB NO.

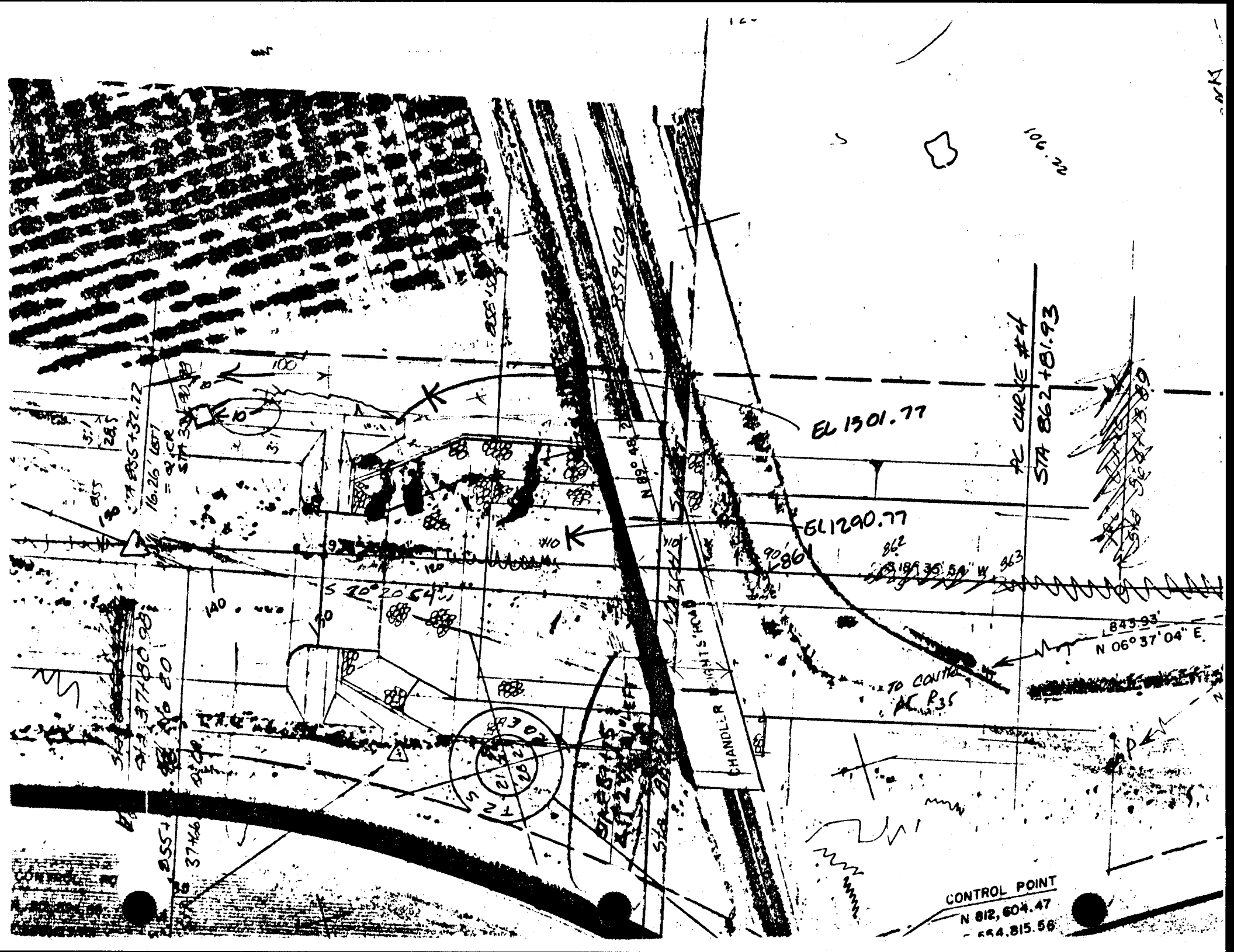
SHEET ___ OF ___

LAYOUT

VOID



Bill Goen indicated flare of 2:1 downstream of rock chutes has worked well. Should apply here also.
LMS


EL 1301.77
EL 1290.77
PC CURVE #4
STA 862+81.93
N 06° 37' 04" E.
S 10° 20' 54"
CHANDLER
CONTROL POINT
N 812,604.47

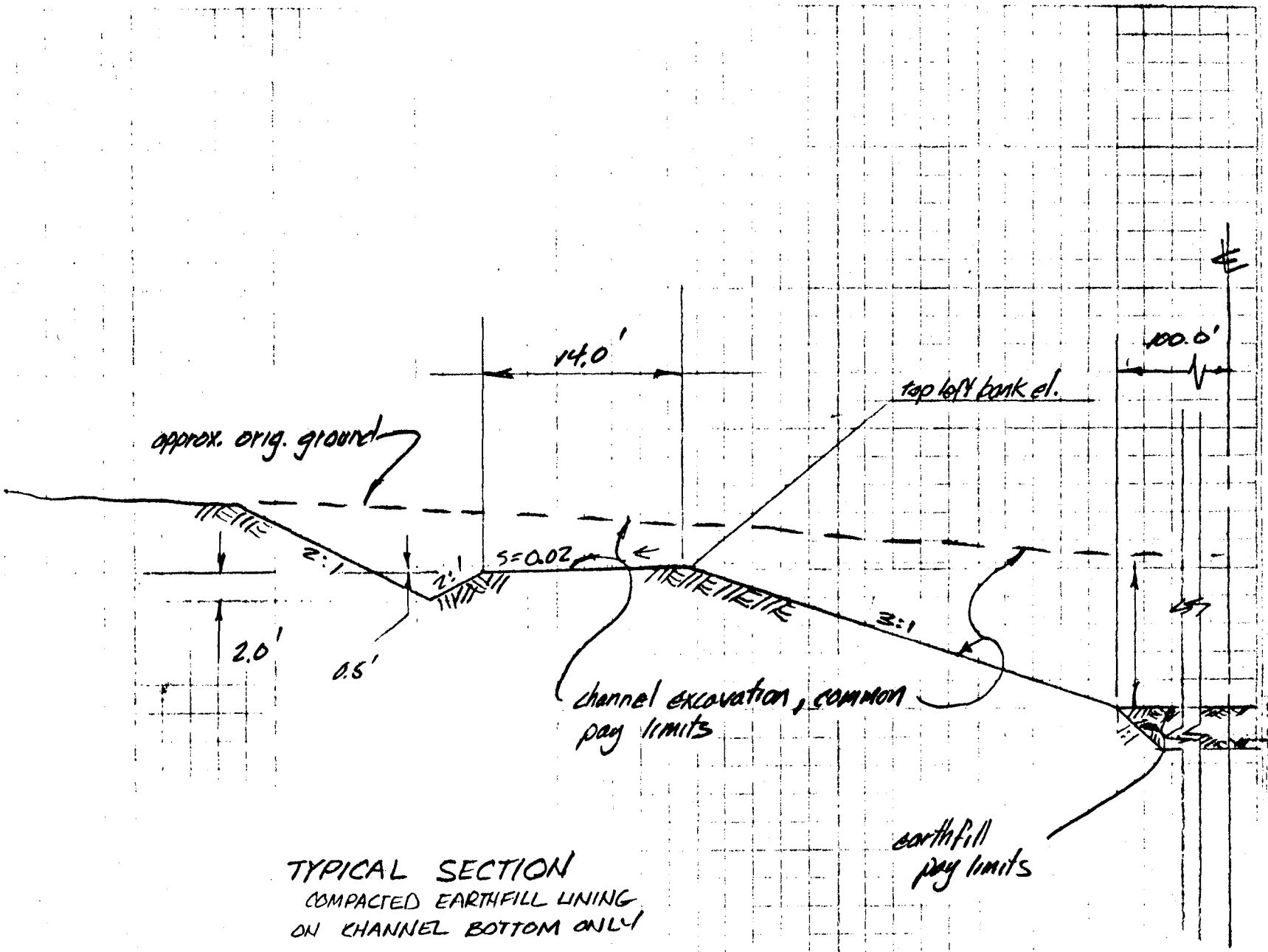
COMPUTATION SHEET

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATION 12/2
F. 0.1.
SUBJECT

9/26/83

PROJECT RUCO R.3
CHECKED BY
DATE
JOB NO.
SHEET



TYPICAL SECTION
COMPACTED EARTHFILL LINING
ON CHANNEL BOTTOM ONLY

COMPUTATION SHEET

SCS-ENG-532 Rev. 6-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARK.

PROJECT RWCD R.7

FOR O.T. 9/26/63

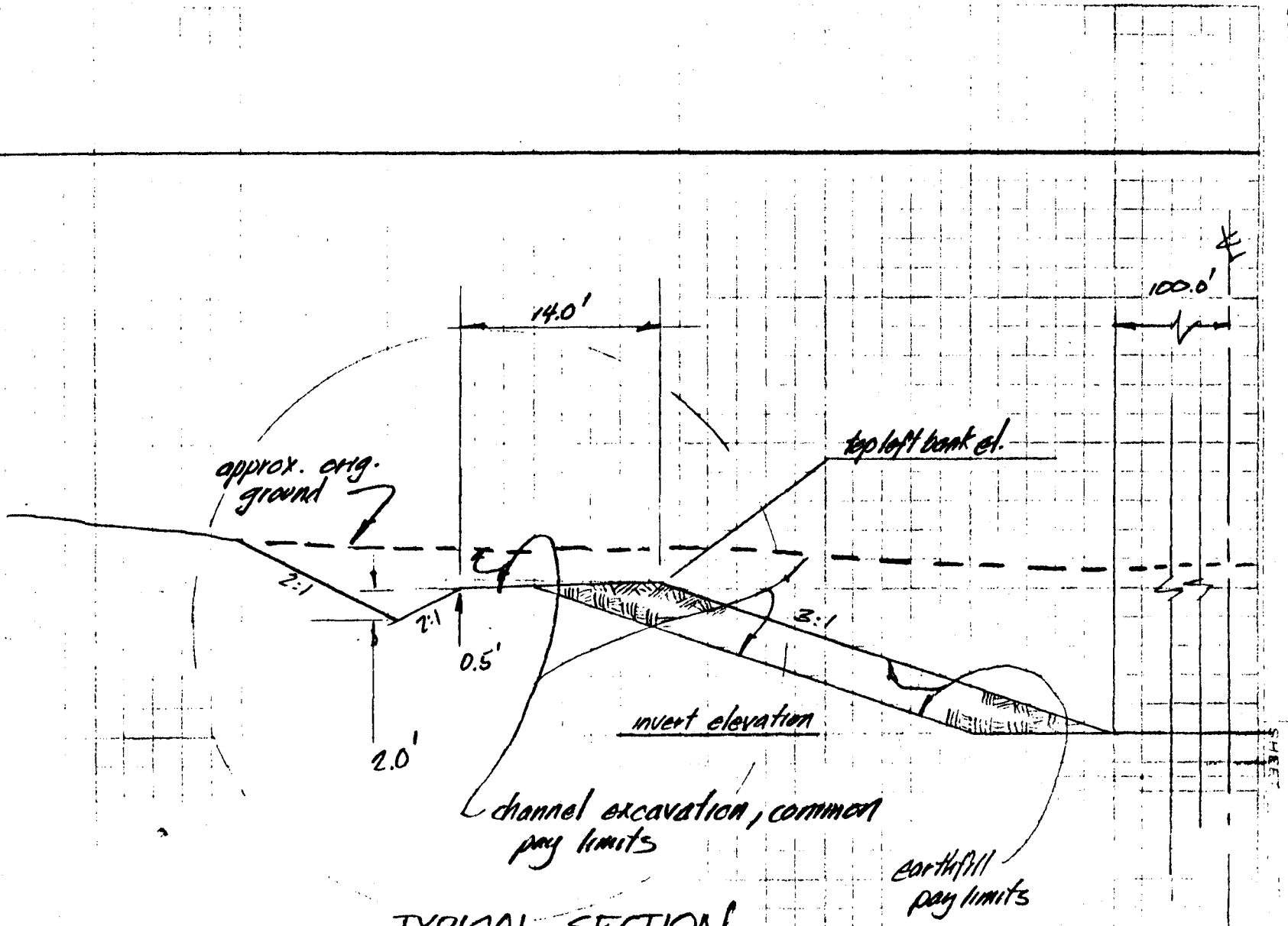
CHECKED BY

DATE

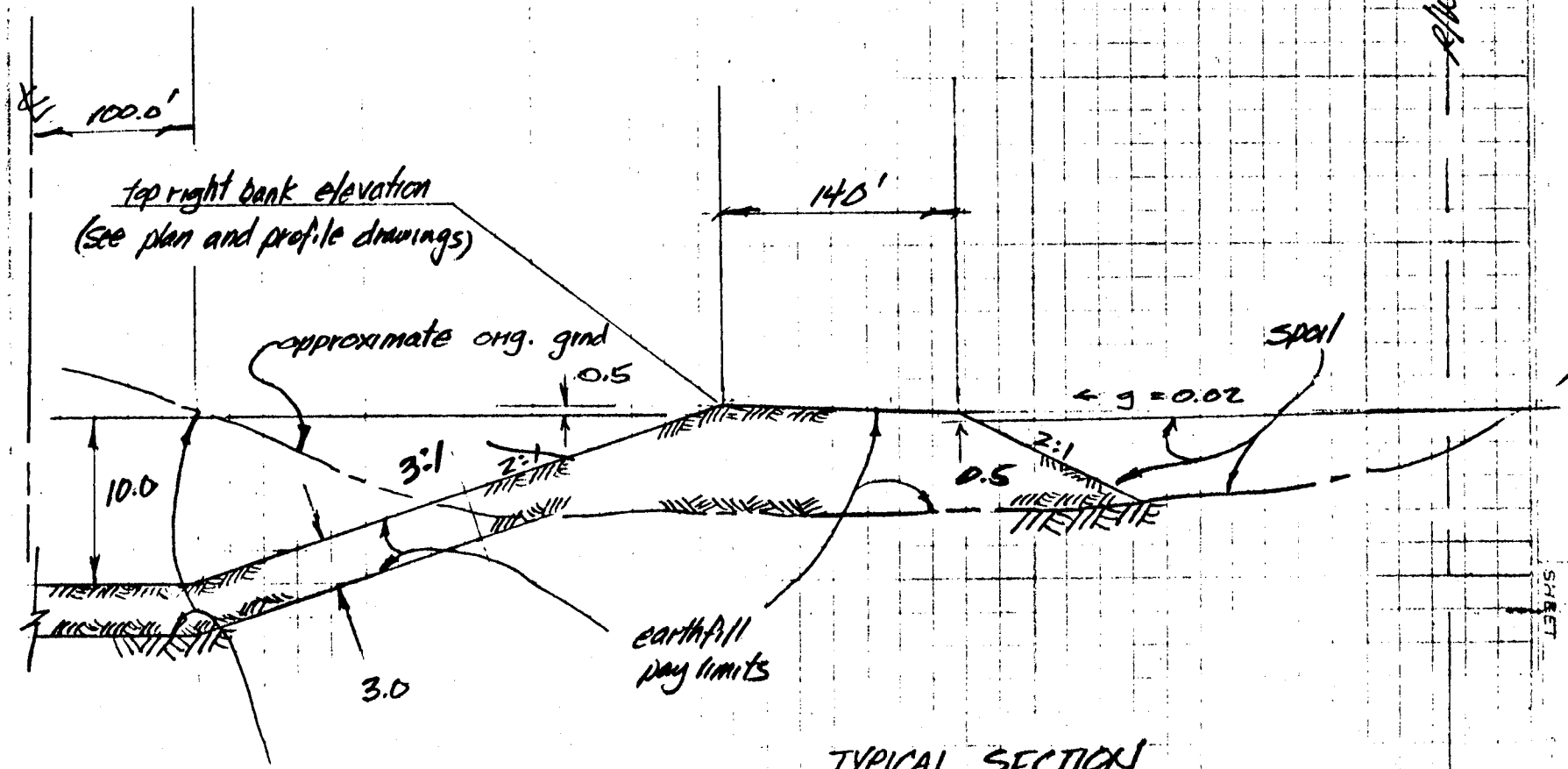
SUBJECT

JOB NO.

SHEET



TYPICAL SECTION
COMPACTED EARTHFILL LINING
ON CHANNEL SIDESLOPES ONLY



TYPICAL SECTION
COMPACTED EARTHFILL LINING
ON CHANNEL BOTTOM AND SIDE SLOPES

CONSERVATION SHEET

PROJECT: RWCD R.3

DATE: 9/20/83

CHECKED BY

DATE

JOB NO.

SHEET

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

COMPUTATION SHEET
SCS-ENG-5238 Rev. 9-69

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

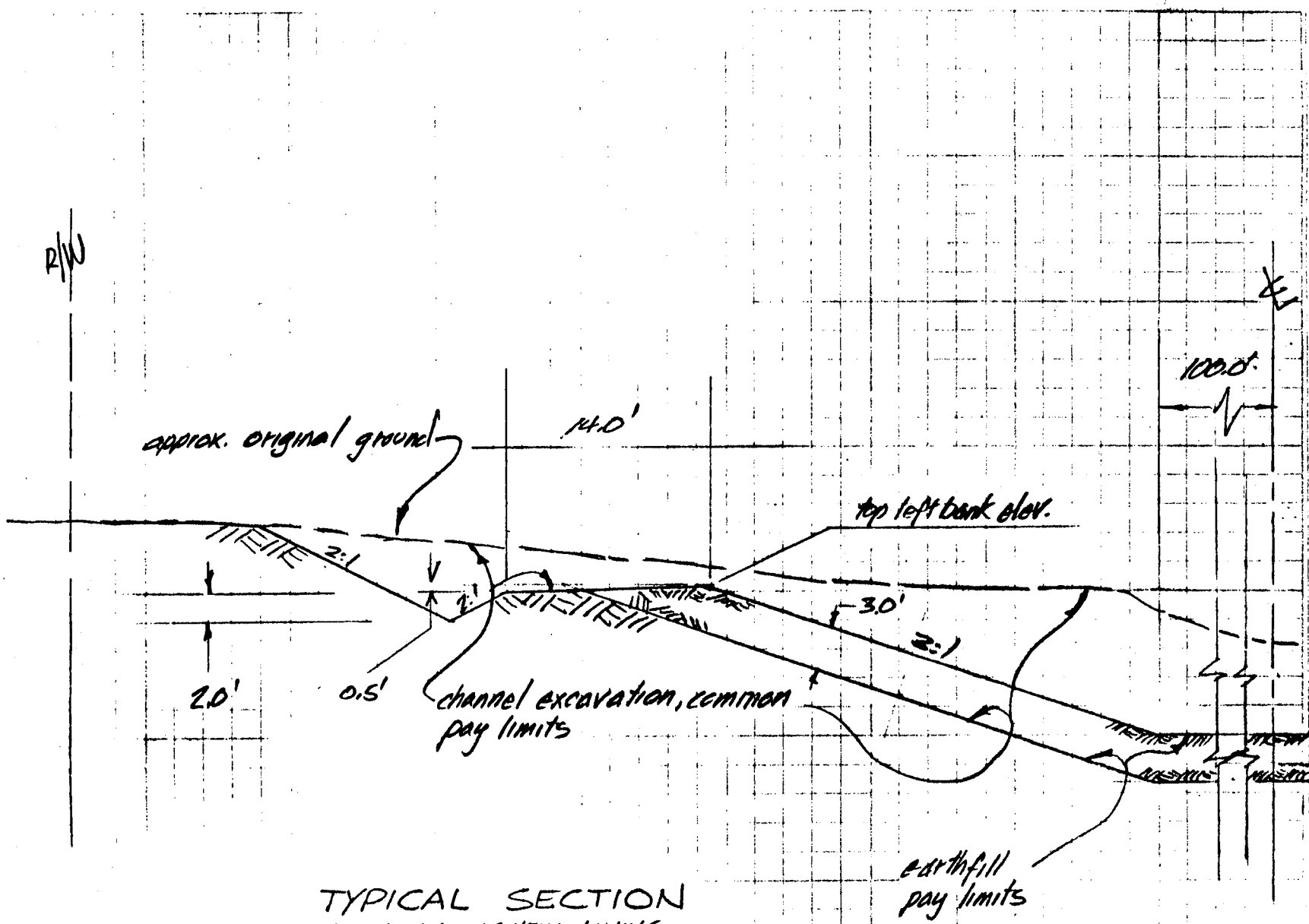
STATE AR12
BY D.T.
SUBJECT

DATE 9/22
CHECKED BY
DATE

PROJECT RWCD R3

JOB NO.

SHEET



TYPICAL SECTION
COMPACTED EARTHFILL LINING
ON CHANNEL BOTTOM AND SIDESLOPES

COMPUTATION SHEET

SCS-ENG-323A Rev. 9-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ADE

BY D.T. DATE 9/26/83

SUBJECT

PROJECT

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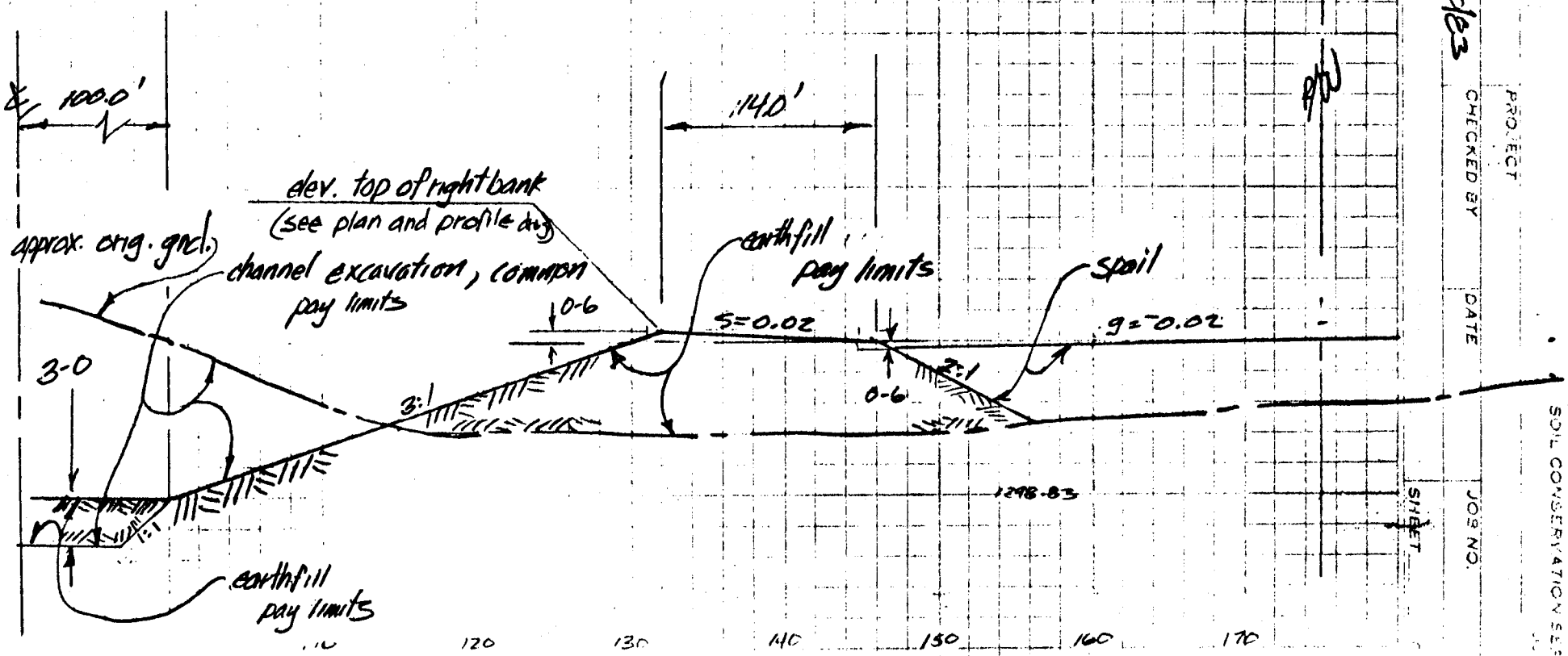
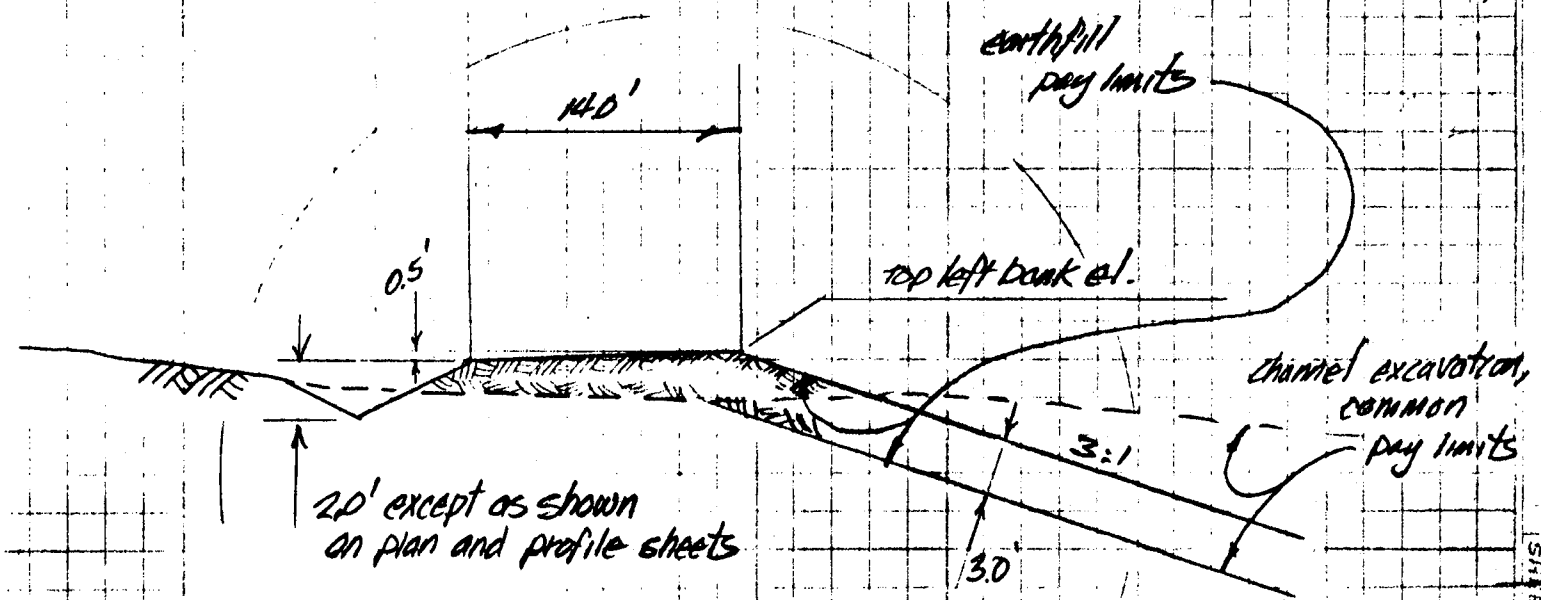


TYPICAL SECTION
COMPACTED EARTHFILL LINING
ON CHANNEL BOTTOM ONLY



TYPICAL SECTION
DETAIL WHERE TOP LEFT BANK ELEVATION LIES ABOVE ORIGINAL GROUND SURFACE
COMPACTED EARTHFILL LINING ON CHANNEL BOTTOM AND SIDE SLOPES OR SIDESLOPES ONLY

CONSTRUCTION SHEET
U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ARIZ
DT.
9/26/83
PROJECT RWCD R.3
CHECKED BY
DATE
JOB NO.
SHEET

COMPUTATION SHEET

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE ARIZ
FOR D.T.
CAT 9/26/83
PROJECT RUCO R3
CHECKED BY
DATE
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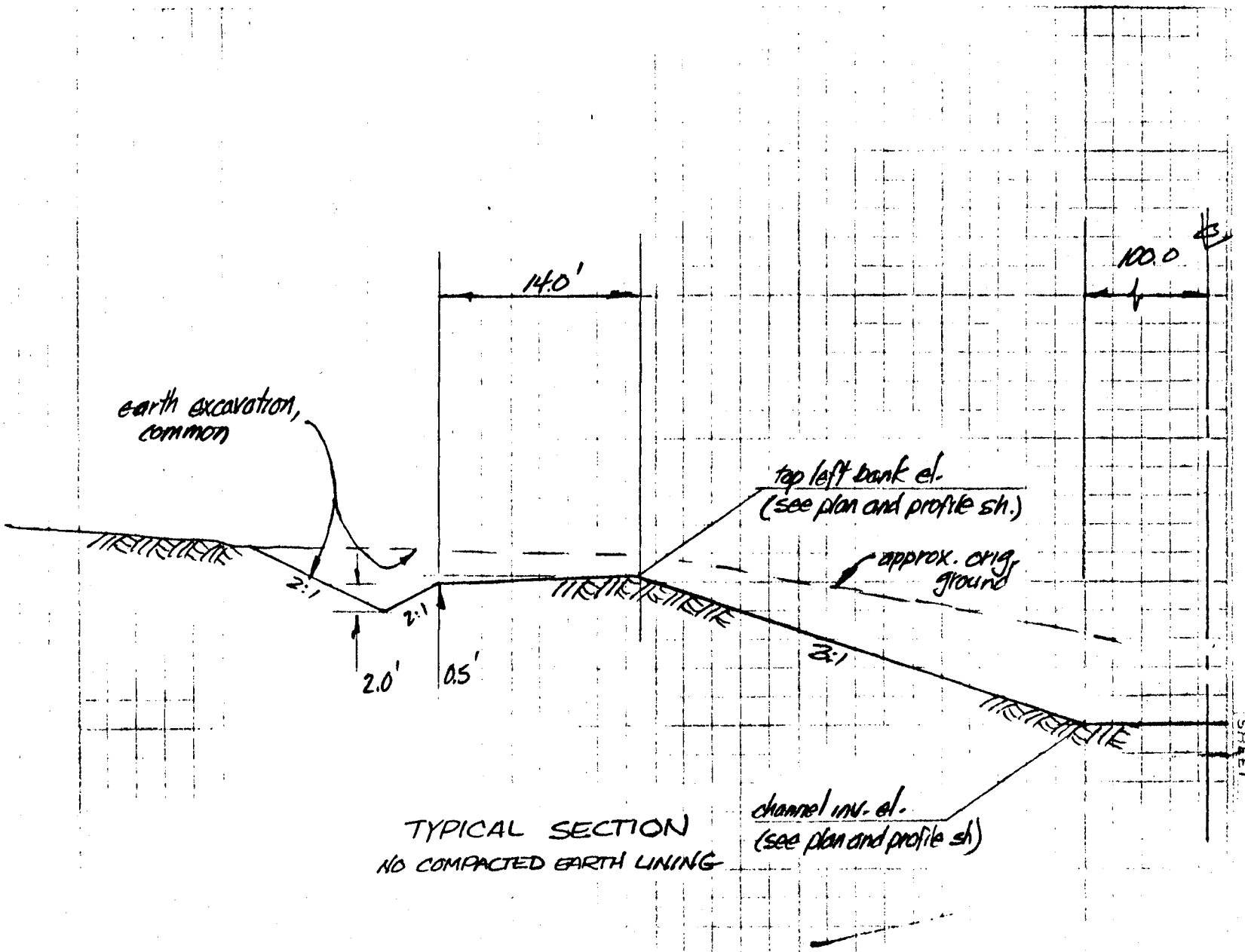
JOB NO.
SHEET



TYPICAL SECTION
NO COMPACTED EARTH LINING

CONSTRUCTION SHEET

U S DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ENG-5534 Rev. 9-69

STATE AZ12.
F.O.T.
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9/26/83

PROJECT RWCD R. 3
CHECKED BY
DATE
JOB NO
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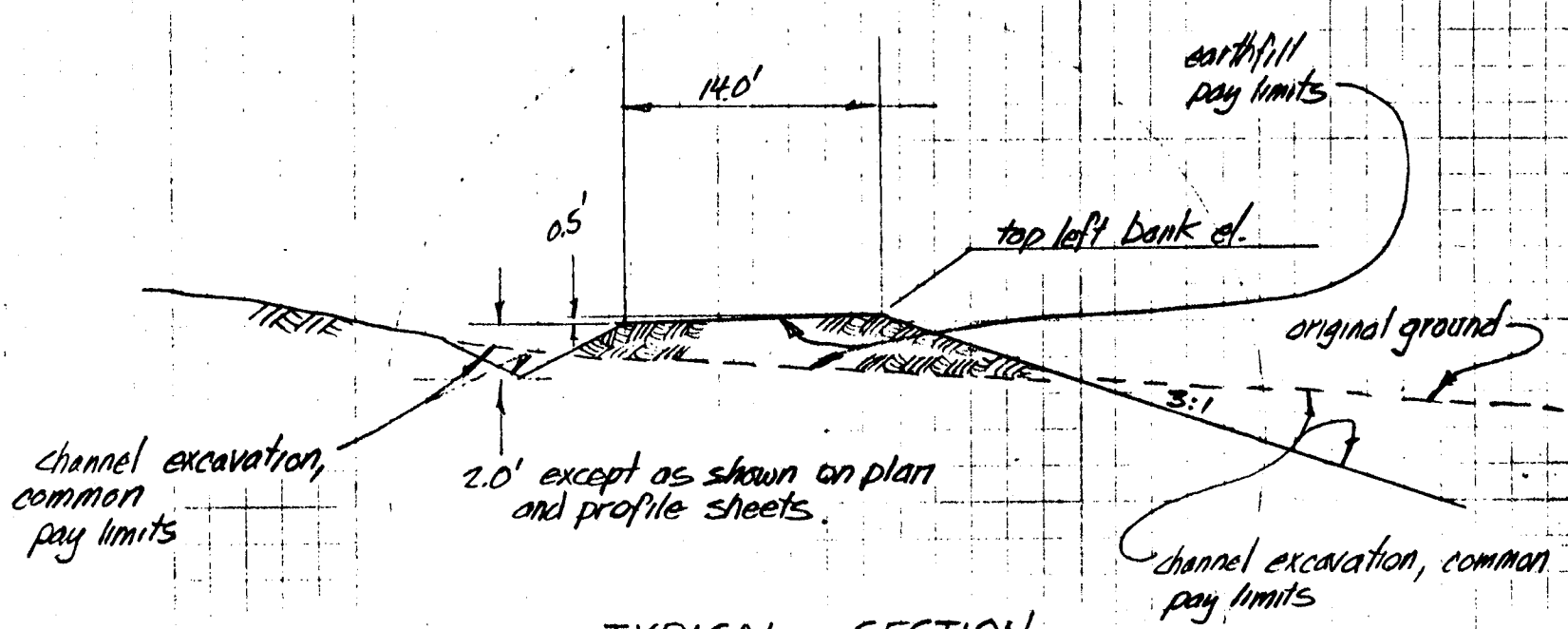
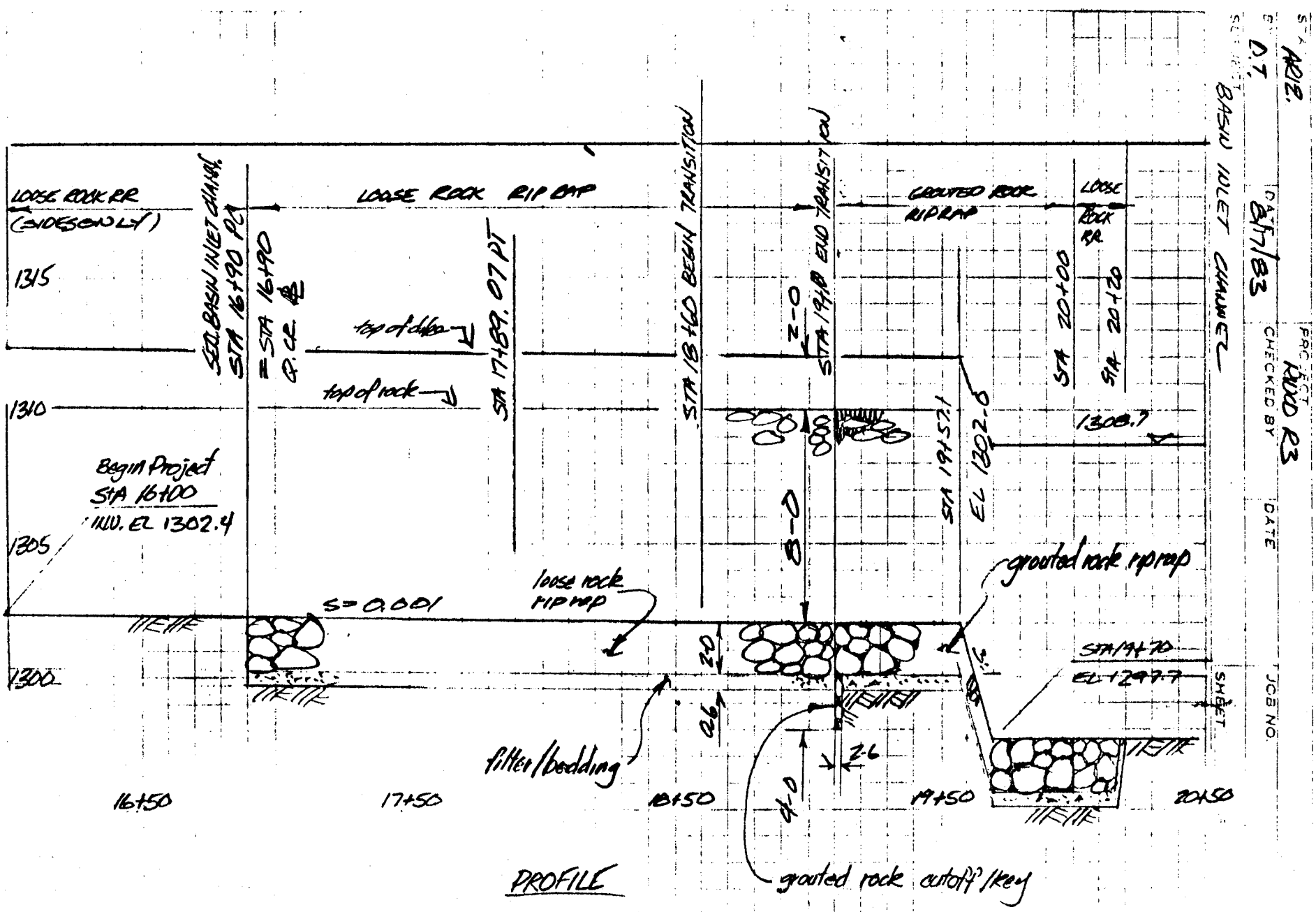
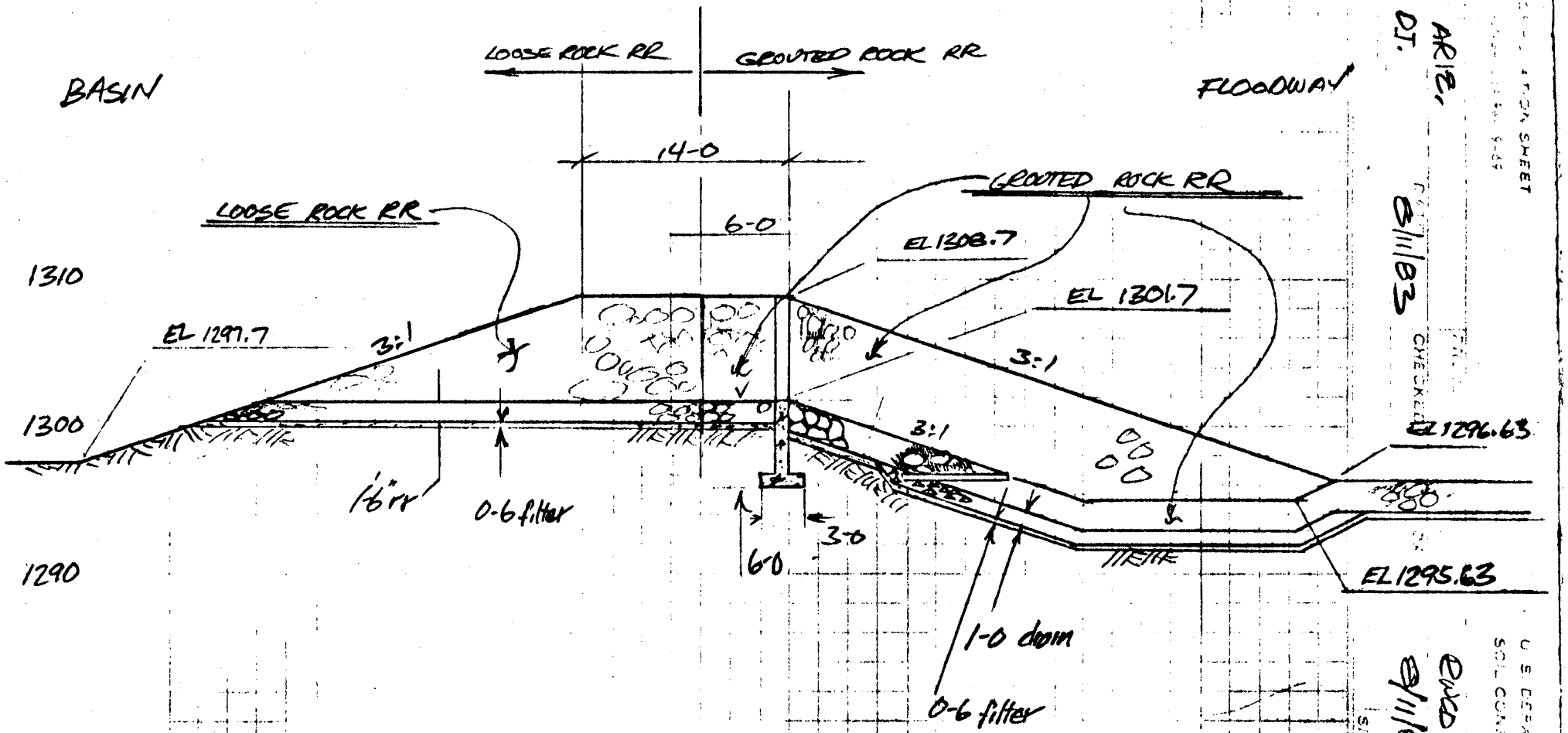


TYPICAL SECTION
DETAIL WHERE TOP LEFT BANK ELEV. LIES ABOVE ORIGINAL GROUND SURFACE
NO COMPACTED EARTH LINING ON CHANNEL SIDE SLOPES.


LOOSE ROCK RR
(SIDESLOPE ONLY)
LOOSE ROCK RIP RAP
GROUTED ROCK RIPRAP
LOOSE ROCK RR
SED. BASIN INLET CHANN.
STA 16+90 PCA
= STA 16+90 P.C.
top of dike
top of rock
STA 17+89.07 PT
STA 18+60 BEGIN TRANSITION
STA 19+18 END TRANSITION
STA 20+00
STA 20+20
1315
1310
1305
1300
Begin Project
STA 16+00
INV. EL 1302.4
S=0.001
loose rock rip rap
grouted rock rip rap
filter/bedding
grouted rock cutoff/key
STA 19+57.1
EL 1302.6
1308.7
STA 19+70
EL 1297.7
2.0
0.6
2.6
4.0
8.0
2.0
16+50
17+50
18+50
19+50
20+50
PROFILE
SED BASIN INLET CHANNEL
BASIN INLET CHANNEL
SHEET
DATE
JOB NO.
CHECKED BY
PROJECT
ROUD R3
DATE 8/17/83
BY D.T.
STA ROUD.
CONSTRUCTION SHEET
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



PROFILE
Basin Outlet

1in = 10ft

AR 12
DJ.
8/11/83

CHECKED

EWD ECH3
8/11/83

SHEET

COMPUTATION SHEET

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

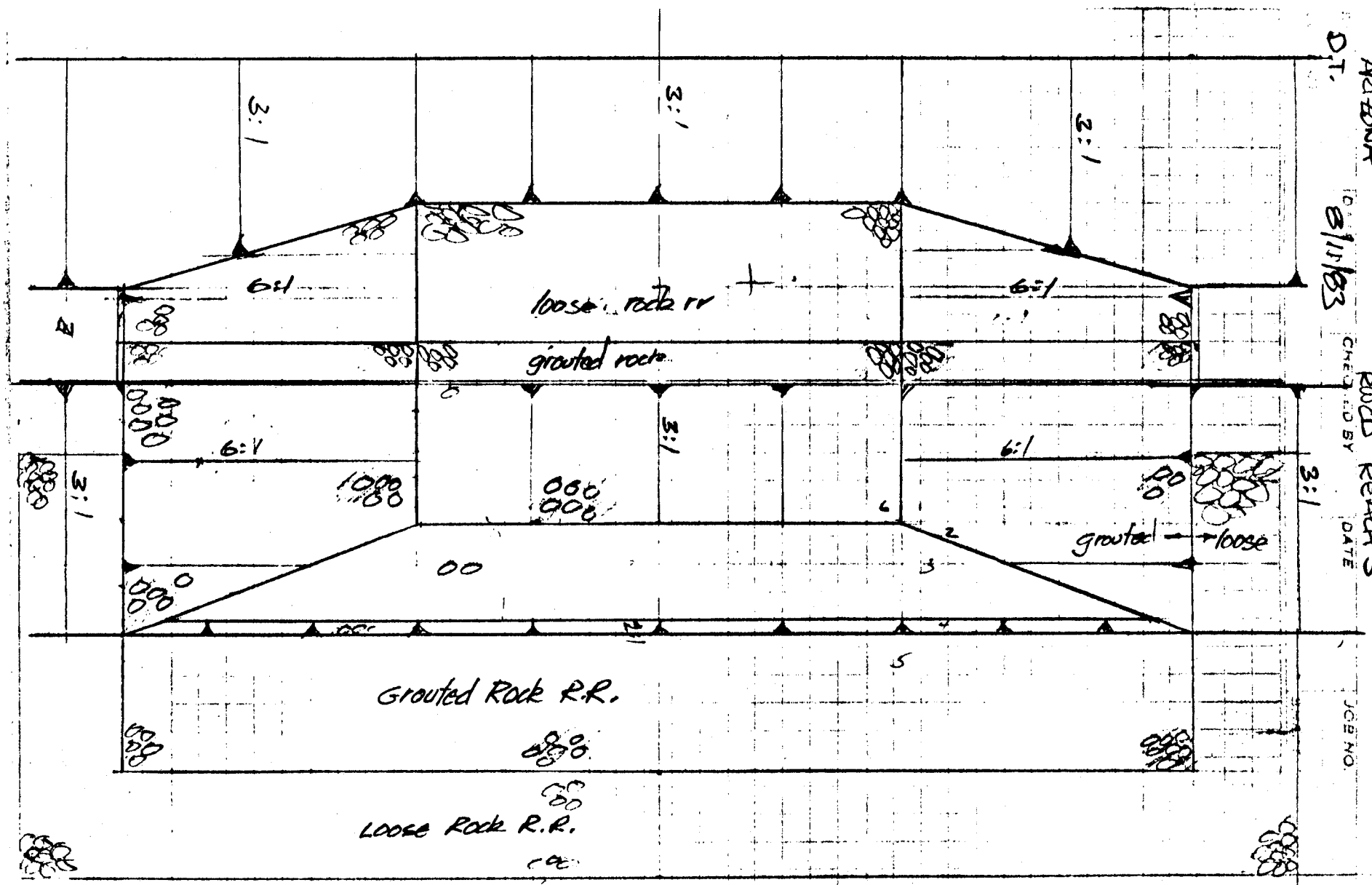
ARIZ. | RWCD R3
D.T. | 9/27/83 | CHECKED BY | DATE | JOB NO.

SUBJECT | SHEET

PROBLEM: MAKE PRELIMINARY LOCATION OF SIDE DRAIN INLETS ON LEFT SIDE OF CHANNEL

SOLUTION:

STATION	DRAIN #
761+06	
774	
786	
799	
812	
825	
837	
858+75	
861+50	
874+25	
887	
899+75	
914+75	
932	
947	
962+25	
976+00	



PLAN
Basin Outlet

CONSTRUCTION SHEET

ARIZONA D.T.

8/11/83

PROJECT RWCD REACH 3

CHECKED BY

DATE

JOB NO.

U.S. DEPARTMENT
SOIL CONSERVATION SERVICE

COMPUTATION SHEET

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

ADIZ.
D.T

PROJECT RWCD R3

9/6/83

CHECKED BY DATE JOB NO

SHEET

PROBLEM: EXTENT OF RIPRAP AT Q.CR BRIDGE

WRCD DRAWINGS Q.CR ROAD BRIDGE OVER RWCD FLOODWAY

ANALYSIS: 1. BRIDGE DRAWING ELEVATIONS ARE WITHIN 0.2 FT OF ELEV ON PLAN AND PROFILE SHEETS. (SEE COMPS. 6/6/83)

2. CHANNEL INVERT EL AT Q.CR. BRIDGE IS APPROX. 1279.57 (RWCD DATUM)

3. TOP OF BRIDGE PIER EL IS 1280.71 ON DRAWINGS. BOTTOM OF BRIDGE PIER EL. IS 1276.71.

4. VELOCITY UNDER THE BRIDGE IS <5 FT/S.

5. SOME LOCAL SCOUR ADJACENT TO THE BRIDGE PIERS CAN BE EXPECTED.

CONCLUSION 1. PROVIDE RIP-RAP ADJACENT TO THE BRIDGE PIERS AND ALONG CHANNEL SIDES.

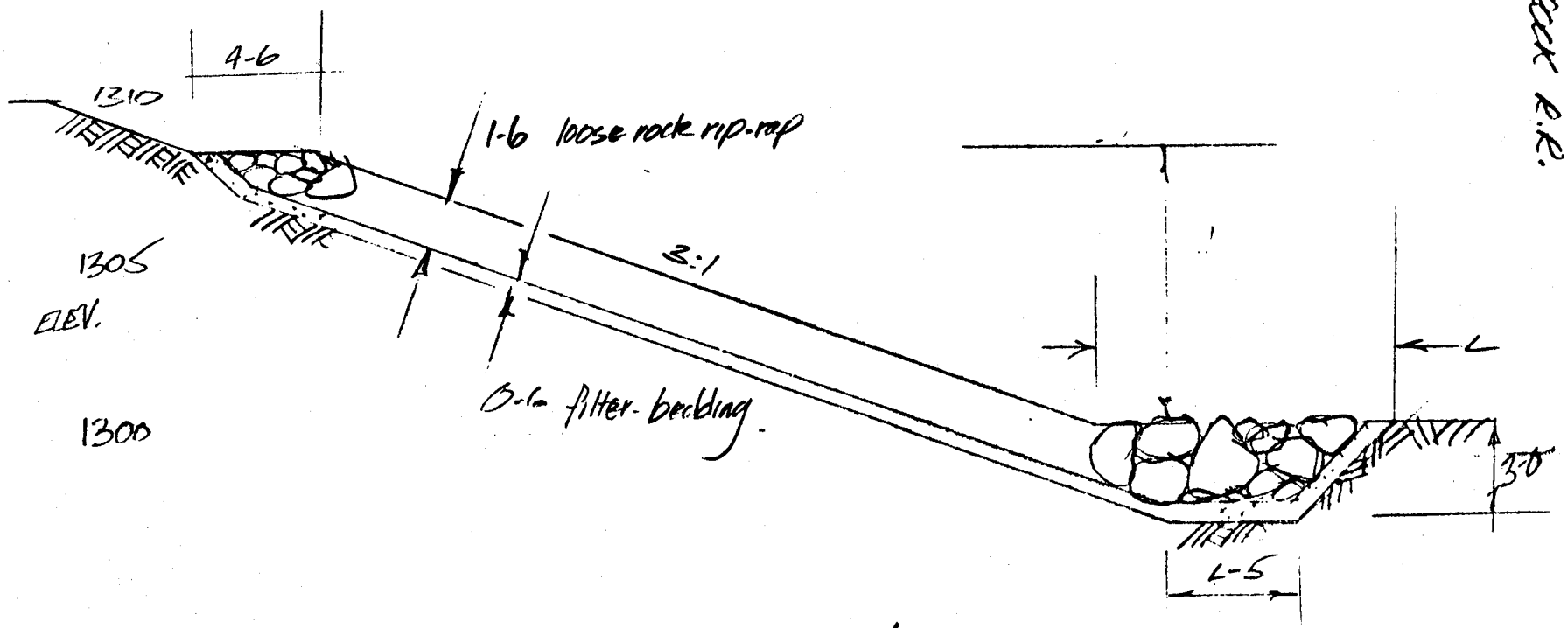
2. BERM: SH 9 OF THE BRIDGE DRAWINGS SHOW A BERM AT EL 1311.35 ADJACENT TO ABUTMENTS. (BRIDGE DATUM)

ARIZONA DT 9/7/83 RWCD C3

TYPICAL DETAIL ROCK R.R.

Extend rr 10' u.s. and

Location	L
LEFT	25
RIGHT	10



TYPICAL SECTION

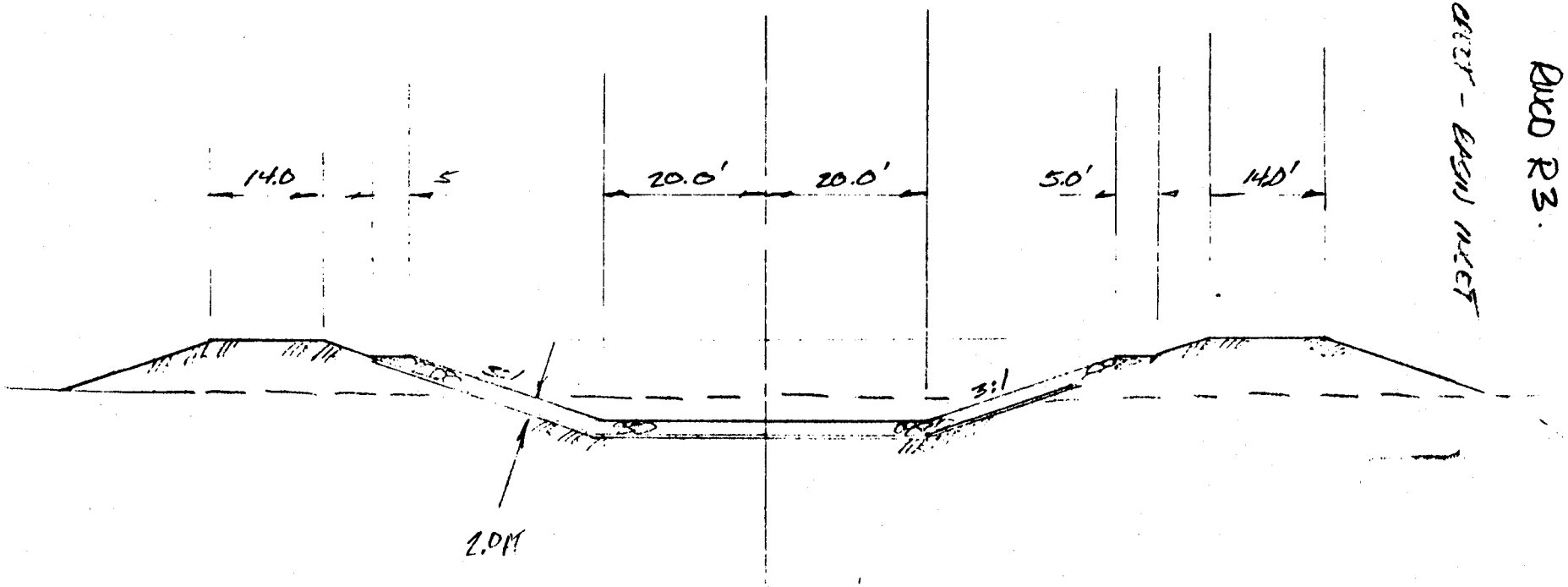
Rip-Rap Under Bridge at Queen Cr.

ARIZ
D.T.

9/27/83

BUCD R3.

TYPICAL SECTION - O. CREEK - BASIN INLET



TYPICAL SECTION
BASIN INLET CHANNEL