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FEDERAL EMERGENCY MANAGEMENT AGENCY **REVISION REQUESTOR AND COMMUNITY OFFICIAL FORM**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 2.13 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

1. OVERVIEW

1. The basis for this revision request is (are): (check all that apply)
   - _ Physical change
     - _ Existing
     - _ Proposed
   - X Improved methodology
   - X Improved data
   - X Floodway revision
   - _ Other
     - Explain
2. Flooding Source: Skunk Creek
3. Project Name/Identifier: Skunk Creek Floodplain Delineation Study
4. FEMA zone designations affected: AE
   (example: A, AH, AO, A1-A30, A99, AE, V, V1-30, VE, B, C, D, X)
5. The NFIP map panel(s) affected for all impacted communities is (are):

Community No.	Community Name	County	State	Map No.	Panel No.	Effective Date
EX:480301 480287	Katy, City Harris County	Harris, Fort Bend, Harris	TX TX	480301 48201C	0005D 0220G	02/08/83 09/28/90
04013	Maricopa Co. and Incorporated Areas	Maricopa	AZ	04013C 04013C 04013C 04013C	1205E 0790D 0770D 0780E 0390E	12/3/93 4/15/88 4/15/88 12/3/93 12/3/93

6. The area of revision encompasses the following types of flooding, structures, and associated disciplines: *(check all that apply)*

Types of Flooding	Structures	Disciplines*
X Riverine	_ Channelization	_ Water Resources
_ Coastal	_ Levee/Floodwall	X Hydrology
_ Alluvial Fan	X Bridge/Culvert	X Hydraulics
_ Shallow Flooding *(e.g. Zones AO and AH)*	_ Dam	_ Sediment Transport
_ Lakes	_ Coastal	_ Interior Drainage
	_ Fill	_ Structural
Affected by wind/wave action	_ Pump Station	_ Geotechnical
_ Yes	_ None	X Land Surveying
X No	_ Channel Relocation	_ Other (*describe*)
	_ Excavation	
	_ Other (describe)	

_ Other (describe)

***Attach completed "Certification by Registered Professional Engineer and/or Land Surveyor" Form for each discipline checked. (Form 2)**

2. FLOODWAY INFORMATION

7. Does the affected flooding source have a floodway designated on the effective FIRM or FBFM? X Yes _ No
8. Does the revised floodway delineation differ from that shown on the effective FIRM or FBFM? X Yes _ No
   If yes, give reason: Different 100-yr peak discharges based on revised hydrology

Attach copy of either a public notice distributed by the community stating the community's intent to revise the floodway or a statement by the community that it has notified all affected property owners and affected adjacent jurisdictions.

9. Does the State have jurisdiction over the floodway or its adoption by communities participating in the NFIP? __ Yes X No

If yes, attach a copy of a letter notifying the appropriate State agency of the floodway revision and documentation of the approval of the revised floodway by the appropriate State agency.

3. PROPOSED ENCROACHMENTS

10. With floodways:

1A. Does the revision request involve fill, new construction, substantial improvement, or other development in the floodway? __ Yes X No

1B. If yes, does the development cause the 100-year water-surface elevation to increase at any location by more than 0.000 feet? __ Yes __ No

11. Without floodways:

2A. Does the revision request involve fill, new construction, substantial improvement, or other development in the 100-year floodplain? __ Yes X No

2B. If yes, does the cumulative effect of all development that has occurred since the effective SFHA was originally identified cause the 100-year water-surface elevation to increase at any location by more than one foot (*or other surcharge limit if community or state has adopted more stringent criteria)?*
__ Yes __ No

If the answer to either Items 1B or 2B is yes, please provide documentation that all requirements of Section 65.12 of the NFIP regulations have been met, regarding evaluation of alternatives, notice to individual legal property owners, concurrence of CEO, and certification that no insurable structures are impacted.

4. REVISION REQUESTOR ACKNOWLEDGMENT

12. Having read NFIP Regulations, 44 CFR Ch. I, parts 59, 60, 61, and 72, I believe that the proposed revision X is __ is not in compliance with the requirements of the aforementioned NFIP Regulations.

5. COMMUNITY OFFICIAL ACKNOWLEDGMENT

13. Was this revision request reviewed by the community for compliance with the community's adopted floodplain management ordinances? X Yes __ No

14. Does this revision request have the endorsement of the community? __ Yes __ No

If no to either of the above questions, please explain:

Please note that community acknowledgment and/or notification is required for all requests as outlined in Section 65.4 (b) of the NFIP Regulations.

6. OPERATION AND MAINTENANCE

15. Does the physical change involve a flood control structure (e.g., levees, floodwalls, channelization, basins, dams)? Yes X No

If yes, please provide the following information for each of the new flood control structures:

A. Inspection of the flood control project will be conducted periodically by _____ (entity) _____ with a maximum interval of _____ months between inspections.

B. Based on the results of scheduled periodic inspections, appropriate maintenance of the flood control facilities will be conducted by _____ (entity) to ensure the integrity and degree of flood protection of the structure.

C. A formal plan of operation, including documentation of the flood warning system, specific actions and assignments of responsibility by individual name or title, and provisions for testing the plan at intervals not less than one year, __ has __ has not been prepared for the flood control structure.

D. The community is willing to assume responsibility for __performing __overseeing compliance with the maintenance and operation plans of the _____
(Name)
flood control structure. If not performed promptly by an owner other than the community, the community will provide the necessary services without cost to the Federal government.

Attach operation and maintenance plans

7. REQUESTED RESPONSE FROM FEMA

16. After examining the pertinent NFIP regulations and reviewing the document entitled "Appeals, Revisions, and Amendments to Flood Insurance Maps: A Guide for Community Officials," dated January 1990, this request is for a:

___a. CLOMR — A letter from FEMA commenting on whether a proposed project, if built as proposed, would justify a map revision *(LOMR or PMR)*, or proposed hydrology changes *(see 44 CFR Ch. I, Parts 60, 65, and 72).*

_X_b. LOMR — A letter from FEMA officially revising the current NFIP map to show changes to floodplains, floodways, or flood elevations. LOMRs typically depict decreased flood hazards. *(See 44 CFR Ch. I Parts 60 and 65.)*

___c. PMR — A reprinted NFIP map incorporating changes to floodplains, floodways, or flood elevations. Because of the time and cost involved to change, reprint, and redistribute an NFIP map, a PMR is usually processed when a revision reflects increased flood hazards or large-scope changes. *(See 44 CFR Ch. I, Parts 60 and 65.)*

___d. Other: Describe:

8. FORMS INCLUDED

17. Form 2 entitled, "Certification by Registered Professional Engineer and/or Land Surveyor" must be submitted.

The following forms should be included with this request if (check the included forms):

· Hydrologic analysis for flooding source differs from that used to develop FIRM	X Hydrologic Analysis Form (Form 3)
· Hydraulic analysis for riverine flooding differs from that used to develop FIRM	X Riverine Hydraulic Analysis Form (Form 4)
· The request is based on updated topographic information or a revised floodplain or floodway delineation is requested	X Riverine/Coastal Mapping Form (Form 5)
· The request involves any type of channel modification	__ Channelization Form (Form 6)
· The request involves new bridge or culvert or revised analysis of an existing bridge or culvert	X Bridge/Culvert Form (Form 7)
· The request involves a new revised levee/floodwall system	__ Levee/Floodwall System Analysis Form (Form 8)
· The request involves analysis of coastal flooding	__ Coastal Analysis Form (Form 9)
· The request involves coastal structures credited as providing protection from the 100-year flood	__ Coastal Structures (Form 10)
· The request involves an existing, proposed, or modified dam	__ Dam Form (Form 11)
· The request involves structures credited as providing protection from the 100-year flood on an alluvial fan	__ Alluvial Fan Flooding Form (Form 12)

9. INITIAL REVIEW FEE

18. The minimum initial review fee for the appropriate request category has been included. __ Yes X No
Initial fee amount: $

or

19. This request is for a project that is for public benefit and is primarily intended for flood loss reduction to insurable structures in identified flood hazard areas which were in existence prior to the commencement of construction of the flood control project. __ Yes __ No

or

20. This request is to correct map errors, to include the effects of natural changes within the areas of special flood hazards, or solely to provide more detailed data. __ Yes __ No

Note: I understand that my signature indicates that all information submitted in support of this request is correct.

Signature of Revision Requestor

MICHAEL S. ELLEGOOD, PE
CHIEF ENGINEER & GEN'L MGR

Printed Name and Title of Revision Requestor

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

Company Name

Telephone No. (602) 506-4700 Date 7/10/97

Note: Signature indicates that the community understands, from the revision requestor, the impacts of the revision on flooding conditions in the community.

Signature of Community Official

Raymond U. Acuña

Printed Name and Title of Community Official

City of Phoenix

Community Name

July 17, 1997

Date

Does this request impact any other communities: __ Yes X No

If yes, attach letters from all affected jurisdictions acknowledging revision request and approving changes to floodway, if applicable.

Note: Although a photograph of physical changes is not required, it may be helpful for FEMA's review.

FEDERAL EMERGENCY MANAGEMENT AGENCY **CREDIT CARD INFORMATION**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

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If paying by credit card, this form must be completed. **THIS FORM SHOULD NOT BE INCLUDED WITH THE REST OF THE FORMS PACKAGE. IT MUST BE MAILED OR FAXED TO:**

Federal Emergency Management Agency
Revisions Fee-Collection System Administrator
P.O. Box 3173
Merrifield, Virginia 22116
Fax: (703) 849-0282

Case # (if known) Amount: $

☐ INITIAL FEE ☐ ADDITIONAL INITIAL FEE ☐ INVOICE

☐ VISA ☐ MASTERCARD

CARD NUMBER

☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

EXP. DATE

☐☐-☐☐

Signature Month Year

NAME *(AS IT APPEARS ON CREDIT CARD)*:

ADDRESS:

DAYTIME PHONE:

NOTICE: A COPY OF THE PROPERTY INFORMATION FORM BEING SUBMITTED FOR THIS REQUEST MUST BE ATTACHED TO THIS FORM.

FEDERAL EMERGENCY MANAGEMENT AGENCY **CERTIFICATION BY REGISTERED PROFESSIONAL ENGINEER AND/OR LAND SURVEYOR FORM**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

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1. This certification is in accordance with 44 CFR Ch. I, Section 65.2
2. I am licensed with an expertise in: Civil Engineering - Water Resources
   [example: water resources (*hydrology, hydraulics, sediment transport, interior drainage*)* structural, geotechnical, land surveying.]
3. I have 27 years experience in the expertise listed above.
4. I have _ prepared X reviewed the attached supporting data and analyses related to my expertise.
5. I X have _ have not visited and physically viewed the project.
6. In my opinion, the following analyses and/or designs, is/are being certified:

   hydrology, hydraulics
7. Based upon the following review, the modifications in place have been constructed in general accordance with plans and specifications.

   Basis for above statement: (check all that apply) N/A

   a. _ Viewed all phases of actual construction.
   b. _ Compared plans and specifications with as-built survey information.
   c. _ Examined plans and specifications and compared with completed projects.
   d. X Other: No construction involved in this project.
8. All information submitted in support of this request is correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1001.

Name: Fred K. Duren, Jr.

Title: Phoenix Regional Office Manager

Registration No.: 12250 Expiration Date: 09-30-99

State: Arizona

Type of License: Professional Engineer - Civil

Fred K. Duren Jr

Signature

6/13/97

Date

Seal
(Optional)

*Specify Subdiscipline

Note: Insert not applicable (N/A) when statement does not apply.

FEDERAL EMERGENCY MANAGEMENT AGENCY **HYDROLOGIC ANALYSIS FORM**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

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Community Name: Maricopa County, Arizona and Incorporated Areas

Flooding Source: Skunk Creek
(One form for each flooding source)

Project Name/Identifier: Skunk Creek Floodplain Delineation Study

1. HYDROLOGIC ANALYSIS IN FIS

_ Approximate study stream (Zone A)
X Detailed study stream (briefly explain methodology): Used HEC-1 program to develop a precipitation / runoff model of the watershed and developed peak discharges at strategic locations.

2. REASON FOR NEW HYDROLOGIC ANALYSIS

_ No existing analysis

X Improved data (*see data revision on page 3*)

_ Changed physical conditions of watershed (*explain*):

X Alternative methodology (*justify why the revised model is better than model used in the effective FIS*): Used different hydrologic model (HEC-1) which is consistent with methodology used for design of flood control structures on Skunk Creek and with the Hydrologic Design Manual for Maricopa County, Arizona.

_ Evaluation of proposed conditions (CLOMRs only) (explain):

_ Other:

If a computer program/model was used in revising the hydrologic analysis, please provide a diskette with the input files for the 10-, 50-, 100-, and 500-year recurrence intervals. Refer to Section 3 (Hydrologic Analysis) of the Technical Data Notebook, under separate cover.

Only the 100-year recurrence interval need be included for SFHAs designated as Zone A.

3. APPROVAL OF ANALYSIS

X Approval of hydrologic analysis, including the resulting peak discharge value(s) has been provided by the appropriate local, state, or Federal Agency (i.e., Flood Control District of Maricopa County)

Attach evidence of approval.

_ Approval of the hydrologic analysis is not required by any local, State, or Federal Agency.

FLOOD CONTROL DISTRICT
of
Maricopa County

2801 West Durango Street • Phoenix, Arizona 85009
Telephone (602) 506-1501
Fax (602) 506-4601
TT (602) 506-5859

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6245 North 24th Parkway
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Phoenix, Arizona 85016-2030

JUN 1 8 1996

SUBJECT : **Skunk Creek Wash Topographic Mapping and Floodplain Delineation Study. Phase II (FCD #95-16)**
Final Hydrology Report.

Dear Ms. Miller :

The final Hydrology Report : Skunk Creek Floodplain Delineation Study, is accepted as submitted with a minor correction as following.

(1) Please specify the correct discharge for the X1SUB in the Cline Creek subwatershed in Table 12.

If you have further questions, please do not hesitate to contact me at 506-1501. Thank you very much for your time and cooperation.

Sincerely,

Hasan Mushtaq
Engineering Division.

Table 12
Subarea Peak and Unit Discharges

Subarea	Area (sq mi)	Q (cfs)	Unit Q (cfs/sq mi)
Upper Main Skunk Creek			
S1	2.08	2911	1400
S2	1.17	1738	1485
S3	1.03	1415	1374
S4	0.97	1295	1335
S5	1.85	2007	1085
S6	0.94	1339	1424
S7	0.68	1061	1560
S8	1.12	1650	1473
S9	1.02	1254	1229
S10	1.80	2350	1306
S11	0.92	1161	1262
S12	0.91	1307	1436
S13	1.27	1734	1365
		Average =	**1364**
Lower Main Skunk Creek			
S14	0.83	1336	1610
S15	0.99	1564	1580
S16	1.32	1930	1462
S17	1.03	1422	1381
S18	1.71	2537	1484
S19	0.77	1368	1777
S20	1.27	1900	1496
S21	2.22	2946	1327
S22	1.47	1987	1352
S23	1.72	2027	1178
S24	0.64	1113	1739
		Average =	**1490**
Cline Creek		1291	
X1SUB	0.61	1391	~~2280~~ 2114
X2SUB	0.43	876	2037
X3SUB	0.56	1121	2002
X4SUB	0.28	650	2321
X5SUB	0.38	776	2042
SUBC1	1.26	2552	2025
SUBC2	2.19	3321	1516
SUBC3	1.24	2149	1733
SUBC4	2.54	4326	1703
SUBC5	3.39	5968	1760
SUBC7	1.20	2462	2052
SUBC8	1.42	2713	1911
SUBC9	0.58	979	1688
		Average =	~~1929~~ 1916

4. REVIEW OF RESULTS

Stream: Skunk Creek

Comparison of 100-year Discharges

Location	Drainage Area (Sq. mi.)	FIS (cfs)	Revised (cfs)
At New River Road	8.0	±200	7,800
Below Rodger Creek Confl.	40.1	28,100	*26,800
At Carefree Highway	48.6	31,400	*23,600
At I-17	64.0	35,000	*22,500

*Excludes 3,600 cfs, which exits study area at Carefree Highway due to split flow.

Note: When revised discharges are not significantly different than FIS discharges, FEMA may require a confidence limits analysis on attachment D at a later date to complete the review.

As is often the case with revision requests, only a portion of a stream may actually be revised or be affected by a revision. Therefore, transition to the unrevised portion is important to maintain the continuity of the study. NFIP regulations stipulate that such a transition must be assured. What is the transition from the proposed discharges to the effective discharges? Please explain how the transition was made (*attach separate sheet if necessary*)

The Revision adds a concentration point at the upstream study limit (Area= 4.3 mi^2, Q100 = 4,900 cfs).

This provides transition from old flows to new flows at the upstream end. No transition is made at downstream end;

Q u/s I-17 = 23,200 and Q d/s I-17 = 35,000. FCDMC has decided not to modify regulatory flows downstream of

I-17 at this time.

ATTACH A COMPLETED REVIEW OF RESULTS PAGE FOR EACH FLOODING SOURCE.

Refer to Section 3 (Hydrologic Analysis) of the Technical Data Notebook, under separate cover.

Is the new hydrologic analysis being developed solely to revise the flow values presented in the FIS (*i.e., no changed hydraulic conditions*)? __ Yes X No

If yes, does the 100-year water-surface elevation change by 1.0 foot or more? __ Yes __ No

FEMA does not normally revise NFIP maps solely due to insignificant flow changes where changes in 100-year water-surface elevation are less than 1.0 foot.

5. HISTORICAL FLOODING INFORMATION

Is historical data available for the flooding source? X Yes __ No

If yes, provide the following:

Location along flooding source: I-17

Maximum peak discharge: 11,500 cfs

Second highest peak discharge: 9,650 cfs

Source of information: USGS Records

6. GAGE RECORD INFORMATION

Location of nearest gage to project site (*along flooding source or similar watershed; specify*):

Lat 33°45'50", Long 112°07'09" in SE 1/4 Section 35, T4N, R2E, Maricopa County; located on the right bank dike of Skunk Creek flood control channel, 200' east of I-17, 3 miles north of Adobe.

Gaging Station: USGS No. 09513860

Drainage area at gage: 64.0 mi^2

Number of years of data: 34

7. DATA REVISION

Please use the following table to list all the data and/or parameters affected by this request and identify them as new data (*New*) or as revising existing data (*Revised*). (*If necessary, attach a separate sheet.*)

Data Parameter	New	Revised	Data Source
Topographic Mapping		X	USGS 7.5 minute quads
HEC-1 Models for Rodger and Cline Creek Watersheds	X		FCDMC / Baker Engineers
Soils/Land Use Map		X	FCDMC
Topographic Mapping at Floodplain	X		Kenney Aerial / 12-95 - for flow split analyses

- Data source can be from a Federal, State, or local government agency, or from a private source. Some State and local governments may have less strict data requirements than Federal agencies, in which case the hydrologic data may not be accepted by FEMA unless it is demonstrated that the data give a better estimate of the flood discharge.
- Attach documentation corroborating each data source (*i.e., certified statement, report, bibliographical reference to a published document*). In the case of a published document or a government report, providing copies of the cover and pertinent pages may be helpful. Refer to Section 3 (Hydrologic Analysis) of Technical Data Notebook, under separate cover.

8. METHODOLOGY FOR NEW ANALYSIS

__ Statistical Analysis of Gage Records (*use Attachment A*)

__ Regional Regression Equations (*use Attachment B*)

X Precipitation/Runoff Model (*use Attachment C*)

__ Other (*specify; attach backup computations and supporting data*):

ATTACHMENT A: STATISTICAL ANALYSIS OF GAGE RECORDS

Gaging Station:

Gage Location (latitude and longitude):

	FIS:	Revised:
1. Number of years of data		
Systematic.....		
Historical		
2. Homogeneous data.....	__ Yes __ No	__ Yes __ No
3. Data adjustments	__ Yes __ No	__ Yes __ No
4. Number of high outliers.....		
Low outliers		
Zero events		
5. Generalized skew		
6. Station skew.....		
7. Adopted skew		
8. Probability distribution used (justify if log-Pearson III was not used)		
9. Transfer equations to ungaged sites.....	.....	__ Yes __ No
If yes, specify method:		
10. Expected probability*		__ Yes __ No
11. Comparison of results with other analyses		__ Yes __ No
If yes, describe comparison:		

***FEMA** does not accept expected probability analyses for the purpose of reflecting flood hazard information in a FIS.

If any data is not available, indicate by N/A.

Attach analysis including plot of flood frequency curve.

ATTACHMENT B: REGIONAL REGRESSION EQUATIONS

1. Bibliographical Reference:

   (Attach a copy of title page, table of contents, and pertinent pages including equations.)

2. Gaged or ungaged stream:

3. Hydrologic region(s):
   Attach backup map.

4. Provide parameters, values, and source of data used to define parameters.

	FIS:	Revised:
5. Urbanized conditions calculations	_ Yes _ No	_ Yes _ No
6. Percent of watershed urbanization		
7. Is the watershed controlled?	_ Yes _ No	_ Yes _ No
8. Comparison with other analyses.....	_ Yes _ No	_ Yes _ No
If the answer to 5, 7, or 8 is yes, explain methodology in Comments. If data is not available, indicate by N/A.		

Comments:

Attach computation and supporting maps, delineating the watershed boundary and drainage area divides.

ATTACHMENT C: PRECIPITATION/RUNOFF MODEL

	FIS:	Revised
1. Method or model used:	TR-20	HEC-1
Version.....		4.0.1E
Date:		May 1991
2. Source of rainfall depth:		FCDMC Hydrology Manual
3. Source of rainfall distribution:		SCS Type II
4. Rainfall duration:		24-hour
5. Areal adjustment to precipitation (%):	1.00	Varies
6. Maximum overland flow length:		4.602 mi
7. Hydrograph development method:	SCS Unit Hydra	S-Graph in FCDMC Manual
8. Loss rate method:	Curve Number	Green-Ampt
Source of soils information:		County ? Databases
Source of land use information		County HIS
9. Channel routing method:		Muskingum Method
10. Reservoir routing:	__ Yes X No	__ Yes X No
11. Baseflow considerations:	__ Yes X No	__ Yes X No
If yes, explain how baseflow was determined:		
12. Snowmelt considerations:	__ Yes __ No	__ Yes X No
13. Model calibration:	__ Yes __ No	__ Yes X No
If yes, explain how calibration was performed: Model results were compared to previous studies and gage analysis. Sensitivity analysis was performed for several model parameters		
14. Future land use condition:		__ Yes X No
If yes, explain why:		

NOTE: FEMA policy is to base flooding on existing conditions.
If data is not available, indicate by N/A.

Attach precipitation/runoff model, hydrologic model schematic, curve number calculations, time of contraction calculations, and supporting maps, delineating the watershed boundary and drainage area divides. Refer to Section 3 (Hydrologic Analysis) of Technical Data Notebook, under separate cover.

ATTACHMENT D: CONFIDENCE LIMITS EVALUATION

Stream:

Select one location for Confidence Limits Evaluation (*describe location*):

Discharges for selected location:

Exceedence Probability	FIS	Revised
10% (10-year)	cfs	cfs
2% (50-year)	cfs	cfs
1% (100-year)	cfs	cfs
0.2% (500-year)	cfs	cfs
1% (100-year) Flood Confidence Intervals 90% Confidence Interval:	5% limit 95% limit	cfs cfs
50% Confidence Interval:	25% limit 75% limit	cfs cfs

If the value of the 100-year frequency flood in the FIS is beyond the 50% confidence interval but within the 90% confidence interval, does the 100-year water-surface elevation change by 1.0 foot or more? __ Yes __ No

An example of confidence limits analysis can be found in Appendix 9 of Bulletin 17B.

Confidence limits not determined. Only Q100 was analyzed. FCDMC made administrative decision to use revised hydrology based on updated analysis and application of current Hydrology Manual procedures.

Attach Confidence Limits Analysis (N/A)

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE HYDRAULIC ANALYSIS FORM**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

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Community Name: Maricopa County, Arizona and Incorporated Areas

Flooding Source: Skunk Creek
(One form for each flooding source)

Project Name/Identifier: Skunk Creek Floodplain Delineation Study

1. REACH TO BE REVISED

Downstream Limit: Central Arizona Project Aqueduct

Upstream Limit: 26.17 river miles upstream of Skunk Creek confluence with New River

2. EFFECTIVE FIS

__ Not studied

__ Studied by approximate methods

Downstream limit of study:
Upstream limit of study:

X Studied by detailed methods

Downstream limit of study: Confluence of Arizona Canal
Upstream limit of study: 27.81 river miles upstream from confluence of New River

X Floodway delineated

Downstream limit of Floodway: Confluence of Arizona Canal
Upstream limit of Floodway: 27.81 river miles upstream from confluence of New River

3. HYDRAULIC ANALYSIS

Why is the hydraulic analysis different from that used to develop the FIRM? (*Check all that apply*)

__ Not studied in FIS

X Improved hydrologic data/analysis. Explain: New hydrology based on updated USGS topographic mapping and improved hydrologic modeling methodology.

X Improved hydraulic analysis. Explain: Based on new aerial topographic mapping, including modeling of new bridges and split / divided flow areas.

__ Flood control structure. Explain:

__ Other. Explain:

3. RIVERINE HYDRAULIC ANALYSIS FORM
Models Submitted

For areas which have detailed flooding:
Full input and output listings along with files on diskette (*if available*) for each of the models listed below (items 1, 2, 3, 4, and 5) and summary of the source of input parameters used in the models must be provided. The summary must include a complete description of any changes made from model to model (*e.g., duplicate effective model to corrected effective model*). At a minimum, the Duplicate Effective (item 1) and the Revised or Post-Project Conditions (item 4) models must be submitted. See instructions for directions on when other models may be required.

Refer to Section 4 (Hydraulic Analysis) of the Technical Date Notebook, under separate cover.

For areas which do not have detailed flooding:
Only the 100-year flood profile is required. A hydraulic model is not required for areas which do not have detailed flooding; however, BFEs may not be added to the revised FIRM. If a hydraulic model is developed for the area, items 3 and 4 below must be submitted.

	Natural	Floodway
1. Duplicate Effective Model Copies of the hydraulic analysis used in the effective FIS, referred to as the effective models (*10-, 50-, 100-, and 500-year multi-profile runs and the floodway run*) must be obtained and then reproduced on the requestor's equipment to produce the duplicate effective model. This is required to assure that the effective model input data has been transferred correctly to the requestor's equipment and to assure that the revised data will be integrated into the effective data to provide a continuous FIS model upstream and downstream of the revised reach.		
2. Corrected Effective Model The corrected effective model is the model that corrects any errors that occur in the duplicate effective model, adds any additional cross sections to the duplicate effective model, or incorporates more detailed topographic information than that used in the currently effective model. The corrected effective model must not reflect any man-made physical changes since the date of the effective model. An error could be a technical error in the modeling procedures, or any construction in the floodplain that occurred prior to the date of the effective model but was not incorporated into the effective model.		
3. Existing or Pre-Project Conditions Model The duplicate effective or corrected model is modified to produce the existing or pre-project conditions model to reflect any modifications that have occurred within the floodplain since the date of the effective model but prior to the construction of the project for which the revision is being requested. If no modification has occurred since the date of the effective model, then this model would be identical to the corrected effective or duplicate effective model.		
4. Revised or Post-Project Conditions Model The existing or pre-project conditions model (*or duplicate effective or corrected effective model, as appropriate*) is revised to reflect revised or post-project conditions. This model must incorporate any physical changes to the floodplain since the effective model was produced as well as the effects of the project. When the request is for proposed project this model should reflect proposed conditions.	Natural X	Floodway X
5. Other: Please attach a sheet describing all other models submitted.		

6. Hydraulic Analyses (only if hydraulic models are not developed)

Please attach all calculations for the existing or pre-project conditions and the revised or post-project conditions. Proceed to Form 5 "Riverine/Coastal Mapping Form." Refer to Section 4 (Hydraulic Analysis) of the Technical Data Notebook, under separate cover.

4. MODEL PARAMETERS (from model used to revise 100-year water-surface elevation)

1. Discharges:	Upstream Limit	Downstream Limit
10-year.....		
50-year.....		
100-year.....	4,900	23,300
500-year.....		

Attach diagram showing changes in 100-year discharge. Refer to Section 3 (Hydrologic Analysis) of Technical Data Notebook, under separate cover.

2. Explain how the starting water-surface elevations were determined: Used the 100-year water surface elevation as determined by the effective FIS Study.

3. Give range of friction loss coefficients (Manning's "n") Channel . . . . . 0.03 - 0.052
Overbanks. . . . . 0.031 - 0.069

If friction loss coefficients are different anywhere along the revised reach from those used to develop the FIRM, give location, value used in the effective FIS, and revised values and an explanation as to how the revised values were determined.

Location	FIS	Revised
Entire revised study reach	0.035 (channel)	0.03 - 0.052 (channel)
Entire revised study reach	0.045 - 0.050 (overbanks)	0.031 - 0.069 (overbanks)

Explain: Used methodology developed by USGS Water Resources Division and described in "Estimated Manning's Roughness Coefficients for Stream Channels and Flood Plains in Maricopa County, Arizona" (Thomsen and Hjalmarson, 1991).

4. Describe how the cross section geometry data were determined (*e.g., field survey, topographic map, taken from previous study*) and list cross sections that were added.

Determined from aerial topgraphic maps. Stationed perpendicular to flow, and, where possible, consistent with location of cross sections from effective FIS.

5. Were natural channel banks selected as the location of the left and right channel banks in this model?

X Yes __ No If no, explain why not:

4. MODEL PARAMETERS (Cont'd)

6. Explain how reach lengths for channel and overbanks were determined:

Channel reach lengths were measured along the thalweg. Overbank reach lengths were measured along the anticipated path of the center of mass of overbank flow.

5. RESULTS (from model used to revise 100-year water-surface elevations)

1. Do the results indicate:	
a. Water-surface elevations higher than end points of cross sections?	X Yes __ No
b. Supercritical depth?	__ Yes X No
c. Critical depth?	X Yes __ No
d. Other unique situations	X Yes __ No
If yes to any of the above, attach an explanation that discusses the situation and how it is presented on the profiles, tables, and maps. Refer to Section 4 (Hydraulic Analysis) in the Technical Data Notebook, under separate cover.	
2. What is the maximum change in energy gradient between cross sections?:	4.77 feet
Specify location	Between 20.05 & 20.16
3. What is the distance between the cross sections in 2 above?:	555.7 feet
4. What is the maximum distance between cross sections?	1,273.17 feet
Specify location	Between 14.54 & 14.30
5. Floodway determination	
a. What is the maximum surcharge allowed by the community or State?	1.0 foot
b. What is the maximum surcharge for the revised conditions?	1.0 foot
Specify location	Occurs at several cross sections
c. What is the maximum velocity?	18.1 fps
Specify location	Cross Section 23.33
d. Are there any negative surcharge values at any cross section?	__ Yes X No
If yes, the floodway may need to be widened. If it is not widened, please explain and indicate the maximum negative surcharge.	

Explain: N/A

5. RESULTS (Cont'd)

6. Is the discharge value used to determine the floodway anywhere different from that used to determine the natural 100-year flood elevations? ..... X Yes __ No

   If Yes, explain:

   The 100-year peak discharge from the floodplain and floodway is different between cross sections 16.87 and 17.48. Due to split flow conditions in this portion of the study area, the floodplain delineation for the mainstream Skunk Creek was modeled with a reduced flow of 23,700 cfs (less 3,600 cfs lost from study area). However, the full flow (i.e., 27,300 cfs) was used for the floodway delineation.

7. Do 100-year water-surface elevations increase at any location? ..... __ Yes X No

   If yes, please attach a list of the locations where the increases occur, state whether or not the increases are located on the requestor's property, and provide an explanation of the reason for the increases. *(For example: State if the increase is due to fill placed within the floodway fringe or placed within the currently adopted floodway limits.)*

   N/A

Please attach a completed comparison table entitled: Water-Surface Elevation Check (See page 6)

6. REVISED FIRM/FBFM AND FLOOD PROFILES

A. The revised water surface elevations tie into those computed by the effective FIS Model (*10-, 50-,* ***100-,*** *and 500-year*), downstream of the project at cross section 13.55 (?) within 1.7 feet *(vertical)* and upstream of the project at cross section 26.35 within 22.7 feet *(vertical)*.

B. The revised floodway elevations tie into those computed by the effective FIS model, downstream of the project at cross section _____ within _____ feet *(vertical)* and upstream of the project at cross section 26.35 within 22.70 feet *(vertical)*.

C. Attach profiles, at the same vertical and horizontal scale as the profiles in the effective FIS report, showing stream bed and profiles of all floods studies (without encroachment). Also, label all cross sections, road crossings (including low chord and top-of-road data), culverts, tributaries, corporate limits, and study limits. If channel distance has changed, the stationing should be revised for all profile sheets. Refer to Section 4 (Hydraulic Analysis) in the Technical Data Notebook, under separate cover.

D. Attach a Floodway Data Table showing data for each cross section listed in the published Floodway Data Table in the FIS report.

Proceed to Riverine/Coastal Mapping Form

FEDERAL EMERGENCY MANAGEMENT AGENCY
WATER-SURFACE ELEVATION CHECK

COMMUNITY NAME	FLOODING SOURCE	PROJECT NAME/IDENTIFIER
Maricopa County, Arizona, and Incorporated Areas	Skunk Creek	Skunk Creek Floodplain Delineation Study

	EFFECTIVE			DUPLICATE EFFECTIVE			CORRECTED EFFECTIVE			EXISTING/PRE-PROJECT			REVISED/PROJECT		
SECNO	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]	NCWSEL[1]	FCWSEL[2]	SURC.[3]
13.55	1544.7	1545.6	0.9										1543.0	1544.0	1.0
15.55	1627.3	1627.3	0.0										1622.5	1622.9	0.4
17.83	1731.0	1731.0	0.0										1724.8	1724.9	0.1
19.63	1812.9	1812.9	0.0										1800.8	1801.2	0.4
23.14	1984.2	1984.5	0.3										1981.3	1982.3	1.0
24.03	2026.7	2026.7	0.0										2025.1	2025.8	0.7
24.60	2054.8	2055.2	0.4										2050.0	2050.5	0.5
25.82	2120.1	2121.1	1.0										2111.7	2111.7	0.0
26.19	2143.7	2143.7	0.0										2130.9	2130.9	0.0

COMMENTS:

[1]100-year (natural) water-surface elevation [2]Encroachment (floodway) Water-Surface Elevation [3]Surcharge Value

Include all cross sections in the models between tie-in points. Any interpolated values should be indicated in parentheses.

FEDERAL EMERGENCY MANAGEMENT AGENCY **RIVERINE/COASTAL MAPPING FORM**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

PUBLIC BURDEN DISCLOSURE NOTICE

Public reporting burden for this form is estimated to average 1.5 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing and reviewing the form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, Federal Emergency Management Agency, 500 C Street, S.W., Washington, DC 20472; and to the Office of Management and Budget, Paperwork Reduction Project (3067-0148), Washington, DC 20503.

Community Name: Maricopa County, Arizona, and Incorporated Areas

Flooding Source: Skunk Creek

Project Name/Identifier: Skunk Creek Floodplain Delineation Study

1. MAPPING CHANGES

1. A topographic work map of suitable scale, contour interval, and planimetric definition must be submitted showing (*indicate N/A when not applicable*):

		Included		
A.	Revised approximate 100-year floodplain boundaries (Zone A)	_ Yes	X No	_ N/A
B.	Revised detailed **100-** and 500-year floodplain boundaries	X Yes	_ No	_ N/A
C.	Revised 100-year floodway boundaries	X Yes	_ No	_ N/A
D.	Location and alignment of all cross sections used in the revised hydraulic model with stationing control indicated	X Yes	_ No	_ N/A
E.	Stream alignments, road and dam alignments	X Yes	_ No	_ N/A
F.	Current community boundaries	X Yes	_ No	_ N/A
G.	Effective 100- and 500-year floodplain and 100-year floodway boundaries from the FIRM/FBFM reduced or enlarged to the scale of the topographic work map	X Yes	_ No	_ N/A
H.	Tie-ins between the effective and revised 100- and 500-year floodplains and 100-year floodway boundaries	X Yes	_ No	_ N/A
I.	The requestor's property boundaries and community easements	X Yes	_ No	_ N/A
J.	The signed certification of a registered professional engineer	X Yes	_ No	_ N/A
K.	Location and description of reference marks	X Yes	_ No	_ N/A
L.	Vertical datum (example: NGVD, NAVD, etc.)	X Yes	_ No	_ N/A
M.	Coastal zone designations tie into adjacent areas not being revised	_ Yes	_ No	X N/A
N.	Location and alignment of all coastal transects used to revise the coastal analyses	_ Yes	_ No	X N/A

If any of the items above are marked no or N/A, please explain: (A) = Both the revised study and the effective FIS were detailed studies. (M & N) = Skunk Creek is not located in a coastal area.

2. What is the source and date of the updated topographic information (*example: orthophoto maps, July 1985; field survey, May 1979, beach profiles, June 1987, etc.*)? Aerial photogrammetry, Dec. 1995 and May 1996.

3. What is the scale and contour interval of the following work maps?

   a. Effective FIS 1" = 400' scale 4-foot Contour interval
   b. Revision Request 1" = 200' scale 2-foot Contour interval

   NOTE: Revised topographic information must be of equal or greater detail.

4. Attach an annotated FIRM and FBFM at the scale of the effective FIRM and FBFM showing the revised 100-year and 500-year floodplains and the 100-year floodway boundaries and how they tie into those shown on the effective FIRM and FBFM downstream and upstream of the revision or adjacent to the area of revision for coastal studies. Refer to Section 4 (Hydraulic Analysis) in the Technical Data Notebook, under separate cover.

   Attach additional pages if needed.

1. MAPPING CHANGES (Cont'd)

5. Flood Boundaries and 100-year water surface elevations:

Has the 100-year floodplain been shifted or increased or the 100-year water surface elevation increased at any location on property other than the requestor's or community's? __ Yes X No

If yes, please give the location of shift or increase and an explanation for the increase.

a. Have the affected property owners been notified of this shift or increase and the effect it will have on their property? ..... __ Yes __ No

If yes, please attach letters from these property owners stating they have no objections to the revised flood boundaries if a LOMR is being requested.

b. What is the number of insurable structures that will be impacted by this shift or increase?

6. Have the floodway boundaries shifted or increased at any location compared to those shown on the effective FBFM or FIRM: ..... __ Yes X No

If yes, explain:

7. If a V-zone has been designated, has it been delineated to extend landward to the heel of the primary frontal dune? __ Yes X No

If no, explain:

8. Manual or digital map submission:

__ Manual

X Digital

Digital map submissions may be used to update digital FIRMs (DFIRMs). For updating DFIRMs, these submissions must be coordinated with FEMA Headquarters as far in advance of submission as possible.

2. EARTH FILL PLACEMENT

1. The fill is: __ Existing __ Proposed

2. Has fill been/will be placed in the regulatory floodway?..... __ Yes X No

   If yes, please attach completed Riverine Hydraulic Analysis Form.

3. Has fill been/will be placed in floodway fringe (*area between the floodway and 100-year floodplain boundaries*)?..... __ Yes X No

   If yes, then complete A, B, C, and D below.

   A. Are fill slopes for granular materials steeper than one vertical on one-and-one-half horizontal? ..... __ Yes __ No

      If yes, justify steeper slopes:

   B. Is adequate erosion protection provided for fill slopes exposed to moving flood waters? (*Slopes exposed to flows with velocities of up to 5 feet per second (fps) during the 100-year flood must, at a minimum, be protected by a cover of grass, vines, weeds, or similar vegetation; slopes exposed to flows with velocities greater than 5 fps during the 100-year flood must, at a minimum, be protected by stone or rock riprap.*) ..... __ Yes __ No

      If no, describe erosion protection provided:

   C. Has all fill placed in revised 100-year floodplain been compacted to 95 percent of the maximum density obtainable with the Standard Proctor Test Method or acceptable equivalent method? __ Yes __ No

   D. Can structures conceivably be constructed on the fill at any time in the future? __ Yes __ No

      If yes, provide certification of fill compaction (item C. above) by the community's NFIP permit official, a registered professional engineer, or an accredited soils engineer.

4. Has fill been/will be placed in a V-zone? __ Yes X No

   If yes, is the fill protected from erosion by a flood control structure such as a revetment or seawall? __ Yes __ No

   If yes, attach the coastal structures form.

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT FORM**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

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Community Name: Maricopa County, Arizona, and Incorporated Areas

Flooding Source: Skunk Creek

Project Name/Identifier: Skunk Creek Floodplain Delineation Study

1. IDENTIFIER

1. Name of roadway, railroad, etc.: New River Road
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): Between 25.70 and 25.72 river miles upstream of confluence with New River.
3. This revision reflects *(check one of the following):*

   X New bridge/culvert not modeled in the FIS

   __ Modified bridge/culvert previously modeled in the FIS

   __ New analysis of bridge/culvert previously modeled in the FIS

   (Explain why new analysis was performed)

2. BACKGROUND

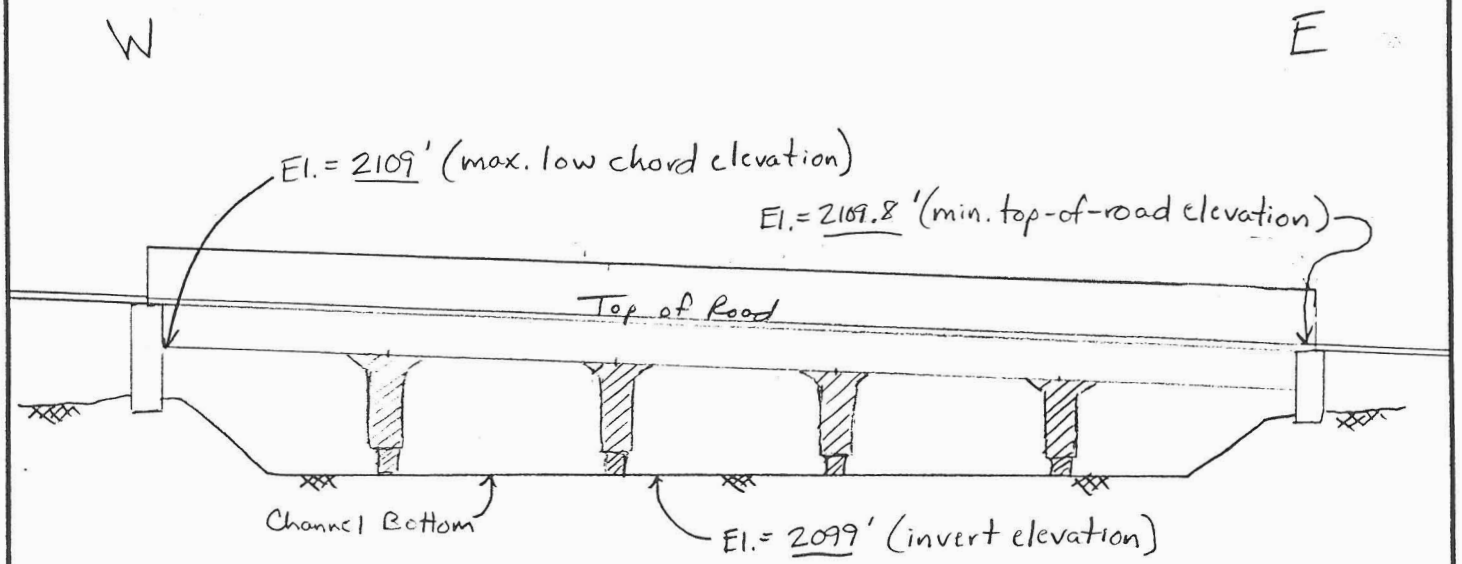
Provide the following information about the structure:

1. Dimension, material, and shape (e.g., two 10 x 5 feet reinforced concrete box culvert; three 30-foot span bridge with 2 rows of two 3-foot diameter circular piers; 40-foot wide ogee shape spillway) 367-foot long by 65-foot wide span bridge with four 4-foot wide piers.
2. Entrance geometry of culvert/type of bridge opening (e..g, 30ϒ - 75ϒ wing walls with square top edge, sloping embankments, and vertical abutments) 2:1 sloping embankments and vertical abutments
3. Hydraulic model used to analyze the structure *(e.g., HEC-2 with special bridge routine, WSPRO, HY8)* HEC-2 with special bridge routine.

   If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A
***One form per new/revised bridge/culvert**

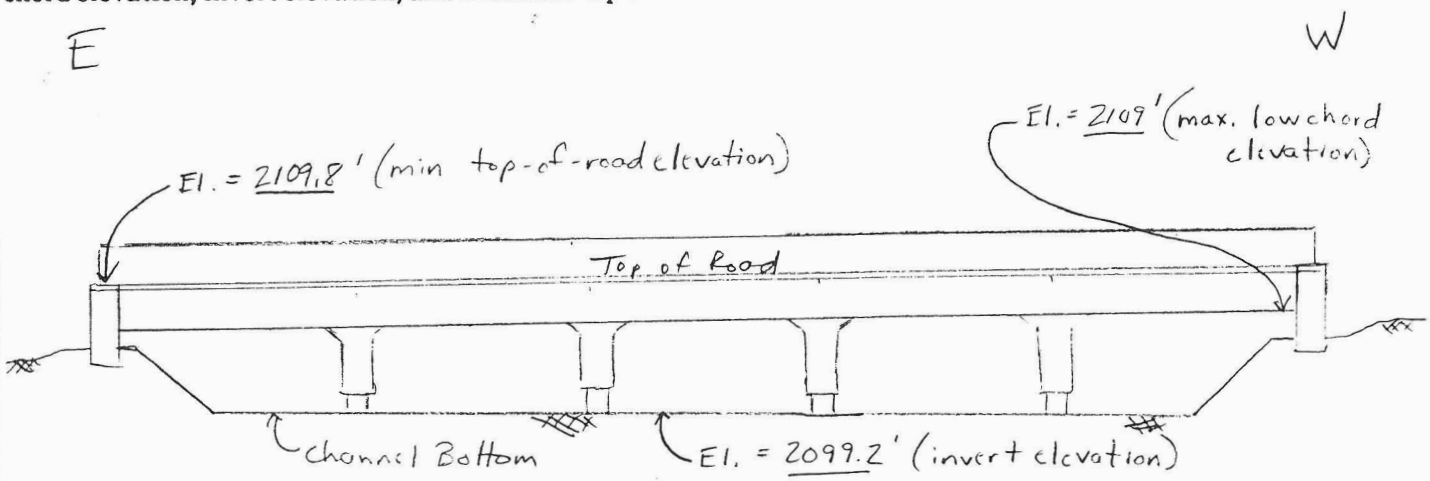
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, minimum top of road elevation, and ineffective flow widths.



Represents ineffective flow areas

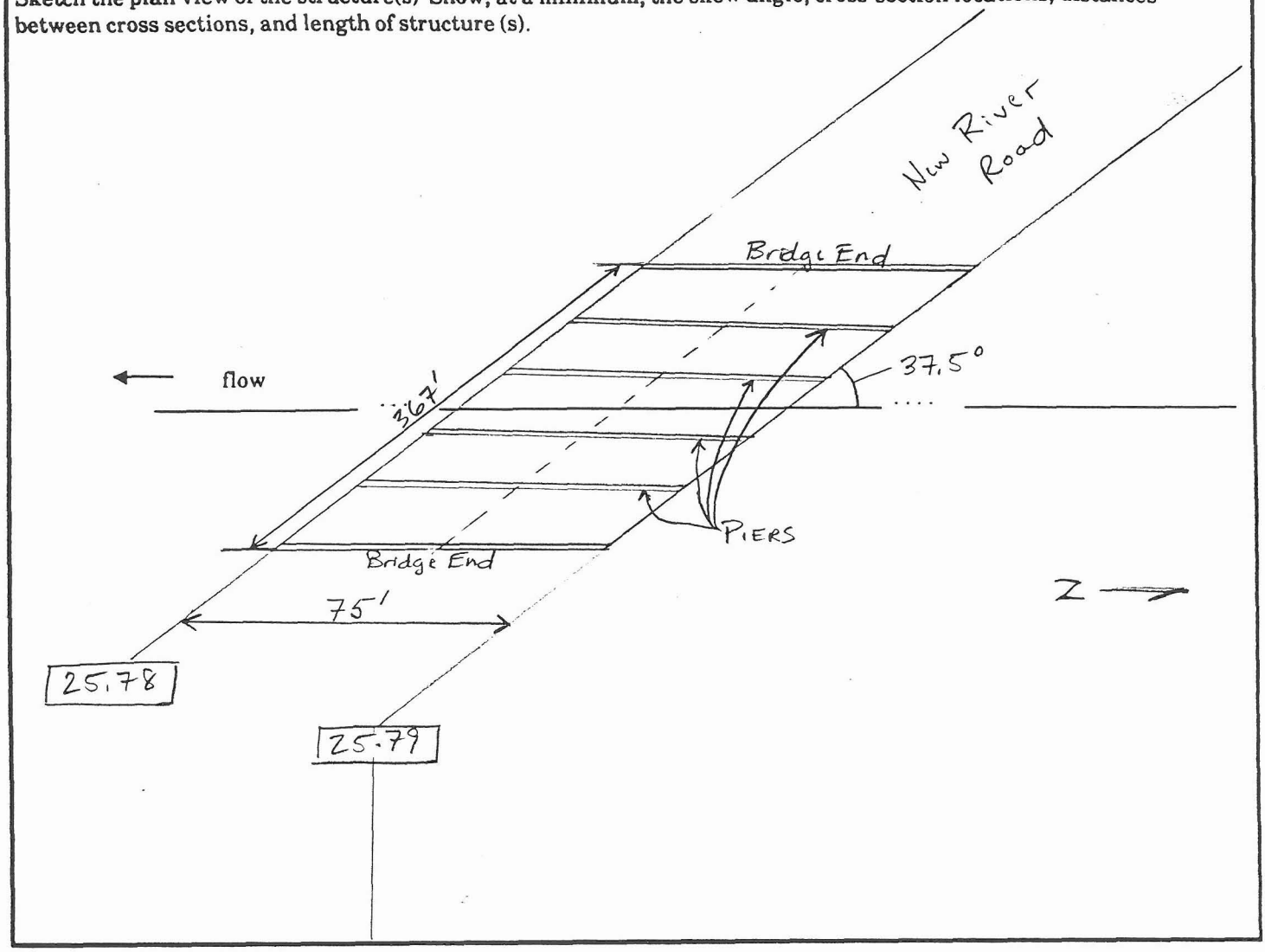
*Drawing is normal to flow direction

Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



* Drawing is normal to flow direction.

Sketch the plan view of the structure(s) Show, at a minimum, the skew angle, cross-section locations, distances between cross sections, and length of structure (s).



Attach plans of the structure (s) certified by a registered Professional Engineer.

Culvert length or bridge width (ft)	197 (bottom width)
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	690 (channel area)
Total culvert/bridge area (ft^2)	1,410 (effective)

3. ANALYSIS (Cont'd)

Elevations Above Which Flow is Effective for Overbanks		
	Left Overbank	Right Overbank
Upstream face	2099.5	2100.6
Downstream face	2099.0	2098.9
Minimum Top of Road Elevation		
	Left Overbank	Right Overbank
Upstream face	2109.8	2111.6
Downstream face	2109.8	2111.6
100-Year Elevations		
	Water-Surface Elevations	Energy Gradient Elevations
Upstream face	2104.11	2105.13
Downstream face	2102.31	2104.03

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	7,800			7,800
The maximum depth of flow over the roadway/railroad (ft.)				
Weir length (ft.)				

Top Widths	Total Floodplain Width	Total Effective Flood Width	Floodway Width
Upstream face	237	237	237
Downstream face	218	218	218

3. ANALYSIS (Cont'd)

Loss Coefficients Entrance loss coefficient	
Manning's "n" value assigned to the structure(s)	0.06
Friction loss coefficient through structure(s)	1.6
Other loss coefficients (e.g., bend manhole, etc.)	
Total loss coefficient	1.6
Weir coefficient	2.6
Pier coefficient	0.9
Contraction loss coefficient	0.3
Expansion loss coefficient	0.5

4. SEDIMENT TRANSPORT CONSIDERATIONS

1. A. Is there any indication from historical records that sediment transport *(including scour and deposition)* can affect the 100-year water-surface elevations? ..... __ Yes X No

   B. Based on the conditions *(such as geomorphology, vegetative cover and development of the watershed and stream bed, and bank conditions)*, is there a potential for debris and sediment transport *(including scour and deposition)* to affect the 100-year water-surface elevations and/or conveyance capacity through the bridge/culvert? ..... __ Yes X No

2. If the answer to either 1A or 1B is yes:

   A. What is the estimated sediment *(bed material)* load?
   _____ cfs *(attach gradation curve)*

   Explain method used to estimate the sediment transport and the depth of scour and/or deposition:

   B. Will sediment accumulate anywhere through the bridge/culvert?..... __ Yes __ No

   If yes, explain the impact on the conveyance capacity through the bridge/culvert?

5. FLOODWAY ANALYSIS

Explain method of bridge encroachment

(floodway run) Method 1 floodway analysis. Encroachment stations are set equal to bank stations.

5. FLOODWAY ANALYSIS (Cont'd)

Comments *(explain any unusual situations):*

See Section 4 (Hydraulic Analysis) in the Technical Data Notebook, under separate cover.

Attach analysis.

See Section 4 (Hydraulic Analysis) in the Technical Data Notebook, under separate cover.

FEDERAL EMERGENCY MANAGEMENT AGENCY **BRIDGE/CULVERT FORM**	O.M.B. Burden No. 3067-0148 Expires July 31, 1997	FEMA USE ONLY

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Community Name: Maricopa County, Arizona, and Incorporated Areas

Flooding Source: Skunk Creek

Project Name/Identifier: Skunk Creek Floodplain Delineation Study

1. IDENTIFIER

1. Name of roadway, railroad, etc.: Carefree Highway
2. Location of bridge/culvert along flooding source (in terms of stream distance or cross-section identifier): Between 16.86 and 16.87 river miles upstream of confluence with New River.
3. This revision reflects *(check one of the following):*

   X New bridge/culvert not modeled in the FIS

   __ Modified bridge/culvert previously modeled in the FIS

   __ New analysis of bridge/culvert previously modeled in the FIS

   (Explain why new analysis was performed)

2. BACKGROUND

Provide the following information about the structure:

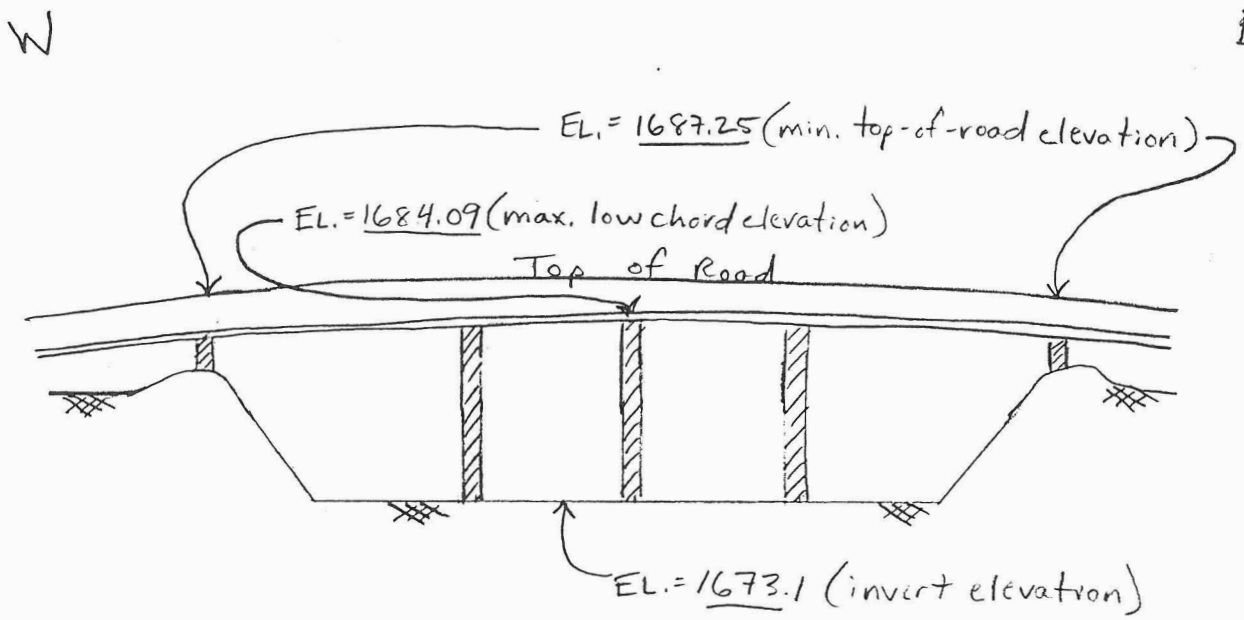
1. Dimension, material, and shape (e.g., two 10 x 5 feet reinforced concrete box culvert; three 30-foot span bridge with 2 rows of two 3-foot diameter circular piers; 40-foot wide ogee shape spillway) 404-foot long by 36-foot wide span bridge with three 4-foot wide piers.
2. Entrance geometry of culvert/type of bridge opening (e..g, 30ϒ - 75ϒ wing walls with square top edge, sloping embankments, and vertical abutments) 2:1 sloping embankments and vertical abutments
3. Hydraulic model used to analyze the structure *(e.g., HEC-2 with special bridge routine, WSPRO, HY8)* HEC-2 with special bridge routine.

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structure(s). *(Attach justification)*

Note: If any items do not apply to submitted hydraulic analysis, indicate by N/A
***One form per new/revised bridge/culvert**

3. ANALYSIS

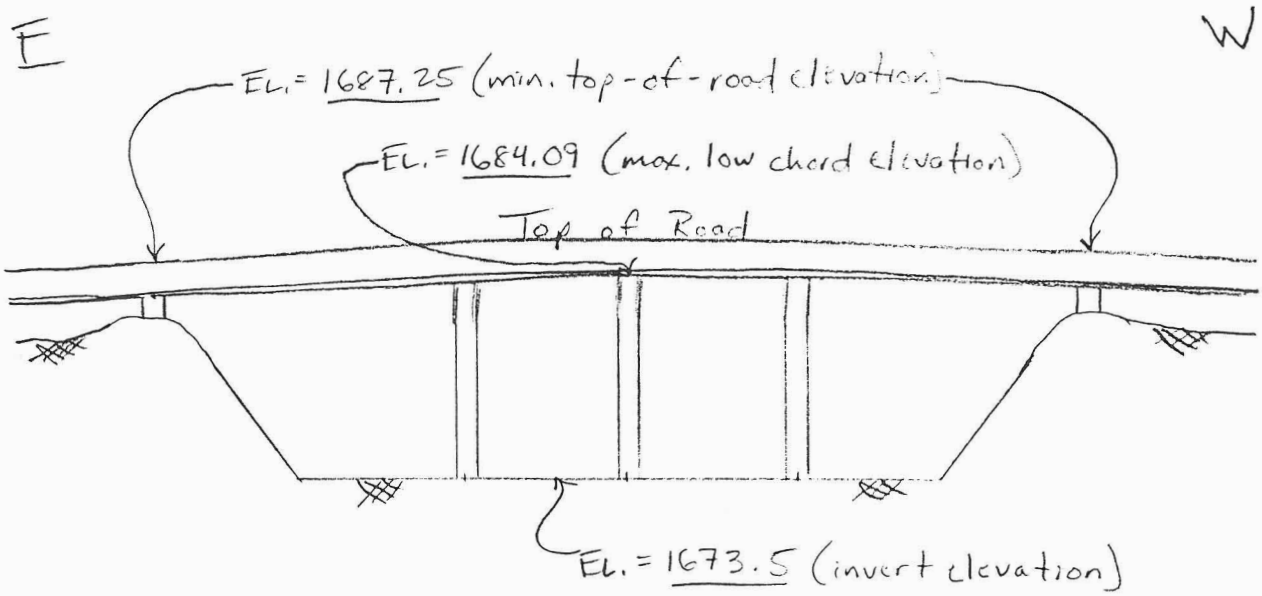
Sketch the downstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, minimum top of road elevation, and ineffective flow widths.



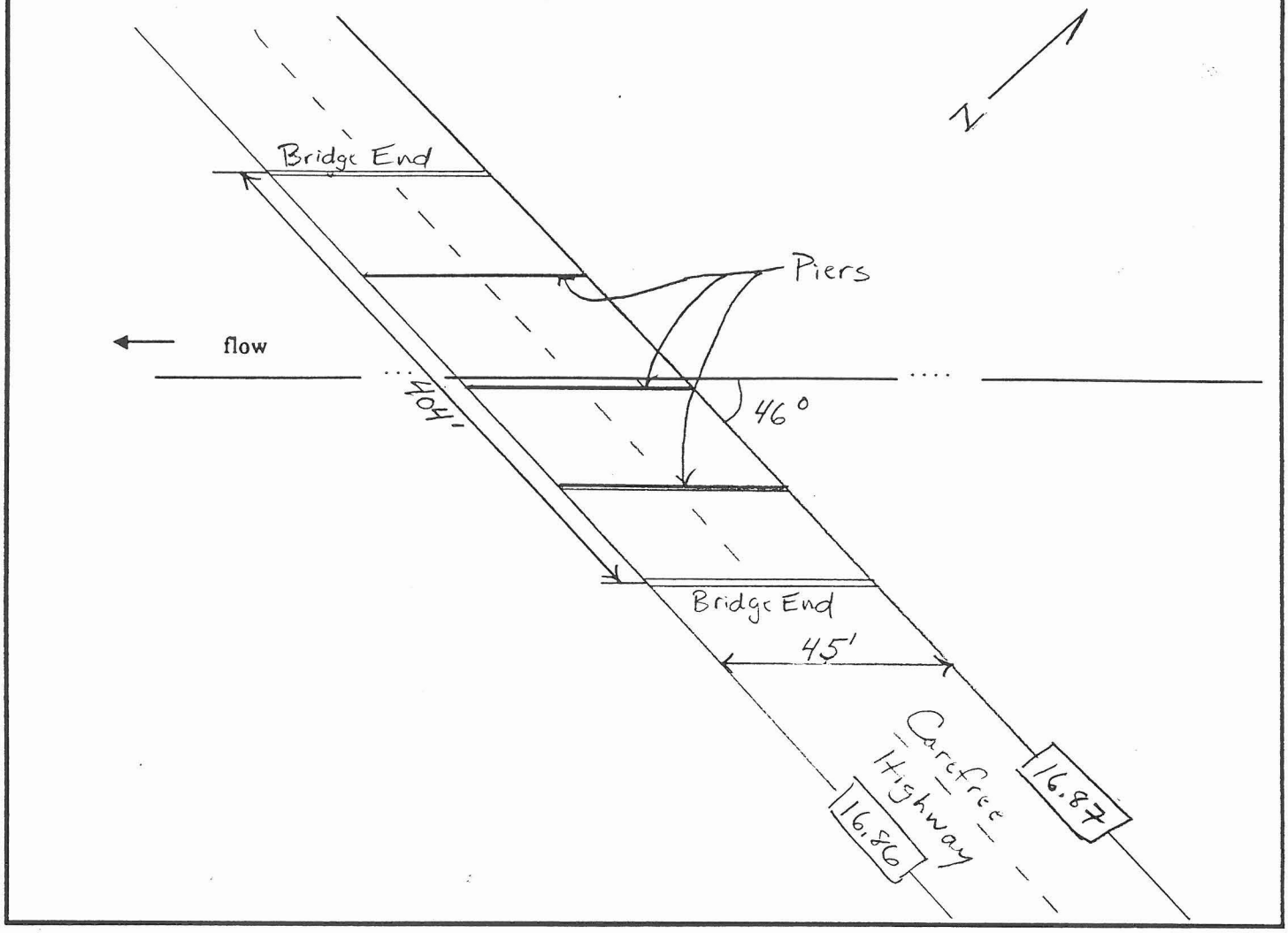
Represents ineffective flow areas

* Drawing is normal to flow direction

Sketch the upstream face of the structure together with the road profile. Show, at a minimum, the maximum low chord elevation, invert elevation, and minimum top of road elevation.



Sketch the plan view of the structure(s) Show, at a minimum, the skew angle, cross-section locations, distances between cross sections, and length of structure (s).



Attach plans of the structure (s) certified by a registered Professional Engineer.

Culvert length or bridge width (ft)	285 (bottom width)
Calculated culvert/bridge area (ft^2) by the hydraulic model, if applicable	2,175 (channel area)
Total culvert/bridge area (ft^2)	4,102 (effective)

3. ANALYSIS (Cont'd)

Elevations Above Which Flow is Effective for Overbanks		
	Left Overbank	Right Overbank
Upstream face	1685.7	1685.8
Downstream face	1686.0	1685.9
Minimum Top of Road Elevation		
	Left Overbank	Right Overbank
Upstream face	1687.25	1679.9
Downstream face	1687.0	1679.9
100-Year Elevations		
	Water-Surface Elevations	Energy Gradient Elevations
Upstream face	1678.96	1682.38
Downstream face	1678.96	1681.95

Discharge	Low Flow	Pressure Flow	Weir Flow	Total Flow
Amount of flow through/over the structure(s) (cfs)	23,700			23,700
The maximum depth of flow over the roadway/railroad (ft.)				
Weir length (ft.)				

Top Widths	Total Floodplain Width	Total Effective Flood Width	Floodway Width
Upstream face	312.16	312.16	311
Downstream face	314.84	314.84	313

3. ANALYSIS (Cont'd)

Loss Coefficients Entrance loss coefficient	
Manning's "n" value assigned to the structure(s)	0.059
Friction loss coefficient through structure(s)	1.56
Other loss coefficients (e.g., bend manhole, etc.)	
Total loss coefficient	1.56
Weir coefficient	2.7
Pier coefficient	1.05
Contraction loss coefficient	0.3
Expansion loss coefficient	0.5

4. SEDIMENT TRANSPORT CONSIDERATIONS

1. A. Is there any indication from historical records that sediment transport *(including scour and deposition)* can affect the 100-year water-surface elevations? ..... __ Yes X No

   B. Based on the conditions *(such as geomorphology, vegetative cover and development of the watershed and stream bed, and bank conditions)*, is there a potential for debris and sediment transport *(including scour and deposition)* to affect the 100-year water-surface elevations and/or conveyance capacity through the bridge/culvert? ..... __ Yes X No

2. If the answer to either 1A or 1B is yes:

   A. What is the estimated sediment *(bed material)* load?
   _____ cfs *(attach gradation curve)*

   Explain method used to estimate the sediment transport and the depth of scour and/or deposition:

   B. Will sediment accumulate anywhere through the bridge/culvert?..... __ Yes __ No

   If yes, explain the impact on the conveyance capacity through the bridge/culvert?

5. FLOODWAY ANALYSIS

Explain method of bridge encroachment

(floodway run) Method 1 floodway analysis. Encroachment stations are set equal to bank stations.

5. FLOODWAY ANALYSIS (Cont'd)

Comments *(explain any unusual situations):*

See Section 4 (Hydraulic Analysis) in the Technical Data Notebook, under separate cover.

Attach analysis.

See Section 4 (Hydraulic Analysis) in the Technical Data Notebook, under separate cover.